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**From:** s47F [redacted] whitehavencoal.com.au>  
**Sent:** Thursday, 1 March 2018 10:34 AM  
**To:** s22 [redacted]  
**Cc:** s47F [redacted] s47F [redacted]  
**Subject:** Maules Creek Coal Mine - EPBC 2010/5566 - Management of Proposed Commonwealth Offset Areas  
**Attachments:** WHC-14-22 RBMP\_Figure 4.pdf

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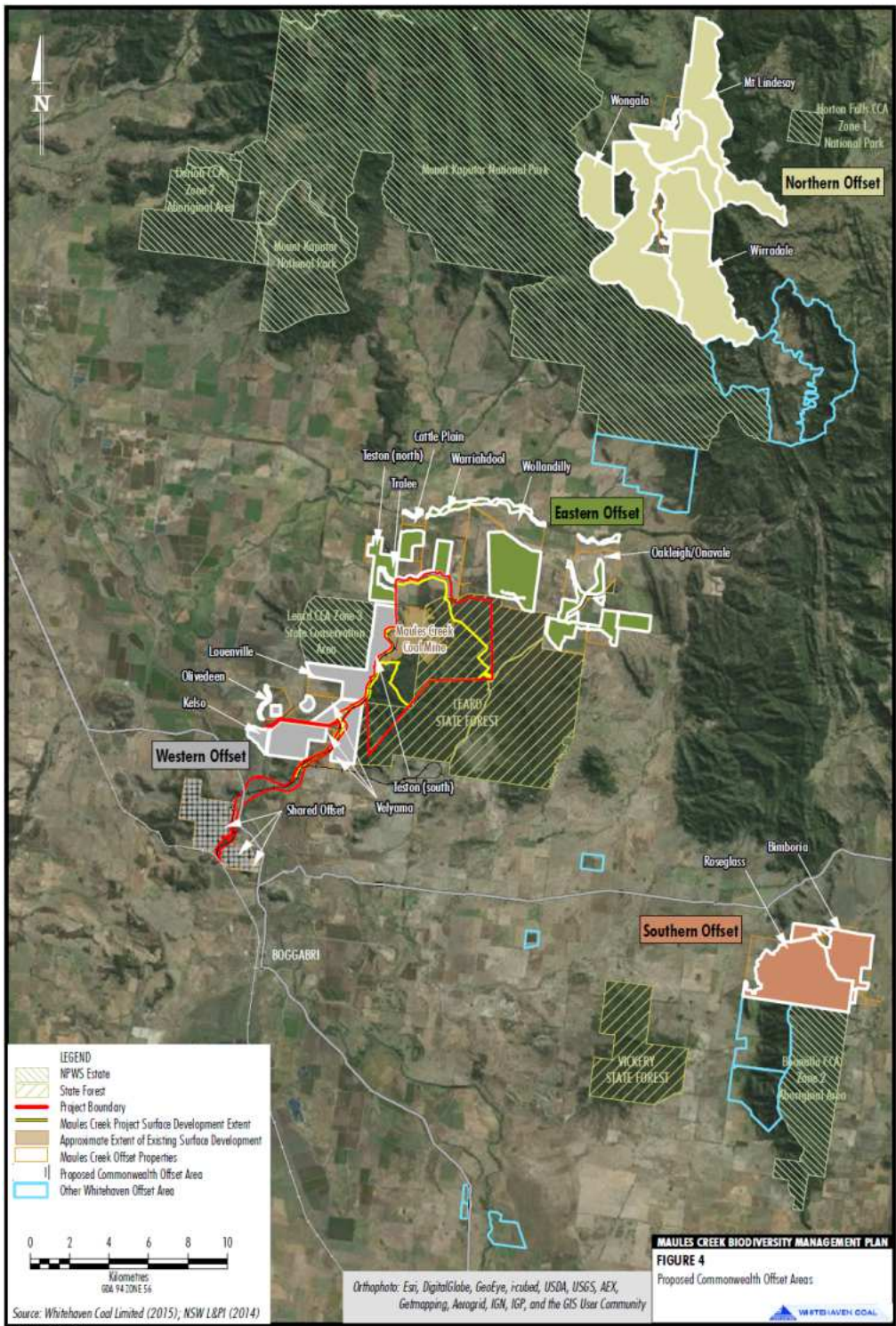
Section 1.2 of the approved Maules Creek Coal Mine Biodiversity Management Plan states:-

*“The additional proposed Commonwealth offset areas shown on Figure 4 will not be subject to the management measures described in this BMP until a legally binding covenant is in place for these additional Commonwealth offset areas. Condition 13 of the Approval Decision EPBC 2010/5566 requires legally binding covenant(s) to be registered over the Commonwealth offset areas by 11 February 2018.”*

I can confirm that the management of the additional proposed Commonwealth offset areas shown on Figure 4 has transitioned to that of biodiversity upon the acquisition by Maules Creek Coal Pty Ltd.

Further, all of the additional proposed Commonwealth offset areas shown on Figure 4 are now either owned outright, or jointly, by Maules Creek Coal Pty Ltd.

Figure 4 of the approved BMP is reproduced below, and attached, for your reference.



Please contact me should you have any further queries.

Regs,

s47F

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Group Manager - Approvals and Biodiversity

**Whitehaven Coal Limited**

231 Conadilly Street, Gunnedah NSW 2380 Australia

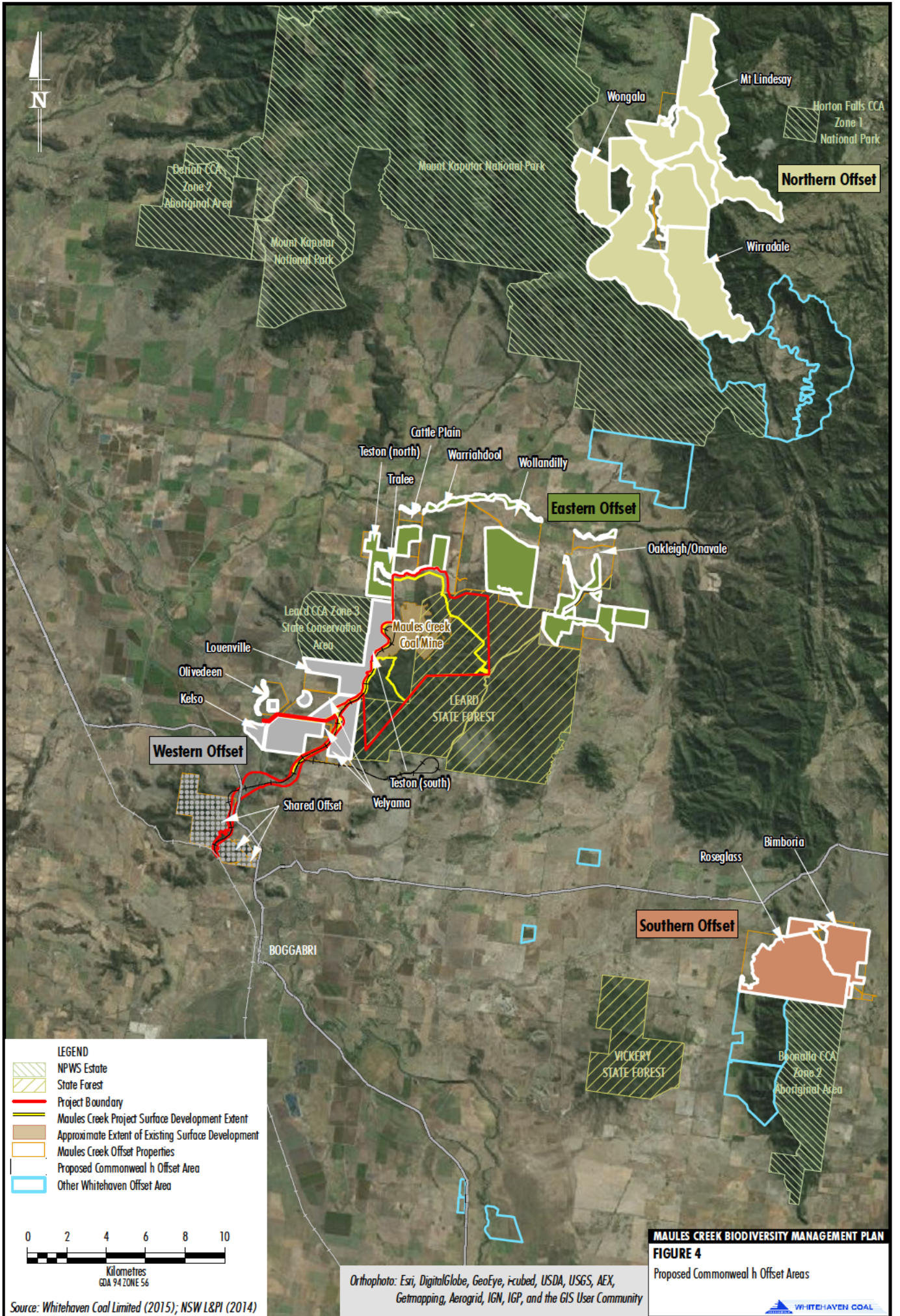
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\*89342678232\*





Source: Whitehaven Coal Limited (2015); NSW L&PI (2014)



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**From:** s47F [redacted]@whitehavencoal.com.au>  
**Sent:** Wednesday, 15 August 2018 7:00 AM  
**To:** s22 [redacted]  
**Cc:** s47F [redacted]; s47F [redacted]; s47F [redacted]  
**Subject:** [13.20] Consultation on Maules Creek Coal Biodiversity Management Plan revised for Leard Forest Regional Biodiversity Strategy Stage 2  
**Attachments:** draft MCCM BMP v2.6 Feb18 final for submission.docx  
**Follow Up Flag:** Follow up  
**Flag Status:** Completed

s22

NSW Department of Planning and Environment approved the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) in September 2017. This triggered a requirement to update Maules Creek Coal Biodiversity Management Plan in accordance with Schedule 3 Condition 53 (b) of Maules Creek Coal’s Project Approval 10\_0138. This updated Maules Creek Coal Biodiversity Management Plan also represents the current version of the Offset Management Plan required by EPBC Approval 2010/5566 Conditions 17 and 18 to be reviewed by the Commonwealth Department of Environment and Energy (DoEE).

NSW Department of Planning and Environment have recommended that the updated Maules Creek Coal Biodiversity Management Plan (attached – tracked changed version based on the NSW approved April 2017 document) is consulted with the agencies specified in PA 10\_0138 Condition 53 (a) which includes the Commonwealth DoEE.

Due to file size; the Maules Creek Coal BMP Figures are not included within the attached word document. The Figures have not required amendment due to the Leard Forest Regional Biodiversity Strategy; and are the same as previously submitted for the approved BMP (dated 12<sup>th</sup> April 2017). Please advise if Commonwealth DoEE would still need a link/file transfer for these figures?

Please advise if the Commonwealth DoEE will require additional time to consider the updated Maules Creek Coal Biodiversity Management Plan beyond 15<sup>th</sup> September 2018?

Regards

s47F [redacted]

Group Superintendent – Biodiversity

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Regards

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	<b>MAULES CREEK</b>	Document Owner:	MCC
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		Last Revision Date:	28 February 2018
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<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

# MAULES CREEK COAL MINE BIODIVERSITY MANAGEMENT PLAN

~~12 April~~ 28 February 2017 2018

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2

s22



s22





	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**TABLE OF CONTENTS**

---

s22

1.2.2 Commonwealth Offset Areas 9

s22



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

# s22

<b>5</b>	<b>EXISTING ENVIRONMENT RELEVANT TO THE OFFSET AREAS</b>	<b>80</b>
5.1	LAND TENURE	80
5.2	LAND USE HISTORY	81
5.3	VEGETATION COMMUNITIES	82
5.4	BOX-GUM WOODLAND AND DERIVED GRASSLAND	84
5.5	HABITAT/FEATURES	93
5.6	THREATENED AND MIGRATORY SPECIES	103
5.7	WEEDS	107
5.8	FERAL ANIMALS	114
5.9	THREATS	115
<b>6</b>	<b>MANAGEMENT OF THE OFFSET AREAS</b>	<b>116</b>
6.1	ECOLOGICAL MANAGEMENT OBJECTIVES	116
6.2	SETTING UP THE OFFSET AREAS	116
6.2.1	Long-term Conservation Security	116
6.2.2	Offset Implementation Costs and Conservation Bond	117
6.2.3	Infrastructure	118
6.3	MANAGEMENT DOMAINS	119
6.4	SEED COLLECTION AND PROPAGATION	133
6.5	REVEGETATION	134
6.5.1	Revegetation Program	134
6.5.2	Ecological Thinning	146
6.6	REUSE OF SALVAGED HABITAT RESOURCES	148
6.7	MANAGEMENT OF CULTURAL HERITAGE VALUES	150
6.8	CONTROL OF WEEDS	150
6.9	CONTROL OF FERAL ANIMALS	156
6.10	CONTROL OF EROSION AND SOIL	162
6.11	MANAGEMENT OF LIVESTOCK GRAZING	163
6.12	CONTROL OF ACCESS	166





## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

6.13	BUSHFIRE MANAGEMENT	166
6.14	TRANSLOCATION OF <i>TYLOPHORA LINEARIS</i>	177
6.15	TRANSLOCATION OF <i>POMADERRIS QUEENSLANDICA</i>	180
6.16	PERFORMANCE AND COMPLETION CRITERIA	182
6.17	MONITORING PROGRAM	197
6.17.1	Vegetation and Habitat Monitoring	198
6.17.2	Fauna Monitoring	212
6.17.3	Weed Monitoring	218
6.17.4	Feral Animal Monitoring	220
6.18	POTENTIAL RISKS AND CONTINGENCY MEASURES	224

# s22

s22

s22



s22

s22

s22



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

s222

The purpose of this Biodiversity Management Plan (BMP) is to provide a consolidated plan for the management of flora and fauna within the MCCM Project Boundary and the MCCM offset areas. This BMP addresses the relevant key requirements outlined in the NSW PA 10\_0138, as modified, and the requirements for the Offset Management Plan outlined in the Commonwealth Approval Decision 2010/5566.

s222

s22



s22


s22

s22

s22

s22



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### 1.2.2 Commonwealth Offset Areas

The Commonwealth offset areas subject to Approval Decision EPBC 2010/5566 are similar to those subject to the approved NSW Biodiversity Offset Strategy, however, offset areas on the following properties were added to the Commonwealth package (Figures 3 and 4) (Greenloaning Biostudies, 2013, 2014a):


- Oakleigh/Onavale Offset Property;
- Bimbooria Offset Property;
- Roseglass Offset Property; and
- Wongala Offset Property.

The total proposed Commonwealth offset areas for the MCCM cover 13,113.7 ha (i.e. a sum of the NSW revised offset areas<sup>1</sup> and additional proposed Commonwealth offset areas shown on Figure 4).


Greenloaning Biostudies (independent reviewer approved by [DetEDoEE](#)) has verified that the Commonwealth offset areas contain no less than 5,532 ha of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland) (listed as a Critically Endangered Ecology Community [CEEC] under the EPBC Act and an Endangered Ecological Community [EEC] under the NSW *Threatened Species Conservation Act* [TSC Act]) (Figure 6) (Greenloaning Biostudies, 2013, 2014a).

Greenloaning Biostudies (2013, 2014a) has also verified that the Commonwealth offset areas contain no less than 9,334 ha of equivalent or better quality of habitat for the Regent Honeyeater (*Xanthomyza phrygia*), Swift Parrot (*Lathamus discolor*) and the South-eastern Long-eared Bat (*Nyctophilus corbeni*) (previously Greater Long-eared Bat).

[DetEDoEE](#) has indicated that it will work with Whitehaven to ensure that the final Commonwealth offsets package reflects the overall proportion of the derived native grassland and woodland forms of Box-Gum Woodland CEEC in the areas being cleared, including, where necessary, the acquisition of additional offset property. MCC will also offset residual impacts on *Tylophora linearis* (a threatened flora species) to the satisfaction of the Commonwealth Minister. The offset areas subject to Approval Decision EPBC 2010/5566 are required to be protected by a legally binding covenant in perpetuity by 11 February 2018 or as otherwise agreed with the Commonwealth Minister (Approval Condition 13).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 6

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

This BMP focuses on the management of the offset areas and these indirect offsets are not described further in this BMP.

The additional proposed Commonwealth offset areas shown on Figure 4 will not be subject to the management measures described in this BMP until a legally binding covenant is in place for these additional Commonwealth offset areas. Condition 13 of the Approval Decision EPBC 2010/5566 requires legally binding covenant(s) to be registered over the Commonwealth offset areas by 11 February 2018.

### 1.3 STRUCTURE OF THE BIODIVERSITY MANAGEMENT PLAN

s22

Part B of this BMP describes the management of flora and fauna within the offset areas. The structure of this plan is as follows:

s22

Section 5 Description of the Existing Environment Relevant to the Offset Areas.

Section 6 Description of the Management Actions to be undertaken within the Offset Areas.

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The following are appended to this BMP:

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Appendix E Offset Area - Vegetation Descriptions

Appendix F Offset Area Risk Assessment

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s22

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s22

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s22

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s22

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

# s22

## 2.2 RELEVANT COMMONWEALTH APPROVAL CONDITIONS

The Commonwealth Minister for the Environment granted Approval Decision EPBC 2010/5566 for the MCCM under the EPBC Act on 11 February 2013. The conditions that are relevant to this BMP are presented in Table 2-2.

**Table 2-2 Approval Decision EPBC 2010/5566 Requirements**

Condition Number	Requirement	Relevant BMP Section
9	<p><i>The person taking the action must register a legally binding conservation covenant over offset areas of no less than</i></p> <p>(a) 9,334 ha of equivalent or better quality of habitat for the regent honeyeater, swift parrot and greater long-eared bat; and</p> <p>(b) 5,532 ha of an equivalent or better quality of the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community.</p> <p><i>Note: the 5,532 ha of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community may be included within the 9,334 ha of offset area for the threatened species if it meets the listing criteria for the EPBC-listed critically endangered ecological community as defined in the EPBC listing advice for that community and the requirements of condition 9.</i></p>	Section 1.2.2
13	<p><i>The mechanism/s for registering a legally binding covenant must provide protection for the offset areas in perpetuity and be registered <del>within 5 years of the date of this approval</del> by 31 December 2018.</i></p> <p><i>Evidence of compliance with condition 13 must be provided to the Department within 30 days of registering a legally binding covenant.</i></p>	Section 6.2.1

**Table 2-2 (Continued) Approval Decision EPBC 2010/5566 Requirements**

Condition Number	Requirement	Relevant BMP Section
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## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

<p><b>17</b></p>	<p>The person taking the action must submit to the Minister for approval, an Offset Management Plan for all the offset areas, specified in condition 9, within 12 months of the date of this approval. The approved Offset management plan must be implemented.</p> <p>Note: For consistency, the proponent may develop a Biodiversity Management Plan that includes the requirements set for managing offsets and set out in these conditions, to align with the requirements of the NSW State Government Project approval dated October 2012 (application number 10_0138) and this approval.</p>	<p><b>Section 1</b></p>
<p><b>18</b></p>	<p>The Offset Management Plan must include, but not be limited to, the following:</p> <p>(a) a text description and map which clearly defines the location and boundaries of the offset areas. This must be accompanied by the offset attributes and shapefiles.</p> <p>(b) a description of the methodology and results of the surveys measuring the baseline ecological conditions in the offset areas. This must be consistent with the State and Transition Model and include but not be limited to:</p> <p>i. the extent and condition of all vegetation communities, including a description of the structure, floristics and tree age class representation of each community.</p> <p>ii. the extent and condition class of all areas of the White Box-Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community;</p> <p>iii. surveys targeting the Regent Honeyeater, Swift Parrot and Greater Long-eared Bat;</p> <p>iv. the extent and quality of all areas of habitat for the Regent Honeyeater, Swift Parrot and Greater Long-eared Bat;</p> <p>v. the location of all survey sites (including coordinates);</p> <p>vi. photo reference points at survey sites.</p> <p>(c) clearly defined ecological management objectives for the offset areas;</p> <p>(d) detailed description of all ecological management activities proposed to be undertaken, including maps and/or diagrams showing areas to be managed and the timing of proposed activities;</p> <p>(e) details of ongoing ecological monitoring programs, performance criteria, targets and provisions for adaptive management, including but not limited to:</p> <p>i. a set of measurable ecological indicators for detecting changes to the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community, including those that may be ascribed to ongoing water stress;</p>	<p><b>Sections 1.2.1 and 5 and Figure 5</b></p> <p><b>Sections 5.3, 5.4, 5.9 and 6.17.1, Figures 8a to 8d, Appendix E</b></p> <p><b>Section 5.4, Figures 7, 9a to 9d</b></p> <p><b>Sections 5.6 and 6.17</b></p> <p><b>Section 5.6, Figures 8a to 8d</b></p> <p><b>Section 5.6, Table 6-15 and Figures 14a to 14d</b></p> <p><b>Section 6.17.1 and Figures 14a to 14d</b></p> <p><b>Section 6.1 and Figures 12a to 12g</b></p> <p><b>Section 6</b></p> <p><b>Section 6.17.1</b></p>

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**Table 2-2 (Continued) Approval Decision EPBC 2010/5566 Requirements**

Condition Number	Requirement	Relevant BMP Section
<b>18 (Cont.)</b>	<i>ii. a monitoring plan to assess the success of the management activities measured against the baseline condition. The monitoring must be statistically robust and able to quantify change in the condition of the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community and habitat for the Regent Honeyeater, Swift Parrot and Greater Long-eared Bat. This should include the use of control sites and periodic ecological surveys to be undertaken by a qualified ecologist.</i>	Section 6.17.1
	<i>iii. a list of performance criteria based on the ecological management objectives for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community and habitat for the Regent Honeyeater, Swift Parrot and Greater Longeared Bat;</i>	Section 6.16
	<i>iv. measures to exclude weeds from all offset areas for the period covered by this approval;</i>	Section 6.8
	<i>v. a description of the potential risks to successful management against the performance criteria, and a description of the contingency measures that will be implemented to mitigate against these risks;</i>	Section 6.18
	<i>vi. a process by which to report to the department the progress of management activities undertaken in the offset areas and the outcome of those activities, including identifying any need for improved management and activities to undertake such improvement.</i>	Section 7.2.2
	<i>(f) details of all parties responsible for management, monitoring and implementing the management activities, including their position or status as separate contractor.</i>	Section 1.5
	<i>(g) details of the funding requirements for the ongoing management activities, including an estimate of the costs of the activities and details of the parties responsible for funding the activities.</i>	Section 6.2.2
<b>19</b>	<i>Unless otherwise agreed to in writing by the department, the baseline surveys for threatened species must be undertaken in accordance with the department's Survey Guidelines for Australia's Threatened Birds and the Survey Guidelines for Australian Threatened Bats. Subsequent monitoring must be carried out annually at the same time of year as the baseline surveys unless otherwise agreed to in writing by the department.</i>	Section 6.17.2

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	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**PART B**  
**OFFSET AREA MANAGEMENT OF FLORA AND FAUNA**

**5 EXISTING ENVIRONMENT RELEVANT TO THE OFFSET AREAS**

An overview of the NSW Biodiversity Offset Strategy and Commonwealth offset areas subject to Approval Decision EPBC 2010/5566 is provided in Sections 1.2.1 and 1.2.2.

**5.1 LAND TENURE**

A list of all the offset properties associated with the NSW and Commonwealth Biodiversity Offset Strategy is provided in Table 5-1. The offset areas that form part of the revised and approved NSW Biodiversity Offset Strategy (Whitehaven, 2015) cover approximately 12,168 ha of land<sup>4,5</sup> (Appendix A), comprising:

- approximately 7,898.1 ha of Existing Woodland/Forest;
- approximately 2,306.2 ha Derived Native Grassland; and
- approximately 1,964.6 Low Diversity Native Grassland/Pasture Improved and Cultivated Land.

Appendix A provides a reconciliation of Condition 44 of Schedule 3 to PA 10\_0138 against the revised and approved NSW Biodiversity Offset Strategy (Whitehaven, 2015).

The Commonwealth offset areas subject to Approval Decision EPBC 2010/5566 described in the table below and on Figure 4.


**Table 5-1 Summary of Biodiversity Offset Strategy Properties**

Property Name	Within the Revised NSW Biodiversity Offset Strategy	Within the Commonwealth Biodiversity Offset Strategy
<b>Eastern and Western Offset</b>		
Cattle Plain	No	Yes
Teston (north)	Yes	Yes
Tralelee	Yes	Yes
Wollandilly	Yes	Yes

<sup>4</sup> Based on Vegetation Mapping by Greenloaning Biostudies (2014b).

<sup>5</sup> As well as a total of 2,078 ha (less the area of the minimised void) of pre-mining native vegetation communities to be reestablished on the post-mine landforms (544 ha of Box Gum Woodland EEC) for a biodiversity conservation land use objective (i.e. long-term security)



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN


Warriahdool	Yes	Yes
Kelso	Yes	Yes
Louenville	Yes	Yes
Olivedeen	Yes	Yes
Teston (south)	Yes	Yes
Velyama	Yes	Yes
Oakleigh/Onavale	Yes	Proposed
*Shared Property	Yes	Yes
<b>Property Name</b>	<b>Within the Revised NSW Biodiversity Offset Strategy</b>	<b>Within the Commonwealth Biodiversity Offset Strategy</b>
<b>Southern Offset</b>		
Roseglass	Yes	Proposed
Bimbooria	Yes	Proposed
<b>Northern Offset</b>		
Mt Lindesay	Yes	Yes
Wirradale	Yes	Yes
Wongala	Yes	Proposed

**Table 5-1 (Continued)**  
**Summary of Biodiversity Offset Strategy Properties**

\* MCC owns the Shared Offset Property under a joint venture ownership with Idemitsu Australia. A small proportion of this land will be utilised by MCC and Boggabri Coal for the proposed rail spur, of which the southern-most section will extend into this shared property. The remainder of the land will be contributed to offset land. MCC intends to dedicate its 50% of the property to the offset strategy and will contribute to the management of the area accordingly.

The offset area on the Teston (South) Property is immediately west of the MCCM and the management of this offset area will be integrated with the overall rehabilitation of the MCCM (as per Condition 52(b) of Schedule 3 to PA 10\_0138).

## 5.2 LAND USE HISTORY

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

The Eastern and Western Offset properties were farming properties that occur mostly within the fertile Namoi valley floor (Figure 3). Parts of the Western Offset properties occur on the Namoi River floodplain. The properties were used for dryland cropping in combination with livestock grazing. As such, these properties have been cleared extensively in the past for agriculture.

The Bimbooria Property in the Southern Offset Area was partly cleared and modified for agriculture, but retains extensive areas of woodland, including Box-Gum Woodland EEC/CEEC. The Bimbooria Property was used in part for cropping as the lower areas have moderately fertile soils.

The Northern Offset ~~is currently being~~ was previously used to graze Dorpa sheep and cattle. Historically, much of the forests and woodland on the Mt Lindesay and Wirradale properties would have been cleared. However, the properties are now well vegetated with mature regenerated forest and woodland but still contain some open grassland areas for pasture. The Northern Offset is currently grazed on occasion or is subject to low intensity but frequent grazing. As such, much of the grassland areas are dominated by native grass species and a high diversity of native forbs and graminoid species.

### 5.3 VEGETATION COMMUNITIES

In July 2014, Greenloaning Biostudies (independent reviewer approved by ~~DotE~~DoEE) produced vegetation mapping for the Maules Creek offset areas as part of, and following, the independent review of the offset areas (Greenloaning Biostudies, 2013 and 2014a). The vegetation communities are listed in Table 5-2 and shown on Figures 8a to 8d. Vegetation descriptions and methods used by Greenloaning Biostudies (2015) are provided in Appendix E.

**Table 5-2 Vegetation Communities**

Vegetation Community		Offset Areas				
No.	Title	Eastern	Western	Southern	Northern	Shared
<b>Forest And Woodland Communities</b>						
2	Belah Woodland					
3	Bimble Box ± White Cypress Pine Grassy Woodland					
4*	Blakely's Red Gum - White Box ± Yellow Box Melaleuca Riparian Forest					
5*	Blakely's Red Gum - Yellow Box Grassy Woodland (± Stringybark)					
7	Bracteate Honeymyrtle Low Riparian Forest - Semi-cleared (Regenerating)					
14	Dwyer's Red Gum - Ironbark Woodland					



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

16	Melaleuca Riparian Forest					
19	Narrow-leaved Ironbark - White Cypress Pine Woodland (Semi-cleared)					
20	Narrow-leaved Ironbark ± White/Black Cypress Pine Grassy Open Forest/Woodland					
23	Narrow-leaved Ironbark - White Cypress Pine Shrubby Open Forest					
25	Pilliga Box - Poplar Box - White Cypress Pine Grassy Open Woodland					
27	River Red Gum Riparian Woodlands and Forests					
28*	Rough-barked Apple - Blakely's Red Gum Riparian Grassy Woodland					
29	Semi-evergreen Vine Thicket					
30	Silver-leaved Ironbark Woodland					
31	Silvertop Stringybark - Apple Box ± Shrubby Woodland/Open Forest					
32	Silvertop Stringybark - Apple Box ± Manna Gum Grassy Woodland/Open Forest					
33	Stringybark - Blakely's Red Gum - Yellow Box Shrubby Open Forest					
34	Stringybark - Rough-barked Apple - Cypress Pine Grassy/Shrubby Open Forest					
36	Tumbledown Red Gum ± Narrow-leaved Ironbark Woodland					
37	Weeping Myall Grassy Open Woodland					

**Table 5-2 (Continued)  
Vegetation Communities**

Vegetation Community		Offset Areas				
No.	Title	Eastern	Western	Southern	Northern	Shared
<b>Forest And Woodland Communities (Continued)</b>						
38*	White Box ± Yellow Box ± Stringybark Grassy Woodland					
39*	White Box (± Stringybark) Grassy Woodland					
40	White Box - Stringybark Shrubby Woodland/ Open Forest					




## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

41	White Box - Tumbledown Gum (semi-cleared/on creek lines)					
42*	White Box - White Cypress Pine ± Narrow-leaved Ironbark Grassy Open Forest					
43*	White Box - White Cypress Pine ± Narrow-leaved Ironbark Grassy Woodland					
44*	White Box - White Cypress Pine ± Narrow-leaved Ironbark Grassy Woodland (semi-cleared)					
45	White Box - White Cypress Pine ± Narrow-leaved Ironbark Shrubby Open Forest					
47*	White Box - Wilga - Belah Woodland					
48*	White Box - Wilga ± Quinine semi-cleared Woodland					
49*	White Box - Stringybark - ± Manna Gum Grassy Woodland					
50	White Box Grassy Woodland (Low Condition)					
51*	Yellow Box - Blakely's Red Gum ± Manna Gum Open Forest/ Woodland					
52*	Yellow Box ± White Cypress Pine Grassy Woodland					
<b>Shrubland Communities</b>						
1	Belah - Wilga - Rosewood Derived Budda Shrubland					
9	Cypress Pine Low Forest/Shrubland (regenerating)					
17	Metasediment Rock Outcrop Shrubland					
18	Motherumbah - Narrow-leaved Ironbark Forest/Semicleared Low Woodland/Shrubland					
22	Narrow-leaved Ironbark + White/Black Cypress Open Forest Regenerating (Shrubland)	Potential	Potential			
35	Tea-tree in Drainage Lines					
46	White Box - White Cypress Pine Derived Shrubland					
<b>Grassland Communities</b>						
6	Bracteate Honey Myrtle Low Riparian Forest – Derived Native Grassland					
8	Cultivation					
10	Derived Native Grassland (Box-Gum Woodland with low diversity and not conforming to EEC/CEEC)					
11*	Derived Native Grassland (Box-Gum Woodland)					

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

12	Derived Native Grassland (Low Diversity)					
13	Derived Native Grassland – Non-threatened					
15	Exotic/Improved Pasture					

**Table 5-2 (Continued) Vegetation Communities**

Vegetation Community		Offset Areas				
No.	Title	Eastern	Western	Southern	Northern	Shared
<b>Grassland Communities (Continued)</b>						
21	Narrow-leaved Ironbark - White Cypress Pine ± Tumbledown Gum Derived Native Grassland					
24	Narrow-leaved Ironbark Derived Native Grassland (Low diversity)					
26	Poplar Box Derived Native Grassland (Low diversity)					

Source: Greenloaning Biostudies (2014b) and Appendix E


\* Conforms to Box-Gum Woodland EEC/CEEC.

