

BIODIVERSITY MANAGEMENT PLAN

MAC-STE-MTP-050

Abstract

<i>EBPC No:</i>	2011/5866 and 2014/7377
<i>EP&A Act Approval No.</i>	09_0062
<i>Project:</i>	Mt Arthur Coal extension project, Muswellbrook, NSW (2011/5866) Mt Arthur Coal open cut modification, Muswellbrook, NSW (2014/7377)
<i>Proponent</i>	Hunter Valley Energy Coal Pty Ltd ACN 062 894 464
<i>Proposed Action:</i>	The development of five new open cut extension areas to uncover additional coal reserves on the existing Mt Arthur Coal Complex (2011/5866) The continuation of the open cut mining operations of approximately 128 million tonnes of run-of-the-mine (ROM) coal at a rate of 32 million tonnes per annum of ROM Coal within HVEC's existing mining tenements and application area – ML1487, ML1358, ML1548, Sublease CL229, ML1655 and ML1739 (2014/7377)
<i>Location of the action:</i>	Near Muswellbrook in the Upper Hunter Valley, NSW
<i>Date of preparation:</i>	April 2019

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Planning & Environment

Planning Services

Resource Assessments

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Ann Perkins
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BHP – Mt Arthur Coal
MUSWELLBROOK NSW 2333
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Dear Ms Perkins

**Mt Arthur Coal Mine – Open Cut Consolidation Project (MP 09_0062)
Approval of Biodiversity Management Plan (version 2.0)**

I refer to your email of 20 May 2019 submitting for approval the revised Biodiversity Management Plan (Plan), as required under condition 40 of Schedule 3 of the Mt Arthur Coal Mine Project's Approval.

The Department has carefully reviewed the revised Plan and finds that it meets the requirements of the condition, and as such, the Secretary has approved the revised Plan.

Please place a copy of this Plan on the mine's website at your earliest convenience.

Should you have any enquiries in relation to this matter, please contact Melissa Anderson on the details above.

Yours sincerely,

Howard Reed *22.5.19*
Director
Resource Assessments
as nominee of the Secretary



Mr Edward Nock
HSE Superintendent
Non-process Infrastructure and Projects
BHP
MUSWELLBROOK NSW 2333

Biodiversity Management Plan

Mt Arthur Coal Extension Project, Muswellbrook, NSW (EPBC 2011/5866)
Mt Arthur Coal open cut modification, Muswellbrook, NSW (EPBC 2014/7377)

Dear Mr Nock

Thank you for submitting for approval the revised Biodiversity Management Plan (BMP) for the above Mt Arthur Coal Mine project approvals.

Officers of this Department have advised me on the BMP and on the conditions of approval for EPBC 2011/5866 and EPBC 2014/7377. On this basis, and as a delegate of the Minister for the Environment, I have decided to approve the *Biodiversity Management Plan* Version 2.0, dated 12 April 2019:

- in accordance with Condition 15 of the EPBC Act approval for EPBC 2011/5866, as meeting the requirements of Conditions 5, 6 and 7 of that approval; and
- in accordance with Condition 4 of the EPBC Act approval for EPBC 2014/7377, as meeting the requirements of Conditions 4, 5, 6, 7 and 8 of that approval.

The approved BMP must now be implemented. Please note that, unless otherwise agreed in writing by the Minister, the *Biodiversity Management Plan* Version 2.0, dated 12 April 2019 must be published on the internet within one month of this decision.

The Department has an active monitoring program which includes monitoring inspections, and desktop document reviews and audits. Please ensure that you maintain accurate records of all activities associated with the conditions of approval, including implementation of the approved BMP, so that they can be made available to the Department on request.

Should you require further information regarding my decision please contact Vaughn Cox on 02 6274 2005, or by email: post.approvals@environment.gov.au.

Yours sincerely

Gregory Manning
Assistant Secretary
Assessments (WA, SA, NT) & Post Approvals Branch
Environment Standards Division

5 June 2019

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Biodiversity Management Plan



Key contact

Edward Nock, HSE Superintendent

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References

- Australian Government Department of the Environment and Energy (DOEE) 2011. Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2011/5866.
- Department of Planning and the Environment (DPE) 2014. NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) Mt Arthur Coal Open Cut Consolidation Project Approval (09_0062 MOD 1) dated 26 September 2014.
- DOEE 2014. Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval 2014/7377.
- Engeny Water Management 2016 *Mt Arthur Mine Fluvial Geomorphology Baseline Study* unpublished report prepared for Mt Arthur Coal Mine
- Mt Arthur Coal 2013. *MAC-ENC-MTP-041 Environmental Management Strategy*. Available online: <https://www.bhp.com/-/media/bhp/regulatory-information-media/coal/new-south-wales-energy-coal/mt-arthur-coal/environmental-management-plans/environmental-management-strategy.pdf>

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- Mt Arthur Coal 2014a. *Offset Management Program –Middle Deep Creek Offset Area*, unpublished report available from <http://www.bhpbilliton.com/environment/regulatory-information>
- Mt Arthur Coal 2014b. *Offset Management Program for Onsite and Near Offsite Offset Areas* unpublished report available from <http://www.bhpbilliton.com/environment/regulatory-information>
- Mt Arthur Coal 2015. *Biodiversity Management Plan*. Unpublished report available from at: <http://www.bhpbilliton.com/environment/regulatory-information>
- Mt Arthur Coal 2015a. *MAC-ENC-PRO-012 Land Management*. Internal procedure.
- Mt Arthur Coal 2015b. *MAC-ENC-PRO-061 Surface Water Monitoring Program*. Internal procedure.
- Mt Arthur Coal 2016. *MAC-ENC-PRO-076 Bushfire Prevention Procedure*. Internal procedure.
- Mt Arthur Coal 2017. *MAC-ENC-MTP-047 Rehabilitation Strategy*. Available online: <https://www.bhp.com/-/media/bhp/regulatory-information-media/coal/nswec/mt-arthur-coal/environmental-management-plans/post-mod-1-approved-rehab-strat--june-2017-from-secretary27s-documents.pdf>
- Mt Arthur Coal 2018. *MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring Procedure* unpublished report
- Mt Arthur Coal 2018a. *Permit to Disturb Procedure*. Internal procedure.
- Mt Arthur Coal 2018b. *Mt Arthur Coal Mine Operations Plan (MOP) FY18-20 V1.2*
- Office of Environment and Heritage NSW (OEH) 2014 *Guidelines for the Preparation of Biodiversity Management Plans for Major Projects*, Office of Environment and Heritage Sydney
- Office of Environment and Heritage NSW (OEH) 2017 *Vegetation Information System: Classification* Accessed online at <http://www.environment.nsw.gov.au/research/Visclassification.htm>
- [Rawlings, K., Freudenberger, D. and Carr, D. 2010, A Guide to Managing Box Gum Grassy Woodlands, Department of Environment, Water, Heritage and the Arts, Canberra](#)
- Urbis & Aecom 2015, *Mt Arthur Coal Mine - Open Cut Modification Project - Visual Impacts Management Report*, Report prepared for Hunter Valley Energy Coal, available from <http://www.bhpbilliton.com/environment/regulatory-information>
- Urbis 2013, *Mt Arthur Coal Open Cut Modification – Landscape and Visual Impact Assessment*, Report prepared for Hunter Valley Energy Coal, available from <http://www.bhpbilliton.com/environment/regulatory-information>

1 Declaration of accuracy

Declaration of accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying the Biodiversity Management Plan (MAC-STE-MTP-050) is complete, current and correct.
2. I am duly authorised to sign this declaration on behalf of the approval holder.
3. I am aware that:
 - a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.
 - b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.
 - c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed



Full name (please print)

_____ Edward Nock _____

Organisation (please print)

_____ Hunter Valley Coal Pty Ltd (HVEC) _____

Date

12 / 04 / 2019

2 Introduction

Hunter Valley Energy Coal Pty Ltd (HVEC) operates the Mt Arthur Coal Complex, which consists of approved open cut and underground mining operations, a rail loop and associated rail loading facilities. The Mt Arthur Coal Mine is located approximately 5 kilometres south west of Muswellbrook within the Muswellbrook Shire Local Government Area (LGA) in the Upper Hunter Valley of NSW. A more detailed description of the Mt Arthur Coal Project is included in *Section 2 Proposed Mining Activities* of MAC's Mining Operations Plan ([MOP](#)) and the Project's Environmental Assessment both of which are found on BHP's internet site (www.bhp.com).

The project includes six conservation areas (shown in **Table 1**) the purpose of which is to offset the impacts of the project on *White Box Yellow Box Blakley's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community* (CEEC) and the regent honeyeater, swift parrot, grey-headed flying-fox.

The project area and associated biodiversity management areas are shown in **Figure 1** Error! Reference source not found. and **Figure 2**.

This Biodiversity Management Plan (BMP) outlines Mt Arthur Coal's (MAC) biodiversity management and monitoring approach that addresses both State and Commonwealth approval conditions in relation to biodiversity management for the MAC Complex.

Management measures to conserve, restore and revegetate land and associated environmental monitoring procedures, which have been developed to assess and report on the adequacy of ecological management strategies, are described.

This document updates the previous BMP to include additions to Saddlers Creek and Middle Deep Creek Offset Areas and to address the requirements of EPBC Act approvals [2011/5866](#) and [2014/7377](#).

3 Intent

The intent of this BMP is to outline MAC's biodiversity management and monitoring approach that addresses both State and Federal approval conditions in relation to biodiversity management for the Mt Arthur Coal Complex.

This document supersedes all other BMPs and Offset Management Programs prepared prior to the "Date of Preparation" shown on the cover page of this BMP.

4 Application

This BMP applies to the following:

- All BHP Billiton employees and contract staff;
- All Partnering contractor company representatives; and
- All Subcontractor company representatives.

5 Abbreviations

AEMR	Annual Environmental Monitoring Report
Biosecurity Matter	NSW Biosecurity Act 2016
BMP	Biodiversity Management Plan
CA	Conservation Agreement
CEEC	Critically Endangered Ecological Community
DOEE	Australian Government Department of the Environment and Energy
EEC	Endangered Ecological Community
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environmental Planning and Biodiversity Conservation Act 1999
EMS	Environmental Management System
PtD	Permit to Disturb
HVEC	Hunter Valley Energy Coal Pty Ltd
ISG	Central Hunter Ironbark –Spotted Grey-Gum Box Forest
LGA	Local Government Area
LLS	Local Land Services
MAC	Mt Arthur Coal
MNES	Matters of National Environmental Significance
MOP	Mining Operations Plan
OEH	NSW Office of Environment and Heritage
PA	Project Approval
PCT	Plant Community Type
TEC	Threatened Ecological Community

6 Objectives and scope

6.1 Objectives

The key objectives of the BMP are:

- To provide a framework for the management of biodiversity values across MAC owned land including post-mining woodland rehabilitation, biodiversity offset areas and Edderton Road Regeneration Area, as shown in **Figure 1**.
- To integrate the offset strategy into the overall rehabilitation of the site and with local and regional corridors, existing conservation areas and existing biodiversity commitments at the MAC mine.
- To define measures to offset the impacts to *White Box Yellow Box Blakley's Red Gum Grassy Woodland and Derived Native Grassland* CEEC and the regent honeyeater, swift parrot, grey-headed flying-fox as a result of the Project.
- To document a monitoring program to assess the success of management actions and contingency measures to respond if performance criteria are not met.
- To monitor the effectiveness the management plan and report on the outcomes.

6.2 Scope

Three government approvals are relevant to this BMP:

- NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) Mt Arthur Coal Open Cut Consolidation Project Approval (09_0062 MOD 1) dated 26 September 2014;
- Australian Government Department of the Environment and Energy (DOEE) 2011 approval (Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval [2011/5866](#)); and
- DOEE 2014 approval ([EPBC 2014/7377](#)).

EPBC [2011/5866](#) and [EPBC 2014/7377](#) are complementary and overlapping in their requirements for the project. Approval conditions related to the management of biodiversity values are listed in **Table 1** and **Appendix 1**.

Conditions 36 from the [Planning Approval 09_0062](#) covers the requirement to implement the Biodiversity Offset Strategy as described in the Environmental Assessment. This includes the establishment of conservation and offset areas. Condition 40 of the Approval requires the development of a BMP and details the required content for the BMP.

The BMP is implemented through a range of strategies, plans, agreements and procedures which include:

- [MAC-ENC-MTP-047 Rehabilitation Strategy](#)
- Biodiversity Offset Strategy (described in Section 4.6.4 of the [Mt Arthur Coal Open Cut Mine Modification Environmental Assessment](#));
- [MAC-ENC-MTP-041 Environmental Management Strategy](#)
- [MOP](#)
- six CAs for offset areas (refer to **Appendix 2**).
- [MAC-ENC-PRO-012 Land Management Procedure](#), which outlines the disturbance process for the MAC Complex
- [MAC-ENC-PRO-080 Rehabilitation and Ecological Development Monitoring Procedure](#), which outlines the procedure for monitoring of offset and rehabilitation areas (including Revegetation Inspection and Aerial Seeding Inspection Forms)
- [MAC-ENC-PRO-076 Bushfire Prevention Procedure](#)

These documents are referenced in the plan and all BHP employees and contractors have either direct or indirect access through the internal document management system. Many of these documents are also available on the Mt Arthur Coal regulatory website.

Relevant excerpts from the Conservation Agreements are provided in **Appendix 2**. This BMP has been prepared in accordance with the relevant approval conditions for the project.

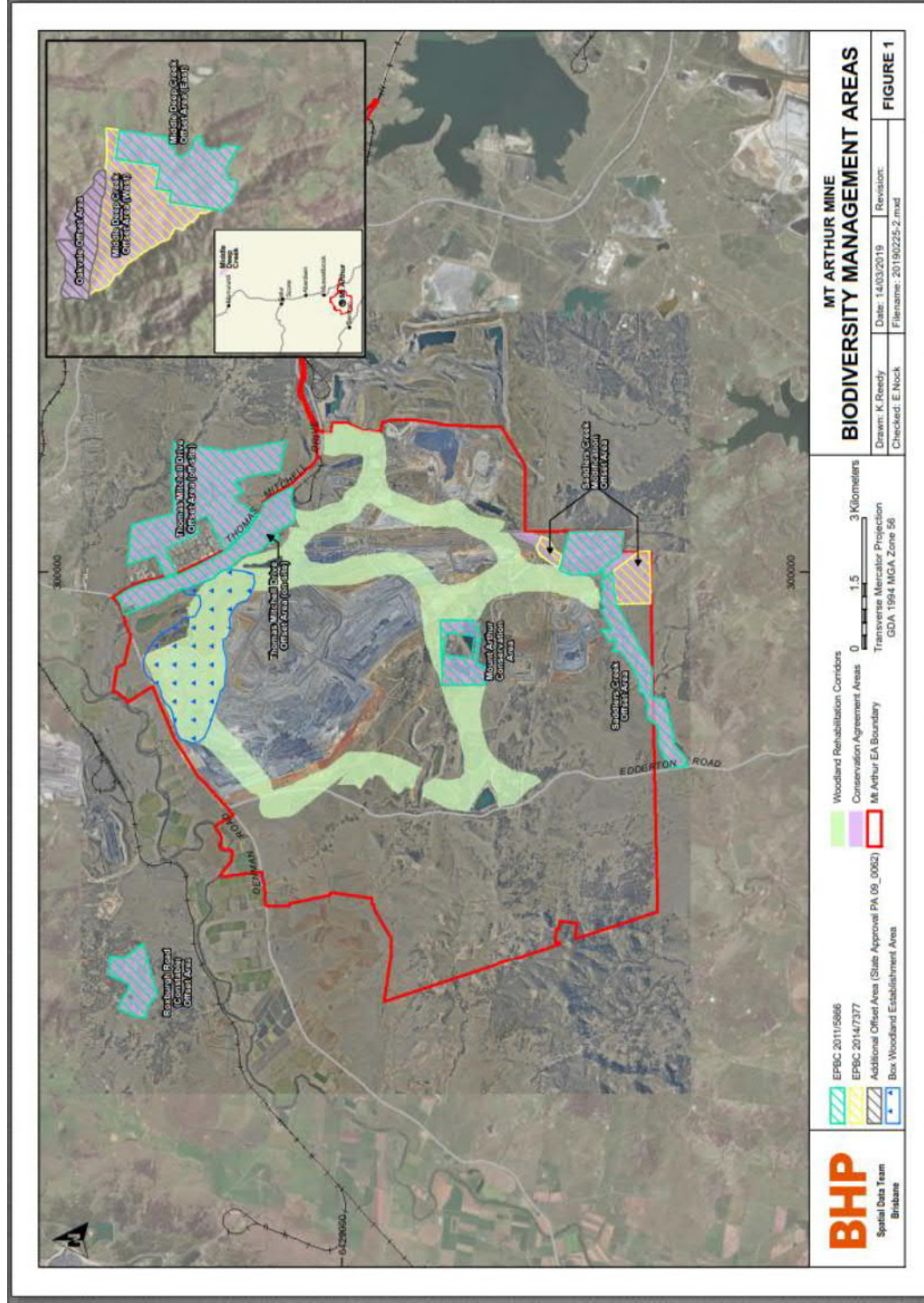


Figure 1: Location of Mt Arthur Coal and associated biodiversity management areas

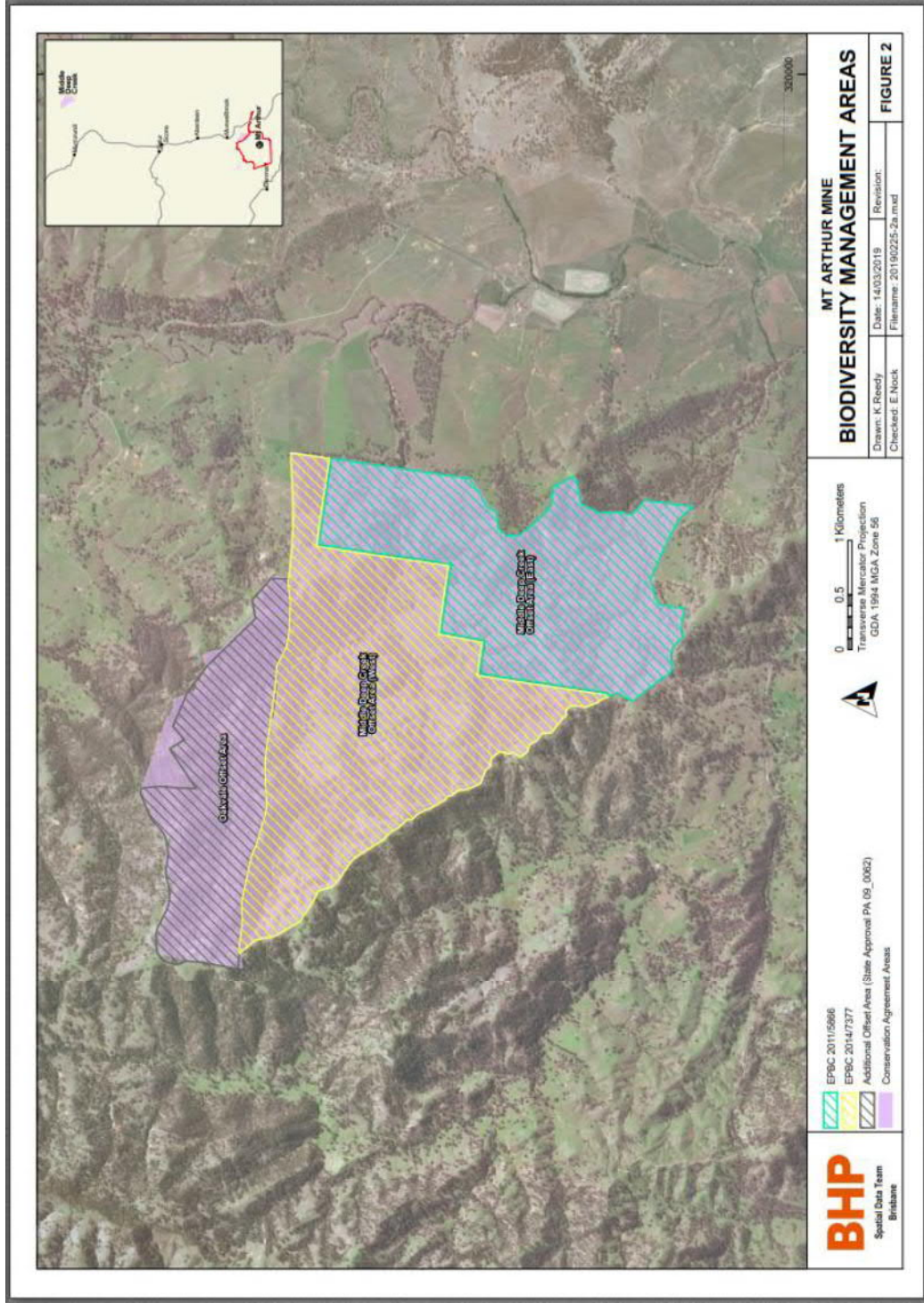


Figure 2 Details of Middle Deep Creek (Oakvale) Offset areas

7 Offset and rehabilitation strategy

MAC's offsets are summarised in **Table 1** and rehabilitation strategy is summarised **Table 2**. The total area includes extensions to Saddlers Creek and Middle Deep Creek offsets as required by [EPBC2014/7377](#) and [PA 09_0062 MOD 1](#).

Table 1: MAC offset areas and approval conditions

Offset Area	Total area (ha) ¹	EPBC listed Box Gum Woodland and Derived Native Grassland (ha) ²	Approval condition in relation to extent and condition of offsets State approval condition PA 09_0062	EPBC 2011/5866C	EPBC 2014/7377
Mt Arthur Conservation Area	99	35	1,723 ha of vegetation to be protected and established	Re-establishment and protection of 707.7 ha of Box Gum Woodland CEEC (including 738.7 ha of suitable habitat for regent honeyeater and swift parrot). The condition of this 707.7 ha is to be improved to 'State 1' condition under the Rawlings et al. (2010) State and Transition Model and listing advice for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community.	131 ha expansion Saddlers Creek Conservation Area and a 410 ha expansion Middle Deep Creek Offset Area. The condition of this 541 ha is to be improved (in relation to matters of national environmental significance (MNES)).
Saddlers Creek Conservation Area	431.3	357			
Thomas Mitchell Drive Offset Area (on-site)	219.4	142.1			
Thomas Mitchell Drive Offset Area (off-site)	495	107.6			
Roxburgh Road 'Constable' Offset Area	109	0.3			
Middle Deep Creek Offset Area	1245.5	1,120.6			
Total area of offsets	2599.2	1,762.6			

1 = The total area of each offset property differ slightly from [DA 09_0062](#) Schedule 3, Condition 36. This is due to the subsequent refinement of property boundaries, and expansions of Saddlers Creek and Middle Deep Creek offset areas.

2 = The offset areas contain a variety of vegetation types in varying condition, including areas of EPBC listed Box Gum Woodland and Derived Native Grassland CEEC.

Table 2: Revegetation and rehabilitation areas¹ and approval conditions

Offset Name	Management Zone	Total area (ha)	EPBC listed Box Gum Woodland and Derived Native Grassland (ha)	Approval conditions in relation to revegetation and post-mining rehabilitation areas
				State approval condition PA 09_0062 EPBC 2011/5866 EPBC 2014/7377
Edderton Road Revegetation Area	Revegetation area	317.3	302.7 ²	1,415 ha of rehabilitation corridors to provide suitable habitat for regent honeyeater and swift parrot.
Post-mining Woodland Rehabilitation (including Box Woodland Establishment Area)	Woodland corridors	2,142	N/A ³	500 ha regeneration area to be established with 299.2 ha to be improved to 'State 1' condition under the Rawlings et al. (2010) State and Transition Model and to meet the listing advice for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community.
	Box Gum Woodland Establishment Area	500	Establishment in progress	
Total area of offset				2,642 ha of vegetation to be established within rehabilitation areas including a 500 ha box gum woodland establishment area. The offset and or rehabilitation strategy is to be focussed on establishment of significant and/or threatened plant species and communities and habitat for significant or threatened animal species.
Total area of offset				2,959.3

1 = Areas directly disturbed by mining are described as rehabilitation areas. Edderton Road Revegetation Areas have not been directly disturbed by mining activities and are planned to be revegetated to contribute to rehabilitation corridors and are not part of a designated offset for the project.

2 = Central Hunter Valley eucalypt forest and woodland CEEC and farm dams and make up the remaining total area.