As verified by Greenloaning Biostudies (independent reviewer approved by [DotEDoEE](#)) (2013, 2014a), and in accordance with Condition 9 of the Approval Decision EPBC 2010/5566, the Commonwealth Biodiversity Offset Strategy provides for the long-term security of no less than 9,334 ha of equivalent or better quality of habitat for the Regent Honeyeater (*Xanthomyza phrygia*), Swift Parrot (*Lathamus discolor*) and the South-eastern Long-eared Bat (*Nyctophilus corbeni*) (previously Greater Long-eared Bat). Most of the vegetation communities listed in Table 5-2 and mapped on Figures 8a to 8d represent habitat for these species.

#### 5.4 BOX-GUM WOODLAND AND DERIVED GRASSLAND

As described in Section 5.3, Greenloaning Biostudies (independent reviewer approved by [DotEDoEE](#)) has produced vegetation mapping for the Maules Creek offset areas as part of, and following, the independent review of the offset areas (Greenloaning Biostudies, 2013 and 2014a).

Methods by Greenloaning Biostudies (2013 and 2014a) included review of key definitions and criteria for the Box-Gum Woodland, field data collection (20m x 50m plots), data analysis and GIS mapping. The mapping of Box-Gum Woodland EEC/CEEC was undertaken by Greenloaning Biostudies (2013 and 2014a) in a manner consistent with the State and Transition Model described by Rawlings *et al.* (2010). The Box-Gum Woodland in the offset area varies in condition class (Table 5-3). Box-Gum Woodland EEC/CEEC is represented by Box-Gum Woodland in Condition State 1 and 2 (Table 5-3; Figures 6 and 9a to 9d).


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**Table 5-3 Box-Gum Woodland and Derived Grassland Condition State**


Condition Class - State and Transition Model <sup>6</sup>	Description
State 1	Box-Gum Woodland EEC/CEEC – Woodland Form (Figures 6 and 9a to 9d)
State 2	Box-Gum Woodland EEC/CEEC – Derived Native Grassland Form (Figures 6 and 9a to 9d)
State 3	Derived Native Grassland (Box-Gum Woodland with low diversity and not conforming to EEC/CEEC) (Figures 8a to 8d)
State 4	Some cultivated land was once Box-Gum Woodland EEC/CEEC

INSERT FIGURE 8a

<sup>6</sup> Rawlings *et al.* (2010).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 8b

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**INSERT FIGURE 8c**






## MAULES CREEK


Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN


INSERT FIGURE 8d

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**INSERT FIGURE 9a**


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 9b


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 9c



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 9d

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Box-Gum Woodland is represented by the following vegetation communities in the offset areas with differing structure and floristics (Greenloaning Biostudies, 2013 and 2014a):

- Blakely's Red Gum - White Box - ± Yellow Box - Melaleuca Riparian Forest;
- Blakely's Red Gum - Yellow Box Grassy Woodland (± Stringybark);
- Rough-Barked Apple - Blakely's Red Gum Riparian Grassy Woodland;
- White box - Stringybark - ± Manna Gum Grassy Woodland;
- White Box - ± Yellow Box ± Stringybark Grassy Woodland;
- White Box - White Cypress Pine ± Narrow-Leaved Ironbark Grassy Open Forest;
- White Box - White Cypress Pine ± Narrow-Leaved Ironbark Grassy Woodland;
- White Box - Wilga - Belah Woodland;
- White Box - Wilga ± Quinine Semi-Cleared Woodland;
- White Box (± Stringybark) Grassy Woodland;
- Yellow Box - Blakely's Red Gum - ± Manna Gum Open Forest/ Woodland; and
- Yellow Box ± White Cypress Pine Grassy Woodland.

The extent of the vegetation communities is shown on Figures 8a to 8d. A lower condition variant of White Box - White Cypress Pine ± Narrow-Leaved Ironbark Grassy Woodland which still represents Box-Gum Woodland EEC/CEEC was identified separately (i.e. White Box - White Cypress Pine ± Narrow-Leaved Ironbark Grassy Woodland [semi-cleared]) (Greenloaning Biostudies, 2013 and 2014a). Vegetation descriptions by Greenloaning Biostudies are provided in Appendix E.

Greenloaning Biostudies collected information on advanced tree regeneration in derived native grassland (moderate to good condition) (Box-Gum Woodland) according to tree age class representation in June 2014.

### 5.5 HABITAT/FEATURES/FEATURES


#### **Regional Setting**

The Northern Offset Properties (Mt Lindsey, Wirradale and Wongala) and the Southern Offset Properties (Roseglass and Bimbooria) are within recognised priority areas for climate change corridors and recognised key fauna habitats (Department of Environment and Climate Change [DECC], 2007).

#### **State Forests and Protected Areas**

Table 5-4 provides a summary of the State Forests and Protected Areas adjacent to the offset areas.

**Table 5-4 State Forests and Protected Areas**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

State Forest or Protected Area	Relevance
Leard State Forest	Parts of the Eastern Offset Area and Western Offset Area are adjacent to Leard State Forest to the east, north and west (Figure 4).
Leard State Conservation Area	Parts of the Western Offset Area are adjacent to Leard State Conservation Area (Figure 4).
Mount Kaputar National Park	The Northern Offset Area is adjacent to Mount Kaputar National Park (Figure 4).
Boonalla CCA Zone 2 Aboriginal Area	The Southern Offset Area is adjacent to Boonalla CCA Zone 2 Aboriginal Area and an existing Whitehaven Offset Area (Figure 4).
Other Offset Areas	The Southern Offset Area is adjacent to an existing Whitehaven Offset Area and parts of the Western Offset Area are adjacent to offset areas held by Boggabri Coal Pty Ltd (Figure 4).

### **Broad Habitats**

The offset areas contain large areas of existing native woodland, forest, shrublands and grasslands. Vegetation communities in offset areas are described in Sections 5.3 and 5.4.

Land types/habitats in the offset areas are shown on Figures 10a to 10g. These land types/habitats those referenced in Condition 44 of Schedule 3 to PA 10\_0138, namely:

- Existing Native Woodland/Forest (including Belah Woodland);
- Derived Native Grassland (moderate to good condition) (including Derived Native Grassland of Box-Gum Woodland EEC/CEEC); and
- Low Diversity Native Grassland, Pasture Improved and/or Cultivated Land.

The land types/habitat mapping is based on the vegetation mapping by Greenloaning Biostudies (2014b).

### **Hollow-Bearing Trees**

Hollow-bearing trees are recorded in most areas of the offset areas, and predominantly within White Box trees (Australia Museum Consulting; 2014). Various threatened birds and mammals that use hollowbearing trees have been recorded in the offset areas (e.g. parrots, owls, the Squirrel Glider, hollowdwelling bats) (Section 5.6).

**INSERT FIGURE 10a**



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018


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INSERT FIGURE 10b




	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 10c

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 10d

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**INSERT FIGURE 10e**




## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

INSERT FIGURE 10f

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**INSERT FIGURE 10g *Groundcover***

As described previously, the offset properties were previously used for agricultural purposes, mainly grazing livestock. Improvement in groundcover and diversity will be monitored as part of the Vegetation and Habitat Monitoring Program (Section 6.17.1).

**Key Flora Species for Fauna**

Key flora species for fauna are considered to be those that provide habitat resources for shelter, breeding and foraging.

Many of the threatened fauna species recorded in the offset areas (Section 5.6) use Box-Gum Woodland EEC/CEEC as habitat (Whitehaven, 2015a) (Figures 10a to 10g). Remnants of Box-Gum Woodland EEC/CEEC generally occur on fertile soils where resources such as water and nutrients are more abundant and as such they are often cleared for agriculture. Flora species associated with Box-Gum Woodland EEC/CEEC provide a good source of habitat resources for fauna (e.g. nectar, tree hollows).

River Red Gum (*Eucalyptus camaldulensis*) forests lining watercourses in the offset area (e.g. along the Namoi River) also provide highly productive habitat for a range of species (Figures 8a and 8b).

**Creeks**


Rivers, streams and creeks within or adjacent to the offset areas are listed in Table 5-5 and shown on Figures 10a to 10g.

**Table 5-5 Rivers, Streams and Creeks within or Adjacent to the Offset Areas**

Offset Area	Rivers, Streams and Creeks
Eastern	Maules Creek (Figures 10a-10c) – ephemeral creek (with permanent/semi-permanent pools around Elfin Crossing) Back Creek (Figures 10a-10c) – ephemeral creek Whiskey Creek (Figure 10a) – ephemeral creek Horsearm Creek (Figure 10a) – ephemeral creek Cattle Plain Creek (Figure 10b) – ephemeral creek
Western	Namoi River (Figure 10e) – permanent river

**Table 5-5 (Continued) Rivers, Streams and Creeks within or Adjacent to the Offset Areas**

Offset Area	Rivers, Streams and Creeks
-------------	----------------------------

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

<b>Northern</b>	<p>Second Water Creek (Figure 10g) – permanent stream</p> <p>Maules Creek (Figure 10g) – <del>ephemeral</del> permanent stream</p> <p>Horton River (Figure 10g) – permanent stream</p> <p>Gap Station Creek (Figure 10g) – ephemeral creek</p> <p>Chinamans Creek (Figure 10g) – ephemeral creek</p> <p>Teatree Creek (Figure 10g) – ephemeral creek</p> <p>Deep Creek (Figure 10g) – ephemeral creek</p> <p>Cut Road Creek (Figure 10g) – ephemeral creek</p> <p>Oaky Gully (Figure 10g) – ephemeral creek</p> <p>Basin Creek (Figure 10g) – ephemeral creek</p> <p>Porcupine Creek (Figure 10g) – ephemeral creek</p> <p>Tareela Creek (Figure 10g) – ephemeral creek</p> <p>Stony Creek (Figure 10g) – ephemeral creek</p>
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**Caves and Cliff Lines**

The Northern Offset Area contains cliffs and rock outcrops that provide habitat for cave-dwelling animals, including bats. The indicative locations of caves are shown on Figure 10g.


**5.6 THREATENED AND MIGRATORY SPECIES**

Threatened and migratory species listed under the TSC Act and EPBC Act and/or their habitat that have been recorded in the offset areas are listed in Table 5-6 and shown on Figures 10a to 10g<sup>7</sup>.

Australia Museum Consulting commenced the monitoring program in the offset areas in October and November (spring) 2014 and February 2015. The methods used are consistent with those outlined in Sections 6.17.1 and 6.17.2. The location of survey sites are shown in Section 6.17. The surveys included diurnal bird census for the Regent Honeyeater (*Xanthomyza phrygia*) and bat surveys for the Southeastern Long-eared Bat (*Nyctophilus corbeni*) (previously Greater Long-eared Bat). The results are presented in Table 5-6. Additional surveys were undertaken in winter 2015 to target the Swift Parrot (*Lathamus discolor*) however this species was not recorded.

In addition to the recent surveys by Australia Museum Consulting (2014), past surveys were undertaken by Cumberland Ecology (2011) (i.e. diurnal bird census which could detect the Regent Honeyeater (*Xanthomyza phrygia*) [if present] and bat surveys which could detect the South-eastern Long-eared Bat (*Nyctophilus corbeni*) [if present] in the Northern, Eastern and Western Offset Areas) and Niche Environment and Heritage (2012) (i.e. bat surveys which could detect the South-eastern Long-eared Bat [if present] in the Roseglass Property in the Southern Offset Area). The results are presented in Table 5-6.

<sup>7</sup> Note: some records cannot be shown on the figures as the exact co-ordinates of the records were not recorded by the original source.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

To date, a total of 20 threatened species have been recorded within the offset areas (Table 5-6) comprising:

- three threatened flora species (all of which are listed under the TSC Act and EPBC Act);
- two threatened reptile species (one under the TSC Act, the other listed under the TSC Act and EPBC Act);
- eleven threatened woodland bird species (all listed under the TSC Act);
- one threatened arboreal mammal (listed under the TSC Act); and
- three confirmed threatened bat species (two of which are listed under the EPBC Act) (and one probable listed under the TSC Act).

The offset areas provide potential habitat for a further 12 threatened species (overall a total of 32 threatened species) (Table 5-6).

Two migratory terrestrial birds listed under the EPBC Act have also been recorded in the offset areas (Table 5-6).

**Table 5-6 Threatened and Migratory Species and/or their Habitat in the Offset Areas**

Common Name	Scientific Name	Conservation Status <sup>1</sup>		Occurrence
		TSC Act	EPBC Act	
<b>Flora</b>				
Bluegrass	<i>Dichanthium setosum</i>	V	V	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g).
	<i>Tylophora linearis</i>	V	E	This species was recorded within the Eastern, Western and Southern Offset Areas by Niche Environment and Heritage (2014) (Figures 10a to 10f).
Granite Homoranthus	<i>Homoranthus prolixus</i>	V	V	This species was recorded within the Southern Offset Area by Niche Environment and Heritage (2012) (Figure 10f).
<b>Reptiles</b>				
Border Thick-tailed Gecko	<i>Uvidicolus sphyrurus</i>	V	V	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g).
Pale-headed Snake	<i>Hoplocephalus bitorquatus</i>	V	-	Preliminary monitoring results indicate that this species was recorded in the offset areas during February 2015 (Australian Museum Consulting pers. comm., 2015).

**Table 5-6 (Continued) Threatened and Migratory Species and/or their Habitat in the Offset Areas**

Common Name	Scientific Name	Conservation Status <sup>1</sup>	Occurrence
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## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

		TSC Act	EPBC Act	
<b>Birds</b>				
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	E	-	Potential habitat.
Square-tailed Kite	<i>Lophoictinia isura</i>	V	-	Potential habitat.
Spotted Harrier	<i>Circus assimilis</i>	V	-	Preliminary monitoring results indicate that this species was recorded nearby the offset areas during February 2015 (Australian Museum Consulting pers. comm., 2015).
Little Eagle	<i>Hieraetus morphnoides</i>	V	-	Potential habitat.
Little Lor keet	<i>Glossopsitta pusilla</i>	V	-	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g) and Cumberland Ecology (2011). It was also recorded in the Southern Offset Area by Niche Environment and Heritage (2012) (Figure 10f) and in the Western Offset Area by Cumberland Ecology (2011) (Figures 10d and 10e).
Turquoise Parrot	<i>Neophema pulchella</i>	V	-	This species was recorded within the Northern Offset Area and Western Offset Area by Cumberland Ecology (2011). Database records of this species in the Western Offset Area are shown on Figures 10a and 10d.
Swift Parrot	<i>Lathamus discolor</i>	E	E	Potential habitat.
Masked Owl	<i>Tyto novaehollandiae</i>	V	-	This species was recorded within the Southern Offset Area by Niche Environment and Heritage (2012) (Figure 10f).
Barking Owl	<i>Ninox connivens</i>	V	-	This species was recorded multiple times at one location within the Eastern Offset Area by Australian Museum Consulting (2014) (Figure 10b).
Speckled Warbler	<i>Pyrrholaemus sagittatus</i>	V	-	This species was recorded within the Western, Southern and Northern Offset Areas by Australian Museum Consulting (2014) (Figure 10e to 10g), Parsons Brinkerhoff (2010) (Figure 10e) and Cumberland Ecology (2011) (Figures 10a and 10d). It was also recorded in the Southern Offset Area by Niche Environment and Heritage (2012) (Figure 10f).
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	E	Potential habitat.
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	V	-	This species was recorded within the Northern Offset Area by Cumberland Ecology (2011).
Painted Honeyeater	<i>Grantiella picta</i>	V	-	Potential habitat.
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V	-	This species was recorded within the Western Offset Area by Parsons Brinkerhoff (2010) (Figure 10e) and in the Western and Southern Offset Areas by Australian Museum Consulting (2014) (Figures 10d and 10f). It was also recorded in the Western and Northern Offset Areas by Cumberland Ecology (2011).

**Table 5-6 (Continued) Threatened and Migratory Species and/or their Habitat in the Offset Areas**






## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Common Name	Scientific Name	Conservation Status <sup>1</sup>		Occurrence
		TSC Act	EPBC Act	
<b>Birds (Cont.)</b>				
Diamond Firetail	<i>Stagonopleura guttata</i>	V	-	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g).
Scarlet Robin	<i>Petroica boodang</i>	V	-	Preliminary monitoring results indicate that this species was recorded in the offset areas during February 2015 (Australian Museum Consulting pers. comm., 2015).
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V	-	This species was recorded within all of the Northern, Eastern, Western and Southern Offset Areas by Australian Museum Consulting (2014) (Figures 10a to 10d, 10f and 10g). Cumberland Ecology (2011) recorded this species in the Eastern and Western Offset Areas.
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	V	-	Potential habitat.
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V	-	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g). Cumberland Ecology (2011) also recorded this species in the Northern Offset Area as well as the Western Offset Area.
Fork-tailed Swift	<i>Apus pacificus</i>	-	M	Potential habitat.
Rainbow Bee-eater	<i>Merops ornatus</i>	-	M	This species was recorded within the Western and Eastern Offset Areas by Australian Museum Consulting (2014) (Figures 10b, 10d and 10e).
White-throated Needle-tail	<i>Hirundapus caudacutus</i>	-	M	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g).
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	-	M	Potential habitat.
<b>Mammals</b>				
Koala	<i>Phascolarctos cinereus</i>	V	V	Potential habitat.
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	-	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g). It was also recorded in the Southern Offset Area by Niche Environment and Heritage (2012) (Figure 10f).
South-eastern Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	This species was recorded within the Western Offset Area by Australian Museum Consulting (2014) (Figure 10d).
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	This species was recorded within the Northern Offset Area by Australian Museum Consulting (2014) (Figure 10g).
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V	-	This species was recorded within all of the Northern, Eastern, Western and Southern Offset Areas by Australian Museum Consulting (2014) (Figures 10a to 10g). This species was also recorded within the Western Offset Area by Parsons Brinkerhoff (2010) (Figure 10e).
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V	-	Probable records of this species were obtained from within the Western and Eastern Offset Areas by Australian Museum Consulting (2014) (Figures 10a to 10d).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

**Table 5-6 (Continued) Threatened and Migratory Species and/or their Habitat in the Offset Areas**

Common Name	Scientific Name	Conservation Status <sup>1</sup>		Occurrence
		TSC Act	EPBC Act	
<b>Mammals (Cont.)</b>				
Little Pied Bat	<i>Chalinolobus picatus</i>	V	-	Potential habitat
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	-	Potential habitat
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V	-	Potential habitat

Current as of February 2015


<sup>1</sup> Threatened species conservation status V = Vulnerable, E = Endangered, CE = Critically Endangered, M=Migratory.

In accordance with Condition 49 of Schedule 3 to PA 10\_0138, the Biodiversity Offset Strategy is focused on protection, enhancement, revegetation and long-term maintenance of viable stands of suitable habitat for threatened species within the MCCM Project Boundary and surrounds.

As verified by Greenloaning Biostudies (independent reviewer approved by [DotEDoEE](#)) (2013, 2014a), and in accordance with Condition 9 of the Approval Decision EPBC 2010/5566, the Commonwealth Biodiversity Offset Strategy provides for the long-term security of no less than 9,334 ha of equivalent or better quality of habitat for the Regent Honeyeater (*Xanthomyza phrygia*), Swift Parrot (*Lathamus discolor*) and the South-eastern Long-eared Bat (*Nyctophilus corbeni*) (previously Greater Long-eared Bat). Most of the vegetation communities listed in Table 5-2 and mapped on Figures 8a to 8d represent habitat for these species.

## 5.7 WEEDS

MCCM will manage weeds in accordance with the NSW Biosecurity Act 2015. The Biosecurity Act 2015 introduced the "General Biosecurity Duty" (GBD) which requires all land managers and users to ensure as far as is reasonably practicable, that biosecurity risks are prevented, eliminated or minimised. In addition to MCCM's GBD responsibility, weed management will be implemented aligned with the North West Regional Strategic Weed Management Plan (NWRSWMP) 2017 – 2022 (North West Local Land Services, 2017) and weed control measures will be guided by published control measures (e.g. DPI, 2014). The NWRSWMP introduces a risk management approach (based on the weed invasion curve stages of prevention, eradication, containment and asset protection) to prioritise weeds for management based on those weeds that are "State Level Determined Priority Weeds for the North West Local Land Services Region" and additional "Regional Priority Weeds". Noxious weeds listed under the NSW Noxious Weeds Act, 1993 for particular local control areas. The noxious weed declarations for the following council areas are relevant to the offset areas:


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

- ~~Narrabri Shire Council (Eastern and Western Offset);~~
- ~~Tamworth Regional Council (Northern Offset); and~~
- ~~Gunnedah Shire Council (Southern Offset).~~

~~Noxious weeds listed under the NSW Noxious Weeds Act, 1993 that have been recorded in the offset areas are listed in Table 5-7, Noxious weeds recorded by Australian Museum Consulting (2014) and are shown on Figures 11a to 11d.~~




	<h2>MAULES CREEK</h2>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**Table 5-7 Environmental and Noxious Weeds in the Offset Areas**

Common Name	Scientific Name	Occurrence
Mother of Millions	<i>Bryophyllum delagoense</i>	Recorded within the Southern Offset in the Roseglass property (Niche Environment and Heritage, 2012).
Paterson's Curse	<i>Echium platagineum</i>	Recorded within the Eastern and Western Offset in the Teston (north) property (Cumberland Ecology, 2011), and in the Wollandilly and Velyama properties (Australian Museum Consulting, 2014). Although this species is not considered a Noxious weed within the Narrabri Shire Council area, it is listed as Noxious within the Gunnedah Shire Council area (relevant to the Southern Offset), and will therefore be managed accordingly.
African Boxthorn	<i>Lycium ferocissimum</i>	Recorded within the Eastern and Western Offset Areas (Australian Museum Consulting, 2014), and within the Southern Offset in the Roseglass property (Niche Environment and Heritage, 2012).
Common Prickly Pear	<i>Opuntia stricta</i>	Common in the Eastern and Western Offset, recorded in the Wollandilly, Oakleigh/Onavale, Teston (north), Louenville, Velyama and Kelso properties. Also recorded in the Northern Offset (Australian Museum Consulting, 2014) and the Southern Offset in the Roseglass property (Niche Environment and Heritage, 2012).
Prickly Pear	<i>Opuntia</i> sp.	Recorded within the Northern Offset in the Wirradale property, and within the Eastern and Western Offset in the Louenville, Tralee and Teston (south) properties (Cumberland Ecology 2011).
Tiger Pear	<i>Opuntia aurantiaca</i>	Recorded within the Southern Offset in the Roseglass property (Australian Museum Consulting, 2014; Niche Environment and Heritage, 2012) and Eastern and Western Offset (Australian Museum Consulting, 2014).
Sweet Briar	<i>Rosa rubiginosa</i>	Common in the Northern Offset Area in the Mt Lindsay and Wirradale properties (Cumberland Ecology, 2011; Australian Museum Consulting, 2014). Also recorded within the Eastern and Western offset area in the Louenville property (Cumberland Ecology, 2011). This species is not considered a Noxious weed within the Tamworth Regional Council area, but is listed as Noxious within the Narrabri Shire Council area.
Fireweed	<i>Senecio</i> spp.	Recorded within the Eastern and Western Offset in the Louenville property (Cumberland Ecology, 2011).
Cockle Burr	<i>Xanthium occidentale</i>	Recorded within the Southern Offset in the Roseglass property (Niche Environment and Heritage, 2012).
Bathurst Burr	<i>Xanthium spinosum</i>	Recorded within the Southern Offset in the Roseglass property (Niche Environment and Heritage, 2012).

Sources: Australian Museum Consulting (2014); Cumberland Ecology (2011) and Niche Environment and Heritage (2012).

\* Noxious Weeds Act, 1993 for the Narrabri Shire Council; Tamworth Regional Council; and Gunnedah Shire Council.


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

Exotic trees, namely Elms (*Ulmus* sp) and Weeping Willows (*Salix babylonica*), occur along Horton Creek in the Northern Offset Area.

[Redacted]


INSERT FIGURE 11a

[Redacted]

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


INSERT FIGURE 11b



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


INSERT FIGURE 11c



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 11d




	<h2>MAULES CREEK</h2>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### 5.8 FERAL ANIMALS

MCCM will implement feral animal management throughout the life of the operation as required based on seasonal conditions that determine the abundance of feral animal species and locations. As described above, feral animal management will be implemented in accordance with the NSW Biosecurity Act 2015 and aligned with relevant industry guidelines and codes of practice (i.e. Local Land Service Pest Control Orders). Feral animals that have been recorded in the offset areas are listed in Table 5-8. Feral animals recorded by Australian Museum Consulting (2014) are shown on Figures 11a to 11d.

**Table 5-8 Feral Animals in the Offset Areas**

Common Name	Scientific Name	Occurrence
Common Myna	<i>Acridotheres tristis</i>	This species was recorded by Australian Museum Consulting (2014).
Feral Pigs	<i>Sus scrofa</i>	Feral Pigs are currently abundant in the offset areas (Australian Museum Consulting, 2014). This species was recorded in the Northern Offset Area (Cumberland Ecology, 2014) and the Southern Offset Area (Niche Environment and Heritage, 2012).
Feral Goats	<i>Capra hircus</i>	Feral Goats are currently abundant in the offset areas (Australian Museum Consulting, 2014). This species was recorded in the Northern Offset Area (Cumberland Ecology, 2014) and the Southern Offset Area (Niche Environment and Heritage, 2012).
European Red Fox	<i>Vulpes vulpes</i>	Foxes are currently abundant in the offset areas (Australian Museum Consulting, 2014).
European Rabbits	<i>Oryctolagus cuniculus</i>	European Rabbits are currently moderately common in the offset areas (Australian Museum Consulting, 2014).
Brown Hare	<i>Lepus capensis</i>	This species was recorded by Australian Museum Consulting (2014).
Feral Deer	<i>Cervus</i> spp., <i>Axis</i> spp., or <i>Dama</i> spp.	Deer have not been recorded in the offset areas by Australian Museum Consulting, 2014; Niche Environment and Heritage, 2012 or Cumberland Ecology, 2014. Deer are considered uncommon or rare.
Feral Cats	<i>Felis catus</i>	Feral Cats are currently moderately common in the offset areas (Australian Museum Consulting, 2014). This species was recorded in the Southern Offset Area (Niche Environment and Heritage, 2012).
Wild Dog	<i>Canis familiaris</i>	This species was recorded in the Southern Offset Area (Niche Environment and Heritage, 2012). Dogs are considered uncommon or rare.
Black Rat	<i>Lepus capensis</i>	This species was recorded by Australian Museum Consulting (2014).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

House Mouse	<i>Mus musculus</i>	This species was recorded by Australian Museum Consulting (2014).
Feral Camel	<i>Camelus dromedarius</i>	This species was recorded by Australian Museum Consulting (2014).

## 5.9 THREATS

Current threats relevant to the condition of the native vegetation and habitats in the offset areas are:

- weeds;
- land clearance and fragmentation;
- feral animals;
- erosion;
- grazing livestock; and
- bushfire risk.

The above threats will be managed as described in Section 6.

The offset areas contain large areas of existing native woodland, forest, shrublands and grasslands. Some 1,964.6 ha of low diversity derived native grassland, pasture improved and cultivated land also occurs in the offset areas. Revegetation will occur within these cleared areas (except in cleared areas with constraints such as existing infrastructure) to lessen fragmentation and provide greater resilience to existing habitats surrounding these cleared areas.


## 6 MANAGEMENT OF THE OFFSET AREAS

This section provides short, medium and long-term measures that will be used to manage the vegetation and habitat in the offset areas and to implement the biodiversity offset strategy. The management regime in the offset areas will be adaptive over time to achieve the ecological management objectives.

### 6.1 ~~ECOLOGICAL~~ ~~ECOLOGICAL~~ ~~MANAGEMENT~~ ~~MANAGEMENT~~ OBJECTIVES

The objectives of the offset areas are to:

- protect and enhance existing native woodland/forest (including areas of Box-Gum Woodland EEC/CEEC in woodland form and habitat for threatened species listed under the TSC Act, namely

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

those listed in Conditions 49 and 50 of Schedule 3 to PA 10\_0138, and threatened species listed under the EPBC Act, namely, the Regent Honeyeater [*Xanthomyza phrygia*], Swift Parrot [*Lathamus discolor*] and the South-eastern Long-eared Bat [*Nyctophilus corbeni*];

- protect and enhance areas of semi-cleared woodland/forest;
- restore self-sustaining vegetation communities within derived native grassland;
- restore the woodland form of Box-Gum Woodland within existing areas of Box-Gum Woodland EEC/CEEC (derived native grassland); and
- restore self-sustaining vegetation communities within areas of low diversity derived native grassland, pasture improved and cultivated land.

These objectives are linked to the proposed management domains/units (Section 6.3), management performance criteria (Section 6.16), completion criteria (Section 6.16) and monitoring program (Section 6.17). Performance criteria are interim targets and completion criteria are the final targets representing achievement of the objectives.

## 6.2 **SETTING-SETTING UP THE OFFSET-OFFSET AAREAS**


### 6.2.1 **Long-term Conservation Security**

The offset areas will be conserved long term by an appropriate mechanism as set out in Condition 54 of Schedule 3 to PA 10\_0138 and Condition 13 of the Approval Decision EPBC 2010/5566. In accordance with Condition 54 of Schedule 3 to PA 10\_0138, the long-term security shall be provided by way of:

- entering into a conservation agreement or agreements pursuant to section 69B of the *National Parks and Wildlife Act 1974*, recording the obligations assumed by the Proponent under the conditions of this approval in relation to these offset areas, and registering the agreement(s) pursuant to section 69F of the *National Parks and Wildlife Act 1974*; or
- a tenure of higher conservation status such as a National Park, or Nature Reserve, under the *National Parks and Wildlife Act 1974*.

The conservation agreements will remain in perpetuity for all lands that cannot be transferred to National Parks estate. [Whitehaven continues to negotiate with OEH and NPWS regarding the potential to transfer portions of the Northern and Southern Offset Areas to National Parks estate as per the letter from NPWS dated 16 August 2017 which outlines NPWS interest in selected MCCM Offset Areas.](#)

~~Some of the management areas contain high quality forest and woodland that adjoins Mount Kaputar National Park, or is close to it. Ongoing discussions will be held with the OEH and the NSW National Parks and Wildlife Service (NPWS) to investigate the potential to add areas to National Parks estate. Preliminary discussions with these agencies have already commenced.~~

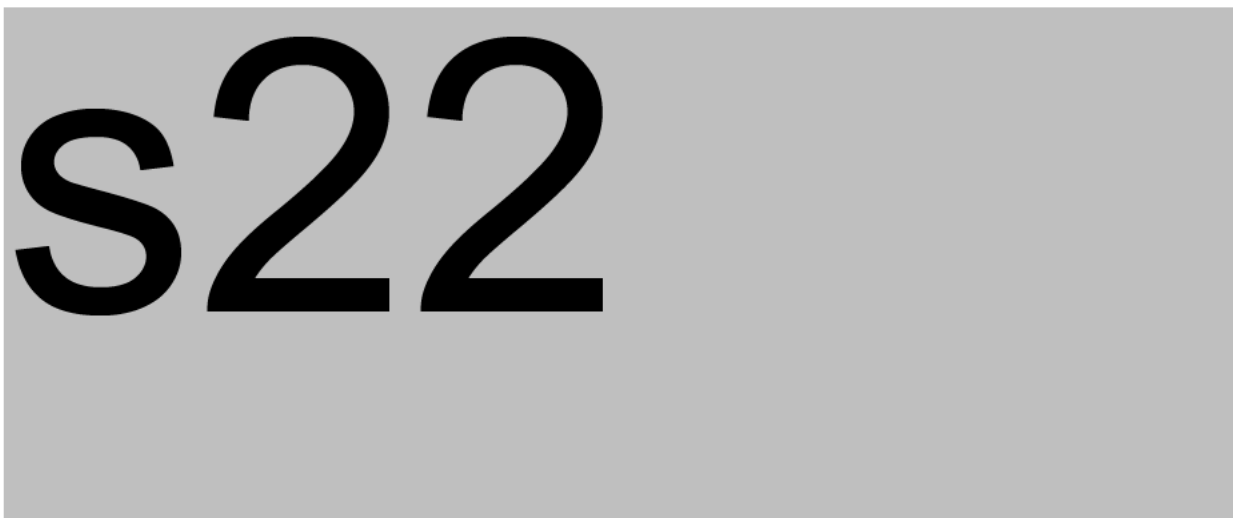
	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

For all lands that cannot be transferred to National Parks estate, MCC intend to secure the offset areas by the provision of a Voluntary Conservation Agreement (VCA) (or as per alternative instruments enacted by the new NSW Biodiversity Conservation Act 2016). The VCA will be registered on the title and will provide for long term conservation outcomes on this land.


Whitehaven have requested extensions from DP&E and DoEE for the timing of securing these offset areas until 31<sup>st</sup> December 2018 to allow the legal and financial processes associated with transferring land to Parks Estate and assessment of VCA applications to continue. Given the time involved with the legal processes, it is likely that further extensions to the timing of securing MCCM Offset Areas will be required. Condition 54 of Schedule 3 to PA 10\_0138 requires the conservation agreements to be registered by December 2014 for the offsets in Condition 44 of Schedule 3 to PA 10\_0138 (i.e. the NSW offset areas located on the Teston [north], Tralee, Wollandilly, Warriahdool, Kelso, Louenville, Olivedeem, Teston [south], Velyama, Shared Offset, Mt Lindesay and Wirradale as per the revised NSW Biodiversity Offset Strategy), unless agreed otherwise by the NSW Secretary of the DP&E after consultation with OEH. The NSW Secretary of the DP&E granted an extension of timing for commencement of securing the offset areas within 3 months of the approval of this BMP (version 2).

The registration of conservation agreements over the additional offset areas identified in the revised and approved NSW Biodiversity Offset Strategy (Whitehaven, 2015) (in accordance with Condition 45 of PA 10\_0138) will commence within 12 months of the approval of Stage 2 of the Leard Forest Mining Precinct Regional Biodiversity Strategy, unless otherwise agreed by the NSW Secretary of the DP&E. The additional NSW offset areas are those located on the Oakleigh/Onavale, Roseglass, Bimboria and Wongala properties.

Condition 13 of the Approval Decision EPBC 2010/5566 requires legally binding covenant(s) to be registered over the Commonwealth offset areas by 11 February 2018. As stated in Section 1.2, the additional proposed Commonwealth offset areas shown on Figure 4 will not be subject to the management measures described in this BMP until a legally binding covenant is in place for these additional Commonwealth offset areas.





	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

# s22

## 6.2.3 Infrastructure


The offset areas will be set-up on the ground by:

- using existing fencing (where practicable and required) to demarcate the perimeter around the offset areas, to manage grazing livestock and avoid accidental clearance (Section 6.12);
- installing gates into the offset areas (Section 6.12); and
- installing signage on gates into the offset areas which recognises that the area is protected for conservation purposes (Section 6.12).

Existing infrastructure in the offset areas (e.g. access tracks/fire trails and fences) is shown on Figures 13a to 13g. The re-use of existing infrastructure in the offset areas will be maximised where practicable. If new infrastructure (e.g. access tracks/fire trails and fences) is required, it will be located in stable locations with vegetation clearing minimised where possible by using already cleared land and/or in accordance with the limits specified for Routine Agricultural Management Activities for the Central Region under the *NSW Native Vegetation Act, 2003* (or its latest equivalent) and the 10/50 Vegetation Clearing rules under the *NSW Rural Fire Act, 1997*. The design of any new infrastructure will consider the location of threatened flora and communities. Existing infrastructure wholly or partly within the offset areas (e.g. electricity transmission lines, access tracks, water bores and pipes, homesteads and sheds) will be retained and managed as required by the relevant owners and/or managers/licencees. The revised NSW Biodiversity Strategy (Whitehaven, 2015) includes 1,835.9 ha of additional offset land above that required under Condition 44 of Schedule 3 to PA 10\_0138<sup>8</sup>.

In accordance with the *Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report* (Umwelt, 2017) Table 2.1 Point 2.3 wherever practical and the need is not apparent to restricting livestock, new fencing will be mostly plain strand wire fencing (minimising the use of barbed wire). New fencing will be installed in a way to avoid, or minimise clearing of any native trees or shrubs. The boundaries of the offset areas that adjoin with other offset areas; the Leard State Forest, Leard State Conservation

<sup>8</sup> The additional offset land comprised approximately 965.8 ha of Existing Woodland/Forest, approximately 574.5 ha Derived Native Grassland (of which 280.2 ha meets the criteria for the Box-Gum Woodland EEC) and 295.6 ha of low diversity derived native grassland, cultivated land and pasture improved land.

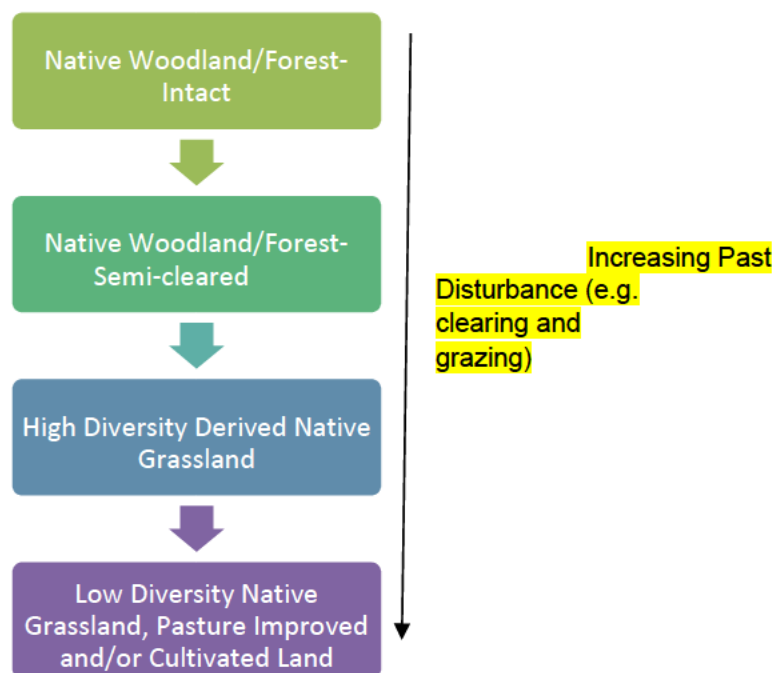
	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**


Area, Boonalla Aboriginal Area and Mount Kaputar National Park will not be fenced or existing fencing will not be replaced unless grazing livestock can access the offset areas through these protected areas and as agreed to with the relevant neighbours (Boggabri Coal, OEH/NPWS and State Forests). The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 2.3 recommends ongoing monitoring and site inspections should note any damage or disrepair of fences to be communicated to the Environmental Representative of the relevant mine site. If, during the course of monitoring, the use of barbed-wire fencing is found to be restrictive or damaging to local wildlife (e.g. gliders/bats caught in fencing), this is to be communicated to the Environmental Representative of the relevant site and ecologically-friendly alternatives are to be investigated. Fencing, gates, access tracks/fire trails and signage will be routinely inspected (annually) for maintenance issues, and at other times during management and monitoring activities.

**6.3 MANAGEMENT DOMAINS**

Management domains for each offset area have also been prepared in consideration of the State and Transition Model for Box-Gum Woodland (Rawlings *et al.*, 2010) which recognises different ecosystem states based on their condition (and the transition between states). For the purpose of this BMP, semi-cleared native woodland/forest has been identified separately to intact native woodland/forest in recognition that it would be in a stable degraded state, or a downwards trajectory towards a derived native grassland, without the offset (Plate 1).







**Plate 1 Different Ecosystem States as a Basis for the Management Domains**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

The management domains and their land management objectives are defined in Table 6-1 and management units are shown on Figures 12a to 12g.

**Table 6-1 Management Domains**


Management Domains	Habitat Management	Enhancement	Restoration	Revegetation
				
<b>Ecosystem States (Plate 1)</b>	Native Woodland/Forest-Intact	Native Woodland/Forest-Semi-cleared	Derived Native Grassland	Cleared Land
<b>Objective</b>	Existing native woodland/forest* to be protected and enhanced	Semi-cleared woodland/forest to be protected and enhanced	Additional native vegetation to be established with the restoration of self-sustaining woodland vegetation communities within derived native grassland (moderate to good condition)	Additional native vegetation to be established in low diversity native grassland, pasture improved and/or cultivated land
<b>Main Management Actions</b>	<ul style="list-style-type: none"> <li>Exclusion of livestock grazing to promote natural regeneration (Section 6.11).</li> <li>Weed and feral animal control (Sections 6.8 and 6.9).</li> <li>Access control (Section 6.12).</li> <li>Bushfire management (Section 6.13).</li> </ul>	<ul style="list-style-type: none"> <li>Exclusion of livestock grazing to promote natural regeneration (Section 6.11).</li> <li>Active revegetation (planting or direct seeding) depending on the success of natural regeneration.</li> <li>Weed and feral animal control (Sections 6.8 and 6.9).</li> <li>Access control (Section 6.12).</li> <li>Bushfire management (Section 6.13).</li> </ul>	<ul style="list-style-type: none"> <li>Light rotational livestock grazing progressing towards removal of livestock grazing (Section 6.11).</li> <li>Active revegetation (planting or direct seeding) depending on the success of natural regeneration.</li> <li>Weed and feral animal control (Sections 6.8 and 6.9).</li> <li>Access control (Section 6.12).</li> <li>Bushfire management (Section 6.13).</li> </ul>	<ul style="list-style-type: none"> <li>Active revegetation (planting or direct seeding).</li> <li>Weed and feral animal control (Sections 6.8 and 6.9).</li> <li>Access control (Section 6.12).</li> <li>Bushfire management (Section 6.13).</li> </ul>

\* The term woodland/forest is used by Condition 44 of Schedule 3 to PA 10\_0138 to describe all native vegetation communities (of varying structure) other than derived grassland.


Note: The Enhancement Domain may contain small areas of Derived Native Grassland.






	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


**INSERT FIGURE 12a**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


**INSERT FIGURE 12b**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


**INSERT FIGURE 12c**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


**INSERT FIGURE 12d**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 12e


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**INSERT FIGURE 12f**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**INSERT FIGURE 12g**



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

The offset areas have been divided into a number of management units based on a combination of the following factors:

- dominant management domains;
- existing fence lines and ease in establishing new fencing;
- connectivity to adjacent areas of bushland;
- agricultural suitability/grazing management (Section 6.11); and
- landscape position and topography.

The management units shown on Figures 12a to 12g were assigned a management domain or combination of management domains based on the most prominent land types (Figures 10a to 10g) within each unit. Some management units contain a mixture of semi-cleared native woodland/forest surrounded by cleared land or derived native grassland (moderate to good condition). These management units are recognised as a combination of management domains as follows:

Restoration/Enhancement (R/E) Restoration of derived native grassland/enhancement of semicleared woodland

Revegetation/Enhancement (Rv/E) Revegetation of cleared land/enhancement of semi-cleared woodland/forest

Revegetation/Restoration (Rv/R) Revegetation of cleared land and restoration of derived native grassland.

There are a total of seven management domain combinations and a total of 44 individual management units (distinct management areas) across the entire offset areas. Table 6-2 provides a list of each management unit including information on:

- vegetation communities;
- presence of the Box-Gum Woodland EEC/CEEC;
- threatened species; and
- watercourses.

The management units are likely to change over time as the habitats in the offset areas improve (e.g. a management unit which is currently assigned an Enhancement Domain may change to a Habitat Management Domain once vegetation improves). However, any of these changes MCC propose to the management units would be incorporated into a revised BMP in accordance with Section 7.3.

The boundaries of the management units shown on Figures 12a to 12g may change so as to avoid, or minimise the need to clear native trees or shrubs during installation of additional fencing.



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-2  
Management Domains and Units**

Management Units	Location	Figure Reference	Threatened Community Present (Figure 9a to 9d)	Threatened Species Recorded (Figures 10a to 10g and Table 5-6)	Watercourses (Figure 10a to 10g)
<b>Habitat Management</b>					
HM1	Teston (south)	Figures 12a and 12d		Speckled Warbler, Grey-crowned Babbler (eastern subspecies), Eastern Bentwing-bat, Brown Treecreeper (eastern subspecies), Yellow-bellied Sheathtail-bat.	Nil
HM2	Oakleigh/Onavale	Figures 12b and 12c		<i>Tylophora linearis</i> , Grey-crowned Babbler (eastern subspecies), Eastern Bentwing-bat, Yellow-bellied Sheathtail-bat.	Nil
HM3	Kelso	Figures 12d and 12e		<i>Tylophora linearis</i> , Grey-crowned Babbler (eastern subspecies), Southeastern Long-eared Bat, Yellow-bellied Sheathtail-bat, Rainbow Bee-eater.	Nil
HM4	Shared Offset	Figure 12e	Nil	<i>Tylophora linearis</i> , Little Lorikeet, Brown Treecreeper (eastern subspecies), Speckled Warbler, Rainbow Bee-eater, Grey-crowned Babbler (eastern subspecies), Varied Sittella, Little Pied Bat, Common Bentwing-bat, Eastern Cave Bat, Yellow-bellied Sheathtail Bat.	Nil
HM5	Roseglass, Bimbooria	Figure 12f		<i>Homoranthus prolixus</i> , Little Lorikeet, Masked Owl, Brown Treecreeper (eastern subspecies), Speckled Warbler, Grey-crowned Babbler (eastern subspecies), Squirrel Glider, Yellow-bellied Sheathtail-bat.	Nil
HM6	Mt Lindesay	Figure 12g		Brown Treecreeper (eastern subspecies).	Horton River
HM7	Mt Lindesay	Figure 12g		Nil	Nil
HM8	Wongala	Figure 12g		Nil	Deep Creek, Teatree Creek
HM9	Wirradale	Figure 12g		Yellow-bellied Sheathtail-bat.	Maules Creek

HM10	Wirradale	Figure 12g		Grey-crowned Babbler (eastern subspecies), Yellow-bellied Sheathtailbat.	Maules Creek, Basin Creek
<b>Enhancement</b>					
E1	Warriahdool	Figure 12a		Nil	Nil

**Table 6-2 (Continued)**  
**Management Domains and Units**

Management Units	Location	Figure Reference	Threatened Community Present (Figure 9a to 9d)	Threatened Species Recorded (Figures 10a to 10g and Table 5-6)	Watercourses (Figure 10a to 10g)
<b>Restoration Enhancement</b>					
R/E1	Wollandilly	Figure 12b		<i>Tylophora linearis</i> , Grey-crowned Babbler (eastern subspecies), Barking Owl, Rainbow Bee-eater, Eastern Bentwing-bat, Yellow-bellied Sheathtail-bat.	Nil
R/E2	Velyama	Figure 12d		Nil	Nil
R/E3	Oakleigh/Onavale	Figure 12c	Nil	Nil	Nil
R/E4	Oakleigh/Onavale	Figure 12c		Nil	Nil
R/E5	Mt Lindesay	Figure 12g		Nil	Second Water Creek
R/E6	Wirradale	Figure 12g		Little Lor keet, Diamond Firetail, Squirrel Glider, Yellow-bellied Sheathtail-bat.	Maules Creek, Tareela Creek, Porcupine Creek, Cut Road Creek, Horton River

R/E7	Wongala	Figure 12g		Nil	Deep Creek
R/E8	Wirradale	Figure 12g		Brown Treecreeper (eastern subspecies), Speckled Warbler, Diamond Firetail, Varied Sittella, White-throated Needle-tail, Hoary Wattled Bat, Large-eared Pied Bat, Little Bentwing-bat, Yellow-bellied Sheath-tail-bat, Border Thick-tailed Gecko.	Basin Creek, Oaky Gully, Chinamans Creek, Gap Station Creek, Teatree Creek
<b>Revegetation</b>					
Rv1	Wollandilly	Figure 12b		Nil	Nil
Rv2	Warriahdool	Figure 12a		Nil	Back Creek
Rv3	Louenville	Figure 12d	Nil	Nil	Nil
Rv4	Velyama	Figure 12d		Nil	Nil
Rv5	Olivedeen	Figure 12e	Nil	Nil	Nil
Rv6	Kelso	Figure 12e	Nil	Nil	Namoi River

**Table 6-2 (Continued)**  
**Management Domains and Units**


Management Units	Location	Figure Reference	Threatened Community Present <sup>9</sup> (Figure 9a to 9d)	Threatened Species Recorded (Figures 10a to 10g and Table 5-6)	Watercourses (Figure 10a to 10g)
<b>Restoration/Enhancement</b>					

<sup>9</sup> Based on Vegetation Mapping by Greenloaning Biostudies (2014b).

Rv7	Shared Offset	Figure 12e		Grey-crowned Babbler (eastern subspecies), Brown Treecreeper (eastern subspecies), Eastern Cave Bat.	Nil
Rv8	Oakleigh/Onavale	Figure 12c		<i>Tylophora linearis</i> .	Nil
Rv9	Oakleigh/Onavale	Figure 12c	Nil	Spotted Harrier.	Nil
Rv10	Oakleigh/Onavale	Figure 12c	Nil	Nil	Nil
<b>Revegetation/Enhancement</b>					
Rv/E1	Tralee and Teston (north)	Figure 12a		<i>Tylophora linearis</i> , Grey-crowned Babbler (eastern subspecies), Eastern Bentwing-bat, Yellow-bellied Sheathtail-bat.	Whiskey Creek, Back Creek.
Rv/E2	Teston (south)	Figure 12a		<i>Tylophora linearis</i> , Grey-crowned Babbler (eastern subspecies), Little Lorikeet, Turquoise Parrot, Speckled Warbler.	Nil
Rv/E3	Wollandilly	Figure 12b		<i>Tylophora linearis</i> , Grey-crowned Babbler (eastern subspecies).	Nil
Rv/E4	Wollandilly	Figure 12b		Nil	Maules Creek
Rv/E5	Warriahdool	Figures 12a and 12b	Nil	Nil	Maules Creek.
Rv/E6	Velyama	Figure 12d	Nil	Nil	Nil
Rv/E7	Velyama	Figure 12d	Nil	Nil	Nil
Rv/E8	Olivedeen	Figure 12e	Nil	Nil	Namoi River.
Rv/E9	Kelso	Figure 12e		Nil	Nil
Rv/E10	Oakleigh/Onavale	Figure 12c		<i>Tylophora linearis</i> .	Nil
Rv/E11	Oakleigh/Onavale	Figure 12c	Nil	Nil	Maules Creek.
<b>Revegetation/Restoration</b>					

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Rv/R1	Wollandilly	Figure 12b		Nil	Nil
Rv/R2	Wollandilly	Figure 12b		<i>Tylophora linearis.</i>	Nil
Rv/R3	Roseglass	Figure 12f		Masked Owl, Speckled Warbler.	Nil
Rv/R4	Bimbooria	Figure 12f		<i>Tylophora linearis.</i>	Nil

	<b>MAULES CREEK</b>	Document Owner:	Env. Manager
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	12 April 2017
		Date Printed:	12 April 2017
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

## 6.4 SEED COLLECTION AND PROPAGATION

Consistent with Section 4.3: Whitehaven/MCCM will undertake the following seed collection and propagation activities aligned with Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.2.

### **Seed Collection, Management and Storage**

Seed collection, management and storage will be undertaken in consideration of Florabank guidelines (<http://www.florabank.org.au/>) (as listed in Section 4.3). Currently accepted best practice, as described in Rawlings *et al.* (2010) for local provenance seed collection includes:

- Collection of seed from several source sites with similar rainfall, soil, altitude, aspect and slope position to the revegetation site to ensure they are most adapted to the landscape and environmental conditions;
- Collection of seed from between 20-50 plants of each species for genetic diversity; and
- Collection of seed from plants spaced approximately three plant-heights apart to prevent collection of too many closely related seeds.

Records – If Whitehaven/MCCM will include all organises seed collected onsite; records will include the relevant information in accordance with Florabank guidelines, species, quantities, dates and locations as per the seed collection protocols (Section 7.1.1).

### **Propagation**

A seed and tubestock supply strategy is described in Section 6.5. Revegetation by seedlings of the scale required will be undertaken by nurseries that can effectively collect commercial quantities of seed, propagate and grow the seed and harden the seedlings.


Orders will need to be placed well in advance of revegetation works to meet the demand for tubestock. The likely time frames for plants to reach transplantable sizes will vary depending on the species and method of propagation (e.g. most species require one season to be of sufficient size, but other species such as *Xanthorrhoea*, *Callitris* and *Bursaria* can take two or more years).

If Whitehaven/MCCM organises propagation onsite; records will include the relevant information in accordance with Florabank guidelines. Records will include all sources of propagation, species, quantities and dates (Section 7.1.1).

## 6.5 REVEGETATION


### 6.5.1 Revegetation Program



	<b>MAULES CREEK</b>	Document Owner:	Env. Manager
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	12 April 2017
		Date Printed:	12 April 2017
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**Objectives**

s22

	<h2>MAULES CREEK</h2>	Document Owner:	Env. Manager
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	12 April 2017
		Date Printed:	12 April 2017
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### Plate 2 Steps to Active Revegetation

#### **Design**

These factors will be considered in the design of the revegetation activities:

- revegetation targets;
- management domains;
- a revegetation schedule;
- site planning;
- species and provenance selection; and
- seed and tube stock supply strategy.

#### **Revegetation Targets**

Native vegetation and fauna habitat in the offset areas will be restored focusing on assisted natural regeneration and targeted vegetation establishment. In accordance with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 5.1, this revegetation program will target:

- restoration of Box-Gum Woodland EEC/CEEC;
- expansion of patches of existing native vegetation;
- creation of buffer zones along watercourses and high value conservation areas (e.g. Leard State Forest);
- creation of corridors that link two or more areas of native vegetation, particularly an east/west corridor to the Namoi River (Condition 54[e] of Schedule 3 to PA 10\_0138); and
- restoration of Belah Woodland on property 'Velyama' (Condition 44 of Schedule 3 to PA 10\_0138).

The objectives of the offset areas include restoration of self-sustaining vegetation communities within previously cleared areas (i.e. derived native grassland [low to good condition], pasture improved and cultivated land) (in accordance with Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.3). Successful restoration of previously cleared areas with native vegetation will expand patches of existing native vegetation, increase connectivity and result in an improvement in biodiversity values. For example, the total area of derived native grassland (low to good condition) pasture improved and cultivated land in the revised and approved NSW Biodiversity Offset Strategy (Whitehaven, 2015) is approximately 4,270.8 ha (almost double the area of native vegetation that will be cleared for the MCCM).

#### **Management Domains and Units**


	<b>MAULES CREEK</b>	Document Owner:	Env. Manager
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	12 April 2017
		Date Printed:	12 April 2017
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

Table 6-1 provides a summary of the revegetation actions for each management domain described in Section 6.3. Natural regeneration will be favoured over planting or direct seeding in areas of native woodland/forest and derived native grassland (moderate to good condition) because natural regeneration conserves the natural genetic diversity of the local vegetation. Revegetation (planting or direct seeding) will be undertaken primarily in areas of low diversity derived native grassland, pasture improved and cultivated land. Revegetation Areas are those outside of existing native forest/woodland and derived native grasslands areas identified on Figures 10a to 10g. The revegetation schedule in Table 6-3 will be subject to site planning as discussed further below.

#### *Revegetation Schedule*

The provisional revegetation schedule is provided in Table 6-3. There are a number of management units which are likely to receive active revegetation (subject to site planning). Priority will be given to those offset areas that adjoin or are nearby the MCCM and Leard State Forest. The revegetation schedule in Table 6-3 will be subject to site planning as discussed further below.

Planting season depends largely on germination conditions including stored moisture, soil temperature, humidity and rainfall. Local conditions will be considered before planting; however, general planting seasons for Central Western NSW are at autumn break through to the beginning of spring (Rawlings *et al.*, 2010).

The revegetation schedule is based on staged revegetation over a number of years in consideration of an adaptive management framework. Revegetation areas will be progressively planned, established, monitored and evaluated. If required, management will be modified to improve the prospects for the next planned revegetation area based on progressive learning.


~~Table 6-3 provides an indicative schedule of revegetation (revegetation schedule is not limited to those listed and may include other areas depending on revegetation site planning).~~ Follow-up planting may be required to replace lost plants or improve diversity of the revegetation.

#### *Site Planning*

The revegetation schedule ~~in Table 6-3~~ and area to be revegetated will be subject to site planning. Site planning will be undertaken prior to revegetation within a Revegetation Area and would include a site inspection by a suitability qualified person(s) (e.g. restoration ecologist[s]) to provide direction and assist MCC with:

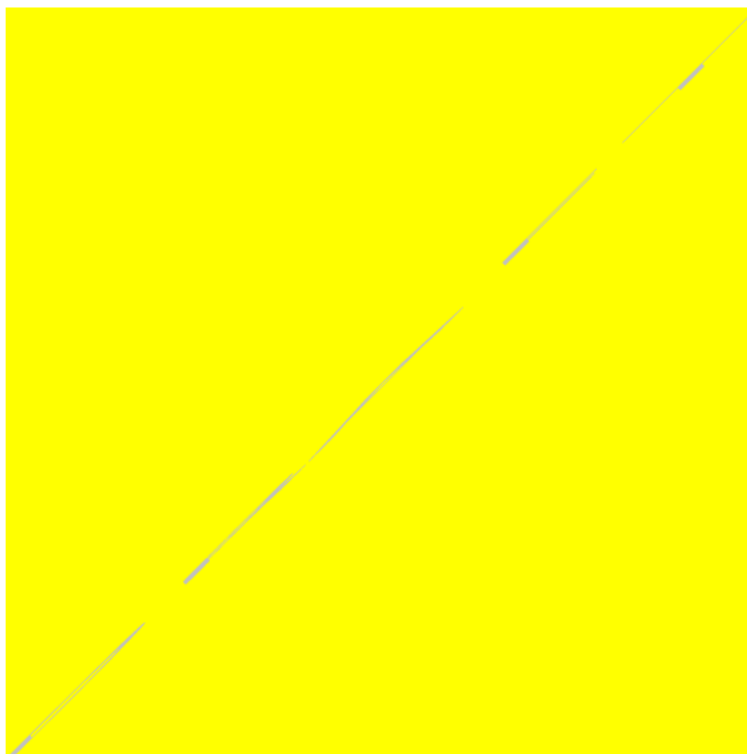
- site preparation requirements (e.g. weed control and nutrient reduction);
- constraints (e.g. infrastructure such as powerlines, access tracks and sheds<sup>10</sup>);

<sup>10</sup> Existing infrastructure wholly or partly within the offset areas (e.g. electricity transmission lines, access tracks, water bores and pipes, homesteads and sheds) will be retained and managed as required by the relevant owners and/or managers/licencees.