3 = Woodland corridors outside of the Box Gum Woodland Establishment Area are not required to be revegetated to a condition equivalent to this CEEC.

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8 Biodiversity management summary

MAC's biodiversity management approach is based on control, mitigation and offsets. **Figure** describes the concept behind biodiversity management for MAC.

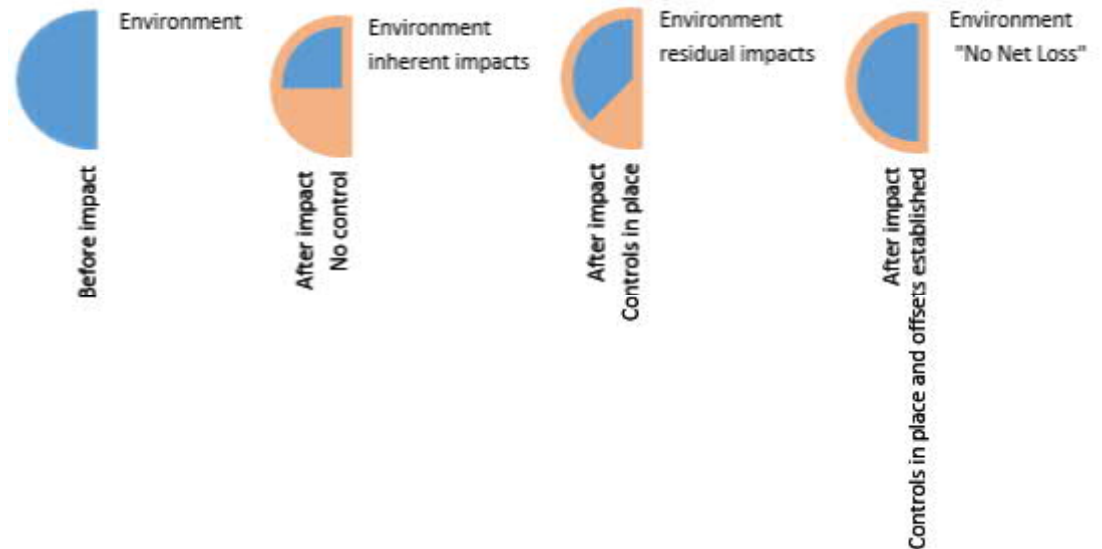


Figure 3: MAC's biodiversity management approach

The Controls and Offsets covered in the BMP are summarised in **Table 3**. It is the responsibility of MAC's HSE Superintendent with the assistance of site based Environment Specialist to ensure the completion targets/objectives are met.

Table 3: Summary of biodiversity management measures, monitoring program, performance criteria and completion targets

Zone	Action			Monitoring	Performance criteria	Completion target / objectives
Remnant woodland and immediate surrounds	Offset areas	Removal of livestock, weed control, pest animal control, fire management.	Vegetation monitoring: plots, photo points, transects, spatial data analysis	No decrease in extent of woodland areas Regeneration of canopy species observed Vegetation is on a trajectory towards benchmark values for the PCT	Forest, woodland and derived native grassland are protected and improved within offset areas to the condition and extent specified in approval conditions.	
Active revegetation works	Offset areas	Removal of livestock grazing to encourage natural regeneration - planting and/or seeding of target vegetation community in areas unlikely to regenerate in sufficient timeframe -weed control where required.	Vegetation monitoring: plots, photo points, transects, spatial data analysis	Targeted regeneration actions completed in accordance with CAs Walk over inspection of each area indicates successful germination and establishment of seed or high tube stock survival in areas previously seeded or planted Transects and/or monitoring plots show progression over time towards species diversity and structure of the corresponding monitoring sites within remnant woodland	Actively managed areas of derived native grassland progress to 'State 1' condition over time in accordance with revegetation commitments.	
	Mine Rehabilitation	Seeding and/or tube stock to supplement seedbank remaining in topsoil. Targeted seed mixes for Upper/Central	Rehabilitation completion monitoring program. Vegetation monitoring: plots, photo points,	Appropriate species are planted/seeded for the intended vegetation community Revegetation inspection of each area indicates successful germination and establishment of seed and/or high tube stock survival in areas previously seeded or planted	Self-sustaining woodland corridors created that meet regulatory requirements in regard to extent and condition. Additional specific completion targets for	

Biodiversity Management Plan

Zone		Action	Monitoring	Performance criteria	Completion target / objectives
		Hunter Box-Ironbark Woodland and Central Hunter Ironbark –Spotted Grey-Gum Box Forest to be used. Weed control.	transects, spatial data analysis	Transects and/or monitoring plots show progression over time towards completion targets for the intended community and corresponding vegetation monitoring sites within remnant woodland	mine rehabilitation are included in Table 10.
All management zones		Routine weed inspections and weed control	Vegetation monitoring plots, meandering transects	Weed management priorities for each management area identified Noxious weeds are managed according to legal requirements as a Biosecurity matter Environmental weeds that are likely to be impacting biodiversity are suppressed across offset areas (where there is limited risk of unintended impacts to offset areas or other receiving environments and are not preventing successful woodland regeneration)	No significant impacts from weeds and pests when compared to nearby areas Forest, woodland and derived native grassland are protected and improved within offset areas to the condition and extent specified in approval conditions. Actively managed areas of derived native grassland progress to 'State 1' condition over time in accordance with revegetation commitments
All management zones		Routine pest animal monitoring and control	Vegetation monitoring and targeted pest monitoring measures as recommended in the CAs	Observations or monitoring of pest animals or their damage reported If pest animals are deemed to require control, a targeted pest animal control strategy devised and implemented Damage to vegetation or ground disturbance (particularly revegetation works) from pest animals reduced so progression to completion criteria is not significantly impeded	

Zone	Action	Monitoring	Performance criteria	Completion target / objectives
All management zones	Fire management	Annual rapid assessments	<p>Pest animal control conducted in conjunction (where possible) with neighbouring properties or wider regional control programs</p> <p>Bushfire at Mt Arthur Coal is managed in accordance with the Bushfire Prevention Procedure and Emergency Procedure – Bushfires</p> <p>Bushfire within offset areas is managed according to conservation agreements</p>	<p>Self-sustaining woodland corridors created that meet regulatory requirements in regard to extent and condition.</p> <p>Additional specific completion targets for mine rehabilitation are included in Table 9.</p>
Offset areas	Fencing, tracks and trails	Annual boundary fence inspections of offset areas	<p>Boundary fences maintained to exclude livestock entering from neighbouring properties</p> <p>Construction and maintenance of any new fences are to use wildlife friendly materials</p> <p>Unused internal fences removed to prevent wildlife injury</p> <p>Management or construction of tracks or trails follow requirements within CAs</p> <p>Any unwanted tracks are closed to facilitate restoration of native vegetation</p>	

Note: relevant excerpts from the CAs are provided in Appendix 2.

9 Biodiversity management areas

9.1 Offset areas

Legally binding CAs have been established between the Minister Administering the National Parks and Wildlife Act 1974 (NSW) and Hunter Valley Energy Coal Pty Ltd for:

- Middle Deep Creek and Oakvale Offset Conservation Area;
- Thomas Mitchell Drive Off-Site Offset Conservation Area;
- Thomas Mitchell Drive On-site Offset Conservation Area;
- Mt Arthur Offset Conservation Area;
- Roxburgh Road Conservation Offset; and
- Saddlers Creek Conservation Area.

In summary the CAs include:

- How the Conservation Areas can be used;
- Management actions to achieve defined aims;
- Monitoring requirements;
- Reporting obligations;
- A non-compliance response process; and
- A dispute resolution process.

Excerpts from the CAs that address Conditions of the Approval are included in **Appendix 2**.

The location of the offset areas is displayed in **Figure 1 and Figure 2**. These agreements satisfy commitments to secure biodiversity offsets in accordance with current State and Commonwealth approvals ([PA 09_0062](#), [EPBC 2011/5866](#) and [EPBC 2014/7377](#)) by providing enduring protection for each offset area. Rehabilitation areas

MAC will progressively rehabilitate post mining landforms to include woodland vegetation that, once established, will provide potential habitat for regent honeyeater and swift parrot¹, including a designated Box Gum Woodland Establishment Area (**Figure 1**). The majority of the Box Gum Woodland Establishment Area is to be rehabilitated to 'State 1' from Rawlings et al. (2010) State and Transition Model and listing advice for the CEEC *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community* (referred to as 'Box Gum Woodland'). 'State 1' condition generally contains a widely spaced Eucalypt canopy, a high diversity of grasses and herbs, few to no weeds, few annual plant species and regeneration of the eucalypt canopy.

The CAs provide a mechanism to ensure the long term security for revegetation areas and re-established woodland areas.

All CAs include Permission and Guidelines (Annexure C Item 3) – refer to **Appendix 2**. These cover a number of areas and include the maintenance of existing access vehicular tracks in the Conservation Area to a maximum width of 4m with 1m either side permissible for clearing. The use of these existing access tracks is permissible under the CAs and is not likely to have an adverse has no impact on biodiversity values.

¹ A description of the habitat requirements of the regent honeyeater and the swift parrot is provided in Sections 3.3 and 3.4 respectively of Open Cut Modification ([EPC 2014/7377](#)) Preliminary Documentation Main Report and Attachments A-E (BHP, June 2016).

Existing tracks will continue to be maintained as required and as such revegetation of access tracks have not been incorporated in the current 10 year revegetation schedule.

9.2 Mining footprint

Biodiversity management within the areas to be impacted by mining or related activities will follow MAC's [MAC-ENC-PRO-012 Land Management Procedure](#) and [Permit to Disturb](#) (PtD) process. Management of this zone is discussed further in **Section 11.3**.

9.3 Integration of offset strategy with rehabilitation areas and surrounding environment

Integration of the offset strategy and rehabilitation areas will be achieved through the design of woodland corridors which will directly link vegetation in Thomas Mitchell Drive Offset Areas, Mt Arthur Offset Area, Saddlers Creek Offset Area and Edderton Road Revegetation Area (**Figure 1**). These woodland corridors will also link offset areas to remnant woodland areas to east of the MAC Complex, including the Drayton Wildlife Refuge (located to the north of Thomas Mitchell Drive and Drayton Coal Mine).

The Middle Deep Creek Offset Area (**Figure 1**) is part of a large area of woodland that extends to the north, west and south in excess of 10 kilometres. The woodland of the Middle Deep Creek Offset area provides habitat and vegetated connectivity for woodland species moving throughout the local landscape. The offset area is broadly connected to Wallabadah Nature Reserve to the north, Camerons Gorge Nature Reserve to the south and Towarri National Park to the south west.