	<b>MAULES CREEK</b>	Document Owner:	Env. Manager
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	12 April 2017
		Date Printed:	12 April 2017

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

- target vegetation community or combination of vegetation communities for the Revegetation Area (considering factors such as soil, aspect, topography, altitude and pre-clearing vegetation types in order to match species to their preferred soil-landscape);
- flora species to be sown/planted (a list for each target vegetation community);
- application rates for seeds as well as planting densities (spacings) for tube stock to help avoid excessive competition and better mimic natural community structure;
- specific revegetation methods/treatments or research trials; and
- ecological resilience and the dominance of native species (e.g. livestock grazing management outlined in Section 6.11 may result in greater dominance of native species negating or reducing the need for active revegetation [planting and/or seeding]).



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**Table 6-3**  
**Indicative# Revegetation Schedule**

Management Units	Location	Figure (Figures-12a to 12g)	Year-1 (May 2014 to end-of-June 2016)	Year-2 (July 2016 to end-of-June 2016)	Year-3 (July 2016 to end-of-June 2017)	Year-4 (July 2017 to end-of-June 2018)
<b>Revegetation</b>						
Rv1	Wollandilly	Figure-12b	-	Design, site preparation and commence revegetation	Maintenance	Maintenance
Rv3	Louenville	Figure-12d	-	Design	Site preparation and commence revegetation	Maintenance
Rv4	Velyama	Figure-12d	-	Design	Site preparation and commence revegetation	Maintenance
Rv6	Kelso	Figure-12e	-	Design	Site preparation and commence revegetation	Maintenance
<b>Revegetation/Enhancement</b>						
Rv/E1	Tralee and Teston (north)	Figure-12a	-	Design, site preparation and commence revegetation	Maintenance	Maintenance
Rv/E2	Teston (south)	Figure-12a	-	Design, site preparation and commence revegetation	Maintenance	Maintenance
Rv/E3	Wollandilly	Figure-12b	-	Design, site preparation and commence revegetation	Maintenance	Maintenance

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**Table 6-3 (Continued)**  
**Indicative# Revegetation Schedule**




Management Units	Location	Figure (Figures-12a to-12g)	Priority Area	Year-1 (May-2014 to end-of-June-2015)	Year-2 (July-2015 to end-of-June-2016)	Year-3 (July-2016 to end-of-June-2017)	Year-4 (July-2017 to end-of-June-2018)
<b>Revegetation/Enhancement (Continued)</b>							
Rv/E6	Velyama	Figure-12d	2	-	Design	Site preparation and commence revegetation	Maintenance
Rv/E7	Velyama	Figure-12d	2	-	Design	Site preparation and commence revegetation	Maintenance
Rv/E9	Kelso	Figure-12e	2	-	Design	Site preparation and commence revegetation	Maintenance
<b>Revegetation/Restoration</b>							
Rv/R1	Wollandilly	Figure-12b	4	-	Design, site preparation and commence revegetation	Maintenance	Maintenance
Rv/R2	Wollandilly	Figure-12b	4	-	Design, site preparation and commence revegetation	Maintenance	Maintenance

\* The actual area of revegetation may be less in a management zone due to specific site constraints; # revegetation schedule is not limited to those listed and may include other areas depending on revegetation site planning.

Light blue highlight — These management units provide for an east/west corridor to the Namoi River by improving connectivity and corridor function in accordance with Condition 54(e) of Schedule 3 to PA 10\_0138.

Orange highlight — This management unit contains Belah Woodland on property 'Velyama' that will be enhanced with restoration of at least 5 ha of additional Belah Woodland.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


### Species and Provenance Selection

Revegetation in the offset areas would preferentially use local endemic (adapted) species (Rawlings *et al.*, 2010), however consideration will be given to the use of a high quality seed sourced further from the site over a low quality more local seed source (Broadhurst *et al.*, 2008 in DECCW, 2011). Seed collection is described in Section 6.4.

In accordance with Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.3; fFlora species used in this revegetation program will include a variety of grasses, low shrubs, mid-sized shrubs and tall trees to create structurally diverse habitat and that the- A provisional species list is provided in Table 6-4\_3 (including species specifically associated with the Box-Gum Woodland EEC/CEEC) as per the NSW Final Determination and Commonwealth Listing Advice for the communities.

**Table 6-43 Provisional Revegetation Species List**

Common Name	Scientific Name	Common Name	Scientific Name
<b>Overstorey</b>		<b>Understorey</b>	
* White Box	<i>Eucalyptus albens</i>	*Smooth Darling Pea	<i>Swainsona galegifolia</i>
* Yellow Box	<i>Eucalyptus melliodora</i>	*Barb-wire Grass	<i>Cymbopogon refractus</i>
* Blakely's Red Gum	<i>Eucalyptus blakelyi</i>	*Si ky Blue-grass	<i>Dichanthium sericeum</i>
Narrow-leaved Ironbark	<i>Eucalyptus crebra</i>	*Daises	<i>Brachyscome spp.</i>
Narrow-leaved Grey Box	<i>Eucalyptus pilligaensis</i>	*Everlasting Daises	<i>Chrysocephalum spp.</i>
Inland Grey Box	<i>Eucalyptus microcarpa</i>	*Kangaroo Grass	<i>Themeda triandra</i>
Dwyer's Red Gum	<i>Eucalyptus dwyeri</i>	*Wallaby Grass	<i>Austrodanthonia induta</i>
<b>Midstorey</b>		*Winter Apple	<i>Eremophila debilis</i>
*Sticky Hop-Bush	<i>Dodonaea viscosa ssp. angustifolia</i>	Blue Trumpet	<i>Brunoniella australis</i>
*Wilga	<i>Geijera parviflora</i>	Three-awn Speargrass	<i>Aristida vagans</i>
Belah	<i>Casuarina cristata</i>	Slender Stackhousia	<i>Stackhousia viminea</i>

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

-	<i>Allocasuarina spp.</i>	Yellow Burr-daisy	<i>Calotis lappulacea</i>
Black Tea-tree	<i>Melaleuca bracteata</i>	-	<i>Rostellularia adscendens var. adscendens</i>
Silver Wattle	<i>Acacia dealbata</i>	Plains Grass	<i>Austrostipa aristiglumis</i>
Hickory Wattle	<i>Acacia implexa</i>	-	<i>Panicum spp.</i>
White Cypress Pine	<i>Callitris glaucophylla</i>	-	<i>Austrodanthonia spp.</i>
Scant Pomaderris	<i>Pomaderris queenslandica</i>	-	<i>Bothriochloa spp.</i>
Buloke	<i>Allocasuarina leuhmannii</i>	-	<i>Chloris spp.</i>
Scant Pomaderris	<i>Pomaderris queenslandica</i>	-	<i>Tylophora linearis</i>

\* Specifically associated with the Box-Gum Woodland EEC/CEEC (in accordance with Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.3 requiring seed and tubestock used in revegetation should include a variety of grasses, low shrubs, mid-sized shrubs and trees, characteristic of White Box – Yellow Box – Blakely's Red Gum Woodland EEC and CEEC (as per the NSW Final Determination and Commonwealth Listing Advice for the communities), to create structurally diverse habitat).


The MCCM Threatened Fauna Implementation Plan (Whitehaven, 2015a) was developed to maximise the likely prospects of providing suitable habitats for threatened fauna within the offset areas (including those species listed in Condition 49 of Schedule 3 to PA 10\_0138). Table 6-4 includes flora species known to be used as habitat resources for threatened fauna that were identified in the MCCM Threatened Fauna Implementation Plan (Whitehaven, 2015a).

The Regent Honeyeater (*Xanthomyza phrygia*) and Swift Parrot (*Lathamus discolor*) may potentially use Box-Gum Woodland EEC/CEEC in the offset areas as a foraging resource (although neither species was recorded in the offset areas or in Leard State Forest). In consideration of the potential foraging habitat requirements of the Regent Honeyeater (*Xanthomyza phrygia*), a variety of box, ironbark and gum eucalypt species will be established, including, but not limited to, White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*), Allocasuarina and Casuarina species (Table 6-4). In consideration of the potential habitat requirements of the Swift Parrot (*Lathamus discolor*), a variety of winter-flowering box, ironbark and gum eucalypt species will be established, including, but not limited to, White Box (*E. albens*) (Table 6-43).

The proposed revegetation of box, ironbark and gum eucalypt species (Table 6-43) can provide habitat for potential sources of prey for the South-eastern Long-eared Bat (*Nyctophilus corbeni*).

### Box-Gum Woodland


Box-Gum Woodland is dominated or co-dominated by White Box, Yellow Box or Blakely's Red Gum trees, however, the species composition of Box-Gum Woodland varies across its range in NSW.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

Queensland and Victoria depending on local conditions (e.g. slope, aspect, soil type). The revegetation program will focus on establishing Box-Gum Woodland with a similar composition of flora species to the existing vegetation communities which represent the Box-Gum Woodland EEC/CEEC. In other words a patch will be expanded using species which occur [or likely to have formerly occurred] in that patch. This will also mimic the variation (patchiness) of the Box-Gum Woodland within the landscape. Box-Gum Woodland is represented by the following vegetation communities in the offset areas (Greenloaning Biostudies, 2014b):

- Blakely's Red Gum - White Box - ± Yellow Box - Melaleuca Riparian Forest;
- Blakely's Red Gum - Yellow Box Grassy Woodland (± Stringybark);
- Rough-Barked Apple - Blakely's Red Gum Riparian Grassy Woodland;
- White Box - Stringybark - ± Manna Gum Grassy Woodland;
- White Box - ± Yellow Box ± Stringybark Grassy Woodland;
- White Box - White Cypress Pine ± Narrow-Leaved Ironbark Grassy Open Forest;
- White Box - White Cypress Pine ± Narrow-Leaved Ironbark Grassy Woodland;
- White Box - Wilga - Belah Woodland;
- White Box - Wilga ± Quinine Semi-Cleared Woodland;
- White Box (± Stringybark) Grassy Woodland;
- Yellow Box - Blakely's Red Gum - ± Manna Gum Open Forest/Woodland; and
- Yellow Box ± White Cypress Pine Grassy Woodland.

Active revegetation of Box-Gum Woodland will prioritise areas of Derived Native Grassland (Box-Gum Woodland -low diversity and not conforming to the EEC/CEEC) shown on Figures 8a to 8d; but other areas of Derived Native Grassland will also be assessment through site planning processes to determine if active revegetation is required where natural regeneration has been limited or non-existent.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

Local native perennial grasses, e.g. Kangaroo Grass (*Themeda triandra*), will be sown in revegetation areas targeting Box-Gum Woodland as these species are known to out-compete annual grass weeds and provide inter tussock spaces for a diversity of ground cover species (e.g. wildflowers). Additional information on species to include in revegetation of Box-Gum Woodland can be found in the [Florabase Florabank](#) (2014) *Box-Gum Grassy Woodland Species - Species Navigator Fact Sheets*.

#### ***Seed and Tube Stock Supply Strategy***

The seed and tube stock supply strategy involves:

- calculation of the amount and species of seed and tube stock required each year;
- review of the amount and species of seed collected locally (e.g. at the mine site and offset areas);
- identifying the gaps and constraints to meeting the demand;
- handling and storage requirements;
- pre-planting treatments; and
- review of how additional seed and/or tube stock will be sourced to meet the demand.

#### ***Revegetation Techniques***

Revegetation techniques (natural regeneration, direct seeding and tubestock planting) are described below. A combination of revegetation techniques may be used in a revegetation area.

#### ***Passive Revegetation - Natural Regeneration***


As described above, natural regeneration will be favoured over planting or direct seeding in areas of native woodland/forest and derived native grassland (moderate to good condition) because natural regeneration conserves the natural genetic diversity of the local vegetation. For example, the condition of the Box-Gum Woodland in the offset areas range from good to degraded condition mainly due to past clearing, grazing, weeds and pests. Natural regeneration in semi-cleared woodland or derived grasslands of Box-Gum Woodland will be promoted through reduced grazing pressure and management of threatening processes to Box-Gum Woodland. Grazing management is discussed in Section 6.11. Controlled burns to stimulate natural regeneration should be examined on an experimental basis (Section 6.13).

Natural regeneration is not likely to occur in pasture improved and cultivated land due to an absence or deficiency of native seed causing low resilience. Active revegetation is therefore discussed below.

#### ***Active Revegetation - Direct Seeding and Tubestock Planting***

Direct seeding and/or tubestock planting will be undertaken primarily in areas of low diversity derived native grassland, pasture improved and cultivated land (Figures 9a to 9c). A combination of direct



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

seeding and tubestock planting may be used to increase the diversity of species, as some species are better suited to direct seeding, and other species are better established by tubestock.

Direct seed and tubestock planting will be undertaken in consideration of the Florabank *Native Vegetation Management Tool* (<http://www.florabank.org.au/>) (Carr *et al.*, 2010) and *A Guide to Managing Box Gum Grassy Woodlands* (Rawlings *et al.*, 2010).

As described above, the site planning will be undertaken prior to revegetation to provide direction and assist MCC with application rates for seeds as well as planting densities for tube stock to help avoid excessive shading better mimic natural communities (species relative abundance and community structure). Box-Gum Woodlands typically have widely spaced trees (30–40 trees/ha) with a ground cover of grasses and a sparse or patchy shrub layer (Rawlings *et al.*, 2010; DEH, 2006). In an ideal patch of Box-Gum Woodland, the groundcover is a mixture of tussock grasses (i.e. grasses in clumps or bunches, rather than a lawn), bare ground, leaf litter, fallen timber, rocks and forbs (Rawlings *et al.*, 2010).

Large areas can be seeded quickly using mechanical seeders (e.g. up to 50 ha/day) and mechanical planters can be used to plant tubestock (Greening Australia, 2015).

Slow-release native plant fertiliser may be selectively used to promote plant growth (if required).


### **Site Preparation**

Site preparation involves consideration of soil testing, grazing protection, weed control and ground preparation as discussed below.

#### **Soil Testing**

Elevated soil nutrients (such as nitrogen) can inhibit revegetation efforts and favour the growth of weeds (Prober *et al.*, 2002; Rawlings *et al.*, 2010; DECCW, 2011). Where necessary, soil testing will be undertaken on soils in previously cultivated land (within the Revegetation Domain) to identify issues with physical and chemical characteristics as well as determine the need for nutrient reduction. Nutrient reduction options in these low diversity native grasslands/pasture improved and/or cultivated land are as follows:

- crash grazing periodically to remove nutrients locked in weeds;
- restriction of livestock access to limit further nutrient enrichment and waiting for the soil fertility levels to drop prior to revegetation activities (Dorrough *et al.*, 2008) (Section 6.11);
- controlled burns (Section 6.13);
- soil scalping (Gibson-Roy *et al.*, 2010); and/or
- planting crops, including all related activities to allow such, which will take up the elevated soil nutrients and harvesting the plants to remove the nutrients, including all related activities to all such (Rawlings *et al.*, 2010).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### ***Grazing Protection***

Livestock will be excluded from areas undergoing active revegetation (i.e. planting or seeding) (Section 6.11). High fertility cultivated paddocks can be rapidly dominated by exotic perennial grasses once grazing is removed (Dorrough *et al.*, 2008), hence the importance of soil testing (above).

### ***Weed Control***

Weed control is described in Section 6.8 and weed monitoring is discussed in Section 6.17.3. There will be a higher need for weed control in cleared land and along waterways compared to existing intact native woodland/forest. Controlling weeds prior to active revegetation can reduce competition and improve the success of revegetation. Cultivation or targeted scalping may be required to remove weeds and nutrients prior to seeding/planting.

### ***Ground Preparation***

Soil compaction inhibits germination of seeds or growth of seedlings (Eddy, 2002; Department of Sustainability and the Environment, 2005; Rawlings *et al.*, 2010; DECCW, 2011). Ground preparation will be undertaken as required to reduce soil compaction and improve infiltration which can affect the success of the revegetation.

Cultural heritage considerations are discussed in Section 6.7.

### ***Improving Habitat Values***

Section 4.1.6 describes the salvage of habitat resources (bush rocks, timber/hollow logs) during vegetation clearance at the MCCM. Section 6.6 describes the reuse of salvaged habitat resources.


### ***Maintenance***

The revegetation areas will be maintained through a variety of activities, including weed control (Section 6.8) and feral animal control (particularly grazing herbivores) (Section 6.9).

Contingency measures to address potential issues with the revegetation areas (e.g. poor understorey diversity, plant growth or grazing kangaroos) are provided in Section 6.18.

### ***Revegetation Monitoring and Reporting***

Monitoring of the revegetation areas is discussed in Section 6.17, record keeping is discussed in Section 7.1, and reporting requirements are discussed in Section 7.2.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### 6.5.2 Ecological Thinning

Sometimes regeneration is too successful and trees may compete with each other for light, water and nutrients (Rawlings *et al.*, 2010; DECCW, 2011). Dense overstorey and midstorey revegetation may require ecological thinning (through selective clearing). The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 3.2 recommends ~~adopt~~ best-practice active and adaptive management of the density of invasive native plants such as white cypress pine (*Callitris glaucophylla*) and black cypress pine (*Callitris endlicheri*). Consistent with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.1; the following section describes how natural regeneration management options such as thinning can be undertaken to promote canopy species regeneration in dense grasslands and cypress pine regrowth areas.

Ecological thinning can increase floristic diversity and structural complexity within a revegetated area and prevent poor or stunted growth of established plants (Bauhus *et al.*, 2001). It also promotes greater access of understorey species, typically herbaceous groundcovers, to resources such as space, light, and nutrients that may otherwise have been restricted by high tree densities. Thinning also increases the amount of woody debris in an area which can provide suitable habitat for ground-dwelling fauna and create microhabitats for flora.

Ecological thinning will be undertaken in an adaptive fashion in select areas where necessary to promote the floristic diversity and structural complexity within the areas undergoing revegetation (the Enhancement, Restoration and Revegetation Domains). Thinning density will be consistent with the species relative abundance and community structure of the target vegetation community (see specific information on Box-Gum Woodland below).

Trees will be felled using a chainsaw or brush cutter to minimise the potential for disturbance to non-target vegetation. Targeted weed monitoring and control will be undertaken (if necessary) in disturbed areas subject to ecological thinning.


Native vegetation clearing in the offset areas will not be undertaken unless for ecological thinning, infrastructure related to the offset areas, maintenance or access for monitoring and bushfire management.

#### **Box-Gum Woodland**


Box-Gum Woodland tree density of 30-40 mature trees per hectare is considered ecologically optimal (Rawlings *et al.*, 2010; McIntyre *et al.*, 2002), with spacing (between mature trees) of half to two crown widths. During 2014, Greenloaning Biostudies identified some areas of Box-Gum Woodland with dense Cypress Pine regeneration (Figures 12a, 12d and 12f). These areas do not meet the condition criteria for the Box-Gum Woodland EEC/CEEC, but could do so with ecological thinning.

Thinning methods will be consistent with *A Guide to Managing Box Gum Grassy Woodlands* (Rawlings *et al.*, 2010). Smaller trees (less than 10 cm diameter at breast height) will be thinned to 400 stems/ha (approximately 5 x 5 m spacing). Larger trees (greater than 10 cm diameter at breast height) will be thinned to 250 stems/ha (approximately 6 x 7 m spacing). Smaller trees will be preferentially removed.



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

Targeted revegetation may also be undertaken in these areas to increase the condition of the vegetation above the criteria for the Box-Gum Woodland EEC/CEEC.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

## 6.6 REUSE OF SALVAGED HABITAT RESOURCES

Section 4.1.6 describes the salvage of naturally scarce fauna habitat features (bush rocks, fallen timber, hollow-bearing trees and –logs) during vegetation clearance at the MCCM for beneficial reuse in accordance with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 2.1. These habitat resources will be used in rehabilitation of the post-mine landforms and in select management units in the offset areas near the MCCM (Table 6-54).


**Table 6-54 Reuse of Salvaged Habitat Resources**

Management Units	Location	Figure Reference
<b>Revegetation</b>		
Rv1	Wollandilly	Figure 12b
Rv2	Warriahdool	Figure 12a
<b>Revegetation/Enhancement</b>		
Rv/E1	Tralee and Teston (north)	Figure 12a
Rv/E2	Teston (south)	Figure 12a
Rv/E3	Wollandilly	Figure 12b
Rv/E4	Wollandilly	Figure 12b
Rv/E5	Warriahdool	Figures 12a and 12b
<b>Revegetation/Restoration</b>		
Rv/R1	Wollandilly	Figure 12b
Rv/R2	Wollandilly	Figure 12b

As described in Section 4.1.6, the salvaged habitat features will be moved to interim storage areas at the mine site until a time that they can be relocated or preferably transported immediately to preidentified sites if available either on mine rehabilitation [commencing in 2018] or the offset areas<sup>11</sup>.

The number of bush rocks added to the offset areas, amount of timber/logs and number of salvaged hollow logs installed in trees will depend on the results of the salvage program at the mine site and use

<sup>11</sup> Salvaged habitat features may be held in interim storage areas for up to five years.


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

on mine rehabilitation areas. Machinery may be required to transport salvaged habitat features across the offset areas.

***Relocation of Bush Rocks***

Relocation of bush rocks within the Leard State Forest or beyond the forest boundary will be undertaken as agreed with FCNSW. Bush rocks will be used in cleared areas within a selection of the management units in Table 6-5 to increase the structural complexity of the management units once they undergo revegetation. Bush rocks provide habitat for some invertebrates and reptiles. Bush rocks will be placed either in piles or scattered.



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### **Relocation of Timber/Hollow Logs**

Timber/logs will also be used in cleared areas within a selection of the management units in Table 6-5 to increase the structural complexity of the management units once they undergo revegetation. Timber/logs will be placed to avoid piles that could harbour feral animals.

### **Provision of Nesting Habitat for Hollow-dwelling Fauna**

Salvaged hollow logs (as specified in Section 4.1.6) will be installed in select trees within a selection of the management units in Table 6-5 to provide nesting habitat for arboreal mammals (bats) and birds. Healthy living trees without existing hollows would be selected for placement of the hollow logs. The hollow logs for nesting habitat will be suspended off the ground, with consideration of the aspect of the placement. Co-ordinate locations of installed hollow logs will be recorded using a GPS.


In addition, the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 2.2 requires that habitat augmentation (using salvaged resources or nest boxes) should be undertaken in habitats identified as having low habitat resources. Where nest boxes are to be installed they are to be made from high quality and durable materials that, ideally, provide for a long lifespan and of designs should be targeted to the hollow-dependent threatened species known to occur in the locality of the offset site such as woodland birds, arboreal mammals and micro-bats. The total number of hollows (existing hollows and nest boxes combined) at the OFFSET sites should be at least the same as the number of hollows with signs of use (nesting material, feathers, fur, scratches, etc) and of suitable dimensions for species occupancy (suitable entrance size and a hollow chamber extending into the branch/trunk) removed from the impact site. It is expected that the installation of nest boxes would be staged over time to mirror the regeneration of the woodland and the species that are utilising each site.

### **6.7 ~~MANAGEMENT~~ MANAGEMENT OF CULTURAL HERITAGE ~~HERITAGE VALUES~~ VALUES**

There is not expected to be any conflict between the proposed restoration works in the offset areas and any Aboriginal heritage values (both cultural and archaeological). However, it is noted that:

- Any disturbance works in the offsets will consider potential impacts to heritage values.
- This BMP will need to consider the outcomes of the Aboriginal Heritage Conservation Strategy required by Condition 57, Schedule 3 to PA 10\_0138.
- If any artefacts are found or known to occur, then consultation will be undertaken with qualified heritage consultants and an appropriate course of action identified. Offset areas outside of the approved Project Boundary will need to meet all statutory requirements under the *National Parks and Wildlife Act 1974* (NP&W Act).

### **6.8 ~~CONTROL~~ CONTROL OF OF WEEDS WEEDS**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Consistent with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.1; the following section describes how the management of weeds addresses threatening processes that promotes natural regeneration of habitat enhancement, restoration domains, corridor enhancement zones, semi-cleared and remnant native woodland vegetation.

### **Objectives**

Environmental and noxious weeds can have detrimental effects on native remnant vegetation and have the potential to compromise revegetation efforts. Weed management of the offset areas will be aimed at controlling the occurrence and spread of environmental (e.g. WONS) and NSW biosecurity noxious priority weeds (formerly noxious weeds) whilst encouraging native species. The long term objective is to reach a stage where the offset areas only require a low level of weed control and where the native vegetation is not inhibited by the presence of weeds.

### **Weed Prevention**

The spread and introduction of weeds can be prevented by minimising disturbances that result in bare soil. Access tracks/fire trails will be maintained and preferentially used to provide access within the offset areas (Section 6.2.3). Access to the offset areas will also be controlled as described in Section 6.12.

The spread of weeds from infested areas will be minimised through washing down vehicles and machinery as required.

The implementation of measures that favour the restoration of healthy native vegetation that outcompetes weed species can also be an effective method of weed management. Revegetation is discussed in Section 6.5.


### **Weed Control Program/Timing**

The weed control program will involve:

- identifying weeds (Section 4.13.2);
- application of weed control techniques in areas requiring weed control;
- follow-up monitoring of weed control; and
- follow-up inspection weed control as required.

Weed control will be undertaken for the targeted weed species based on seasonal conditions.

Follow-up weed control will be undertaken, as required, in areas that have received past primary weeding treatments. Follow-up treatments ensure pressure is maintained on weeds assisting regenerating or planted native plants to out-compete weed species.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


### ***Weed Control Techniques***

A number of environmental and ~~noxious-priority~~ weeds are known to occur in the offset areas as listed in Table 6-65. Initially weeding will take place targeting the noxious weeds (Table 6-65) and as well as any other environmental weeds present in the offset areas. However, if new weeds species are found, those new weeds species will also be managed in accordance with this BMP.

~~The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 3.2 recommends techniques for the removal of weeds in consideration of the *Noxious and Environmental Weed Control Handbook* (DPI, 2014a) and resources on the NSW WeedWise website (<http://weeds.dpi.nsw.gov.au/>). Recommended techniques for removal of noxious weeds that have been published by DPI Agriculture will be consulted prior to weed control, e.g. *Noxious and Environmental Weed Control Handbook* (DPI, 2014a). Local weed management plans published by the Local Councils (Narrabri Shire Council, 2014; Tamworth Regional Council, 2014 and Gunnedah Shire Council, 2014) also provide information on the control of noxious weeds. Relevant methods for controlling ~~noxious~~ priority weeds known to occur in the offset areas are summarised in Table 6-65.~~





	<h2>MAULES CREEK</h2>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**Table 6-65 Control of Example ~~Target~~-Priority Noxious Weeds**


Common Name	Scientific Name	Example Control Methods (DPI, 2014a) <sup>2</sup>
Mother of Millions	<i>Bryophyllum delagoense</i>	<ul style="list-style-type: none"> <li>herbicide application</li> </ul>
Paterson's Curse	<i>Echium plantagineum</i>	<ul style="list-style-type: none"> <li>grazing management practices</li> <li>herbicide application</li> </ul>
African Boxthorn	<i>Lycium ferocissimum</i>	<ul style="list-style-type: none"> <li>physically remove</li> <li>herbicide application</li> </ul>
Common Prickly Pear	<i>Opuntia stricta</i>	<ul style="list-style-type: none"> <li>herbicide application</li> </ul>
Prickly Pear	<i>Opuntia</i> sp.	<ul style="list-style-type: none"> <li>herbicide application</li> </ul>
Tiger Pear	<i>Opuntia aurantiaca</i>	<ul style="list-style-type: none"> <li>herbicide application</li> </ul>
Sweet Briar	<i>Rosa rubiginosa</i>	<ul style="list-style-type: none"> <li>physical removal</li> <li>herbicide application</li> </ul>
Fireweed	<i>Senecio</i> spp.	<ul style="list-style-type: none"> <li>grazing management practices</li> <li>herbicide application</li> </ul>
Cockle Burr	<i>Xanthium occidentale</i>	<ul style="list-style-type: none"> <li>physical removal</li> <li>herbicide application</li> </ul>
Bathurst Burr	<i>Xanthium spinosum</i>	<ul style="list-style-type: none"> <li>physical removal</li> <li>herbicide application</li> </ul>

Sources: Australian Museum Consulting (2014); Cumberland Ecology (2011) and Niche Environment and Heritage (2012).

<sup>1</sup>— *Noxious Weeds Act, 1993* for the Narrabri Shire Council; Tamworth Regional Council; and Gunnedah Shire Council.

<sup>2</sup> An alternative published method may be used as required.

In addition to species listed in Table 6-65, Coolatai Grass (*Hyparrhenia hirta*) is particularly invasive and is a recognised threat to Box-Gum Woodland EEC/CEEC (DECCW, 2011), although it is not noxious in the control areas relevant to the offset areas. In the event that Coolatai Grass is found in the offset areas, individual plants can be pulled by hand or treated with herbicide (DPI, 2014a). This is consistent with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 3.2 recommending adopting best-practice management of Coolatai grass which threatens to suppress

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**


the native understorey of Box-Gum Woodlands as per the recommendations set out in the Department of Primary Industries NSW WeedWise Website.

All personnel involved in weeding management will be required to hold relevant and valid licences/permits for weeding works, including a chemical licence to use herbicides and a chainsaw certificate to operate chainsaws (where applicable).

~~Weed control techniques in Table 6.6 (i.e. physical removal, herbicide application and grazing management practices) are described below. Nutrient management by removal of grazing livestock and controlled burns to reduce annual and perennial grass weeds are also described below. Additional techniques may be undertaken depending on the weed species present and the success of these control techniques.~~





	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### Physical Removal

Some woody weeds (e.g. African Boxthorn and Sweet Briar) may be physically removed. After physical removal of any plant material, the plant material will be stockpiled (for no more than 1 week) away (>200 m) from sensitive areas (i.e. creeks or Box Gum Woodland CEEC/EEC) that avoids further spread of the woody weed and disposed of appropriately.