10 Biodiversity values and baseline condition of vegetation

The offset areas contain significant areas of the Box Gum Woodland CEEC and habitat for the Critically Endangered regent honeyeater and swift parrot. Biodiversity values of each offset area have been described and mapped within individual CAs (refer to **Appendix 2** for details) and are summarised briefly below:

Fifteen separate Plant Community Types (PCT) have been mapped across the offset areas. The condition of these vegetation communities and extent is described in **Table 4** with mapping, photographs and descriptions of vegetation communities within each offset are included in each CA

- Two Commonwealth listed CEECs (**Table 5**)
- Six State listed Endangered Ecological Communities (EECs)
- Twenty four threatened flora and fauna species and/or populations have been observed in the offset areas and surrounds (**Appendix 3**)

Table 4: Plant community types, current condition state and extent across offset areas

PCT	Area (ha) ¹			
	1 - Intact	2 – Derived Native Grassland (Derived Native Grassland)	3 – Areas requiring a more extensive revegetation works (e.g. exotic grassland)	Total Area (ha)*
116 Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley	0.4	-	-	0.4
1543 Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley	0.2	-	-	0.2
1586 White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley	-	4.2	-	4.2
1604 Narrow-leaved Ironbark - Box - Spotted Gum shrub - grass open forest of the central and lower Hunter	0.4	3.4	-	3.8
1606 White Box - Narrow-leaved Ironbark - Blakely's Red Gum shrubby open forest of the central and upper Hunter	21.1	7.5	-	28.6
1608 Grey Box - Grey Gum - Rough-barked Apple - Blakely's Red Gum grassy open forest of the central Hunter	9.4	6.3	-	15.7
1654 Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley	24.3	1.3	-	25.6
1684 Silvertop Stringybark - Rough-barked Apple - Bundy open forest of the Liverpool Ranges and Northern Tablelands escarpment	88.6	12.1	-	100.7
1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	232.0	909.6	-	1,141.6
1692 Bull Oak grassy woodland of the central Hunter Valley	50.8	48.6	-	99.4
1731 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley	29.08	-	-	29.08

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PCT	Area (ha) ¹			
1737 Typha rushland			3.3	3.3
281 Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	94.8	12.8	3.4	111.1
42 River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	89.8	169.4		259.2
618 White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	562.5	447	51.7	1061.2
Total area	1,203.5	1,622.3	58.4	2,884.2 ²

¹ includes Edderton Road Revegetation Area,

² features not part of PCTs such as farm dams, dwellings, roads and tracks and exotic grassland excluded from calculations

Table 5: Commonwealth listed TECs within offset areas

Commonwealth Listed TEC	Area (ha) within offset areas*
White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	2,065.3
Central Hunter Valley eucalypt forest and woodland CEEC	205.6
Total	2,270.9*

* includes Edderton Road Revegetation Area

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Table 6: State listed EECs within offset areas

State listed EEC	Area (ha) within offset areas*
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions	387
Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions	0.4
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions	89.8
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions	4.2
Hunter Valley Weeping Myall Woodland	0.4
White Box Yellow Box Blakely's Red Gum Woodland	1,793.7
Total	2,275.5*

* includes Edderton Road Revegetation Area

11 Biodiversity management

11.1 Management of offset areas

MAC is required to improve the condition of vegetation within the offset areas. CAs have been prepared for six offset areas (**Table 1**) and contain provisions and also restrictions on the types of management measures and activities that can be conducted within each area. Ten year management schedules for each offset area are included within the respective CA. Should any discrepancies arise between this BMP and CAs then the CA will prevail. Management measures and activities excerpts from the CAs are included in Appendix 2.

Edderton Road Revegetation area forms part of MAC's designated rehabilitation areas. However as this area has not been directly disturbed by mining and contains area of intact vegetation and native grassland, management actions for this area are the same as offset areas. For the purposes of clarity and similarities in management requirements offset and revegetation areas will be termed collectively as 'offset areas' unless otherwise specified. Management of these areas to improve condition of vegetation includes the following aims and actions:

- Revegetation;
- Weed control;
- Pest animal monitoring and control;
- Fire management;
- Fencing; and
- Monitoring and reporting.

Grazing of livestock within offset areas is generally prohibited under the CAs. Middle Deep Creek Offset and Thomas Mitchel Drive Off-site Offset have provisions for fencing to support strategic grazing should it be required as a management tool.

No specific plans have been prepared to date for strategic grazing in the offset areas. However should grazing be required, a grazing management strategy will be prepared detailing the intended objectives, methods to be used, duration and timing including resting periods to allow vegetation to recover, intended stocking rates and additional monitoring requirements to track changes. If strategic grazing is to be undertaken in areas of Box Gum Woodland, the grazing management strategy for these areas will be guided by [Rawlings et al \(2010\)](#). Additional detail for other land management activities are included in Table 7.

Revegetation activities will involve natural and active regeneration. Natural regeneration is the development of native vegetation without any specific management actions besides livestock exclusion and preventing unwanted vehicle access. Active regeneration is the planting or seeding of indigenous vegetation and management of weeds. Active regeneration will be used in areas where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion.

Proposed management aims, actions and associated timing for each management action in each offset area are detailed within individual CAs (see Appendix 2).

11.2 Post-mining woodland rehabilitation

Post mining woodland rehabilitation will be managed in accordance with *Section 7 Rehabilitation Implementation* of the [MOP](#) and [MAC-ENC-MTP-047 Rehabilitation Strategy](#) and be guided by the [MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring Procedure](#).

Actions intended for this management zone include:

- Topsoil management;
- Establishment of woodland corridors;
- Establishment of the Box Gum Woodland Revegetation area;
- Weed and pest animal control; and
- Fire management.

Management measures for post-mining woodland rehabilitation are included in **Table 7**. Further details are provided in Appendix 2. The intended vegetation communities within woodland corridors are Central Hunter Box - Ironbark Woodland and Central Hunter Ironbark -Spotted Gum – Grey Box Forest. Specific completion targets for these communities are described in **Table 9**.

The Box Gum Woodland Establishment Area and the Woodland Rehabilitation Corridor will be revegetated with a tree, shrub and grass seed mix targeting the establishment of Central Hunter Box-Ironbark Woodland and Box Gum Woodland. The seed mix may also include an exotic sterile cover crop to assist with initial slope stabilisation, weed and dust control. Extensive tubestock planting programs are currently underway, to facilitate the establishment of Box Gum Woodland and fauna habitat. The intended schedule for woodland rehabilitation to the financial year of 2020 is included in *Table 8, Section 7.2 Proposed Rehabilitation Activities* this MOP Term of the [MOP](#) and is updated during each [MOP](#) revision. BHP commits to the actions of Table 8 of the Mt Arthur Coal: Mine Operation Plan FY 18-20 dated 24 August 2018.

Table 7: Management actions for offset and rehabilitation areas

Management Aim	Management Actions	
	Offset Areas	Rehabilitation post mining
Substrate management	n/a	Substrate management is implemented through the Land Management Procedure
Revegetation	<ul style="list-style-type: none"> ▪ Facilitate natural regeneration through stock removal. ▪ Active revegetation using a variety of methods will be used where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion. ▪ Seed stock will be sourced locally and follow the collection guidelines set out in the CAs. 	<ul style="list-style-type: none"> ▪ Seeding and or tube stock is used to supplement any seedbank remaining in topsoil. ▪ Targeted seed mixes have been refined for two of the targeted communities: Upper/Central Hunter Box-Ironbark Woodland and Central Hunter Ironbark –Spotted Grey-Gum Box Forest (ISG) as listed in <i>Table 10 Mt Arthur Coal Box Gum Woodland</i> of the MOP. ▪ Seed will be sourced locally and originate from MAC's seed collection program (where practicable). Details on seed collection are provided in Appendix 2.

Management Aim	Management Actions	
Weed control	<ul style="list-style-type: none"> Weed control will be conducted in response to ecological monitoring outcomes and observations and the established weed assessment program. Noxious Weeds will be controlled in accordance with best practice processes and relevant requirements under the NW Act. Additional intensive on-going weed control programs using a range of control techniques, will be required to achieve condition targets for the Box Gum Woodland Rehabilitation Area, particularly in areas of previous pasture rehabilitation currently dominated by exotic grasses. Weed control within offset areas will be undertaken in accordance with the CAs. 	
Pest animal monitoring and control	<ul style="list-style-type: none"> Pest animal control will be conducted in conjunction with neighbouring properties or wider regional control programs or in response to observations of or damage by pest animals or through other pest animal monitoring activities. Methods for pest animal control may include shooting, trapping and use of poisonous baits consistent with advice from the NSW Office of Environment and Heritage (OEH) and Local Land Services (LLS). 	
Fire management	Bushfire at Mt Arthur Coal is managed in accordance with the: <ul style="list-style-type: none"> Bushfire Prevention Procedure Emergency Procedure – Bushfires CAs 	
Fencing, tracks and trails	Construction and maintenance of fences within offset areas are to be undertaken in accordance with the CAs.	Fencing will be maintained where appropriate to prevent livestock access from surrounding properties. Appropriate fencing will be installed to prevent livestock access to woodland corridors, during any grazing trials or following introduction of stock into pasture rehabilitation areas.

Note: relevant excerpts from the CAs are provided in Appendix 2.

11.3 Mining footprint

11.3.1 Land Management Procedure

The mining footprint is managed through the [MAC-ENC-PRO-012 Land Management](#) procedure. The [MAC-ENC-PRO-012 Land Management](#) procedure details control measures to be implemented during vegetation clearing to ensure activities are undertaken in an environmentally responsible manner and in accordance with BHP's conditions and commitments. The [MAC-ENC-PRO-012 Land Management](#) procedure covers:

- Permit to Disturb process (PtD);
- Pre-clearance survey;
- Fauna management;
- Topsoil management; and
- Biodiversity management

The following sections provide more detail on each of these aspects covered by the Land Management Procedure.

Permit to disturb (PtD) process

Disturbance to land within the approved mining footprint is managed in accordance with [MAC-ENC-PRO-012 Land Management](#) procedure and associated PtD system. The purpose of the procedure is to ensure that ground disturbance activities, such as vegetation clearing, topsoil stripping and stockpiling, are undertaken in an environmentally responsible manner in accordance with statutory requirements and site environmental plans. The procedure outlines:

- Roles and responsibilities of key personnel
- PtD process
- Vegetation clearing controls
- Topsoil management
- Management and translocation of threatened species
- Weeds
- Feral animal control
- Fire prevention
- Land use of buffer lands
- Inspections of topsoil stripping activities and topsoil stockpiles

The PtD system sets the basis for directing how work is managed in order to meet our environmental conditions and commitments. The PtD is initiated by the project owner or delegate and then submitted to an environmental specialist (ES) for review. The ES reviews the proposal in the PtD against our conditions and commitments and documents controls needed to ensure that they are met. Aspects assessed to determine if controls are needed include but are not limited to:

- Checks to confirm that the work is within approved environmental and tenure boundaries;
- Consistency with conditions and commitments, particularly Federal, State and Local approvals, management plans and MOP;
- Assessment of lower risk alternatives;
- Topsoil stripping and stockpiling;
- Impacts on flora and fauna species and communities of conservation significance;
- Land use of buffer lands;
- Water resources;
- Erosion and sedimentation;
- Stakeholders;
- Noise, light and dust;
- Weeds and feral animals;
- Bushfires;
- Impacts to rehabilitation areas; and
- Contaminated sites.

Pre-clearance survey

The conditions in the PtD will determine the need for a pre-clearance survey. Where the PtD identifies a significant risk to significant ecological features² the PtD will require that a pre-clearance survey be undertaken. The aim of the pre-clearance survey is to:

- Confirm whether not any impacts on significant ecological features are covered by the Environmental Assessment and can meet the conditions and commitments relating to the Project approvals. Where this is not the case no work will proceed without State and Federal Government approval; and
- Limit impacts on native flora and fauna and their habitats in the Environmental Assessment Boundary.

The outcomes of the pre-clearance surveys will inform the development of controls to reduce the potential impacts on significant ecological features.

The pre-clearance survey will be used to identify significant ecological features that can be salvaged and used for improving ecological outcomes through beneficial use. Conditions relating to recovery activities and beneficial use will be included on the PtD.

Topsoil

Topsoil resources suitable for recovery and use as a growth medium was identified during the Environmental Assessment (EA) process. The EAs recommended topsoil recovery depths between 100 to 300mm. Where the PtD identifies that topsoil is to be disturbed or removed the focus of the controls developed will be on maximising the opportunity to salvage and reuse it. Where this is the case prior to topsoil stripping, a pre-stripping assessment is made to ground-truth the broad scale stripping recommendations from the EAs and a final stripping plan is developed based on this. The final stripping plan is modified to ensure all suitable topsoil material is recovered, without contamination by subsoils.

The [MOP](#) details the management measures for ensuring the maintenance of topsoil quality and volume during stripping, handling, stockpiling and placement. They include:

- *disturb the minimum area necessary for mining and associated infrastructure;*
- *stripping depths and limits (including areas of no recovery) are to be clearly delineated with survey pegs, and adhered to during stripping operations;*
- *clearing and topsoil removal activities must be checked at regular intervals to ensure continued effectiveness of stripping methods and management of topsoil;*
- *clearing and topsoil stripping should be limited to daylight hours where possible;*
- *during topsoil stripping and stockpiling the process avoids structural degradation of soils – taking particular care to avoid excessive compaction (i.e. avoiding re-handling and limit stripping activities in wet conditions);*
- *direct topsoil placement from stripping onto prepared rehabilitation areas is maximised, and double handling (relocation of stockpiles) minimised through planning;*
- *Topsoil stockpiles shall be:*
 - *no greater than 3 metres in height;*
 - *located away from drainage lines, operational areas, and proposed disturbance areas;*
 - *managed to minimise run-on and minimise sediment laden run-off;*
 - *surveyed and recorded on mine plans;*
 - *ripped and sown with a pasture seed mix (where planned to remain for longer than 6 months); and*

² Significant ecological features includes: threatened species; endangered populations; hollow-bearing trees; other habitat trees (such as those containing nests or dreys); vegetation containing significant seed resources; hollow logs and stumps; fallen timber; and boulders.