In addition to species listed in Table 6.6, exotic trees such as Elms (*Ulmus* sp.) and Weeping Willows (*Salix babylonica*) will be controlled and removed from areas of occurrence along Horton Creek. This is intended to promote regeneration of native riparian vegetation.

### Herbicide Application

The application and concentration of herbicides will be in consideration of the *Noxious and Environmental Weed Control Handbook* (DPI, 2014a). Removal of weeds with a herbicide will 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; and
- target drilling and injecting large tree weeds with herbicides.

Herbicide sprays will only occur during suitable weather conditions (i.e. not during wet or windy conditions), and during appropriate seasons.

### Crash Grazing Periodically to Reduce Annual and Perennial Grass Weeds


Crash grazing is the practice of allowing high densities of livestock to graze targeted areas for short periods of time, and is aimed at breaking up mats of perennial grass species to allow room for natural regeneration of trees and shrubs to take place. Crash grazing can also assist with the prevention or reduction of weedy annual or perennial grass seed production.

Management of livestock grazing is described in Section 6.11.

### Nutrient Management – Removal of Grazing Livestock

Grazing livestock add nutrients into the soil and disturb groundcover which can promote the growth of weeds. Management of livestock grazing is described in Section 6.11.

### Controlled Burns to Reduce Annual and Perennial Grass Weeds

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

Controlled burns may be undertaken in Revegetation and Restoration Domains to reduce weeds and/or promote the biodiversity. Spring burns can be useful for reducing the mass of exotic annual grasses (Rawlings et al., 2010) which occur in the Revegetation and Restoration Domains. Bushfire management is described in Section 6.13. Autumn burns may be useful to assist with natural tree and shrub regeneration and to assist with ecological thinning. Controlled burns will be conducted on an adaptive (experimental) basis.

**Weed Communication**

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 3.1 recommends weed management conditions and trends to be communicated across the BTM Complex Leard Forest Mining Precinct and should include:

- review monitoring reports for up-to-date information on weeds;
- discussing and prioritising weed prevention, control methods and target species across the BTM Complex Leard Forest Mining Precinct for the following year;
- liaise with local land managers and stakeholders on control measures and schedules.

In addition, a feedback loop will be developed to alert the BTM Complex Leard Forest Mining Precinct of any new or emerging weeds recorded to be occurring on any of the offset sites.

**Weed Monitoring and Reporting**

Weed monitoring is discussed in Section 6.17.3, including considering a coordinated approach for consistent record keeping is discussed in Section 7.1, and reporting requirements are discussed in Section 7.2.


**6.9 CONTROL CONTROL OF FERAL FERAL ANIMALS ANIMALS**

Consistent with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.1; the following section describes how the management of feral animals addresses threatening processes that promotes natural regeneration of habitat enhancement, restoration domains, corridor enhancement zones, semi-cleared and remnant native woodland vegetation.

**Objectives**

The goal of feral animal management in the Offset Areas will be to ensure that impacts to native species, existing vegetation and rehabilitation efforts caused by feral animals are minimised and managed. Feral animals will be controlled within all offset areas with the long term objective being to reach a stage where the conservation management areas only require a low level of feral animal control and where the biodiversity value of native vegetation and rehabilitation efforts and restorations areas are not at high risk from feral animal.



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### Feral Animal Control Techniques

Feral animal management will focus on the main feral animals recorded from the offset areas (Table 6-76). However, if new feral animals are found during monitoring those new feral animals will also be managed in accordance with this BMP. The control of feral animals is intended to be adaptive and will be informed/reviewed based on the findings from the Feral Animal Monitoring Program (Section 6.17.4). The control program will also consider advice from neighbouring landowners regarding observations of target feral animals upon offset areas.

Control measures will be implemented by mine staff or by an appropriate Pest Control Contractor(s) as required. All personnel involved in feral animal control will be required to hold relevant and valid licences/permits, including any relevant chemical licences for pesticide use or a firearms licence for shooting. The *Humane Pest Animal Control: Code of Practice and Standard Operating Procedures* (DPI, 2013, or its revision) will be followed. The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 3.3 recommends that feral animal control should be undertaken in consideration of the control recommendations outlined in the Department of Primary Industries Vertebrate Pest Control Manual (DPI 2014) and that control strategies follow the NSW Codes of Practices (COPs) and Standard Operating Procedures (SOPs) (<http://www.dpi.nsw.gov.au/agriculture/pests-woods/vertebrate-pests/publications/model-codes-of-practice>).

**Table 6-76  
Control Methods for Target Feral Animals**

Common Name	Scientific Name	Example Control Method	Relevant Documents <sup>4</sup>
<b>Birds</b>			
Common Myna	<i>Acridotheres tristis</i>	• trapping.	-
Feral Pig	<i>Sus scrofa</i>	• trapping/ground shooting; and/or • ground baiting (usi1080 poison).	<ul style="list-style-type: none"> <li>• <i>Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs</i> (Department of the Environment and Heritage, 2005);</li> <li>• <i>PestSmart Toolkit</i> (Invasive Animals Cooperative Research Centre, 2015); and</li> <li>• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).</li> </ul>
Feral Goat	<i>Capra hircus</i>	• ground shooting.	<ul style="list-style-type: none"> <li>• <i>Threat Abatement Plan for Competition and Land Degradation by Unmanaged Goats</i> (DEWHA, 2008d); and</li> </ul>



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

			<ul style="list-style-type: none"> <li>• <i>PestSmart Toolkit</i> (Invasive Animals Cooperative Research Centre, 2015).</li> </ul>
European Red Fox	<i>Vulpes vulpes</i>	<ul style="list-style-type: none"> <li>• trapping, and/or</li> <li>• ground baiting (usi1080 poison).</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Threat Abatement Plan for Predation by European Red Fox</i> (DEWHA, 2008a);</li> <li>• <i>NSW Threat Abatement Plan For Predation by The Red Fox (Vulpes vulpes)</i> (OEH, 2011);</li> <li>• <i>PestSmart Toolkit</i> (Invasive Animals Cooperative Research Centre, 2015); and</li> <li>• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).</li> </ul>
European Rabbit	<i>Oryctolagus cuniculus</i>	<ul style="list-style-type: none"> <li>• warren ripping/fumigation;</li> <li>• ground shooting; and/or</li> <li>• ground baiting (usi1080 poison).</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Threat Abatement Plan for Competition and Land Degradation by Rabbits</i> (DEWHA, 2008b);</li> <li>• <i>PestSmart Toolkit</i> (Invasive Animals Cooperative Research Centre, 2015); and</li> <li>• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).</li> </ul>
Brown Hare	<i>Lepus capensis</i>	<ul style="list-style-type: none"> <li>• ground shooting.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Integrated Hare Control</i> (Department of Environment and Primary Industries [VIC], 2015); and</li> <li>• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).</li> </ul>
Feral Deer	<i>Cervus spp., Axis spp., or Dama spp.</i>	<ul style="list-style-type: none"> <li>• ground shooting.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Feral Fallow Deer Dama dama Fact Sheet</i> (Department of Agriculture, Fisheries, Forestry and Biosecurity Queensland, 2013);</li> <li>• <i>Feral Deer</i> (DoEE, 2011); and</li> <li>• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).</li> </ul>
Feral Cat	<i>Felis catus</i>	<ul style="list-style-type: none"> <li>• ground baiting; and/or</li> <li>• shooting.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Threat Abatement Plan for Predation by Feral Cats</i> (DEWHA, 2008c);</li> <li>• <i>PestSmart Toolkit</i> (Invasive Animals Cooperative Research Centre, 2015); and</li> <li>• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).</li> </ul>

**Table 6-7 (Continued)**  
**Control Methods for Target Feral Animals**

Common Name	Scientific Name	Example Control Method	Relevant Documents <sup>2</sup>
Wild Dog	<i>Canis familiaris</i>	<ul style="list-style-type: none"> <li>• ground baiting (using 1080 poison); and/or</li> <li>• ground shooting.</li> </ul>	<ul style="list-style-type: none"> <li>• <i>New South Wales Wild Dog Management Strategy 2012-2015</i> (DPI, 2012);</li> <li>• <i>Wild Dog Policy</i> (DECC, 2005);</li> <li>• <i>PestSmart Toolkit</i> (Invasive Animals Cooperative Research Centre, 2015); and</li> <li>• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).</li> </ul>





## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Black Rat	<i>Rattus rattus</i>	• ground baiting.	• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).
House Mouse	<i>Mus musculus</i>	• ground baiting.	• <i>Vertebrate Pest Control Manual</i> (DPI, 2014b).
Feral Camel	<i>Camelus dromedarius</i>	• ground shooting.	• <i>National Feral Camel Action Plan</i> (DoE/DoEE, 2010).

<sup>1</sup> *Local Land Services Act 2013*

<sup>2</sup> An alternative published method may be used as required.

Feral animal control techniques in Table 6.7.6 are described in Section 4.6 and below. A selection of these techniques or additional techniques may be undertaken depending on the feral animal species which is in an abundance that requires control (as determined through monitoring) and the success of these control techniques.

#### Common Myna


Although poisoning and shooting have been used to control small numbers of Mynas, neither method is considered to be effective, and safe for humans and non target animals in broad scale use. One avenue for safe, humane and effective control of Mynas is selective trapping (Tideman, 2005). Mynas can be trapped selectively with nest box traps during the breeding season (Austral spring), and with valve traps at feeding areas. Mynas captured in traps can be euthanased whilst held within the trap by immersing the capsule of the trap in a gassing sleeve (Tideman, 2005).

#### Feral Animal Communication

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 3.1 recommends feral animal management conditions and trends to be communicated across the BTM Complex Leard Forest Mining Precinct and should include:

- review monitoring reports for up-to-date information on feral animals;
- discussing and prioritising feral animals animal prevention, control methods and target species across the BTM Complex Leard Forest Mining Precinct for the following year;
- liaise with local land managers and stakeholders on control measures and schedules.


In addition, a feedback loop will be developed to alert the BTM Complex Leard Forest Mining Precinct of any new or emerging feral animals recorded to be occurring on any of the offset sites. Public communication on pest animal records wont be reported through FeralScan.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

***Feral Animal Monitoring and Reporting***

Feral animal monitoring is discussed in Section 6.17.4, including considering a coordinated approach for consistent record keeping is discussed in Section 7.1, and reporting requirements are discussed in Section 7.2.



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

## 6.10 ~~CONTROL~~ ~~CONTROL OF EROSION~~ ~~EROSION AND SOIL~~ ~~SOIL~~

A draft recommended action from the MCCM Independent Biodiversity Audit 2017 (ERM, 2018) was for “a register of offset erosion areas be developed to incorporate the old Teston North quarry and other areas of erosion as identified”.

### **Erosion**

Livestock grazing has the potential to cause erosion, particularly along watercourses. Grazing livestock will be excluded from various management domains that contain watercourses (Habitat Management Domain, Enhancement Management Domain, Restoration/Enhancement Management Domain) and riparian zones within management unit Rv2 (Back Creek), Rv/E1 (Back Creek and Whiskey Creek), Rv/E4 and Rv/E11 (Maules Creek) as well as management unit Rv6 and Rv/E8 (Namoi River). Further, drainage areas in paddocks subject to grazing will generally be well grassed (with high ground cover) or fenced off from livestock grazing.

The proposed revegetation program (that aims to restore native vegetation cover) and livestock grazing management program (that will lessen grazing pressures) will likely reduce the potential of erosion issues developing in the offset areas.


An existing area of erosion occurs in Rv/E1 (old Teston North quarry). Additional earthworks will be required before ~~This area will~~ ~~can~~ ~~be remediated~~ ~~revegetated~~ as part of the revegetation program.

### **Soil Salinity**

Salinity is not known to be an issue for the offset areas (after McKenzie Soil Management, 2015), and the actions specified in this BMP are not likely to increase the level of salinity, and therefore no salinity management measures are proposed to be undertaken in this BMP.

## 6.11 ~~MANAGEMENT~~ ~~MANAGEMENT OF LIVESTOCK~~ ~~LIVESTOCK GRAZING~~ ~~GRAZING~~

Consistent with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.1; the following section describes how livestock restriction in conjunction with strategic grazing addresses threatening processes that promotes natural regeneration of habitat enhancement, restoration domains, corridor enhancement zones, semi-cleared and remnant native woodland vegetation.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### **Objectives**


The offset areas will be managed primarily for the purposes of compensating for biodiversity impacts from the MCCM and improving regional biodiversity outcomes. If required, the objectives of controlled livestock grazing are to protect existing intact bushland areas and riparian areas whilst stimulating natural regeneration of native vegetation and/or controlling weeds.

### **Agricultural Suitability Assessment**

In January 2015, McKenzie Soil Management Pty Ltd (Dr David McKenzie) undertook an Agricultural Suitability Assessment in accordance with Condition 46 of Schedule 3 to PA 10\_0138. In relation to the offset areas, the objectives of the agricultural suitability assessment were to:

- undertake a review of the suitability of grazing livestock within the offset areas (in low diversity derived grassland, cultivated land and pasture improved land) to assist natural regeneration.
- provide recommendations of agricultural-related management measures for maintaining or enhancing the lands within the offset areas for conservation and corridor enhancement purposes.



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

In summary, the recommendations were to:

- to restrict livestock grazing in existing intact bushland areas, riparian areas and areas undergoing active planting/seeding;
- use strategic livestock grazing (if required) prior to revegetation in the additional low diversity derived grassland, cultivated land and pasture improved land to control weeds and carry out the grazing in a way that minimises damage to soil structure;
- strategic livestock grazing may be used in derived native grasslands to promote diversity and control weeds (e.g. a controlled regime with crash grazing, resting, light grazing and rotational grazing); and
- gradually de-stock the offset areas once native vegetation is dominant.

The management of livestock grazing in the offset areas is described below based on these recommendations and consideration of *A Guide to Managing Box Gum Grassy Woodlands* (Rawlings *et al.*, 2010); *Biodiversity in the Paddock: a Land Managers Guide* (Dorrrough *et al.*, 2008) and *Sustainable Land Management Practices for Graziers* (Stein *et al.*, 2009).

### **Grazing Management**

Grazing will be managed as outlined below.


#### **Short Term (3 year period of this BMP)**

Agriculture/grazing will be removed from offset areas as existing licence/agistment agreements expire. The offset areas will be rested to allow natural and active revegetation to commence with the exclusion of grazing continued until such time as revegetation can survive browsing. The following offset areas specifically will have grazing excluded:

- Habitat Management Domain;
- Enhancement Management Domain;
- Restoration/Enhancement Management Domain;
- riparian zones within Rv2 (Back Creek), Rv/E1 (Back Creek and Whiskey Creek), Rv/E4 and Rv/E11 (Maules Creek) as well as Rv6 and Rv/E8 (Namoi River); and
- existing native woodland/forest containing *Tylophora linearis* within Rv/E1, Rv/E2 and Rv/R1.

#### **Medium Term**

Grazing could be used in accordance with the agricultural suitability assessment for biodiversity management to protect existing intact bushland areas and riparian areas whilst stimulating natural regeneration of native vegetation and/or controlling weeds until such time as the native vegetation condition improves to the Enhancement Ecosystem State (see Table 6-1).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### Long Term

All agriculture/grazing will be excluded from the offset area.

### 6.12 ~~CONTROL~~ CONTROL OF ACCESS ACCESS

As described in Section 6.2.3, the offset areas will be set-up on the ground by:

- using existing fencing (where practicable and required) to demarcate the perimeter around the offset areas to manage grazing livestock and avoid accidental clearance;
- installing gates into the offset areas; and
- installing signage on gates into the offset areas which recognised that the area is protected for conservation purposes and to deter third party access into the area.

Vehicle access will be predominantly restricted to designated tracks to minimise ground disturbance (e.g. compaction); with the exception for biodiversity management actions and inspections which unavoidably result in vehicles and machinery travelling off-tracks within the offset area. Maintenance of all access tracks, fire trails, fences and gates to be undertaken as required.

### 6.13 ~~BUSHFIRE~~ BUSHFIRE MANAGEMENT MANAGEMENT

Consistent with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 1.1; the following section describes how natural regeneration management options such as controlled burning can be undertaken to promote canopy species regeneration in dense grasslands and cypress pine regrowth areas.


#### Objectives

The objective of fire management for the offset areas is to:

- appropriately manage the risk of unplanned bushfire occurring;
- respond to an unplanned bushfire were it to occur; and
- use fire to reduce weeds and/or promote the biodiversity of the offset areas.

#### Maintaining Fire Breaks and Access Trails

Infrastructure in the offset areas is shown in Figures 13a to 13g and includes dwellings, fence lines and power lines. Fire access trails identified in Figures 13a to 13g are indicative only. Final locations of fire

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

breaks will be assessed based on routine fuel load and fire hazard assessments. In general, fire breaks will be periodically maintained as zero fuel barriers acknowledging that in between maintenance that some fuel accumulation will occur. Fire breaks are to be located along the perimeter of property/offset boundaries to mitigate fire spreading onto or off the site; as well as fire breaks established strategically within the properties/offsets utilising internal infrastructure boundaries, access trails and fence lines for controlled or back burn ignition sites in case of bush fires.

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 and 2.2 Point 4.1 recommends the accessibility and functionality of fire trails and access tracks should be regularly maintained and monitored within the offset sites. All fire breaks and access trails identified will be inspected at least once a year for maintenance requirements prior to the fire season. However, maintenance issues may also be noted during other routine management and monitoring activities undertaken in the offset areas. Maintenance of fire breaks and access trails will be scheduled as and when required in accordance with Section 6.2.3.

### **Emergency Bushfire Response**


If a bushfire was to occur within or move towards the offset areas, the local NSW Rural Fire Service will be called for assistance. MCCM will assist the Rural Fire Service, Forestry Corporation NSW, emergency services and National Parks and Wildlife Services as much as possible if there is a fire in the surrounding area. However, the assistance provided will be based on the nature of the request from emergency services and is subject to the legal and statutory obligation held by MCCM for its people and or plant. The Rural Fire Service, if required, could be assisted by personnel and/or resources located on the mine, (for fires in the offset areas near the mine) this would occur following assessment and consultation between the mine and the emergency services. Dams (some of which may provide a source of water for fire fighting) are shown on Figures 13a to 13g.

After a bushfire, a record will be made of the timing, intensity and extent of each fire.

[Redacted]


INSERT FIGURE 13A

[Redacted]

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


**INSERT FIGURE 13B**



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


**INSERT FIGURE 13C**



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			


**INSERT FIGURE 13D**



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 13E




	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

INSERT FIGURE 13F






	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**INSERT FIGURE 13G**



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

### **Assessing Fuel Loads**

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 and 2.2 Point 4.1 recommends monitoring of fuel levels will take place as part of the overall annual inspection of the offset sites but also fuel load assessment and an assessment of the feasibility of completing fuel load reduction as identified on a risk basis or as recommended by the RFS. ~~Monitoring fuel levels will take place as part of the annual inspection.~~ Where fuel loads are considered to pose a threat and fuel loads are required to be reduced, the method to reduce fuel loads may involve one or more of the following and could involve consultation with the NSW Rural Fire Services.

### **Controlled Grazing to Reduce Fuel Loads**

Fuel within the offset areas will be controlled to manage fire risk, whilst not inhibiting regeneration of native plants. Fuel reduction may be undertaken through crash grazing (where this does not impact significantly on plant growth or habitat) consistent with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 4.1 however ~~–G~~grazing management of fuel loads ~~is as~~ described in Section 6.11 ~~wont be trialled~~.

### **Controlled (Ecological) Burns to Reduce Fuel Loads**

In accordance with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 Point 4.2: ~~f~~Fuel reduction can also be undertaken through controlled burns (or ecological burns). Controlled burns will be coordinated with the NSW Rural Fire Service. The use of fire in each management domain is discussed below.

### **Revegetation and Restoration Domains**


Controlled burns may be undertaken in Revegetation and Restoration Domains to reduce weeds and/or promote the biodiversity. Spring burns can be useful for reducing the mass of exotic annual grasses (Rawlings *et al.*, 2010) which occur in the Revegetation and Restoration Domains.

No controlled burns will be undertaken in these zones if native vegetation is establishing (e.g. if planting or seeding has occurred) until the revegetation is sufficiently mature to withstand controlled burns.

### **Habitat Management and Enhancement Domains**

Controlled burns may occur in existing woodland/forest within the Habitat Management and Enhancement Domains in consultation with the NSW Rural Fire Service. The relevant Bush Fire Risk Management Plans to the offset areas provide fire frequency intervals for vegetation forms (Table 6-87).

**Table 6-87 Fire Frequency Intervals for Vegetation Forms**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Vegetation Type	Fire Frequency Intervals (Years)	
	Minimum	Maximum
Grassland	3 Years	10 Years
Grassy Woodland	8 Years	40 Years
Dry Sclerophyll Forest (Shrub/Grass Subformation)	8 Years	50 Years
Dry Sclerophyll Forest (Shrub Subformation)	10 Years	30 Years
Semi-Arid Woodlands (Grassy Subformation)	9 Years	No Maximum
Semi-Arid Woodlands (Shrubby Subformation)	15 Years	No Maximum


Modified Source: Narrabri/Moree Bush Fire Management Committee (2010); Liverpool Range Bush Fire Management Committee (2010); Tamworth Bush Fire Management Committee (2011).

Further to the intervals in Table 6-8, the fire frequency interval of controlled burns in patches of Box-Gum Woodland EEC/CEEC (existing grassy woodland) will be no less than five years. DECCW (2011) suggests fire frequency in Box-Gum Woodland EEC/CEEC will be a minimum interval of five years and a maximum interval of 40 years. Rawlings *et al.* (2010) recommends fire frequency in Box-Gum Woodland EEC/CEEC will be every four to eight years.

Prior to controlled burns, consideration will be given to known occurrences of threatened flora species and their sensitivities to fire; as well as considering mosaic burning and avoid burning hollow bearing trees to minimise impact to fauna. The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 4.1 recommends additional flora monitoring points will be required to assess the impacts of control measures on native vegetation communities (particularly within White Box – Yellow Box – Blakelys Red Gum Woodland EEC and CEEC). In habitat restoration areas and regeneration/revegetation zones, monitoring will be required to record the response to a fire event and guide the need for potential active and adaptive management.

Autumn burns can be useful for reducing biomass and increasing native species diversity (Rawlings *et al.*, 2010). If controlled burns are to occur, low intensity prescribed burning is recommended for all vegetation types in the offset areas (after NSW Rural Fire Services, 2006). As defined by the NSW Rural Fire Services (2006) low intensity prescribed burning means:

*the use of fire intended to result in the removal of the leaf litter, grass and shrub layer with minimal canopy scorching. Fires will be patchy and the actual area burnt may vary between 40% and 80%. The average flame height will be less than one metre. This can be achieved by lighting under conditions where a combination of some or all of following factors influence fire behaviour – low fuel loads, moist fuels, low temperatures, high humidity, low wind speeds and fire lighting patterns.*

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

The timing, intensity and extent of each fire will be recorded so that the fire frequency intervals can be managed over time. After an uncontrolled wildfire, the fire frequency interval may need to increase depending on the intensity of the wildfire.

#### **Communication with Adjacent Landholders**

Landholders adjacent to the offset areas will be contacted before controlled burns occur to notify them of the controlled burn as well as to discuss burning programs on the adjacent properties and possibilities of co-ordinating controlled burns.

#### **6.14 TRANSLOCATION OF TYLOPHORA LINEARIS**

*Tylophora linearis* (a threatened flora species listed under the TSC Act and EPBC Act) was identified in the MCCM Project Boundary during pre-clearing flora surveys during 2014. It was also found in the offset areas, Leard State Forest and in other local conservation reserves.

Following the identification of *Tylophora linearis* in the MCCM Project Boundary, a propagation and translocation program was prepared for the species in consultation with Dr Colin Driscoll (Hunter Eco), OEH, DP&E and ~~DoE~~DoEE. The propagation and translocation program is provided in Appendix C.


There are multiple stages to the propagation and translocation program:

- Stage 1 - Root Architecture and Growth Study;
- Stage 2 - Seed Production Monitoring;
- Stage 3 - Seed Collection and Storage;
- Stage 4 - Seed Propagation; and
- Stage 5 - Translocation Trials.

Stages 1 to 4 were undertaken in the second half of 2014 (Plate 3). This research approach has resulted in the first documented examination of *Tylophora linearis* root architecture and growth and the first documented collection of seed pods from *Tylophora linearis*.

From the seeds collected, *Tylophora linearis* plants were propagated (Plate 3). Approximately 80 seedlings were planted in the Eastern Offset in December 2015. Depending on the success of the planting, other *Tylophora linearis* plants could be translocated into the offset areas (e.g. within the offset areas on the Wollandilly Property) or in mine rehabilitation (e.g. on the overburden emplacement areas). Suitable recipient sites would be selected through a site inspection by a suitability qualified person and based on the following criteria:

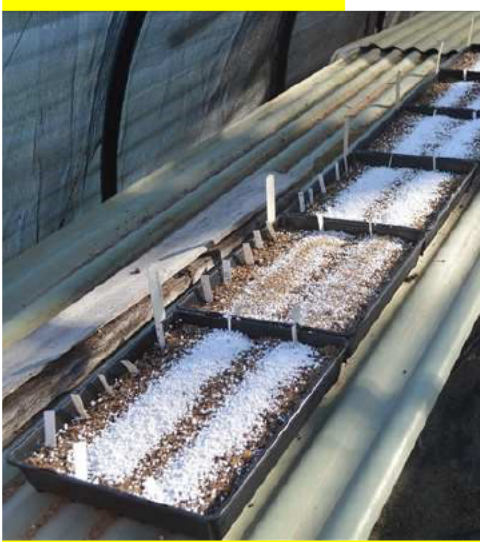
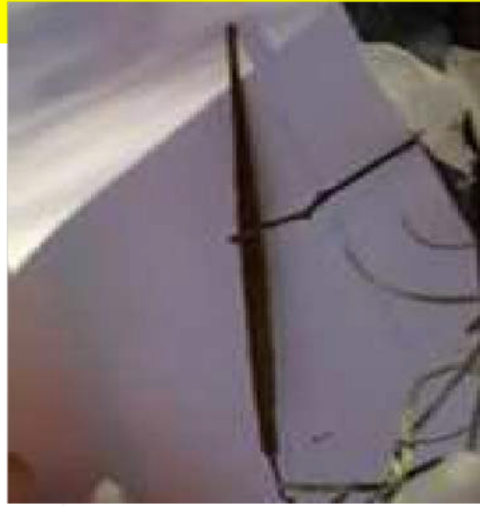
- within or near modelled suitable habitat;
- within vegetation having a similar structure to that in which the species is commonly found locally i.e. woodland with a moderate shrub layer and grassy ground cover; and


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

- within a locality accessible for exclusion fencing, planting, watering and monitoring.

Each recipient site will be fenced to keep out mammal herbivores and fencing will be installed without clearing any native trees or shrubs.





	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018


**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

**Plate 3 *Tylophora linearis* (Note: above ground [top left], root system [top right], seeds [middle left], seed pod [middle right], germination trial [bottom left] and propagated plants [bottom right])**

s22

A draft recommendationed action from the MCCM Independent Biodiversity Audit 2017 (ERM, Seedlings will be planted beside a small shrub that the plant can climb with the seedling being planted at the centre of a patch of loosened soil to allow the roots to spread. Each plant will be numbered for monitoring purposes.

- 
- 
- 
- development of suckers (if visible);
- presence of insect herbivores; and
- integrity of fencing.


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

2018) was for "further research may be required to better understand the requirements of this species to support ongoing translocation success".

s22



s22

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

**6.16 PERFORMANCE AND ~~COMPLETION~~ COMPLETION CRITERIA CRITERIA**

Performance criteria are interim targets for the implementation of management activities in this BMP while completion criteria once achieved, indicate that management has been successful at obtaining the desired result towards woodland ecological restoration and that MCCM are no longer obligated to implement the management required by this BMP. ~~Performance criteria are interim targets for the management activities. The following performance and completion criteria have been updated in accordance with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.3. While the Regional Biodiversity Strategy criteria have been adopted for the time being; Whitehaven has committed to an additional program of work to further refine annual performance and completion criteria in consultation with OEH, specifically addressing:~~

- ~~Inclusion of sufficient parameters/indicators such that successful completion of each (rehabilitation) phase can be demonstrated.~~
- ~~Inclusion of defined trigger points to inform trajectory analysis, and~~
- ~~Defined reference sites and site specific benchmarks.~~

~~Once finalised, the refined performance and completion criteria will be incorporated into an amended BMP (aligned with the MOP) that will be provided to agencies for approval. The performance criteria in Table 6-9 has been developed in consideration of the Draft Hunter Valley Coal Mines Best Practice Guidelines for Biodiversity Offset Management Plans (DP&I, 2014), approved and draft Tarrawonga Coal Mine Biodiversity Management Plan (Whitehaven, 2015c, 2015d) and Boggabri Coal Mine Biodiversity Management Plan (Boggabri Coal Pty Ltd, 2015).~~

~~The performance of the offset areas will be monitored against the performance criteria provided in Table 6-98. The aim is for all performance criteria to be met within each period. If performance criteria are not being met, contingency measures will be considered (Section 6.18).~~

**Table 6-98 Performance and Completion Criteria**

Strategic Focus Areas/ Management Component	Performance Measures and Preliminary Completion Criteria	Timeframe (following Offset establishment)*	
		Ongoing Performance Measured	Completion Timeframe
Strategic Focus Area 1 - Enhance the quality of habitats and landscapes at the offset sites for White Box – Yellow Box – Blakely's Red Gum Woodland EEC and CEEC			



# MAULES CREEK

Document Ow  
 Revision Perio  
 Issue:  
 Last Revision  
 Date Printed:

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEM


<p><b>1.1 Natural regeneration (in semi-cleared and remnant native woodland vegetation in good condition)</b></p>	<p><b>100% of the White Box – Yellow Box – Blakely's Red Gum Woodland EEC and CEEC monitoring sites across the relevant vegetation zones in each offset site show all locally-occurring canopy species recruiting<sup>3</sup> (i.e. canopy tree species occurring in the moderate to good condition PCT at the offset site or surrounds are recruiting in the semi-cleared and remnant native woodland vegetation). Where monitoring is undertaken according to the BBAM sampling should occur across each entire vegetation zones. Where monitoring is undertaken according to the BAM sampling should be undertaken in the monitoring sites of each vegetation zone.</b></p> <p><sup>3</sup> To meet the definition of "canopy species recruiting" there should be evidence of recruitment of at least 5 saplings per hectare.</p>
---	--

Annually By year 10

<b>Strategic Focus</b>	<b>Areas/ Performance Measures and Preliminary Completion Criteria</b>
<b>Management Component</b>	<p>Naturally regenerated areas of White Box – Yellow Box – Blakely's Red Gum Woodland EEC and CEEC monitoring sites conform to the condition assessment outlined on page 5 of the EPBC Policy Statement 3.5 White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands across the relevant vegetation zones in each offset site.</p> <p>100% of the White Box – Yellow Box – Blakely's Red Gum Woodland EEC and CEEC across the relevant vegetation zones in each offset site show evidence of occupation or presence of at least 80% of the native fauna species comparative to approved benchmark or monitoring reference sites.</p> <p>100% of the White Box – Yellow Box – Blakely's Red Gum Woodland EEC and CEEC monitoring sites across the relevant vegetation zones in each offset site is within the benchmark ranges for the cover scores (i.e. overstorey, midstorey and groundcover) and at 80% or above for species richness benchmarks.</p>
<b>1.2 Collect and propagate seed</b>	<p>Seed collection records, including location of plantings and success rates (where available), are reported on in the Annual Summary Report.</p> <p>Seed is collected over a range of sites across the locality to adequately capture local variations within the offset sites and disturbance areas.</p> <p>100% of the White Box – Yellow Box – Blakely's Red Gum</p>
<b>1.3 Active</b>	<p>Woodland EEC and CEEC monitoring sites across the relevant revegetation (in vegetation zones in each offset site show all locally-occurring</p>

semi-cleared canopy species recruiting<sup>3</sup> (i.e. canopy tree species occurring woodland, in the moderate to good condition PCT at the offset site or derived native surrounds are recruiting in the semi-cleared and remnant grasslands and native woodland vegetation). Where monitoring is undertaken cleared land) according to the BBAM sampling should occur across each entire vegetation zones. Where monitoring is undertaken according to the BBAM sampling should be undertaken in the monitoring sites of each vegetation zone.