- *inspected periodically and, if required, treated for weed infestation.*

Where the PtD identifies that salinity is a risk relating to the activity the focus of the controls developed will be on reducing the risk of accelerated erosion and preventing successful revegetation due to salinity. Spoil and soil salinity risk is measured by geochemical assessments during project planning. Where this is determined to be a significant risk, soil characterisations sampling and review of rehabilitation practices will be carried out to determine root cause. Remedial strategies will be identified to modify soil characteristics and selection and rehabilitation to prevent recurrence (e.g. topdressing, gypsum application etc.) (BHP, 2017a).

Native Fauna

Where a PtD and pre-clearance survey indicates risk to threatened species and endangered species and the conditions and commitments relating to State and/or Federal Government cannot be met no work is to be undertaken without Government approval. Where the approval conditions and commitments can be met controls will be identified to reduce the impacts where practicable. For example habitat tree³ felling inspections would be undertaken prior to clearing habitat trees identified through the pre-clearing survey. The purpose of these inspections are to:

- Minimise potential impacts from clearing of habitat trees on threatened fauna species;
- Identify fauna within habitat trees and recommend management actions to minimise impact on these species;
- Identify safety requirements through the completion of a risk assessment, where applicable; and

Identify habitat attributes for potential salvage (such as sizeable logs and salvaged tree hollows) and where practicable arrange for relocation. Habitat features (such as hollow bearing trees) suitable for salvage will be identified and marked in the field. They may then be reinstated in suitable areas or stockpiled.

Weeds

A weed control program has been implemented at the Mt Arthur Coal Complex (in accordance with relevant requirements under the Noxious Weeds Act 1993), and typically includes:

- an annual weed assessment across the Mt Arthur Coal Complex which includes an update to site weed mapping and assesses weed risk setting the basis for weed control for the annual weed control program;
- an annual weed control program across the Mt Arthur Coal Complex targeted on a basis of risk; and
- monitoring and inspections of areas to assess the effectiveness of the weed control program and to ascertain the requirement for further work.

Feral animal control

Feral animal control programs will be completed at least annually. These programs typically consist of feral dog and fox baiting and trapping. This will include details of feral animal sightings, control actions and assess the effectiveness of these control strategies.

Bushfire management

A Bushfire Prevention Procedure has been prepared for the Mt Arthur Coal Complex. The procedure prioritises the protection of life and property, along with the significant ecological features within the Mt Arthur Coal Complex.

³ Habitat trees are trees containing hollows, major trunks or branch cracks, spout or fissures or showing obvious signs of fauna activity.

11.3.2 Management of landscaping to reduce visual impacts

A Visual Impacts Management Report ([Urbis & AECOM 2015](#)) has been prepared for the MAC complex in relation to the Modification and a Landscape and Visual Impact Assessment was completed as part of the Mt Arthur Coal Open Cut Mine Modification Project EIA ([Urbis 2013](#)).

Screening has been successfully employed at several locations around Mt Arthur Coal, most notably along Thomas Mitchell Drive and Edderton Road, where a thick vegetated band comprising of canopy, understory and grasses effectively blocks out most views of the site. Maintenance of landscaping and vegetation screening (addition and replacement of trees/plants) will continue where required with consideration given to establishing new vegetated visual screens where required. Plantings in these areas will consist of locally indigenous plant species.

11.3.3 Rehabilitation of creeks and drainage lines following mining

A geomorphological survey ([Engeny, 2016](#)) has been completed across the MAC complex for the purposes of establishing potential future reinstatement criteria and rehabilitation plans.

As per **Table 6** of the Mining Operations Plan ([Mt Arthur Coal, 2018b](#)) it is intended that creek diversions and realignments will be rehabilitated to:

- Mimic predevelopment flows for all flood events up to and including the 1 in 100 year ARI;
- Incorporate erosion control measures based on vegetation and engineering revetments;
- Incorporate structures for aquatic habitat (including geomorphic and vegetation); and
- Revegetate with suitable native species.

Rehabilitated water management features will be re-instated and managed as stable, noneroding and non-polluting landform features that either hold water (i.e. dams) or allow the unimpeded flow of water (i.e. drainage lines and watercourses) as designed ([Mt Arthur Coal, 2018b](#)).

MAC will:

- Define a process for decision making on the approach for creek reinstatement (using the current mine plan),
- Develop a set of creek design principles;
- Develop design for creek reinstatement, replacement and or offsets; and
- Develop a program for execution of creek reinstatement replacement and or offsets.

The outputs of these tasks will be presented to the Department of Planning and Environment and Department of the Environment and Energy at the end of 2019.

Mt Arthur's [Surface Water Monitoring Program MAC-ENC-PRO-061](#) describes the surface water monitoring activities undertaken. The purpose of the program is to manage hydrological impacts of mining on the local and regional surface water systems. This includes:

- Surface water flows to measure impacts on local and regional surface water hydrology;
- Riparian and in-stream vegetation and channel stability to assess potential impacts on stream health which is undertaken on an annual basis; and
- Surface water quality.

The program covers receiving environment water management systems including creeks potentially impacted by operations.

Results of the monitoring are reported as per **Section 12.3** and where there are significant negative changes observed actions are taken to respond to the deviation.

12 Monitoring and reporting

12.1 Monitoring program

[MAC-ENC-PRO-080 Rehabilitation Completion and Ecological Development Monitoring Procedure](#) has been prepared to assess the performance of the offset strategy and post-mining woodland rehabilitation in regards to the completion criteria for each area and to trigger remedial (or preventative) activities or works.

The [Ecological Development Monitoring Procedure](#) is summarised in Table 8 and includes monitoring of vegetation communities and revegetation areas across the MAC Complex and offset areas.

The Procedure requires that all flora and fauna monitoring methods used meets NSW state and federal survey guidelines for monitoring threatened species and communities.

Floristic plot data is collected at the offset properties using the BioBanking Assessment Methodology (BBAM) as per the CA requirements.

Permanently marked vegetation monitoring plots have been established within revegetation areas and appropriate benchmark sites within corresponding vegetation communities. Revegetation inspections will be conducted to determine the initial success of all seeding or planting works. The numbers of permanent monitoring locations will be reviewed on an annual basis as the area of active management (within offset areas) and post-mining woodland rehabilitation progresses. Revegetation monitoring at specific sites will cease when it can be demonstrated the rehabilitation is on a trajectory towards reaching the completion criteria without additional management actions.

Where a change is made to the methods defined in Table 9 below it will be reported in the Annual Environmental Management Report.

Appendix 2 provides excerpts from the CAs that provide additional information on the monitoring program. Table 2 of Annexure D (shown in **Appendix 2**) provides benchmarks for management of the offsets.

Table 8: Summary of Rehabilitation Completion and Ecological Development Monitoring Procedure

Monitoring Type	Suitable methods	Area	Staff	Monitoring frequency	Reasoning	Risk and Level Response	Trigger	Proposed Response Action and Mitigation Measures
Vegetation Community Assessment	Meandering transects	Woodland rehabilitation and revegetation areas (including Box Gum Woodland Establishment Area) and offset areas	Qualified Ecologist	Rotational with annual review	<p>Identification of issues or changes in vegetation condition. Reporting on</p> <ul style="list-style-type: none"> General health of vegetation Evidence of natural regeneration Occurrence and abundance of weed species Signs of disturbance, either by stock or humans Evidence of feral animals impacting vegetation Erosion issues or vegetation dieback Revegetation success 	<p>Insufficient, poor quality or incorrect species seed/seedlings leading to poor vegetation establishment.</p>	<p>Progress indicators: Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.</p>	<p>Review ecological monitoring results and, if required, seed viability testing to determine if seed/seedling quality is contributing to poor vegetation establishment.</p> <p>Identify required modifications to rehabilitation design or seed sourcing, and complete remedial planting works for areas of poor vegetation establishment.</p> <p>Establish a broad supply base of seed to mitigate supply limitations, and a broad species base to mitigate undersupply and climatic variation.</p>
	Permanent 20 x 20m flora monitoring quadrats and photo-monitoring point				<p>Quantitative assessment of change in floristic composition and vegetation structure over time, comparison of remnant woodland areas (control/reference sites) with structure and composition of revegetation areas. Qualitative assessment and observations as in meandering transects above.</p>	<p>Poor vegetation development leading to simplified, nonstratified community structure of poor habitat value.</p>	<p>Progress indicators: Ecosystem/Land use Sustainability.</p>	<p>Review ecological monitoring results to determine likely causes of non-development of vegetation stratum (i.e. species selection, seed/seedling quality, vegetation establishment practices or site conditions) and identify remedial treatment options (i.e. remedial planting, modification of species selection and establishment method or additional ground treatment).</p> <p>Conduct remedial treatment, as selected, and review rehabilitation practices to incorporate new measures.</p> <p>Ensure species mix used in rehabilitation programs are aligned to the floristic structure of the targeted plant community/ reference sites.</p>
						<p>Inadequate weed control, leading to extreme weed competition preventing establishment of desired species.</p>	<p>Progress indicators: Growth Medium Development; Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.</p>	<p>Implement remedial treatment program to control weeds (i.e. chemical weed control, encourage rapid establishment of ground cover, scalping of surface layer, topdressing).</p> <p>Weed control undertaken in accordance with the requirements of the Noxious Weeds Act 1993 by competent operators.</p> <p>Weed species density and distribution monitored. Topsoil supply treated for weeds prior to stripping, if required.</p>

Monitoring Type	Suitable methods	Area	Staff	Monitoring frequency	Reasoning	Risk and Level Response	Trigger	Proposed Response Action and Mitigation Measures
						Continued dominance of exotic tropical grass species, preventing successful establishment of native grass groundcover.	Progress indicators: Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Review of ecological monitoring results to identify species of concern, and most appropriate treatment (including cost/benefit analysis on starting rehabilitation again). Identify best treatment options, which may include chemical spraying, slashing, cultivating, burning or grazing existing groundcover, and vegetation establishment, which may include tubestock planting or direct drilling seed. Ensure intensified monitoring during reestablishment of remedially treated rehabilitation, and review ongoing monitoring/maintenance regime to ensure adequate.
						Ecosystem processes (i.e. reproduction, nitrogen fixing and nutrient recycling) not reestablished, leading to sterile unsustainable ecosystem.	Progress indicators: Growth Medium Development; Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Review ecological monitoring results and, if required, conduct targeted sampling to determine likely causes of non-development of processes (i.e. oversupply or undersupply of nutrients, species selection, soil properties or climatic contributors) and identify remedial treatment options (i.e. mulches, composts, biosolids, inoculants, remedial planting, species selection, etc). Conduct remedial treatment and/or review rehabilitation planning and practice to incorporate new treatment measures. Review monitoring program to more accurately detect the presence/ absence of process indicators.
						Insect attack, disease infestation causing premature vegetation die-back.	Progress indicators: Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Conduct remedial treatment, if required, and review rehabilitation maintenance practices to incorporate new treatment measures. Review monitoring program to more accurately detect the presence/ absence of disease indicators. Aim to encourage diversity within the vegetation (i.e. colonisation by spiders, insects, frogs, lizards and insectivorous birds) by providing suitable habitat features and vegetation complexity.
Revegetation inspection	Walk over inspection filling out the MAC <i>Revegetation Inspection Form</i>	Actively revegetated areas in both offset and post-mining rehabilitation (including Box Gum Woodland Establishment Area)	Suitably experienced MAC employees or contractors	Within a year of revegetation works	Assessment of survival and establishment of seedlings/tubestock, identify potential issues and identify any requirement for maintenance or remedial management.	Risk and Level Response for "Revegetation inspection" is the same as for "Vegetation Community Assessment" but at a coarser level.	Trigger for Response for "Revegetation inspection" is the same as for "Vegetation Community Assessment" but at a coarser level.	Proposed Response Action and Mitigation Measures for Response for "Revegetation inspection" is the same as for "Vegetation Community Assessment" but at a coarser level.

Monitoring Type	Suitable methods	Area	Staff	Monitoring frequency	Reasoning	Risk and Level Response	Trigger	Proposed Response Action and Mitigation Measures
Aerial seeding inspection	Walk over inspection filling out the <i>Aerial Seeding Inspection Form</i>	Post-mining rehabilitation areas that have been aerial seeded	Suitably experienced MAC employees or contractors	Within a year of Aerial Seeding	Assessment of vegetation establishment, identify potential issues and identify any requirement for maintenance or remedial management.	Risk and Level Response for "Aerial seeding inspection" is the same as for "Vegetation Community Assessment" but at a coarser level.	Triger for Response for "Aerial seeding inspection" is the same as for "Vegetation Community Assessment" but at a coarser level.	Proposed Response Action and Mitigation Measures for Response for "Aerial seeding inspection" is the same as for "Vegetation Community Assessment" but at a coarser level.

12.2 Adaptive management

The management of biodiversity values at MAC will be adaptive. The results of the rehabilitation and ecological monitoring program and trials of new biodiversity management methods will inform the forward management of biodiversity values and allow for response to any unforeseen environmental changes. This approach allows for the ongoing refinement of biodiversity management at MAC and provides a degree of flexibility required to ensure successful rehabilitation.

12.3 Reporting

Findings of [MAC-ENC-PRO-080 Rehabilitation and Ecological Development Monitoring Procedure](#) will be reported in the Annual Environmental Monitoring Report (AEMR) and in accordance with the CAs. Details are provided in Appendix 2.

Observations and findings, discussion of trends in vegetation community condition and ecological development compared to previous monitoring results, baseline data, reference sites and completion criteria will be included. Issues/concerns and recommendations on management or remedial treatment (including any amendments needed to this BMP), will be incorporated into the rehabilitation work plan/budget. This may include changes to the BMP as per Condition 10 of EPBC approvals [2011/5866](#) and [2014/7377](#) approval and Condition 4 of Schedule 5 of [PA 09 0062](#).

Revegetation and aerial seeding inspection findings will be reported on field forms (hard or soft copies) and will include, management actions required prior to vegetation establishment, or remedial actions required post-establishment. These management requirements will be incorporated into the revegetation/aerial seeding project plan or management plan for the area. Additional reporting obligations are contained within the CAs for each offset areas (Appendix 2).

Reporting will be carried out in accordance with Schedule 5, condition 8 of [PA 09 0062](#), condition 14 of the EPBC Approval [2011/5866](#) and condition 18 of the EPBC Approval [2014/7377](#).

Annual reporting to the Department will review progress of management actions undertaken in the conservation and offset areas, regeneration area and rehabilitation corridors and the outcome of those actions, including identifying any need for improved management and actions to undertake such improvement.

12.4 Roles and responsibilities

The Mt Arthur Coal Environmental Management System (EMS) details the roles, responsibilities, authorities and accountabilities for employees and contractors in relation to the environmental management of the MAC Complex. Roles and responsibilities for the BMP are shown in **Table 9**.

Table 9 Roles and responsibilities

Role	Accountabilities
General Manager	<ul style="list-style-type: none">Ensure that sufficient resources are allocated for the implementation of BMP measures.
Manager Production Planning	<ul style="list-style-type: none">Ensure that the Permit to Disturb (PtD) process is followed in advance of clearing activities.Planning and execution of the annual rehabilitation program for the mine footprint.

Table 9 Roles and responsibilities

Health, Safety and Environmental Superintendent	<ul style="list-style-type: none"> ▪ Coordinate the implementation of the biodiversity offset and management strategies outlined in the BMP. ▪ Manage and maintain the ecological and rehabilitation monitoring programs in accordance with this plan for the offset areas. ▪ Accountable for the implementation of the PtD process. ▪ Report potential or actual biodiversity or offset issues, including incidents and non-conformances. ▪ Ensure that personnel involved in the carrying out and monitoring the BMP activities and values are appropriately qualified, licensed and experienced to undertake the task. ▪ Ensure that the BMP is reviewed and updated in accordance with the review schedule or following any modifications or new approvals. ▪ Carry out governance activities to verify management actions and monitoring is being carried in accordance with the BMP. ▪ Ensure all internal and external reporting requirements relating to biodiversity management are met.
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12.5 Consultation

This document has been prepared in consultation with local, state and federal Government. Initial responses on draft documents were received from:

- Department of the Environment and Energy on 24 July 2017;
- NSW Department of Planning & Environment on 1 March 2018;
- Office of Environment & Heritage on 28 May 2018; and
- Muswellbrook Shire Council on 21 May 2018 and 8 June 2018.

Evidence of consultation is provided in **Appendix 4**.

The document was conditionally approved by the NSW Department of Planning & Environment on 17 December 2018. This document has been updated to address the further information request.

Extensive consultation with the Department of Environment and Energy occurred in January 2019 and the document updated to address feedback.

13 Performance indicators

Performance indicators and targets have been developed to evaluate the success or performance of a particular action or activity. Completion criteria provide a measure to determine the overall success for the offset and rehabilitation activities. Broad performance indicators/completion criteria for offset areas and rehabilitation areas have previously been developed and are included within *Section 6 Performance Indicators and Completion Criteria* in the current [MOP](#) and [MAC-ENC-MTP-047 Rehabilitation Strategy](#) for the MAC Complex. More specific performance indicators for each management action to be implemented within biodiversity management areas are included in **Table 3**. Completion criteria for post-mining rehabilitation areas including condition, structure and plant species diversity is included in **Table 10**.

Table 10: Target condition, structure and plant species diversity for post-mining rehabilitation areas

Completion targets for vegetation plots in woodland rehabilitation areas					
Zone	Requirement	Planned Vegetation Community	Canopy	Midstorey/ Shrub layer	Groundcover
Woodland Rehabilitation Corridors	Self-sustaining woodland corridors to be established on post-mining land	Central Hunter Box – Ironbark Woodland	Widely spaced eucalypts with 10-40% canopy cover dominated by the canopy species within intended seed mix or planted tube stock. This is currently White Box (<i>Eucalyptus albens</i>) Grey Box (<i>Eucalyptus moluccana</i>) and Narrow leaved Ironbark (<i>Eucalyptus crebra</i>).	A sparse midstorey/shrub layer (1-10% cover) comprising regrowth of canopy species as well as characteristic Central Hunter Box – Ironbark Woodland shrubs species	<p>≥ 50% native cover and between 0.1 to 1m in height and containing a minimum of 5 native understory species characteristic of Central Hunter Box – Ironbark Woodland and/or the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community</p> <p>Exotic cover makes up less than 50% of total groundcover</p>
		Central Hunter Ironbark - Spotted Gum – Grey Box Forest	Up to 30% cover dominated by Spotted Gum (<i>Corymbia maculata</i>)	1-10% cover comprising Cooba (<i>Acacia salicina</i>), Native Olive (<i>Notelaea microcarpa</i> var. <i>microcarpa</i>), Native Blackthorn (<i>Bursaria spinosa</i>), Shiny-leaved Canthium (<i>Canthium odorata</i>) and Western Boobialla (<i>Myoporum montanum</i>).	<p>≥ 50% native cover between 0.1 to 1m in height and containing a minimum of 5 native understory species characteristic of the vegetation community.</p> <p>Exotic cover makes up less than 50% of total groundcover.</p>

Completion targets for vegetation plots in woodland rehabilitation areas					
Box Gum Woodland rehabilitation area	A 500 ha area of Box Gum Woodland area established with a minimum of 299.2 ha consistent with the State 1 condition class for Box Gum Woodland and listing advice for the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community	Central Hunter Box – Ironbark Woodland	As for woodland rehabilitation corridors above	As for woodland rehabilitation corridors above	<p>≥ 50% cover between 0.1 to 1m in height supporting a diverse native groundcover of 12 or more native understory species characteristic of Central Hunter Box – Ironbark Woodland and/or the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community including several State 1 indicator species as listed in Rawlings et. al (2010).</p> <p>Exotic species comprise <10% of total groundcover.</p>

13.1 Risks to successful revegetation

A trigger action response plan (TARP) has been prepared by MAC to detail the risks to successful revegetation and potential corrective actions and is included in the *Section 9 Intervention and Adaptive Management* of the [MOP](#) (Mt Arthur Coal, 2017a). Table 14 of the [MOP](#) includes:

- Risk and Level for Response;
- Monitoring & Measurement Process for tracking performance;
- Triggers for initiating controls to improve outcomes;
- Proposed Response Action and Mitigation Measures to improve outcomes; and
- Responsible Person for monitoring and responding to declining performance.

Where performance criteria are not being met or monitoring sites do not appear to be on a trajectory towards completion criteria, the potential causes and possible remediation methods will be investigated. Trials of possible remediation methods will be recorded and inform future management of biodiversity at MAC.

Appendix 1 Conditions of approval reference table

DP&E Project Approval Conditions

DP&E Project Approval Conditions relevant to this BMP (09 0062)		Section Addressed
Biodiversity Management Plan 40. The Proponent shall prepare and implement a Biodiversity Management Plan for the project to the satisfaction of the Director-General. This plan must: (a) be prepared in consultation with DECCW, NOW and Council, and be submitted to the Director-General for approval by the end of March 2012; and (b) describe how the implementation of the offset strategy would be integrated with the overall rehabilitation of the site (see below);		a) Section 12.5 and Appendix 3 b) Section 7 and 9.3
c) include: (i) a description of the short, medium, and long term measures that would be implemented to: <ul style="list-style-type: none">implement the offset strategy; andmanage the remnant vegetation and habitat on the site and in the offset areas; (ii) detailed performance and completion criteria for the implementation of the offset strategy;		(i) Sections 7, 8, 9, 11, 12 and Appendix 2. (ii) Table 8 of Section 12.1, Section 13 and Appendix 2.

Biodiversity Management Plan

DP&E Project Approval Conditions relevant to this BMP (09_0062)		Section Addressed
<p>(iii) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:</p> <ul style="list-style-type: none"> ■ implementing revegetation and regeneration within the disturbance areas and offset areas, including establishment of canopy, sub-canopy (if relevant), understorey and ground strata; ■ protecting vegetation and soil outside the disturbance areas; ■ rehabilitating creeks and drainage lines on the site (both inside and outside the disturbance areas), to ensure no net loss of stream length and aquatic habitat; ■ managing salinity; ■ conserving and reusing topsoil; ■ undertaking pre-clearance surveys; ■ managing impacts on fauna; ■ landscaping the site and along public roads (including Thomas Mitchell Drive, Denman Road, Edderton Road and Roxburgh Road) to minimise visual and lighting impacts; ■ collecting and propagating seed; ■ salvaging and reusing material from the site for habitat enhancement; ■ salvaging, transplanting and/or propagating threatened flora and native grassland; ■ controlling weeds and feral pests; ■ managing grazing and agriculture on site; ■ controlling access; and ■ bushfire management. 		Sections 8,9, 11 & Appendix 2
	(iv) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;	Sections 12 and 13 and Appendix 2
	(v) a description of the potential risks to successful revegetation, and a description of the contingency measures that would be implemented to mitigate these risks;	Section 13.1
	(vi) details of who would be responsible for monitoring, reviewing, and implementing the plan.	Section 12.1 & 12.4

DOEE Project Approval Conditions 2011

DoEE Project Approval Conditions relevant to this BMP (EPBC 2011/5866)		Section Addressed
5. The person taking the action must submit for the Minister's Approval the Biodiversity Management Plan (BMP) for the project by 30 June 2013. The BMP must reflect the proposed Mt Arthur Coal Complex Biodiversity Offset Strategy as outlined in Table 1 and as generally described in the preliminary documentation and focus on the reestablishment and protection of a minimum of 707.7 ha of Box Gum Woodland and a minimum of 738.7 ha of suitable habitat for regent honeyeater and swift parrot. The approved BMP must be implemented.		<p>The BMP was submitted to Mr Shane Gaddes, Assistant Secretary of the Compliance and Enforcement Branch, Environment Assessment and Compliance Division of the Department of Sustainability, Environment, Water, Population and Communities on the 28th of June 2013.</p> <p>The BMP has been developed to reflect the MAC Complex Biodiversity Offset Strategy, the preliminary documentation and the reestablishment of box gum woodland and habitat for the regent honeyeater and swift parrot.</p> <p>The BMP has been implemented.</p>
6. The BMP must describe how the implementation of the Offset Strategy would be integrated with the overall rehabilitation of the site and with local and regional corridors, existing conservation areas and existing biodiversity commitments at Mt Arthur Coal.		Sections 7 and 9.3
<p>7. The BMP must include but not be limited to:</p> <p>a) A text description and map to clearly define the location, boundaries and size of the conservation and offset areas and the regeneration area and rehabilitation corridors. This must be accompanied with the offset attributes and a shape file;</p> <p>b) Details of the mechanisms, legal instrument, steps and timing for registering a legally binding conservation covenant that provides enduring protection over each nominated conservation and offset area;</p> <p>c) A detailed description of the current condition of the extant vegetation of each conservation and offset area prior to any management activities. This will provide a baseline description of the vegetation condition for the purpose of monitoring;</p>		<p>a) Section 9.1 and Figure 1</p> <p>b) Section 9.1 and Appendix 2</p> <p>c) Section 10</p>