	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

80% of the nest boxes installed are being utilised or show signs of use by native species across the offset sites.	Each nest box	Ongoing
<u>2.2 Habitat augmentation</u> Utilisation of nest boxes by pest species such as European honey bee ( <i>Apis mellifera</i> ), common myna ( <i>Acridotheres tristis</i> ), common starling ( <i>Sturnus vulgaris</i> ) and feral rodent species ( <i>Rattus</i> and <i>Mus</i> spp.) should be monitored at and nest box installation should be recorded.	Annually	Ongoing
Each nest box installed within the offset sites should be in good structural condition and functioning in the landscape following installation.	Annually	Ongoing
<u>2.3 Access</u> Livestock are excluded from restoration areas following planting and high quality woodland vegetation at the offset sites (it is acknowledged that strategic grazing may be required in some areas).	1 year	By year 10
<i>Strategic Focus Area 3 - Promote a consistent and coordinated approach to weed management and pest animal control</i>		
<u>3.1 Weed and the BTM Complex</u> Weed trends and control schedules are communicated across the Leard Forest Mining Precinct in the relevant pest prevention forums, and communication.	Annually	Ongoing
The most recent offset monitoring summary reports containing information on weed and pest records, trends and issues are provided across the BTM Complex Leard Forest Mining Precinct and reported on in the Annual Summary Report.	Annually	Ongoing
Key messages on weeds are effectively communicated, where appropriate, with relevant local land holders, managers and stakeholders.	Annually	Ongoing
<u>3.2 Weed</u> Offset site flora monitoring shows an overall reduction in exotic plant cover following control measures implemented across the control offset sites.	Annually	Ongoing
Weed species do not comprise more than 20% of any strata in the native vegetation communities within the offset sites.	Annually	Ongoing
Weed control is undertaken across the offset sites using methods outlined in the Noxious and Environmental Weeds Control Handbook (6th Edition) (DPI 2014), Narrabri Shire Council Weed Management Plans, and/or the NSW WeedWise website.	Annually	Ongoing
Significant weed infestations or newly identified weed species within the offset sites are reviewed and control measures implemented within 1 year of identification of the issue.	Annually	By year 5
<u>3.3 Pest animal</u> Offset site fauna monitoring shows an overall reduction in pest animal species and population sizes targeted by control measures implemented across the offset sites (in consideration of potential drought conditions and seasonal trends).	Annually	Ongoing
Pest animal control is undertaken across the offset sites using methods approved under the NSW Codes of Practices (COPs) and Standard Operating Procedures (SOPs).	Annually	Ongoing
Significant pest animal occurrences or newly identified pest species within the offset sites are reviewed and control		




	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Strategic Focus	Timeframe (following Offset establishment)*		
Areas/	Performance Measures and Preliminary Completion		
Management	Criteria	Ongoing Performance	Completion Timeframe
		Measured Component	
<b>Strategic Focus Area 4 - Promote a consistent and coordinated approach to fire management for biodiversity</b>			
4.1 Managing	If determined to be suitable following recommendations from the RFS, strategic grazing will not be used in management zones to manage fuel loads.	No grazing to occur in MCCM fuel loads Offsets	No grazing to occur in MCCM fuel loads Offsets
4.3 Ecological	Fuel reduction is undertaken in the form of controlled burning (as per recommendations in Rawlings et al. 2010) as deemed control burns required and in consultation with the RFS. The impacts of control and mosaic burning on native and weed species diversity is reported on and information made available to all BTM Complex Leard Forest Mining Precinct sites.	Every 5 years	Ongoing
<b>Strategic Focus Area 5 – Enhance the connectivity of habitats through corridor and buffer area establishment and management</b>			
5.1 Connected	Corridors within the offset sites are in accordance with the performance indicators outlined in Strategic Focus Area 3 in relation to weeds and pests, broader regional corridors	As per Strategic Focus Area 3, Focus Area 3, Targeted fauna monitoring indicates that the offset site	As per Strategic Focus Area 3, landscapes and By year 10
5.2 Mine	The rehabilitated habitat in mine rehabilitation and the vegetated buffer corridor provides a wildlife corridor linking conservation areas in the east, linking Leard rehabilitation relinquishment and the State Forest and to west towards the Namoi River, (subject to rehabilitation of mining lease vegetated buffer corridor for by DRG) habitat connectivity	Annually	By year 30
<b>Strategic Focus Area 6 – Consult and workshop biodiversity issues with local stakeholders and land managers</b>			
6.1 Biodiversity	Targeted consultation with key stakeholders, land managers and agencies regarding biodiversity issues is demonstrated management through the development of resources and workshops involving consultation stakeholders	Annually	Ongoing
	An annual summary report is to be prepared detailing the overall biodiversity performance and outcomes of the offset sites across the region.	Annually	Ongoing

Further to the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.3; Table 6-9 below explicitly quantifies the completion criteria for Items 1.1 and 1.3 regarding qualitative descriptions of completion criteria.


**Table 6-9 Quantitative Completion Criteria addressing Leard Forest Regional Biodiversity Strategy**

	<h1>MAULES CREEK</h1>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

	<u>PCT Community Type ID 1393 (BVT NA226) White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion</u>		<u>Leard Forest Regional Biodiversity Strategy Completion Criteria</u>	
	<u>PCT Benchmark Minimum or Average</u>	<u>PCT Benchmark Maximum</u>	<u>Qualitative Description</u>	<u>Quantitative Completion Criteria</u>
Total Native Plant Species Richness	23	Not Applicable	80% or above for species richness benchmarks	>18.4
% Native Overstorey Cover	6%	25%	Within the benchmark ranges for the cover scores	>6% but <25%
% Native Mid-Storey Cover	0%	5%	Within the benchmark ranges for the cover scores	>0% but <5%
% Native Groundcover (Grasses)	30%	40%	Within the benchmark ranges for the cover scores	>30% but <40%
Native Groundcover (Shrubs)	0%	0%	Within the benchmark ranges for the cover scores	0%
Native Groundcover (Other)	3%	5%	Within the benchmark ranges for the cover scores	>3% but <5%
Number of Trees with Hollows	1	Not Applicable	Not Applicable	Not Applicable
Total Length Fallen Logs	30	Not Applicable	Not Applicable	Not Applicable
Number of Canopy Species Sapling Recruitment	Not Applicable	Not Applicable	5 saplings/ha	>0.5 saplings/1000m <sup>2</sup> (i.e. 50m x 20m transect/plot)
Regenerating areas conform to the condition assessment of the EPBC Policy Statement 3.5 Page 5 White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands	Not Applicable	Not Applicable	<u>Condition assessment of the EPBC Policy Statement White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands</u> 42 or more native understorey species (excluding grasses); b) at least one important species*; c) 20 or more mature trees per hectare; or d) natural regeneration of dominant everstorey eucalypts	a) >12 forb or other understorey species; b) >1 important species*; c) >2 dominant overstorey trees >125cmDBH/1000m <sup>2</sup> (i.e. 50m x 20m transect/plot); or d) natural regeneration of dominant overstorey eucalypts >15cmDBH

\* Important species as per EPBC Act Policy Statement White Box Yellow Box Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands Species List


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Action	Performance Criteria				Completion Criteria
	Year 1 (May 2014 to end of June 2016)	Year 2 (July 2016 to end of June 2016)	Year 3 (July 2016 to end of June 2017)	Year 4 to 24 (July 2017 to meeting the Completion Criteria)	
<b>Setting Up the Offset Areas (Section 6.2)</b>					
Long-term Conservation Security <sup>(A, B, C, D)</sup>	-	Commence long-term security of the offset areas (all offset areas except Wongala, Roseglass, Bimbooria and Oakleigh/Onavale)  <b>Target Date – Commencement within 3 months of the approval of this BMP (version 2)</b> (extension in timing approved by DP&E) Security of the offset areas is subject to CEH timing for establishing a VCA.	-	Long-term security of the offset areas that are subject to the approval of the revised offset strategy to be registered (Wongala, Roseglass, Bimbooria and Oakleigh/Onavale)  <b>Target Date – within 12 month of approval of the Stage 2 LFMPRA.</b>  Long-term security of offset areas required by Approval Decision EPBC 2010/5666 to be secured by 11 February 2018.	All offset areas are secured
Offset Implementation Costs and Conservation Bond <sup>(A, B, C, D)</sup>	-	Calculate Offset Implementation Costs and Lodge Conservation Bond  <b>Target Date – Within 3 months of the approval of this BMP (version 2)</b>	-	-	N/A

**Table 6-9 (Continued)**




	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

### Performance and Completion Criteria

Action	Performance Criteria				Completion Criteria
	Year 1 (May 2014 to end of June 2015)	Year 2 (July 2015 to end of June 2016)	Year 3 (July 2016 to end of June 2017)	Year 4 to 21 (July 2017 to meeting the Completion Criteria)	
<b>Setting Up the Offset Areas (Section 6.2) (Cont.)</b>					
Mapping of Fences	Complete (refer Figures 12a to 12g)	-	-	-	N/A
Gate and Fence Installation (Perimeter of the offset areas as necessary to exclude livestock, except where adjacent to existing state forests or protected areas)	-	Complete Target Timing – June 2016	-	-	Gates and fences installed around the perimeter of the offset areas (except where adjacent to existing state forests or protected areas)
Inspection of Fences for Maintenance Purposes	-	Annually and as required at other times	Annually and as required at other times	Annually and as required at other times	N/A
Removal of Redundant Fences	-	Commence	-	Complete	No redundant fencing
Signage Installation	-	Commence	-	Complete	Signs installed
Mapping of Access Tracks	Complete (refer Figures 12a to 12g)	-	-	-	N/A
Inspection of Access Tracks for Maintenance Purposes	-	Annually and as required at other times	Annually and as required at other times	Annually and as required at other times	N/A
<b>Seed Collection and Propagation (Section 6.4)</b>					
Seed Collection	-	Commence	To be completed annually	To be completed annually as required	N/A
Seed Collection Propagation	-	Commence	To be completed annually	To be completed annually as required	N/A

**Table 6-9 (Continued)**


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

### Performance and Completion Criteria

Action	Performance Criteria				Completion Criteria
	Year 1 (May 2014 to end of June 2015)	Year 2 (July 2015 to end of June 2016)	Year 3 (July 2016 to end of June 2017)	Year 4 to 21 (July 2017 to meeting the Completion Criteria)	
<b>Revegetation (Section 6.5)</b>					
Identification Of Revegetation Areas (A, B, C, D)	Complete – Figures 12a to 12g	-	-	-	N/A
Revegetation of Year 2 Areas (as listed in Table 6-3) (A, B, C, D)	-	Completed design, site preparation and initial seeding/planting	Maintenance as required.	Maintenance as required.	Refer to the completion criteria below this table.
Revegetation of Year 3 Areas (as listed in Table 6-3) (A, B, C, D)	-	Completed design	Completed site preparation and initial seeding/planting	Maintenance as required.	
<b>Reuse of Salvaged Habitat Resources (Section 6.6)</b>					
Relocation of salvaged habitat resources (D)	-	Commence	Continue	Continue	Complete
<b>Management of Cultural Heritage (Section 6.7)</b>					
Comply with Cultural Heritage Requirements	Continue	Continue	Continue	Continue	N/A
<b>Weed Management (Section 6.8)</b>					
Control of Major Weed Occurrences (noxious and WONS) (A)	Commence	Continue across all offset areas that require weed control as indicated through monitoring.	Continue across all offset areas that require weed control as indicated through monitoring.	Continue across all offset areas that require weed control as indicated through monitoring.	-
Weed extent (noxious and WONS)	-	Establish baseline cover of weeds (noxious and WONS).	-	50% reduction in the cover of weeds (noxious and WONS) in the offset areas compared to baseline cover.	80% reduction in the cover of weeds (noxious and WONS) in the offset areas.
Note: Weed species/coverage can vary substantially between seasons/years beyond the control of Whitehaven.					

**Table 6-9 (Continued)**


	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

### Performance and Completion Criteria

Action	Performance Criteria				Completion Criteria
	Year 1 (May 2014 to end of June 2015)	Year 2 (July 2015 to end of June 2016)	Year 3 (July 2016 to end of June 2017)	Year 4 to 21 (July 2017 to meeting the Completion Criteria)	
<b>Feral Animal Management (Section 6.9)</b>					
Control of Feral Animals	Commence	Continue across all offset areas that require feral animal control as indicated through monitoring.	Continue across all offset areas that require feral animal control as indicated through monitoring.	Continue across all offset areas that require feral animal control as indicated through monitoring.	Minimal feral animals as evidenced through monitoring data.
Feral Animal Abundance	-	Establish abundance of feral animals.	Stable or downward trend in feral animal abundance compared to previous year.	Stable or downward trend in feral animal abundance compared to previous year.	50% reduction in feral animal abundance compared to baseline.
Note: the movement patterns of some feral animals mean that some aspects of the feral population such as immigration of animals from outside the offset area are beyond the control of Whitehaven.					
<b>Control of Erosion (Section 6.10)</b>					
Inspection of Offset Areas for Major Erosion and (if required) Control of Erosion	-	Annually and as required at other times	Annually and as required at other times	Annually and as required at other times	Areas of active erosion reduced.
<b>Management of Livestock (Section 6.11)</b>					
Agricultural Suitability Assessment	Complete	-	-	-	N/A
Grazing Management <sup>(A, B, C, D)</sup>	Commence	Continue	Continue	Continue	Livestock absent from Grazing Exclusion Areas

**Table 6.9 (Continued)**

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018


## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

### Performance and Completion Criteria

Action	Performance Criteria				Completion Criteria
	Year 1 (May 2014 to end of June 2015)	Year 2 (July 2015 to end of June 2016)	Year 3 (July 2016 to end of June 2017)	Year 4 to 21 (July 2017 to meeting the Completion Criteria)	
<i>Management of Livestock (Section 6.11)</i>					
Inspection of Fences for Maintenance Purposes	-	Annually and as required at other times	Annually and as required at other times	Annually and as required at other times	N/A
<i>Bushfire Management (Section 6.13)</i>					
Establish Bushfire Management Measures	Complete	Reviewed and updated as required	Reviewed and updated as required	Reviewed and updated as required	N/A
Mapping of Fire Breaks and Trails	Commence	Complete	-	-	N/A
Monitoring of Fuel Loads	-	Continue	Continue	Continue	N/A
Controlled Burning	-	Fuel load reduction was undertaken (where required) without substantially damaging the integrity of the vegetation communities	Fuel load reduction was undertaken (where required) without substantially damaging the integrity of the vegetation communities	Fuel load reduction was undertaken (where required) without substantially damaging the integrity of the vegetation communities	Fuel load reduction activities have not damaged integrity of the vegetation communities (e.g. no species lost)
<i>Translocation of Tylophora linearis (Section 6.14)</i>					
Procedures for Translocation	Complete	-	-	-	N/A
Translocation to be undertaken	-	Complete	-	-	Translocations are undertaken and the success reported
Monitoring	-	Commence	Continue	Continue	N/A

**Table 6.9 (Continued)**




	<h2>MAULES CREEK</h2>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

#### Performance and Completion Criteria

Action	Performance Criteria				Completion Criteria
	Year 1 (May 2014 to end of June 2015)	Year 2 (July 2015 to end of June 2016)	Year 3 (July 2016 to end of June 2017)	Year 4 to 21 (July 2017 to meeting the Completion Criteria)	
<b>Translocation of Pomaderris queenslandica (Section 6.15)</b>					
Procedures for Translocation	-	Complete	-	-	N/A
Translocation to be undertaken	-	-	Complete	-	Translocations are undertaken and the success reported
Monitoring	-	-	Commence	Continue	N/A
<b>Monitoring (Section 6.17)</b>					
Vegetation and Habitat Monitoring <sup>(A, B, C, D)</sup>	Commence Spring 2014	Continue Target Timing – Spring 2015	Continue Target Timing – Spring 2016	Continue Target Timing – Spring	N/A
Fauna Monitoring	Commence Spring and summer before May 2015	Continue Target Timing – Winter 2015	-	Continue Target Timing – Spring, summer, winter every three years	N/A
Monitoring for Regent Honeyeater, Swift Parrot and Southern Long-eared Bat <sup>(B, C, D)</sup>	Commence	Continue	Continue	Continue	N/A
Weed Monitoring	Commence	Continue Indicative Timing – August, November, February, May	Continue Indicative Timing – August, November, February, May	Continue Indicative Timing – August, November, February, May	N/A
Feral Animal Monitoring	Commence	Continue Indicative Timing – August, November, February, May	Continue Indicative Timing – August, November, February, May	Continue Indicative Timing – August, November, February, May	N/A
<b>Recording (Section 7.1)</b>					
Recording information summarised in Section 7.1	-	Annually	Annually	Annually	N/A

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-9 (Continued)**

### Performance and Completion Criteria

Action	Performance Criteria				Completion Criteria
	Year 1 (May 2014 to end of June 2015)	Year 2 (July 2015 to end of June 2016)	Year 3 (July 2016 to end of June 2017)	Year 4 to 21 (July 2017 to meeting the Completion Criteria)	
<b>Reporting (Section 7.2)</b>					
Box-Gum Woodland EEC/CEEC and threatened species investigation reports and implementation plans	Complete	-	-	-	N/A
MCCM Annual Review	Annually	Annually	Annually	Annually	N/A
BMP Annual Report	Annually (A, B, C, D)	Annually	Annually	Annually	N/A
Commonwealth Approval Compliance Reports	Annually (A, B, C, D)	Annually Target Timing - March	Annually Target Timing - March	Annually Target Timing - March	N/A
<i>Tylophora linearis</i> Propagation and Translocation Program	Annually	Annually Target Translocation Timing - September - December	Annually	Annually	N/A

A — Performance criteria relevant to the Box-Gum Woodland EEC/CEEC

B — Performance criteria relevant to potential habitat for the Regent Honeyeater (*Xanthomyza phrygia*).

C — Performance criteria relevant to potential habitat for the Swift Parrot (*Lathamus discolor*).

D — Performance criteria relevant to potential habitat for the South-eastern Long-eared Bat (*Nyctophilus oorbeni*).

Interim and quantitative performance criteria for habitat complexity are provided for domains that require revegetation (natural regeneration or active planting/seeding) in Table 6-10. The offset areas will be reviewed against quantitative performance criteria for habitat complexity at five and ten year increments. The interim performance criteria for habitat complexity will be further refined based on reference site data (discussed further below) by 2018 prior to the first performance review which is due in 2020.

Native Plant Species Richness

Native Overstorey Cover

Condition Variable

Native Mid-storey Cover



# MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018


## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-10 Interim Performance Criteria for Habitat Complexity**

Native Groundcover (Grasses)	Specific Performance Criteria for Enhancement Domain		Specific Performance Criteria for Revegetation and Restoration Domains	
	Performance Criteria		Performance Criteria	
	Performance Criteria at 5 years (2020)	Performance Criteria at 10 years (2025)	Performance Criteria at 5 years (2020)	Performance Criteria at 10 years (2025)
Exotic Plant Cover	Increase to at least 50% of lower benchmark.	Increase to at least 80% of lower benchmark.	Increase to at least 10% of lower benchmark.	Increase to at least 30% of lower benchmark.
Number of Trees with Hollows	No change expected in 5 years.	Increase to at least 20% of lower benchmark.	Increase to at least 10% of lower benchmark.	Increase to at least 30% of lower benchmark.
% Canopy Recruitment				more than 100% of upper benchmark.
Total Length (m) Of Fallen Logs	Increase to at least 50% of lower benchmark.	Increase to at least 80% of lower benchmark.	Increase to at least 10% of lower benchmark.	Increase to at least 30% of lower benchmark.
	Increase to at least 50% of lower benchmark.	Increase to at least 80% of lower benchmark.	Increase to at least 10% of lower benchmark.	Increase to at least 30% of lower benchmark.
	Increase to at least 50% of lower benchmark.	Increase to at least 80% of lower benchmark.	Increase to at least 10% of lower benchmark.	Increase to at least 30% of lower benchmark.
	Increase to at least 50% of lower benchmark.	Increase to at least 80% of lower benchmark.	Increase to at least 10% of lower benchmark.	Increase to at least 30% of lower benchmark.
	Decreasing number of and cover of exotic species	Less than 5% of domain area	Decreasing number and cover of exotic species	Less than 10% domain area
	No change expected in after 5 years	No significant increase expected in 10 years.	None expected after 5 years.	None expected after 10 years.
	Increase to at least 50% of lower benchmark.	Increase to at least 80% of lower benchmark.	None expected after 5 years.	None expected after 10 years.
	No change expected in 5 years	No significant increase expected in 10 years.	None expected after 5 years.	None expected after 10 years (except salvaged).

### Reference Sites

Reference sites will be located in areas that comprise a quality of vegetation that is aspired to and feasible to achieve within 21 years after commencement of management activities. Reference sites are used within the performance and completion criteria.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

The benchmark values from reference sites will be established in consultation with OEH and then included in this BMP by 2018 prior to the first performance review which is due in 2020.

In November 2013, OEH suggested that MCC determine reference sites (local benchmarks) for completion criteria which represent what is aspired to be achieved in 21 years. OEH explained that the Biometric benchmarks will be inappropriate as they are meant to be quantitative measures of the range of variability in condition in vegetation with relatively little evidence of alteration, disturbance or modification by humans since European settlement and recovery to this level is unlikely to be achieved in 21 years.

**Completion Criteria**

The completion criterion represents achievement of the offset area objectives. In accordance with Condition 52 of Schedule 3 to PA 10\_0138, if the Biodiversity Offset Strategy is completed generally in accordance with the completion criteria in this BMP to the satisfaction of the NSW Secretary of the DP&E, the NSW Secretary of the DP&E will release the conservation bond (Section 6.2.2). If the Biodiversity Offset Strategy is not completed generally in accordance with the completion criteria in this BMP, the NSW Secretary of the DP&E will call in all or part of the conservation bond, and arrange for the satisfactory completion of the relevant works.

The completion criteria in Table 6-9 has been developed in consideration of the Draft Hunter Valley Coal Mines Best Practice Guidelines for Biodiversity Offset Management Plans (DP&I, 2014).


Additional completion criteria are provided in Table 6-11 for each land type directly relating to the objectives of the offset areas. OEH requested the completion criteria for population trends of reptiles, nectarivorous woodland birds, arboreal insectivorous woodland birds, ground dwelling insectivorous woodland birds, bark gleaning woodland birds and ground dwelling mammals (Table 6-11). However, it is acknowledged that population trends of these faunal groups may vary due to reasons unrelated to the offset areas.

**Table 6-11**

**Completion Criteria**

Aspect	Completion Criteria
Long-term Security	Long-term security was provided for the offset areas (Section 6.2.1).
Existing native (Habitat Enhancement)	Areas of existing remnant vegetation have been conserved and maintained. Areas of woodland/forest existing remnant vegetation have been managed to reach the lower benchmark <sup>1</sup> condition Management and complexity. Refer to Table 6-12 for specific completion criteria for habitat complexity.
Derived Native Grassland (Restoration)	Areas of derived native grassland have been revegetated with self-sustaining vegetation communities that are trending towards benchmark <sup>2</sup> condition. Refer to Table 6-12 for specific completion criteria for habitat complexity.
Box Gum Woodland EEC/CEEC (Derived Native)	Areas of Box Gum Woodland EEC/CEEC (Derived Native Grassland) have been revegetated with self-sustaining vegetation communities that are trending towards



	<h2>MAULES CREEK</h2>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

~~Grassland) (Restoration) benchmark<sup>†</sup> condition. Refer to Table 6-12 for specific completion criteria for habitat complexity.~~

~~Low Diversity Derived Native Grassland, Pasture Improved and Cultivated Land And Cultivated Land (Revegetation) Areas of Low Diversity Derived Native Grassland, Pasture Improved and Cultivated Land have been revegetated with self-sustaining vegetation communities that are trending towards benchmark<sup>†</sup> condition. Refer to Table 6-12 for specific completion criteria for habitat complexity.~~

#### ~~Native Fauna Population Trends~~

~~Reptiles A consistently observed increase in reptile species richness and/or abundance within each off-set domain across at least half of the monitoring sites in that domain.~~

~~Nocturnal Woodland Birds A consistently observed increase in nocturnal woodland bird species richness and/or abundance within each off-set domain across at least half of the monitoring sites in that domain.~~

~~Arboreal Insectivorous Woodland Birds A consistently observed increase in arboreal insectivorous woodland bird species richness and/or abundance within each off-set domain across at least half of the monitoring sites in that domain.~~


~~Ground Dwelling Woodland Birds Ground dwelling insectivorous woodland birds persisting in areas maintained as open grassland.~~

~~Bark gleaning Woodland Birds A consistently observed increase in bark gleaning woodland bird species richness and/or abundance within each off-set domain across at least half of the monitoring sites in that domain.~~

~~Ground dwelling Mammals A consistently observed increase in ground dwelling mammal species richness and/or abundance within each off-set domain across at least half of the monitoring sites in that domain.~~

~~<sup>†</sup>Local benchmarks will be developed for the purpose of the completion criteria. The benchmark values will be determined in consultation with OEH.~~

~~Interim and quantitative completion criteria for habitat complexity are provided for domains that require revegetation (natural regeneration or active planting/seeding) in Table 6-12. Completion criteria are aimed to be met after 21 years (2036). The interim completion criteria for habitat complexity will be further refined based on reference site data (discussed further below) by 2018 prior to the first performance review which is due in 2020.~~

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-12**

### Interim Completion Criteria for Habitat Complexity at 21 Years

Condition Variable	Specific Performance Criteria for Enhancement Domain	Specific Performance Criteria for Revegetation and Restoration Domains
Native Species Richness	Increase to at least lower benchmark.	Increase to at least 80% of lower benchmark.
Native Overstorey Cover	Increase to at least lower benchmark.	Increase to at least 80% of lower benchmark.
Native Mid-storey Cover	Increase to at least lower benchmark.	Increase to at least 80% of lower benchmark.
Native Groundcover (Grasses)	Increase to at least lower benchmark.	Increase to at least 80% of lower benchmark.
Native Groundcover (Shrubs)	Increase to at least lower benchmark.	Increase to at least 80% of lower benchmark.
Native Groundcover (Other)	Increase to at least lower benchmark.	Increase to at least 80% of lower benchmark.
Exotic Plant Cover	Less than 5% of domain area	Less than 10% of domain area
Number of Trees with Hollows	No change.	No change.
% Canopy Recruitment	Increase to at least lower benchmark.	Some natural regeneration of Eucalypt canopy species present.
Total Length (m) Of Fallen Logs	No change.	No change.


## 6.17 MONITORING PROGRAM

There are four components to the monitoring program:

- vegetation and habitat monitoring (Section 6.17.1);
- fauna monitoring (Section 6.17.2);
- weed monitoring (Section 6.17.3); and
- feral animal monitoring (Section 6.17.4).

Suitably qualified and licenced personnel will be engaged to undertake the monitoring program. Suitably qualified and licence personnel will be engaged to undertake the monitoring program. Australia Museum Consulting commenced the monitoring program in October and November (spring) 2014 and February 2015.

### 6.17.1 Vegetation and Habitat Monitoring

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

**Purpose**

Monitoring will be undertaken to track changes in vegetation and habitat in the offset areas in response to management measures. The data collected will be used to evaluate the progress of habitat reestablishment, restoration and enhancement towards meeting the performance and completion criteria (Section 6.16).

Vegetation and habitat monitoring will include documentation of native and introduced (including noxious weed) flora species. Weed monitoring is also outlined in Section 6.17.3.

**Monitoring Design**

The monitoring includes detailed systematic sampling:

- in degraded native vegetation which will be subject to restoration and enhancement through predominantly natural regeneration (i.e. the Restoration and Enhancement Domains); and
- in cleared areas subject to active revegetation (i.e. the Revegetation Domain).


The vegetation and habitat monitoring program also includes observational and photo monitoring through-out the offset areas (including the Habitat Management Domain and along watercourses).

A number of plots will be established at each monitoring site and two types of monitoring plot will be used to monitor vegetation and habitat (Table 6-4310).

**Table 6-4310 Types of Monitoring Sites**

Types of Monitoring Plots	Definition
Action Plots	Action plots will be located in areas that are subject to management activities.
Control Plots	Control plots will be located in areas that are not subject to management activities.

The number of initial Vegetation and Habitat Monitoring Sites and plots per restoration and enhancement domains are listed in Table 6-4411. In revegetation domains, additional monitoring sites will be progressively established to monitor the progress of active revegetation. Additional monitoring sites may also be progressively established for testing specific management techniques in an adaptive management framework (e.g. testing a management technique and revising the technique based on a monitoring outcome).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-1411**  
**Number of Vegetation and Habitat Monitoring Sites per Domain**

Domain	General Description	Objective	Northern	Eastern	Western	Southern	Total Number of Sites
Revegetation	Low Diversity Native Grassland, Pasture Improved and/or Cultivated Land	Additional native vegetation to be established targeted restoration of self-sustaining vegetation communities in low diversity derived native grassland, pasture improved and cultivated land.	Note 1	Note 1	Note 1	Note 1	Note 1
Restoration	Derived Native Grassland	Additional native vegetation to be established with the restoration of self-sustaining vegetation communities within derived native grassland.	4(3)	2(3)	2(3)	2(3)	10(3)
Enhancement	Semi-cleared Woodland/Forest	Semi-cleared woodland/forest to be protected and enhanced.	4(3)	2(3)	2(3)	2(3)	10(3)
<b>Total Sites (replicates)</b>			<b>8</b>	<b>4</b>	<b>4*</b>	<b>4</b>	<b>20</b>
<b>Total Plots</b>			<b>24</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>60</b>

Numbers within brackets denotes number of plots at each site.

Note 1 Monitoring sites will be progressively established in the Revegetation Domain to monitor the progress of active revegetation.

\* Two additional plots will be located in the Shared Offset Property.

### **Location of Monitoring Sites**

Vegetation and Habitat Monitoring Sites will be located across all of the offset areas (Northern, Eastern, Western and Southern Areas). The aim is not to sample every vegetation community, but to adequately sample each domain, to detect trends and changes in the vegetation condition within each domain. Monitoring sites are mostly located in Box-Gum Woodland EEC/CEEC (Table 6-1512).

The preliminary location of monitoring sites is shown on Figures 14a to 14d. These monitoring site locations have been selected following commencement of the pilot monitoring study in 2014.



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-1512**  
**Schedule of Vegetation and Habitat Monitoring Sites**

Area	Site No.	Management Unit	Domain	Approximate Co-ordinates	
				Latitude	Longitude
Northern	VS1*	R/E6	Restoration	-30.35	150.29
	VS2*	R/E8	Restoration	-30.34	150.25
	VS3*	R/E8	Restoration	-30.35	150.26
	VS4*	R/E8	Restoration	-30.40	150.26
	VS5*	R/E6	Enhancement	-30.35	150.30
	VS6*^	HM6	Habitat Management	-30.32	150.28
	VS7*	R/E8	Enhancement	-30.38	150.26
	VS8*	R/E8	Enhancement	-30.41	150.26
	VS9*	R/E8	Enhancement	-30.37	150.26
Eastern	VS10*	Rv/R2	Restoration	-30.52	150.18
	VS11*	R/E1	Restoration	-30.53	150.18
	VS12*^	HM2	Habitat Management	-30.56	150.20
	VS13*	R/E1	Enhancement	-30.54	150.18
	VS14	Rv/E1	Enhancement	-30.54	150.12
Western	VS15*	R/E2	Restoration	-30.61	150.09
	VS16*	R/E2	Restoration	-30.61	150.09
	VS17*	Rv/E6	Enhancement	-30.58	150.08
	VS18*	Rv/E6	Enhancement	-30.59	150.09
	VS19^	HM3	Habitat Management	-30.60	150.07
	VS20 <sup>x</sup>	HM4	Habitat Management	-30.66	150.03
	VS21 <sup>x</sup>	HM4	Habitat Management	-30.64	150.02
Southern	VS22*	Rv/R4	Restoration	-30.72	150.35
	VS23*	Rv/R3	Restoration	-30.71	150.33
	VS24*	Rv/R4	Enhancement	-30.72	150.35
	VS25*	Rv/R3	Enhancement	-30.71	150.34

\* This site is located within Box-Gum Woodland EEC/CEEC as mapped by Greenloaning Biostudies (2014b).

^ This is an additional site to compliment a fauna monitoring site.

<sup>x</sup> additional plots in the Shared Offset Property.

**INSERT FIGURE 14A**



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN



**INSERT FIGURE 14B**



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN



**INSERT FIGURE 14C**





## MAULES CREEK


Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN



**INSERT FIGURE 14D**



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN




### ***Timing and Frequency***

Vegetation and habitat will be monitored on an annual basis in spring, when the highest diversity of plants is expected to be present (after Rawlings *et al.*, 2010). The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 1.1 & 1.3 recommends monitoring of regenerating White Box – Yellow Box – Blakely’s Red Gum Woodland EEC and CEEC should be undertaken annually and across offset sites. It is recommended that the season for the monitoring sites is rotated every year to assess the community during different seasons such as half of the monitoring sites surveyed in autumn (to maximise the detection of native perennials) and half of the monitoring sites surveyed in spring (to identify the extent of exotic annuals in the community). Monitoring should be undertaken within the offset sites at least annually for the first five years and then every two years until preliminary completion criteria are met.

### ***Methodology***

The vegetation and habitat monitoring methodology will include:

- detailed records of all management activities (e.g. date, location, on-ground works);
- fixed monitoring plots;
- photographic monitoring; and

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

- general observations;

The methodology is detailed below.

Monitoring of *Tylophora linearis* and *Pomerderis queenslandica* in the offset areas will also occur as part of the translocation program as described in Sections 6.14 and 6.15.

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 1.1 & 1.3 recommends monitoring should be undertaken in accordance with BioBanking Assessment Methodology (BBAM) (2014) or Biodiversity Assessment Method (BAM) (whichever is determined to be the most appropriate through consultation with OEH) to analyse trends against benchmark data by undertaking plot and transect surveys: undertaking at least the minimum number of plots and transects per vegetation zone; and photographic monitoring at permanent monitoring points conducted using a consistent methodology across the offset sites.

### Fixed Monitoring Plots

Fixed monitoring plots measuring 20 x 50 m will be established at each Vegetation and Habitat Monitoring Site to gather habitat data. Within each plot, a 20 x 20 m quadrat will be established to sample flora. The 20 x 20 m quadrat will be sampled using a nested method (which segments the quadrat) as described by Morrison *et al.* (1995) and Lewis *et al.* (2008). Figure 15 shows the layout of a plot and quadrat.

Plots will be permanently marked by placement of star pickets as recommended by Rawlings *et al.* (2010) at the northern and southern end of the midline of each plot. The location of the pickets will be recorded using a GPS. As a result of pilot surveys (Australia Museum Consulting, 2014) one plot at each

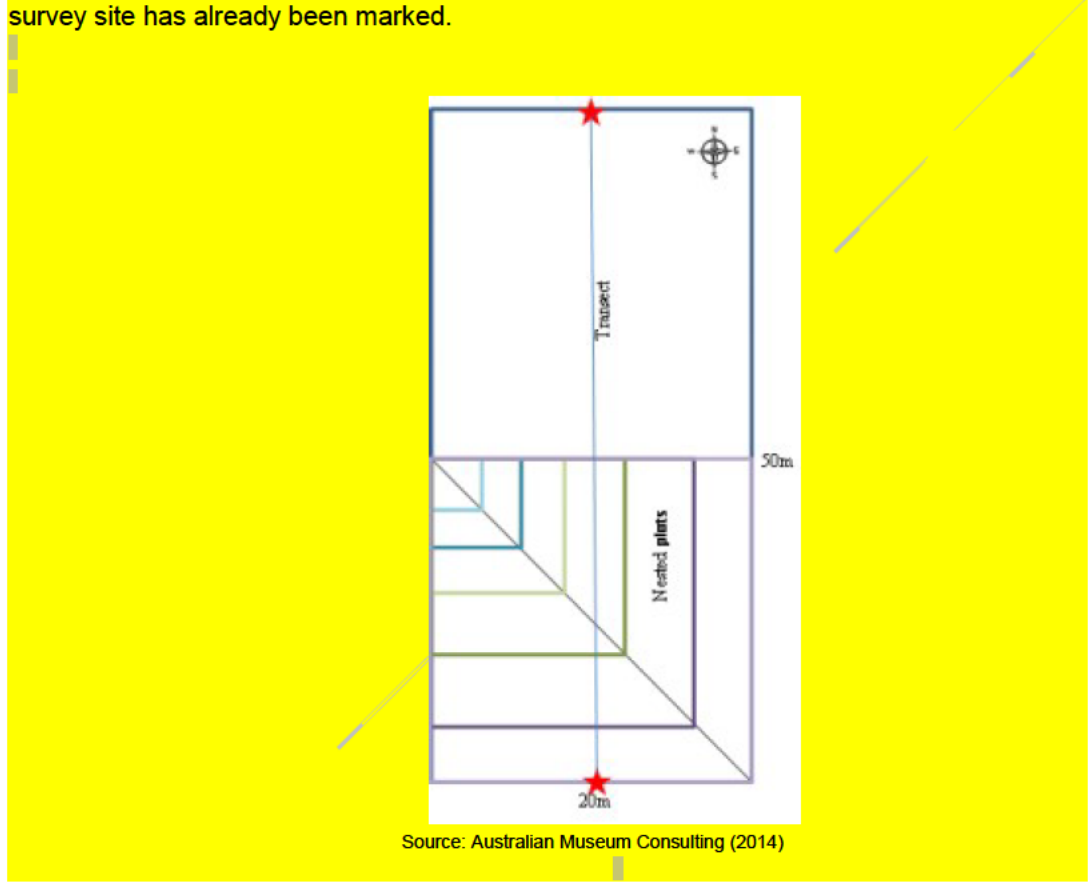


# MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

survey site has already been marked.




Source: Australian Museum Consulting (2014)

**Figure 15 Layout of the Vegetation and Habitat Monitoring Plot**

The methodology includes monitoring vegetation structural parameters and flora species (Table 6-4612) and a range of parameters such as habitat, management issues/response and vegetation cover (Table 6-4714). Parameters 1 to 4 in Table 6-47-14 will be recorded every 10 years. The parameters specified below to be measured by monitoring will produce data for comparison with the ecological indicators outlined previously in Tables 6-8 & 6-9 as Performance and Completion Criteria.

**Table 6-4613 Field Survey Parameters to be Recorded in Each 20 x 20 m Quadrat**


Parameter	Assessment Technique	Activity
1 Overall site cover: 5% Cryptogam cover	Average within 20 x 20 m quadrat increments.	Record cryptogam as a percentage of the site. Record in increments. Cryptogams occurring on soil and rocks are included in the assessment.
2 Overall site cover: 5%	Average within 20 x 20 m	Record rock cover as a percentage of the site. Record in

	<h1>MAULES CREEK</h1>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<h2>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</h2>			
	Rock Cover	quadrat	increments.
3	Overall site cover:	Average within 20 x 20 m	Record bare ground as a percentage of the site. Record in
	Bare ground	quadrat	5% increments. Bare ground excludes rocks.
4	Structural	Average within 20 x 20 m	Record percentage cover of canopy species. Canopy Assessment:
	quadrat	species are classified as vegetation >8 m. Record the height	
	Canopy		range of canopy species in metres.
5	Structural	Average within 20 x 20 m	Record percentage cover of Mid 1 species. Mid 1 is Assessment:
	quadrat	classified as vegetation <8 m and >5 m. Record the height	
	Midstorey 1		range of Mid 1 species in metres.
6	Structural	Average within 20 x 20 m	Record percentage cover of Mid 2 species. Mid 2 is Assessment:
	quadrat	classified as vegetation <5 m and >1 m. Record the height	
	Midstorey 2		range of Mid 2 species in metres.
7	Structural	Average within 20 x 20 m	Record percentage cover of living ground layer species. The
	Assessment: quadrat	ground layer is classified as vegetation <1 m. Record the Ground layer height range of	ground layer species in centimetres
8	Tree Species Size	Count within 20 x 20 m	Record height classes of all tree species present. The
	Classing	quadrat	classes include <1m, 1-2m,2-5m,5-10m,10-15m,15-20m,20-25m,25-30m,>30m
			Count the number of each species which occurs within each class.
			Record the total number of each species as the sum of all records.
9	Flora Species Richness	Six nested subplots within 20 x 20 m quadrat	Record presence of all flora species within subplots. Record with sample identification and field name where applicable.
			Identify specimens using floristic keys. Canopy species richness should be recorded across the whole plot

Source: Australian Museum Consulting (2014)

**Table 6-4714 Field Survey Parameters Recorded during the Pilot Survey in 20 x 50 m Plot**


	Factor assessed	Assessment	
		Technique	Activity
<b>Habitat</b>			
1	Habitat Feature Tree Count	Count all hollows >10 cm occurring in plot. Consistent with Hollows 20 x 50 m plot BioBanking methodology. Record comments where	applicable. If absent record as zero.
2	Habitat Feature: Fallen	Count	Count all fallen logs >10 cm diameter and >50 cm in length logs occurring in plot. Record comments where applicable. If absent record as zero.
3	Proximity to water	Observation General	Record in meters type and distance of standing and area ephemeral water occurring <500 m from the site. This includes dams, streams and drainage lines. Record comments where applicable. If absent record as zero.

 <b>MAULES CREEK</b>		Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			
4	Proximity to rocks, caves or and over hangs	Observation General area	Record in meters distance to large habitat rocks, caves overhangs occurring <300 m from the site. Record comments where applicable. If absent record as zero.
5	Presence of flowering Eucalypts	Observation 20 x 50 m plot flowering occurs	Record presence or absence of flowering Eucalypts. Where flowering occurs record species and proportion of site containing the flowering species (e.g. <i>Eucalyptus crebra</i> <5%). Record comments where applicable. If absent record as zero.
<b>Management Issues/Response</b>			
6	Evidence of extensive erosion or waterlogging	Observation General area	Record in meters distance to erosion or waterlogging occurring <300 m from the site. Record comments where disturbing native vegetation applicable. If absent record as zero.
7	Dense stands of regeneration ( <i>Callitris</i> )	Observation General area	Record presence or absence of dense stands of <i>Callitris</i> <i>glaucophylla</i> occurring within or directly adjacent to the plot. <i>glaucophylla</i> that may require thinning. Record comments where applicable. If absent record as zero.
8	Evidence of past disturbance	Observation 20 x 50 m plot disturbance type	Record presence or absence of disturbance and document disturbance type. This include, but is not limited to, fire, logging, tree thinning, roads/tracks, grazing. If absent record as zero.
9	Dieback of Eucalypts that due to water	Observation 20 x 50 m plot description of site topography	Record presence or absence of Eucalypt dieback and could be description of site topography. Record comments where stress applicable. If absent record as zero.
10	Presence/absence of Noisy Mynas	Observations/Call Identification General area	Record presence or absence of Noisy Mynas and/or Yellow-eared Mynas if not distinguishable. Record comments where applicable. If absent record as zero.
11	Presence/absence of Honeyeaters	Observation/Call Identification General area	Record presence or absence of other Honeyeaters. Record other habitat and comments where applicable. If absent record as zero.
12	Evidence of disturbance animals.	Observation 20 x 50 m plot includes sighting, scats	Record presence or absence of pest animals. Evidence by pest tracks or obvious grazing. This includes but is not limited to livestock, fox, rabbit, deer, pigs, goats. Record comments where applicable. If absent record as zero.

**Table 6-47-14 (Continued) Field Survey Parameters Recorded during the Pilot Survey in 20 x 50 m Plot**

		Assessment	
Factor assessed		Technique	Activity
<b>Management Issues and Responses (Cont.)</b>			
13	Regeneration of canopy 50 m plot	Observation regeneration	Record presence or absence of canopy species species regeneration. Where possible record species and proportion of site containing the regenerating species (i.e. <i>Eucalyptus</i> <i>crebra</i> 5 to 15%). Record comments where applicable. If absent record as zero.
14	Overall vegetation (Resilience)	Observation 20 x 50 m plot	Record vegetation condition on a scale of 1-4, where 1 is condition Very Poor and 4 is Good. Classify based on modified BioBanking



	<h1>MAULES CREEK</h1>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

descriptions (e.g. Good: <10% weed and/or healthy strata and high assemblage diversity. Moderate: 10 to 30% weed and/or minor stratum dieback and moderate assemblage diversity. Poor: 30 to 80% weed and/or moderate stratum dieback and low assemblage diversity. Very Poor: >80% weed and/or extensive stratum dieback/extremely reduced diversity)

### Vegetation Cover


15	Native overstorey cover of (NOS) 50 m transect	At 10 points along a overstorey (on a 1-3 scale in which 1 is poor and 3 is good).	Record height of highest layer in metres. Record health of projected foliage cover directly over the selected point and within the boundaries of a confined shape (e.g. 5 cm tube).
16	Native midstorey cover of (NMS) 50 m transect	At 10 points along a midstorey (on a 1-3 scale in which 1 is poor and 3 is good).	Record height of highest layer in metres. Record health of projected foliage cover directly over the selected point and within the boundaries of a confined shape (e.g. 5 cm tube).
17	Exotic overstorey and of midstorey cover 50 m transect	At 10 points along a midstorey (on a 1-3 scale in which 1 is poor and 3 is good).	Record height of highest layer in metres. Record health of projected foliage cover directly over the selected point and within the boundaries of a confined shape (e.g. 5 cm tube).
18	Native ground cover (grasses)	At 50 points along a 50 m transect	Record occurrences or hit at each point. Record only occurrence, even if multiple "hits" of native grasses occur at the point. Consistent with BioBanking methodology.
19	Native ground cover (forb)	At 50 points along a 50 m transect	Record occurrences or hit at each point. Record only occurrence, even if multiple "hits" of native forbs occur at the point. Consistent with Biobanking methodology.
20	Native ground cover (other)	At 50 points along a 50 m transect	Record occurrences or hit at each point. Record only occurrence, even if multiple "hits" of native ground covers occur at the point. Include cryptogams. Consistent with Biobanking methodology.
21	Exotic ground cover	At 50 points along a 50 m transect	Record occurrences or hit at each point. Record only occurrence, even if multiple "hits" of exotic species occur at the point. Consistent with Biobanking methodology.
22	Overall site cover: Litter 20 x 20 m quadrat	Average within increments.	Record litter cover as a percentage of the site. Record in 5% cover increments. Litter cover includes all dead material but excludes cryptogams and rocks. Litter depth is captured in the fire fuel hazard assessment.

Source: Australian Museum Consulting (2014)

### Photographic Monitoring

Photo monitoring will be undertaken at the following fixed sites in the offset areas:

- VS1-25 (Vegetation and Habitat Monitoring Sites);
- PS1-15 (Additional Photo Monitoring Sites); and

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

- Any additional Vegetation and Habitat Monitoring Sites established over time (including at least one Photo Monitoring Site per Management Domain, particularly in areas undergoing active management).

Photos will be taken in a consistent direction, location (at global positioning system [GPS] points), height above the ground and time of day. These aspects and the date will be recorded for each photo taken (north, south, east and west). Aerial photographs will also be used (e.g. every three years) to show enhancement of vegetation connectivity.

### **General Observations**

General observations outside monitoring sites will also be made during monitoring activities. The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 1.1 & 1.3 & 3.2 recommends during monitoring surveys, specific notes should be taken on any dense or emerging stands of exotic plant species, such as Coolatai grass (*Hyparrhenia hirta*), white cypress pine (*Callitris glaucophylla*) or black cypress pine (*Callitris endlicheri*), that may result in the suppression of native understorey species establishment.

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 3.2 recommends weed occurrences in the offset sites will be identified as part of the annual flora surveys, but also opportunistically recorded during any other offset site inspections to examine the effectiveness of control measures. For major weed infestations or newly recorded species, the location, size, density and species should be recorded and communicated to Environmental Representative of the relevant site.


### **Data Analysis and Storage**

The monitoring program includes measurement of a number of indicators (parameters) that will enable changes to the Box-Gum Woodland EEC/CEEC to be detected (e.g. floristics, recruitment), including changes that may be ascribed to water stress (e.g. visual dieback).

The monitoring program also includes measurement of a number of indicators (parameters) that will enable changes to the habitat (for the Regent Honeyeater, Swift Parrot and South-eastern Long-eared Bat) to be detected.

All quadrat data will be entered in databases and stored for later use and analysis. Data will be added to annually so that it will form a data matrix that is amenable to analysis using classification and ordination techniques, and parametric statistics.


Data collected will be analysed and compared with the performance criteria (Section 6.16).

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018
<b>WHC_PLN_MC_BIODIVERSITY MANAGEMENT PLAN</b>			

After the photographic monitoring event the photos from previous monitoring periods. Natural regeneration of the occurrence of habitat complexity (e.g. logs, litter), plant establishment and the status of weeds will all be noted.

will be compared to the photos from the native understorey and overstorey species.



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

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## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

#### 6.17.2 Fauna Monitoring

##### *Purpose*

Monitoring will be undertaken to document the fauna species response to improvement in vegetation and habitat in the offset areas and to demonstrate progress towards completion criteria (Table 6-118 and 6-129). Generally an increase in the species richness and/or abundance is anticipated as the quantity and/or quality of habitat resources increases over time.


Fauna monitoring will include documentation of native and introduced (including feral) animals. Feral animal monitoring is also outlined in Section 6.17.4.

##### *Monitoring Design*

The numbers of Fauna Monitoring Sites per domain are listed in Table 6-1815. Monitoring sites will be progressively established in the Revegetation Domain monitor cleared areas subject to active revegetation. Similarly, monitoring sites will be progressively established in the Restoration Domains to monitor derived grassland areas subject to natural regeneration.

**Table 6-1815  
Number of Fauna Monitoring Sites per Domain**

Domain	General Description	Objective	Northern	Eastern	Western	Southern	Total Number of Sites
Revegetation	Low Diversity Native Grassland, Pasture Improved and/or Cultivated Land	Additional native vegetation to be established targeted restoration of self-sustaining vegetation communities in low diversity derived native grassland, pasture improved and cultivated land.	Note 1	Note 1	Note 1	Note 1	Note 1
Restoration	Derived Native Grassland	Additional native vegetation to be established with the restoration of self-sustaining vegetation communities within derived native grassland.	Note 1	Note 1	Note 1	Note 1	Note 1
Enhancement	Semi-cleared Woodland/Forest	Semi-cleared woodland/forest to be protected and enhanced.	4	2	0	0	6
Habitat Management	Existing Native Woodland/Forest	Existing woodland/forest to be protected and enhanced.	4	1	3	2	10
<b>Total Sites</b>			<b>8</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>16</b>

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Note 1 Monitoring sites will be progressively established in the Revegetation and Restoration Domains to monitor the fauna usage of revegetation.

### **Location of Monitoring Sites**

Monitoring sites are located across all of the offset areas (Northern, Eastern, Western and Southern Areas). The location of monitoring sites is shown on Figures 14a to 14d. The monitoring site locations have been selected following commencement of the pilot monitoring study in 2014.

### **Frequency**

Seasonal fauna surveys will be undertaken in spring, summer and winter every three years. This frequency is appropriate to detect species changes due to improvement in vegetation and habitat in the offset areas. Habitat monitoring will occur yearly as described in Section 6.17.1.

In accordance with Condition 19 of the Approval Decision EPBC 2010/5566, monitoring for the Regent Honeyeater (*Xanthomyza phrygia*), Swift Parrot (*Lathamus discolor*) and the South-eastern Long-eared Bat (*Nyctophilus corbeni*) will be carried out annually unless otherwise agreed to in writing by DotE/DoEE. Surveys will occur between March and July for the Swift Parrot (*Lathamus discolor*), between September and November for the Regent Honeyeater (*Xanthomyza phrygia*) and October to April for the South-eastern Long-eared Bat (*Nyctophilus corbeni*).


### **Target Fauna**

All native and introduced vertebrate fauna groups will be targeted, including:

- frogs;
- reptiles;
- birds (including nectarivorous woodland birds, arboreal insectivorous woodland birds, ground-dwelling insectivorous woodland birds and bark-gleaning woodland birds);
- bats;
- other arboreal mammals; and
- ground-dwelling mammals.

### **Target Habitat**

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 2.1 and 2.2 recommends salvaged arboreal hollows located within areas surrounding the offset sites should be monitored for their use and condition in conjunction with other annual fauna monitoring. Monitoring techniques may include the use of remote camera surveys targeting areas where salvaged hollows and fallen timber is installed into habitat.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Further, an assessment of the number of nest boxes required should be undertaken (the total number of hollows (existing hollows and nest boxes combined) at the offset sites should be at least the same as


monitored for their signs of use<sup>2</sup> and condition at consistent times of the year (preferably spring) across the offset sites targeting species type based on nest box design. Signs of use monitoring may be undertaken using a pole camera that allows viewing of the inhabitants of the boxes as well as a view of the condition of the top of the boxes from the ground with minimal disturbance to the fauna occupying the boxes.

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 5.1 recommends monitoring undertaken as part of other ecological monitoring at the offset sites should consider the connected landscapes and corridors in the locality and region by including survey techniques to demonstrate fauna movement across these areas such as remote camera surveys and radio tracking and/or woodland bird banding.

the number of hollows with signs of use (nesting material, feathers, fur, scratches, etc) and of suitable dimensions for species occupancy (suitable entrance size and a hollow chamber extending into the branch/trunk) removed from the impact site). Nest boxes installed within the offset sites should be **Target Faunal Movement Corridors**

### **Methodology**


Fauna monitoring methods are outlined in Table 6-49~~16~~.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-1916**  
**Fauna Monitoring Methods**

Group	Location	Method	Description	Relevant Survey Period	Method Source
Amphibians	Monitoring Sites in the Riparian Domain	Nocturnal Searches	Searches for 30-60 person minutes at each site and all species observed or heard were identified. Each site will be surveyed on 2 separate nights.	Spring and Summer	DECC (2009)
	Monitoring Sites in the Riparian Domain	Call Playback	Broadcast call for amphibians if suitable habitat exists.	Spring and Summer	DECC (2009)
	Monitoring Sites in the Riparian Domain	Tadpole Surveys	Searches for 30-60 minutes in suitable habitat.	Spring and Summer	DECC (2009)
Reptiles	All monitoring sites.	Habitat Search	Active search of potential reptile habitats performed for 60 person minutes at each site.	Spring and Summer	Department of Environment and Conservation (DEC) (2004)
	All monitoring sites.	Spotlighting	Active searches for nocturnal species, including nocturnal reptiles will be performed for 60 person minutes at each site.	Spring and Summer	DEC (2004)
Diurnal Birds	All monitoring sites.	Area Search	20 minute standard search within 3 hours of dawn, each site will surveyed twice times. All birds observed or heard will be recorded.	Spring, Summer and Winter	DEC (2004)
Nocturnal Birds	All monitoring sites.	Call Playback (Owls)	Targeting Masked Owl and Barking broadcast for 5 minutes followed by 5 minutes of listening then a 10 minute spotlighting session following the final listening period.	Spring, Summer and Winter	DEC (2004)
	All monitoring sites.	Habitat Search	Opportunistic observations of signs of nocturnal birds throughout the study area.	Spring, Summer and Winter	DEC (2004)
	All monitoring sites.	Spotlighting	Active searches for nocturnal species, including nocturnal birds will be performed for 60 person minutes at each site, twice.	Spring, Summer and Winter	DEC (2004)

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN


**Table 6-19-16 (Continued)**

Group	Location	Method	Description	Relevant Survey Period	Method Source
Terrestrial Mammals	All monitoring sites.	Camera Traps	Each camera left <i>in-situ</i> for a minimum of 10 days with a bait chamber positioned between 1 to 3 m from the camera.	Spring, Summer and Winter	Eyre <i>et al.</i> (2012)
	All monitoring sites.	Secondary Evidence	Opportunistic observations of fauna signs throughout the study area.	Spring, Summer and Winter	DEC (2004)
	All monitoring sites.	Spotlighting	Active searches for nocturnal species, including nocturnal mammals will be performed for 60 person minutes at each site.	Spring, Summer and Winter	DEC (2004)
Bats (including the Southern Long-eared Bat)	All monitoring sites.	Anabat Detectors	Two Anabat units left overnight for 2 nights at each site.	Spring and Summer	DEC (2004); DEWHA (2010a)
	Monitoring sites in flyways.	Harp-trapping	Two Harp traps per site left <i>in situ</i> for 2 nights.	Spring and Summer	DEC (2004); DEWHA (2010a)

### Fauna Monitoring Methods

The methodology outlined in Table 6-19-16 will enable detection of threatened fauna species. The target threatened fauna are listed below in Table 6-20-17. These are species that have been recorded in the offset areas and surrounding areas. Although not all of these species have been recorded on the offset areas, potential habitat for these species occurs, and therefore they will be surveyed for using the methods in Table 6-19-17. The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 3.3 recommends observations of pest animals should be undertaken as part of the annual fauna monitoring, but also opportunistically recorded during any other offset site inspections.