DoEE Project Approval Conditions relevant to this BMP (EPBC 2011/5866)		Section Addressed
<p>d) Details of vegetation communities to be re-established to achieve the 500 ha regeneration area and 1415 ha of rehabilitated corridors:</p> <p>I. Timing of progressive regeneration;</p> <p>II. Criteria to determine success of re-establishment of the Box Gum Woodland and other woodland forest communities</p> <p>III. Documentation including mapping of current environmental values relevant to MNES of the area;</p> <p>IV. Where revegetation through planting seedlings and/or seeds is intended, details of appropriate species and ratios of species relevant to historically occurring listed migratory and listed threatened species habitat and the White Box – Yellow Box – Blakely’s’ Red Gum Grassy Woodland and Derived Native Grassland Ecological Community; and</p> <p>V. The source and provenance of the seed and/or seedlings which will be utilised.</p>	<p>d) Section 11.2 and Appendix 2</p> <p>I. Section 11.2, Appendix 2 & Section 7.2 of the MOP</p> <p>II. Section 7 & 13</p> <p>III. Mapping included Appendix 2</p> <p>IV. Section 7.2 of the MOP</p> <p>V. Section 11.2 and Appendix 2.</p>	

Biodiversity Management Plan

DoEE Project Approval Conditions relevant to this BMP (EPBC 2011/58669)		Section Addressed
<p>e) Details of measures to offset the impacts to the MNES described in conditions 3 and 4 including:</p> <p>I. Details of management actions that will improve the condition of a minimum of 707.7 ha within the conservation and offset areas and 299.2 ha regeneration area to 'State 1' consistent with the state and transition model for Box Gum Woodland (Rawlings et al, 2010) and listing advice for the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community;</p> <p>II. Management schedules for all conservation and offset areas, the regeneration area and the rehabilitation corridors identifying targeted actions for specific areas to protect and enhance the extent and condition of the habitat values of the offset areas, a map showing areas to be managed;</p> <p>III. Type of actions for each conservation and offset area, the regeneration area and rehabilitation corridors and details of methods to be used;</p> <p>IV. Timing of management actions for each area;</p> <p>V. Performance criteria for each action;</p> <p>VI. A detailed monitoring plan for each action including, but not limited to, control sites, periodic ecological surveys to be undertaken by a qualified ecologist, as agreed to in writing by the minister, and consistent with the survey guidelines for nationally threatened species and communities, to assess the success of the management actions measured against identified milestones and objectives;</p> <p>VII. Contingency measures to be implemented if performance criteria are not met;</p> <p>VIII. A process to report, to the department, the progress of management actions undertaken in the conservation and offset areas, regeneration area and rehabilitation corridors and the outcomes of these actions including identifying the need for improved management and actions to undertake such improvement; and</p> <p>IX. Details of the various parties responsible for management, monitoring and implementing the management activities including their position or status as a separate contractor.</p>		<p>I. Section 7, 11.1, 11.2 & Appendix 2</p> <p>II. Section 7.2 of the MOP & Appendix 2</p> <p>III. Section 11 & Appendix 2</p> <p>IV. Section 11 & Appendix 2</p> <p>V. Section 7, 13 & Appendix 2</p> <p>VI. Section 12.1 & Appendix 2</p> <p>VII. Section 13.1 & Section 9 of the MOP</p> <p>VIII. Section 12.3 & Section 10 of the MOP</p> <p>IX. Section 12.4</p>

DoEE Project Approval Conditions relevant to this BMP (EPBC 2011/5866)		Section Addressed
<p>8. Where strategic grazing is proposed as a management tool, the person undertaking the action must provide, as part of the BMP identified in Condition 5, details of the proposed grazing activities for each management area. This must include:</p> <ul style="list-style-type: none"> a. Objectives; b. Details of the grazing methods to be used; c. Timing including seasons in which grazing will occur, period of grazing and rest period; d. Stocking rate per season; and e. Monitoring of impacts of grazing including any changes in the condition of vegetation, habitat and weed density 		Section 11.1
	9. Grazing activities must be undertaken in accordance with the guidelines for strategic grazing (Rawlings et al, 2010) and managed so that for each management unit at least 70% of the sward meets a minimum height of 10 cm.	
	14. Within 3 months of every 12 month anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of the Biodiversity Offset Strategy and the Biodiversity Management Plan as specified in the conditions. Documentary evidence providing proof of the date of publication and noncompliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published.	
		Section 12.3

DOEE Project Approval Conditions 2014

DoEE Project Approval Conditions relevant to this BMP (EPBC 2014/7377)		Section Addressed
<p>4. The person taking the action must submit to the Department, for approval by the Minister, a revised Biodiversity Management Plan (BMP) for the project by 30 June 2017. The BMP must reflect the proposed Mt Arthur Coal Complex Biodiversity Offset Strategy as generally described in the Preliminary Documentation for EPBC 2011/5866, and include the additional offsets which are described in the Preliminary Documentation for EPBC 2014/7377. The Preliminary Documentation states:</p> <ul style="list-style-type: none">a) the following offsets will be secured to compensate for the removal of the 58.4 ha of Box Gum Woodland CEEC and 53.4 ha of foraging habitat:<ul style="list-style-type: none">i. a 410 ha expansion of the existing Middle Deep Creek offset area located approximately 70 km north of the Action area; andii. a 131 ha expansion of the existing Saddlers Creek offset area located approximately 1 km south of the Action area.		<p>The BMP submitted to the Department of the Environment and Energy on 29 June 2017 at 4:35pm.</p>
<p>5. The BMP must describe how the implementation of the offset strategy would be integrated with the overall rehabilitation of the site and with local and regional corridors, existing conservation areas and existing biodiversity commitments at the Mt Arthur Coal mine.</p>		<p>Sections 7 and 9.3</p>

<p>6. The revised BMP must include the additional offsets for the proposed action described in EPBC 2014/7377 and follow the requirements for the BMP outlined in the conditions in EPBC 2011/5866 described below:</p> <ul style="list-style-type: none"> a) a text description and map to clearly define the location and boundaries of the conservation and offset areas and regeneration areas. This must be accompanied with the offset attributes and a shape file; b) details of the mechanisms, legal instrument, steps and timing for registering a legally binding conservation covenant that provides enduring protection over each nominated conservation and offset area; c) a detailed description of the current condition of the extant vegetation of each conservation and offset area identified in the Preliminary Documentation for EPBC 2014/7377 prior to any management activities. This will provide a baseline description of the vegetation condition of the additional offset areas for the purpose of monitoring; d) details of measures to offset the impacts to the MNES described in condition 2 and 3 including: <ul style="list-style-type: none"> i) details of management actions that will improve the condition of a minimum of 541 ha within the offset areas; ii) management schedules for the offset areas identifying targeted actions for specific areas to protect and enhance the extent and condition of habitat values of the offset areas, a map showing areas to be managed; iii) type of management actions for each offset area and details of methods to be used; iv) timing of management actions for each offset area; v) performance criteria for each action; vi) a detailed monitoring plan for each action including, but not limited to: <ul style="list-style-type: none"> • control sites; and • periodic ecological surveys to be undertaken by a qualified ecologist, as agreed to in writing by the Minister, and consistent with survey guidelines for nationally threatened species and communities, to assess 	<ul style="list-style-type: none"> a) Table 2 & Figure 1 b) Section 9 c) Section 10 d) Section 11, Appendix 2 <ul style="list-style-type: none"> i. Section 11.1 ii. Section 11 & Appendix 2 iii. Sections 7 and 11.1& Appendix 2 iv. Appendix 2 v. Section 12.1, Section 13 & Appendix 2 vi. Section 12.1 & Appendix 2 vii. Section 12.1 13.1 and Section 9 of the MOP viii. Section 12.3 ix. Section 7, 11.1 & 12.4
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DoEE Project Approval Conditions relevant to this BMP (EPBC 2014/7377)		Section Addressed
<p>the success of the management actions measured against identified milestones and objectives;</p> <p>vii) contingency measures to be implemented if performance criteria are not met;</p> <p>viii) a process to report, to the Department, the progress of management actions undertaken in offset areas and the outcome of those actions, including identifying any need for improved management and actions to undertake such improvement; and</p> <p>ix) details of the various parties responsible for management, monitoring and implementing the management activities, including their position or status as a separate contractor.</p>		
<p>7. Where strategic grazing is proposed as a management tool, the person undertaking the action must provide, as part of the BMP identified in condition 5, details of the proposed grazing activities for each management area. This must include:</p> <ul style="list-style-type: none"> a) objectives b) details of the grazing methods to be used; c) timing including seasons in which grazing will occur, period of grazing and rest period; d) stocking rate per season; and e) monitoring of impacts of grazing including any changes in the condition of vegetation, habitat and weed density. 		Section 11.1
<p>8. Grazing activities must be undertaken in accordance with the guidelines for strategic grazing in A Guide to Managing Box Gum Grassy Woodlands, Kimberlie Rawlings, David Freudenberger and David Carr, Department of Environment, Water, Heritage and the Arts, Canberra, 2010.</p>		

Appendix 2 Conservation Agreements (CAs)

Appendix 2 contains excerpts from the Conservation Agreements that have been established for each of the Offsets and Conservation Areas referred to in Section 0 Rehabilitation areas relevant to the Biodiversity Management Plan. The sections include:

- Annexure B – Conservation Values. Detailing the conservation values of the conservation areas. Maps are included within this Annexure which provide detail on location, threatened species and ecological communities, and the indicative revegetation schedule (referred to as Annexure B Diagram B8). This map shows the polygons by year where rehabilitation works are to take place.
- Annexure C Management of the Conservation Area Items 1 and 2. This details the timing and management actions relating to the protection and enhancement of the Conservation Areas. Aspects covered include:
 - weed control;
 - revegetation activities;
 - seed collection, propagation and planting;
 - pest animal control;
 - hazard reduction burns;
 - fencing;
 - annual reporting; and
 - threatened species, populations and endangered ecological communities;
- Annexure C Item 3: Permissions and Guidelines. This provides further details on the delivery of the management of the aspects listed in the previous bullet point.
- Annexure D – Monitoring Program. This provides details on the monitoring program to be carried out within each of the Conservation Areas and Offsets. It covers:
 - Photo monitoring;
 - Quadrat monitoring;
 - Walk through assessments; and
 - Reporting.
- Annexure D Table 1. This provides the locations of the monitoring points and the vegetation communities represented.
- Annexure D Table 2. This provides the benchmarks and baselines for each of the quadrat sites. It provides a basis for determining ecological completion.

Note: “Year 1” means twelve month period following Commencement date.

MAC-STE-MTP-050

Biodiversity Management Plan



Thomas Mitchell Drive Off-Site Offset Conservation Area
Lodgement number: C892129
Commencement date: 2 December 2016

ANNEXURE B - CONSERVATION VALUES

1. CONSERVATION VALUES

The Owner and the Minister recognise that the Conservation Area contains the following conservation values:

A The Conservation Area contains three biometric communities:

- Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
- Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley
- River Red Gum - River Oak grassy riparian woodland of the Hunter Valley

Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (PCT 1691)

This community supports a typically sparse canopy (10 to 40 per cent cover) dominated by either Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), or Narrow-leaved Ironbark (*Eucalyptus crebra*). The occurrences of this community have been separated based on the dominance of these two species in order to identify areas of White Box – Yellow Box – Blakely's Red Gum Woodland EEC (listed under the TSC Act) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC (listed under the EPBC Act). In some areas, Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*) may occur in low abundance. Height of the canopy ranges from 7 to 20 metres.