	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-2017**  
**Threatened and Migratory Species**

Common Name	Scientific Name	Conservation Status <sup>1</sup>		Known to Occur in the Offset Areas (Table 5-6)
		TSC Act	EPBC Act	
<b>Reptiles</b>				
Border Thick-tailed Gecko	<i>Uvidicolus sphyrurus</i>	✓	V	✓
Pale-headed Snake	<i>Hoplocephalus bitorquatus</i>	V	-	Potential
<b>Birds</b>				
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	E	-	Potential
Square-tailed Kite	<i>Lopholctinia isura</i>	V	-	Potential
Spotted Harrier	<i>Circus assimilis</i>	V	-	Potential
Little Eagle	<i>Hieraaetus morphnoides</i>	V	-	Potential
Little Lorikeet	<i>Glossopsitta pusilla</i>	V	-	✓
Turquoise Parrot	<i>Neophema pulchella</i>	V	-	✓
Swift Parrot	<i>Lathamus discolor</i>	E	E	Potential
Masked Owl	<i>Tyto novaehollandiae</i>	V	-	✓
Barking Owl	<i>Ninox connivens</i>	V	-	✓
Speckled Warbler	<i>Pyrrholaemus sagittatus</i>	V	-	✓
Regent Honeyeater	<i>Anthochaera Phrygia</i>	CE	E	Potential
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	V	-	✓
Painted Honeyeater	<i>Grantiella picta</i>	V	-	Potential
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V	-	✓
Diamond Firetail	<i>Stagonopleura guttata</i>	V	-	✓
Scarlet Robin	<i>Petroica boodang</i>	V	-	✓
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V	-	✓
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	V	-	✓
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V	-	✓
Fork-tailed Swift	<i>Apus pacificus</i>	-	M	Potential
Rainbow Bee-eater	<i>Merops ornatus</i>	-	M	✓
White-throated Needletail	<i>Hirundapus caudacutus</i>	-	M	✓
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	-	M	Potential

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-20-17 (Continued)  
Threatened and Migratory Species**

Common Name	Scientific Name	Conservation Status <sup>1</sup>		Known to Occur in the Offset Areas (Table 5-6)
		TSC Act	EPBC Act	
<b>Mammals</b>				
Koala	<i>Phascolarctos cinereus</i>	✓	V	Potential
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	-	✓
Yellow-bellied Sheathtail-bat	<i>Saccolaimus flaviventris</i>	V	-	✓
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V	-	✓
South-eastern Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	✓
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	✓
Little Pied Bat	<i>Chalinolobus picatus</i>	V	-	Potential
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	-	Potential
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V	-	Potential

### **Threatened Fauna Listed Under the EPBC Act**

In accordance with Condition 19 of the Approval Decision EPBC 2010/5566, baseline surveys of the offset areas and subsequent monitoring will be undertaken for the Regent Honeyeater (*Xanthomyza phrygia*), Swift Parrot (*Lathamus discolor*) and the South-eastern Long-eared Bat (*Nyctophilus corbeni*) in accordance with the *Survey Guidelines for Australia's Threatened Birds* (DEWHA, 2010b) and the *Survey Guidelines for Australian Threatened Bats* (DEWHA, 2010a), unless otherwise agreed to in writing by ~~DoE~~DoEE.

### **Data Analysis and Storage**


All fauna data will be entered in a database and stored for later use and analysis. Data will be added to annually so that it will form a data matrix that is amenable to analysis using classification and ordination techniques, and parametric statistics.

### **6.17.3 Weed Monitoring**

#### **Purpose**

Monitoring will be undertaken to document the change in the type, extent and density of major environmental (e.g. WONS) and noxious weed occurrences in the offset areas over time. Regular inspections will also facilitate detection of new infestations of weeds and enable assessment of the effectiveness of the weed management measures as outlined in Section 6.8.



	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 and 2.2 Point 3.2 recommends that a coordinated approach to weed monitoring across the offset sites


for consistent reporting and data analysis for major weed infestations or newly recorded species, the location, size, density and species should be recorded and communicated to Environmental Representative of the relevant site. During monitoring surveys, specific notes should be taken on any dense or emerging stands of exotic plant species, such as Coolatai grass (*Hyparrhenia hirta*) and invasive native species such as white cypress pine (*Callitris glaucophylla*) or black cypress pine (*Callitris endlicheri*), that may result in the suppression of native species establishment, within White Box – Yellow Box – Blakelys Red Gum Woodland EEC and CEEC.

### **Methodology**

As described in Section 6.17.1, the vegetation and habitat monitoring methodology will include documentation of native and introduced (including ~~biosecurity noxious~~ priority weeds) flora species. However, additional methodology to specifically monitoring weeds is outlined below.

Environmental (e.g. WONS) and ~~biosecurity noxious~~ priority (formerly noxious) weeds will be monitored via inspections of the offset areas by a suitably qualified person(s) with experience in identification of weeds. If major weed infestations are discovered in the offset areas, the coordinates will be recorded, including the boundaries of large populations and details recorded regarding the estimated density of the infestation and the number of plants. Mapping will be prepared showing the extent of weeds requiring control.

The weeds will be controlled as outlined in Section 6.8. Follow-up inspections will be undertaken to assess the effectiveness of the weed management measures implemented and the requirement for any additional management measures.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

A draft recommendation from the MCCM Independent Biodiversity Audit 2017 (ERM, 2018) was for “the methodology used in Year 4 (spring 2018 weed monitoring) should replicate the baseline weed monitoring to allow quantitative comparison of weed populations and determine what % reduction has been achieved”.

### **Frequency**

Environmental (e.g. WONS) and noxious weeds will be monitored twice a year for three years (following State approval of BMP Edition 2 in April 2017) and thereafter the frequency of monitoring would be reviewed. Each weed monitoring period will include primary monitoring and secondary monitoring after weed control (a total of four weed monitoring events per year). Review of the weed management measures will be completed based on the results of the first five years of monitoring and follow-up works will be developed and implemented as required.

### **Data Analysis and Storage**

All weed monitoring data will be entered in a database and stored for later use and analysis. Data should include control measures (e.g. date, activity, location). New species detected during surveys will be added to the database and reported on within the BMP Annual Report (Section 7.2.2).

#### **6.17.4 Feral Animal Monitoring**

##### **Purpose**

The abundance and distribution of feral animals within the offset areas will be monitored to:

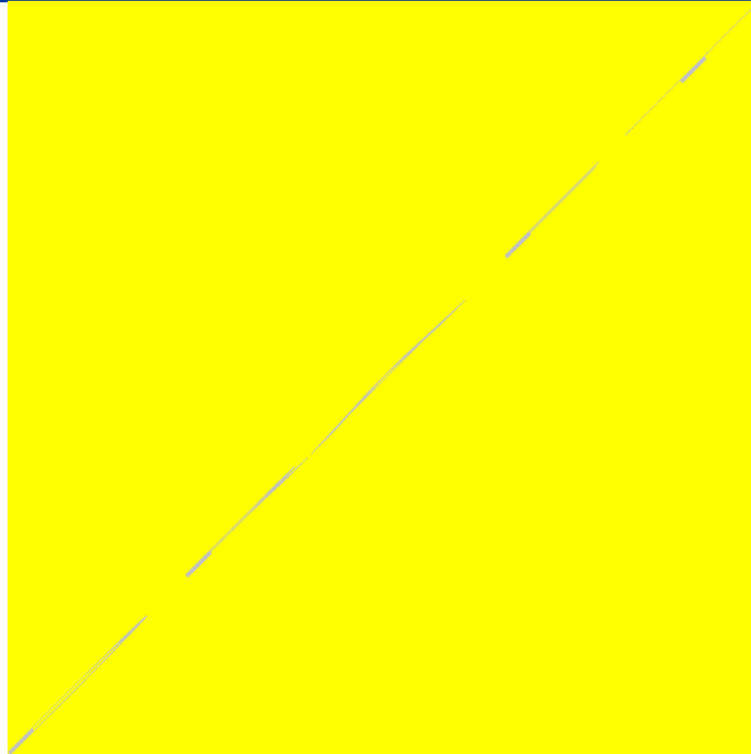
- provide the necessary information to trigger management actions; and
- determine the efficacy of control measures aimed at reducing feral animal abundance.



# MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN




### Methodology

As described in Section 6.17.2, the fauna monitoring methodology will include documentation of native and introduced (including feral) animal species. The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.2 Point 3.3 Feral-feral animal monitoring will adopt the relevant methodologies for specific feral animals generally in accordance with the NSW DPI *Monitoring Techniques for Vertebrate Pests* (Mitchell and Balogh, 2007a to e) so that a range of methods can/cannot be used such as transects/spotlighting, sandpads, cameras traps, etc. that will be determined where practicable and relevant to the specific offset areas/properties. ~~Table 6-21 provides a list of target feral animals. Data on feral animal population/abundance from monitoring and control outcomes (e.g. date, activity, location) will be recorded.~~

The Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.1 and 2.2 Point 3.3 recommends that a coordinated approach to feral animal monitoring across the offset sites for consistent reporting and data analysis of pest animals should be undertaken prior to and following the application of control measures to examine the effectiveness of these measures. For significant pest animal occurrences or observed pest animal damage, the date, location, activity, density and pest animal species should be recorded and communicated to the Environmental Representative of the relevant site.

**Table 6-21**  
**Target Feral Animals**

Page 220	UNCONTROLLED COPY WHEN PRINTED	REFER TO INTRANET FOR LATEST VERSION

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**


Common Name	Scientific Name	Status <sup>4</sup>	Feral Pig	<i>Sus scrofa</i>	Declared pest
Feral Goat	<i>Capra hircus</i>				-
European Red Fox	<i>Vulpes vulpes</i>				Declared pest
European Rabbit	<i>Oryctolagus cuniculus</i>				Declared pest
Feral Deer	<i>Cervus spp.</i> , <i>Axis spp.</i> , or <i>Dama spp.</i>				-
Feral Cat	<i>Felis catus</i>				-
Wild Dog	<i>Canis familiaris</i>				Declared pest

**Frequency**

In order to monitor population changes over time and determine the efficacy of control measures, feral animals will be monitored. Feral animals will be monitored on a quarterly basis for three years (following State approval of BMP Edition 2) and thereafter the frequency of monitoring would be reviewed. Review of the feral animal control measures and follow-up works will be developed and implemented as required, and no later than 5 years after commencement of monitoring under this BMP. Any proposed changes to frequency of monitoring will be discussed with OEH and formalised in a revision to the BMP.

**Data Analysis and Storage**

After each monitoring event is complete, an estimate of feral animal abundance will be estimated in

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

accordance with NSW DPI *Monitoring Techniques for Vertebrate Pests* (Mitchell and Balogh, 2007a)

Data will be updated annually to analyse for trends and effectiveness of control program.

grazing kangaroos are determined to be overabundant

to e).

reviewed (Section 6.18).



# MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

### 6.18 ~~POTENTIAL POTENTIAL RISKS RISKS AND CONTINGENCY~~ ~~CONTINGENCY MEASURES MEASURES~~

#### Contingency Measures

The following Biodiversity Trigger, Action and Response Plan have been updated in accordance with the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) Table 2.4 which are aligned to the performance and completion criteria in Section 6.16. Table 6-19 provides trigger points for contingency measures (corrective actions) to be implemented if the monitoring program (described in Section 6.13.1) identifies that the performance criteria (Table 6-7 and 6-8) are not being met. Contingency measures may not be limited to those listed in Table 6-18.

**Table 6-18 Contingency Measures**

Aspect	Trigger	Action/ Response
<i>Strategic Focus Area 1 – Enhance the quality of habitats and landscapes at the offset sites for White Box – Yellow Box – Blakely's Red Gum Woodland EEC and CEEC</i>		
1.1 Natural regeneration	<ul style="list-style-type: none"> <li>Canopy species are not recruiting across</li> <li>100% of the relevant vegetation zones in the (in semi-cleared and offset sites after 5 years following offset establishment, good condition)</li> <li>Targeted removal of noncharacteristic and weeds, following supplementary to the definition of the community in the EPBC planting with tubestock and seed, if deemed</li> </ul>	<ul style="list-style-type: none"> <li>Review the likely reasons for success in other naturally regenerating areas within the offset sites and the potential cause of plant remnant native species failure, woodland vegetation in naturally regenerated areas do not conform species</li> <li>Policy Statement 3.5 White Box – Yellow Box required.</li> <li>Blakely's Red Gum Grassy Woodlands and</li> <li>Consider additional monitoring to examine Derived Native Grasslands after 10 years the establishment, following offset</li> <li>Naturally regenerated grassland areas are</li> <li>Undertake consultation with OEH on whether actions are required</li> <li>Targeted removal of non-characteristic species, following supplementary planting with tubestock and seed, if deemed required.</li> <li>Investigate and prioritise augmentation of</li> <li>habitat resources for the targeted threatened species, site do not show evidence of</li> <li>Review the likely reasons for success in</li> <li>other naturally regenerating areas within the offset sites and the potential cause of below</li> </ul>
	<ul style="list-style-type: none"> <li>Blakely's Red Gum Woodland EEC and CEEC (such as grey box (Eucalyptus microcarpa) or poplar box (Eucalyptus populnea) dominated vegetation).</li> <li>White Box – Yellow Box – Blakely's Red</li> <li>Gum Woodland EEC and CEEC across 100% of the relevant vegetation zones in each offset occupation or</li> <li>presence of at least 80% of the native fauna species comparative to approved benchmark or monitoring reference sites after 10 years following offset establishment.</li> <li>White Box – Yellow Box – Blakely's Red</li> <li>Gum Woodland EEC and CEEC across the relevant vegetation zones in each offset site is</li> </ul>	<ul style="list-style-type: none"> <li>Investigate and prioritise augmentation of</li> <li>habitat resources for the targeted threatened species, site do not show evidence of</li> <li>Review the likely reasons for success in</li> <li>other naturally regenerating areas within the offset sites and the potential cause of below</li> </ul>





# MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

not within the benchmark ranges for the cover benchmark performance, scores (i.e. overstorey, midstorey and groundcover) and at 80% or above for species richness benchmarks. OR the benchmark ranges for the cover scores and 80% or more the species richness benchmarks are met but not across 100% of the offset sites after 10 years following offset establishment.

- Undertake consultation with OEH on whether actions are required.
- Evaluate whether supplementary planting with appropriate tubestock and seed is of required.

Aspect	Trigger	Action/ Response
	Seed collection records are not reported on	• Make appropriate notations in the Annual

Aspect	Trigger	Action/ Response
1.2 Collect and propagate seed in the Annual Review, Summary Report on environmental propagate seed documentation performance.	Seed is not collected over a range of sites	• Review seed inventory and propagated
	across the locality and local variations in species mixes are not captured, in other areas.	• Review the success or otherwise of rehabilitation/revegetation that has used seed and tubestock and determine if more diversity is required.
	Canopy species are not recruiting across	• Review the likely reasons for success in
1.3 Active revegetation	100% of the relevant vegetation zones in each other actively revegetated areas within the (in semi-cleared offset site after 15 years following offset establishment, species failure, native grasslands and noncharacteristic cleared land) the definition of the community in the EPBC further Policy Statement 3.5 White Box – Yellow Box supplementary planting with tubestock and – Blakely's Red Gum Grassy Woodlands and seed, if deemed required.	• Targeted removal of species and weeds following
	Derived Native Grasslands broadly across the offset sites after 15 years following offset the success or otherwise of management establishment measures.	• Consider additional monitoring to examine
	White Box – Yellow Box – Blakely's Red	• Investigate and prioritise augmentation of
	Gum Woodland EEC and CEEC across 100% of the relevant vegetation zones in each offset occupation or presence of at least 80% of the native fauna	habitat resources for locally-occurring fauna species, site do not show evidence of
	species comparative to approved benchmark or monitoring reference sites after 15 years following offset establishment.	• Review the likely reasons for success in
	White Box – Yellow Box – Blakely's Red	• Review the likely reasons for success in
	Gum Woodland EEC and CEEC across the relevant vegetation zones in each offset site is not within the benchmark ranges for the cover overstorey, midstorey and groundcover) and at 80% or above for species richness benchmarks. OR the benchmark ranges for the cover scores and 80% or more the species richness benchmarks are met but not across 100% of the offset sites after 15 years following offset establishment.	other naturally regenerating areas within the offset sites and the potential cause of below benchmark performance, scores (i.e. whether actions are required.
	richness benchmarks. OR the benchmark ranges for the cover scores and 80% or more the species richness benchmarks are met but not across 100% of the offset sites after 15 years following offset establishment.	• Evaluate whether supplementary planting with appropriate tubestock and seed is of required.



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

*Strategic Focus Area 2 – Provide ongoing management and enhancement of existing habitats at the offset sites for threatened species and communities*

- Salvaged resources are damaged, have
- Re-establish salvaged resources, if

2.1 Salvage of habitat deteriorated or are no longer present, appropriate resources

- Review and identify the need to replace hollow loss with nest boxes.
- Review and identify appropriate measures to reduce loss, damage or deterioration of salvaged resources in the future.
- Loss or damage of nest boxes or evidence of
- Identify and replace all lost and damaged

2.2 Habitat deterioration of nest box condition, nest boxes, augmentation and nest

- Review and identify appropriate measures to box installation
- reduce loss, damage or deterioration nest boxes in the future.
- Monitoring shows less than 80% sign of use
- Review the performance of nest boxes and
- of nest boxes across the offset sites after 5 naturally occurring hollows at reference sites
- years following installation, to investigate the need for new nest box designs, replacements, or
- change in location of nest boxes.
- Nest boxes are not in good structural
- Remove pest animals.

- condition or found to be utilised by pest
- Consider the need for nest box replacement species such as European honey bee (Apis or repair

Aspect	Trigger	Action/ Response
	mellifera), common myna (Acridotheres tristis), common starling (Sturnus vulgaris) and feral rodent species (Rattus and Mus spp.).	
2.3 Access control	• Livestock are accessing and causing	• Identify location of entry and repair fencing
	damage in areas where they should be excluded.	as required.
	• Reports of fauna being injured or killed as a	• Specifically monitor livestock occupancy in conservation areas.
	result of barbed wire fencing within the offset sites, should be investigated.	• Review the incident/s and advise on whether alternative fencing materials are required or
<i>Strategic Focus Area 3 - Promote a consistent and coordinated approach to weed management and pest animal control</i>		
3.1 Weed and pest prevention and	• Weed trends and control schedules are not	• Mine Site Environmental Representative to
	communicated across the BTM Complex, eard	be responsible for making information
	Forest Mining Precinct or with relevant local	available for meetings and forums
	as communication land holders, managers and stakeholders, appropriate.	
3.2 Weed control	• Offset site flora monitoring show an	• Identify location of weed issues and review
	increased level of exotic plant cover following the need for further control measures such as	
	control measures implemented across the offset sites, and control burns.	physical removal, herbicides, strategic grazing
	• Weed species collectively comprise more than 20% of any strata in the native vegetation communities within the offset sites during any	• Consider additional monitoring to examine the success or otherwise of additional control measures, year following offset establishment.
	• Weed control is not undertaken across the	• Review the methods being used and consult
	offset sites using methods outlined in the with agencies on the other suitable methods Noxious and Environmental Weeds Control of weed control.	
	Handbook (6th Edition) (DPI 2014), Narrabri Shire Council Weed Management Plans, and/or the NSW WeedWise website.	• Discuss alternative control methods with contractors hired to undertake weed control.



• Significant weed invasions or newly identified • Review the issues and facilitate additional

weeds species within the offset sites are control measures as required within 1 year of identified through site inspections and identification of the issue, monitoring.

3.3 Pest animal control increase of pest animal species following review the need for further control measures control measures implemented across the in accordance with NSW Codes of Practices offset sites. (COPs) and Standard Operating Procedures (SOPs).

• Consider additional monitoring to examine the success or otherwise of additional control measures.

• Consider the potential impact of drought conditions and seasonal trends.

• Pest animal control is not being undertaken • Review the methods being used and consult

using methods approved under the NSW with DPI on the other suitable methods of pest animal control. Codes of Practices (COPs) and Standard Operating Procedures (SOPs).

• Discuss alternative control methods with contractors hired to undertake pest animal control.

• Significant pest animal occurrences or newly • Review the issues and facilitate additional

identified pest species within the offset sites control measures as required within 1 year of are identified through site inspections and identification of the issue, monitoring.

Strategic Focus Area 4 - Promote a consistent and coordinated approach to fire management for biodiversity


4.1 Managing fuel loads

• Fuel loads are assessed as being moderate • Undertake controlled burning as required but

or high risk for intense and damaging in consideration of the recommendations in bushfires. Rawlings et al. (2010) and in consultation with the RFS.

• Whitehaven will not consider the implementation of strategic grazing in Aspect Trigger

	Action/ Response	
		appropriate management zones where control burning is not considered suitable
4.3 Ecological control on weed species and native species diversity detrimental to the Strategic	<ul style="list-style-type: none"> <li>• The impacts of control and mosaic burning</li> <li>• Review the most up to date advice and information on control burning in relation to the restoration of</li> <li>• Fuel reduction in the form of controlled</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate suitable actions and reinstate restoration activities. burns is found to be</li> <li>• Focus Areas of biodiversity conservation Box-Gum Woodland and fauna habitats.</li> <li>• Review monitoring reports and inspection</li> </ul>
	burning is not undertaken as recommended in Rawlings et al. (2010).	<ul style="list-style-type: none"> <li>reports to determine the level of fuel loads in the offset sites and discuss the appropriateness of control burning with the local Rural Fire Services and adjacent land managers.</li> <li>• Review the most up to date authoritative advice and information on the frequency of control burning in relation to the restoration of Box-Gum Woodland and fauna habitats. • Whitehaven will not consider the implementation of strategic grazing in appropriate management zones where control burning is not considered suitable.</li> </ul>
		Strategic Focus Area 5 – Enhance the connectivity of habitats through corridor and buffer area establishment and management
5.1 Connected landscapes and broader corridors	<ul style="list-style-type: none"> <li>• Corridors within the offset sites are not in accordance with the TARPs outlined in regional Strategic Focus Area 3 in relation to weeds and pests.</li> <li>• Targeted fauna monitoring does not indicate</li> </ul>	<ul style="list-style-type: none"> <li>• As per Strategic Focus Area 3.</li> <li>• Investigate the need for further habitat</li> </ul>
	that the offset site corridors provide habitat for fauna species in the locality 10 years offset establishment	<ul style="list-style-type: none"> <li>augmentation (such as nest boxes, fallen native timber) to provide suitable 'stepping stone' following habitat across the offset sites.</li> </ul>

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

## WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN


- Investigate the need for and implement additional or different monitoring methods to monitor fauna movement.
  - Rehabilitation and the vegetated buffer
  - Investigate the need for further habitat
- 5.2 Mine rehabilitation corridor does not provide linking habitats from augmentation (such as nest boxes, fallen and the vegetated buffer conservation areas in the east, linking Leard timber) to provide suitable 'stepping stone' corridor for habitat
- State Forest and west towards the Namoi habitat across the offset sites, connectivity
- River 30 years following the approval of the Strategy.
- Review the mine rehabilitation status and confirm whether further targeted canopy tree planting is required.
  - Investigate the opportunity to secure other land holdings that would, with appropriate management, increase the habitat connectivity of the mine rehabilitation.
  - Boggabri and Maules Creek Coal Mines do
  - Undertake an annual meeting to discuss and
- not demonstrate a coordinated approach to coordinate monitoring within the vegetated monitoring in the vegetated buffer corridor, buffer corridor
- Strategic Focus Area 6 – Consult and workshop biodiversity issues with local stakeholders and land managers
- Targeted consultation with key stakeholders,
  - Mine Site Environmental Representative to
- 6.1 Biodiversity land managers is not undertaken through the be responsible for invitations sent out with an management development of resources and workshops appropriate lead time to allow for key consultation
- involving stakeholders, stakeholders, land managers, relevant
- Meetings have not included relevant authorities and agencies are given the
  - authorities and agencies (OEH, DP&E, opportunity to engage in the biodiversity
  - LLS, NPWS) and the CCC, management issues.

### **Threatened Species and Box-Gum Woodland Implementation Plans**

As described in Section 2.3, the *MCCM Threatened Fauna Implementation Plan* (Whitehaven, 2015a) and *MCCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (Whitehaven, 2015b) were prepared by Whitehaven in accordance with Conditions 48 and 50 of Schedule 3 to PA 10\_0138. These implementation plans were approved by DP&E on the 14 January 2015.

The *MCCM Threatened Fauna Implementation Plan* (Whitehaven, 2015a) was developed to maximise the likely prospects for the provision of suitable habitats for threatened fauna on the offset areas and on the post mining landform. This investigation involved identification of all factors likely to enhance or impede the effective long term provision of suitable habitat(s) for threatened species. The investigation has resulted in the identification of 21 individual actions relating to the Biodiversity Offset Strategy.

The *MCCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (Whitehaven, 2015b) was developed to maximise the prospects for rehabilitation and regeneration of the Box-Gum Woodland EEC/CEEC on the offset areas and the mine site. This investigation involved identification of all factors likely to enhance or impede the effective long term restoration of degraded remnants of Box-Gum Woodland in offset areas or regeneration of Box-Gum Woodland on disturbed areas. The investigation resulted in the identification of 52 individual actions relating to the Biodiversity Offset Strategy.

	<b>MAULES CREEK</b>	Document Owner:	MCC
		Revision Period:	As required
		Issue:	2
		Last Revision Date:	28 February 2018
		Date Printed:	28 February 2018

**WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN**

The approved implementation plans are incorporated into this BMP. Appendix B provides the individual actions of the implementation plans together with a reference to where the individual actions are addressed in this BMP.

**Risk Assessment**

Following preparation of the *MCCM Threatened Fauna Implementation Plan* (Whitehaven, 2015a) and *MCCM Box-Gum Woodland Endangered Ecological Community Implementation Plan* (Whitehaven, 2015b), a risk assessment was undertaken to confirm that appropriate measures are included in the BMP to management risks (impediments) to achieving the objectives of the offset areas. The risk assessment is provided in Appendix F.

**Contingency Measures**

Table 6-22 provides trigger points for contingency measures (corrective actions) to be implemented if the monitoring program identifies that the performance criteria are not being met. Contingency measures may not be limited to those listed in Table 6-22.





## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

**Table 6-22  
Contingency Measures**

Aspect	Trigger Point	Contingency Measures
Revegetation	Poor understorey diversity.	Consider replanting, causing disturbance through fire or grazing.
	Dense grass cover.	Consider ecological thinning, causing disturbance through fire or grazing.
	Poor native plant growth/germination.	Additional planting or sowing to replace lost recruits or seedlings if the rate of loss is higher than the rate of establishment. Consider the benefits and practicality of applying soil ameliorants.
	Dense overstorey and midstorey revegetation.	Ecological thinning.
	Grazing kangaroos is significantly damaging young seedlings.	If grazing kangaroos is significantly damaging young seedlings, the need for kangaroo control measures will be reviewed. Options for managing the issue include controlling kangaroo numbers or use of tree guards to protect young seedlings.
Control of Weeds	Insect pests significantly damaging young seedlings.	Pesticide will be used safely according to the safety data sheets.
	Presence of Myrtle Rust or Phytophthora	Establish hygiene protocols (e.g. avoiding infected areas, vehicle wash down).
	Weed invasion—perennial and annual grasses, perennial herbs, annual and biennial herbs and woody weeds.	Review additional strategies to control target weed species. Increase the frequency of weed control and monitoring. Re-evaluate the grazing strategy.
Control of Feral Animals	Sustained increase in feral animal numbers despite control measures.	Review additional strategies to control target feral animals. Increase the frequency of feral animal control and monitoring. Consider the practicality of installing temporary fencing around plantings (effective against feral pigs).
Management of Livestock Grazing	Too frequent grazing management, impacting on native fauna habitat, removing or destroying plantings (potentially due to drought etc.).	Re-evaluate the grazing strategy. Lower the grazing pressure as required and preferentially rotate stock out of stressed paddocks to prevent overgrazing of native pastures. Fence off sensitive areas to exclude or control grazing.
<p><i>Access Control</i>  <i>Illegal access and vandalism.</i>  <i>Inspect and remedy issue.</i>  <i>Report illegal access and vandalism to relevant authorities.</i></p>		

**Table 6-22 (Continued)**



## MAULES CREEK

Document Owner:	MCC
Revision Period:	As required
Issue:	2
Last Revision Date:	28 February 2018
Date Printed:	28 February 2018

### WHC\_PLN\_MC\_BIODIVERSITY MANAGEMENT PLAN

Aspect	Section	Trigger Point	Contingency Measures
Bushfire Management	Section 6.13	Unplanned bushfire over greater than 20% of the offset areas.	Inspect and remedy issues with fences, gates or access. Re-evaluate the required management in the affected portions of the offset areas and revise the BMP (if required).
Translocation of <i>Tylophora linearis</i>	Section 6.14	Translocation unsuccessful.	Resume implementation of Stages 2 to 5 of the <i>Tylophora linearis</i> Propagation and Translocation Program (Appendix C).
Translocation of <i>Pomadouris queenslandica</i>	Section 6.15	Translocation unsuccessful.	Resume implementation of Stages 2 to 5 of the <i>Pomadouris queenslandica</i> Propagation and Translocation Program (Appendix D).

**Contingency Measures**

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**From:** s22  
**Sent:** Wednesday, 29 August 2018 11:14 AM  
**To:** s47F  
**Cc:** s47F ; s47F ; s22 s47F  
**Subject:** RE: [13.20] Consultation on Tarrawonga Coal Biodiversity Management Plan revised for Leard Forest Regional Biodiversity Strategy Stage 2 [SEC=UNCLASSIFIED]

Hi s47F

Thanks for submitting the Biodiversity Management Plans for the Maules Creek and Tarawonga coal mines. We will endeavour to provide comments by 15 September 2018.

Kind regards

s22  
Assistant Director  
Post Approvals Section  
Assessments (WA, SA, NT) and Post Approvals Branch  
Environment Standards Division  
Department of the Environment and Energy  
P: 02 6274 s22  
e: s22

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**From:** s47F [mailto:s47F@whitehavencoal.com.au]  
**Sent:** Wednesday, 15 August 2018 8:05 AM  
**To:** s22  
**Cc:** s47F ; s47F  
**Subject:** [13.20] Consultation on Tarrawonga Coal Biodiversity Management Plan revised for Leard Forest Regional Biodiversity Strategy Stage 2

s22

NSW Department of Planning and Environment approved the Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report (Umwelt, 2017) in September 2017. This triggered a requirement to update Tarrawonga Coal Biodiversity Management Plan in accordance with Schedule 3 Conditions 42 and 48 (b) of Tarrawonga Coal’s Project Approval 11\_0047. This updated Tarrawonga Coal Biodiversity Management Plan also represents the current version of the Offset Management Plan required by EPBC Approval 2011/5923 Conditions 12 and 13 to be reviewed by the Commonwealth Department of Environment and Energy (DoEE).

NSW Department of Planning and Environment have recommended that the updated Tarrawonga Coal Biodiversity Management Plan (attached – tracked changed version based on the NSW approved April 2017 document) is consulted with the agencies specified in PA 11\_0047 Condition 48 (a) which includes the Commonwealth DoEE.

Can comments please be received before 15<sup>th</sup> September 2018, otherwise please advise if the Commonwealth DoEE will require additional time to consider the updated Maules Creek Coal Biodiversity Management Plan?

Regards

s47F  
Group Superintendent – Biodiversity

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