The shrub layer is generally very sparse (1 to 10 per cent cover), comprising regrowth of the above listed canopy species, *Cassinia quinquefaria*, Western Golden Wattle (*Acacia decora*), Kangaroo Thorn (*Acacia paradoxa*), Native Blackthorn (*Bursaria spinosa*), Western Boobialla (*Myoporum montanum*), and Native Olive (*Notelaea microcarpa* var. *microcarpa*). The shrub layer ranges from 0.5 to 4 metres in height.

This community is characterised by a diverse and dense ground layer (up to 85 per cent cover) between 0.1 and 1 metre in height. Common herbs and sub-shrubs include Yellow Burr-Daisy (*Calotis lappulacea*), Common Everlasting (*Chrysocephalum apiculatum*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Corrugated Sida (*Sida corrugata*), *Rostellularia adscendens*, Climbing Saltbush (*Einadia nutans*), Many-flowered Mat-Rush (*Lomandra multiflora* subsp. *multiflora*), Amulla (*Eremophila debilis*), *Glycine tabacina*, *Maireana microphylla*, and Kidney Weed (*Dichondra repens*). Native grasses include Barbed Wire Grass (*Cymbopogon refractus*), Wallaby Grass (*Rytidosperma fulvum*), Speargrass (*Austrostipa scabra*), Weeping Grass (*Microlaena stipoides* var. *stipoides*), Shorthair Plumegrass (*Dichelachne micrantha*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*), Paddock Lovegrass (*Eragrostis leptostachya*), Tall Chloris (*Chloris ventricosa*), Pitted Bluegrass (*Bothriochloa decipiens* var. *decipiens*) and Red Grass (*Bothriochloa macra*).

This community is consistent with the EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. The Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*) dominated areas of this community are also consistent with the CEEC White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act. The presence of these communities in the Conservation Area was determined by comparing the 'assemblage of species' present, the 'particular area' in which they occur, and other physical descriptors against the Final Determination (NSW) and/or the listing and conservation advice (Commonwealth).

Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley (PCT 1731)

This vegetation community is confined to Ramrod Creek within the Thomas Mitchell Drive Off-site Conservation Area.

This community supports a sparse to mid – dense canopy (up to 50 per cent cover) dominated by Swamp Oak (*Casuarina glauca*), with occurrences of Rough-Barked Apple (*Angophora floribunda*) and Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*). Height of the canopy ranges from 14 to 20 metres. The shrub layer is generally absent; however, in some areas a very sparse (less than 5 per cent cover) shrub layer occurs, comprising *Spartothamnella juncea* and regenerating Swamp Oak (*Casuarina glauca*). When present, the shrub layer ranges from 1 to 2 metres in height.

This community is characterised by a dense ground layer (50 to 90 per cent cover) between 0.1 and 1.5 metre in height. Common herbs and sub-shrubs include *Glycine tabacina*, Swamp Dock (*Rumex brownii*), Whiteroot (*Pratia purpurascens*), *Maireana microphylla*, Kidney Weed (*Dichondra repens*) and Stinking Pennywort (*Hydrocotyle laxiflora*). Weeping Grass (*Microlaena stipoides* var. *stipoides*) and Common Couch (*Cynodon dactylon*) are the dominant native grasses, as well as the taller Slender Bamboo Grass (*Austrostipa verticillata*).

This community is not consistent with any listed TEC under the TSC Act or EPBC Act.

River Red Gum - River Oak grassy riparian woodland of the Hunter Valley (PCT 1733)

This vegetation community is confined to the floodplains and associated low rises along Ramrod Creek within the Thomas Mitchell Drive Off-site Conservation Area.

This community supports a sparse canopy (up to 20 per cent cover) dominated by Yellow Box (*Eucalyptus melliodora*), Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Forest Red Gum (*Eucalyptus tereticornis*). In some areas Swamp Oak (*Casuarina glauca*) and Rough-barked Apple (*Angophora floribunda*) may occur in low abundance. The height of the canopy ranges from 14 to 25 metres. A sub-canopy of the above listed canopy species is often present (up to 20 per cent cover) and ranges between 2 to 8 metres in height.

The shrub layer is generally sparse (up to 20 per cent cover), comprising regrowth of the above listed canopy species, Cooba (*Acacia salicina*) and Native Olive (*Notelaea microcarpa* var. *microcarpa*). The shrub layer ranges from 0.5 to 2 metres in height.

This community is characterised by a diverse and dense ground layer (up to 95 per cent cover) between 0.1 and 1 metre in height. Common herbs include Common Everlasting (*Chrysocephalum apiculatum*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Many- Flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), Amulla (*Eremophila debilis*), Native Pennyroyal (*Mentha saturioides*), *Glycine tabacina*, *Maireana microphylla*, and Kidney Weed (*Dichondra repens*). Native grasses include Weeping Grass (*Microlaena stipoides* var. *stipoides*), Common Couch (*Cynodon dactylon*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*), Red Grass (*Bothriochloa macra*), Slender Rat's Tail Grass (*Sporobolus creber*), Tall Chloris (*Chloris ventricosa*), Kangaroo Grass (*Themeda australis*), Queensland Bluegrass (*Dichanthium sericeum* subsp. *sericeum*) and *Digitaria diffusa*.

This community is consistent with the EEC Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. This community is also consistent with the CEEC White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act. The presence of these communities in the Conservation Area was determined by comparing the 'assemblage of species' present, the 'particular area' in which they occur, and other

physical descriptors against the Final Determination (NSW) and/or the listing and conservation advice (Commonwealth).

Table 1 shows the area of each plant community type by condition state (see also **Diagram B7**). Narrow-leaved Ironbark - Grey Box grassy woodland exists in two different condition states (intact and DNG), whilst Swamp Oak - Weeping Grass grassy riparian forest and River Red Gum - River Oak grassy riparian woodland are both in intact condition.

Table 1 Plant community types present in the Conservation Area

PCT code	Plant community type (PCT)	Condition	Area (ha)
1691	Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	Intact	44.0
		DNG	376.7
1731	Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley	Intact	14.5
		DNG	-
42	River Red Gum - River Oak grassy riparian woodland of the Hunter Valley	Intact	32.6
		DNG	-
TOTAL		467.8	

B The Conservation Area contains the following threatened fauna species (and refer to **Table 3 Annexure B** and **Diagram B4**):

- *Circus assimilis* (Spotted Harrier) (Vulnerable (V) – TSC Act)
- *Miniopterus australis* (Little Bentwing-bat) (Vulnerable (V) – TSC Act)
- *Chthonicola sagittata* (Speckled Warbler) (Vulnerable (V) – TSC Act)

The following Endangered Ecological Communities are present in the Conservation Area (see **Diagram B5** and **B6**):

- *Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions* (EEC - TSC Act and EPBC Act)
- *Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions* (EEC – TSC Act)
- *White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EEC – TSC Act, CEEC – EPBC Act)

As

shown

in

Table 2, 222 ha of the vegetation present on the Conservation Area corresponds to listed threatened ecological communities under the TSC and / or EPBC Act. These are shown by condition state and listing status.

Table 2 Threatened ecological communities present in the Conservation Area

Threatened ecological community	Condition	TSC listed (ha)	EPBC listed (ha)
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions (TSC Act) / Central Hunter Valley eucalypt forest and woodland (EPBC Act)	Intact	44.0	44.0
	DNG	101.2	70.5
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions (TSC Act)	Intact	32.6	-
	DNG	0	-
White Box Yellow Box Blakely's Red Gum Woodland (TSC Act) / White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)	Intact	0	32.6
	DNG	44.3	44.3
Total		222.1	222.1

- C The Conservation Area is located to the east of the Hunter Valley section of the Great Eastern Ranges Initiative. The Great Eastern Ranges Initiative aims to maintain and improve the 'corridor' connectivity of mountain ecosystems running the length of eastern Australia. The focal area of the Initiative includes the Great Dividing Range and the Great Escarpment of Eastern Australia which extend along the majority of Australia's east coast. The current area of focus for this Initiative is the 1,200 kilometres section of the Great Eastern Ranges that falls within NSW.

The Hunter Valley has been identified as one of the five priority areas along the ranges and is considered to be the most diverse and complex in regards to its biodiversity and connectivity and its social and economic factors. The Hunter Valley represents a significant east-west linkage of natural vegetation in the Great Eastern Ranges, with the potential for north-south 'stepping stones' of vegetation such as this Conservation Area, to allow species movement and improve connectivity across areas of the Hunter Valley that have been historically cleared and/ or grazed.

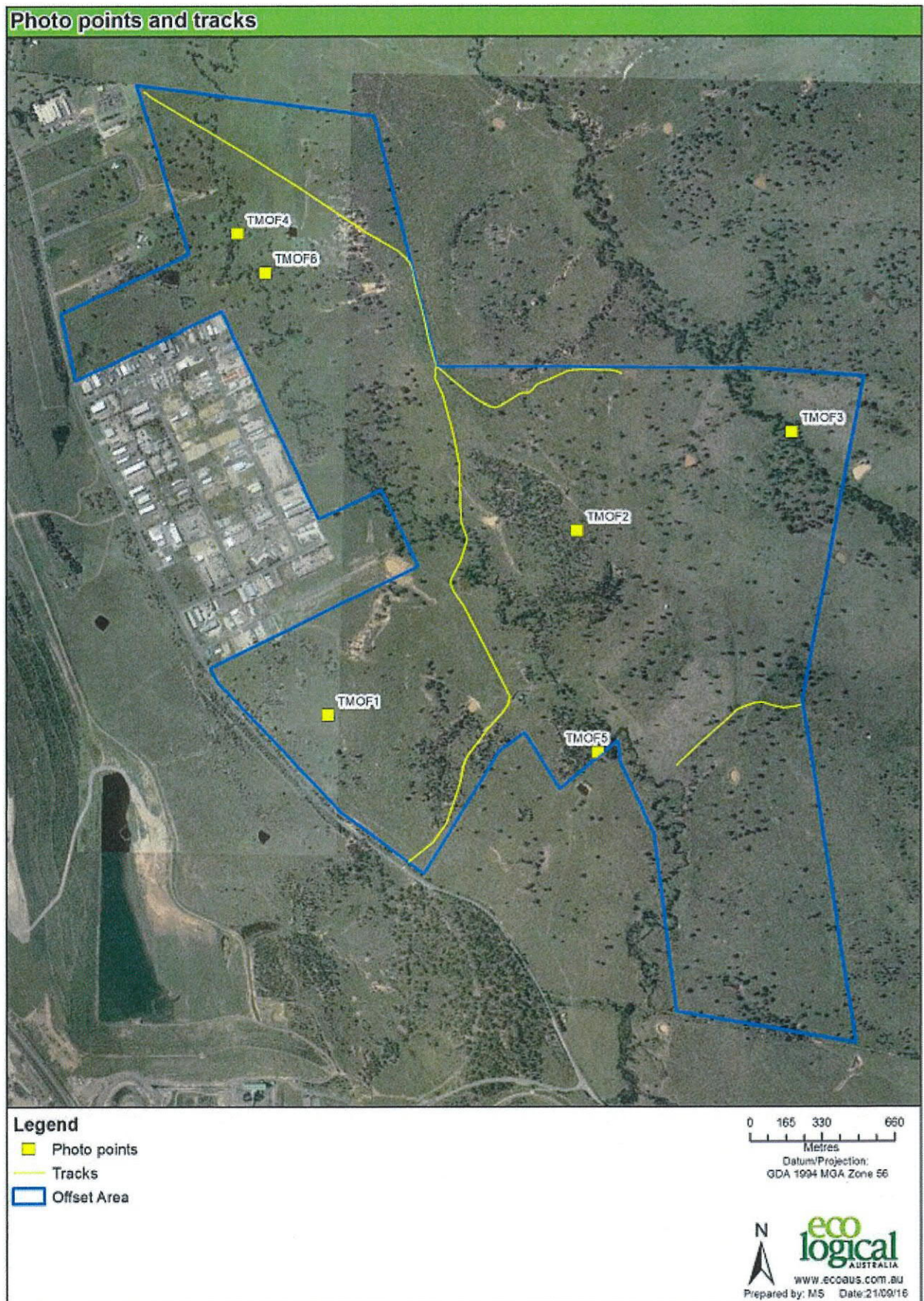
- D The Conservation Area is likely to contain Aboriginal heritage values; however, no detailed studies have been undertaken.

ANNEXURE B TABLE 3 Threatened species found within 20 km radius of site which may occur within the Conservation Area due to the presence of suitable habitat (search conducted March 2016).

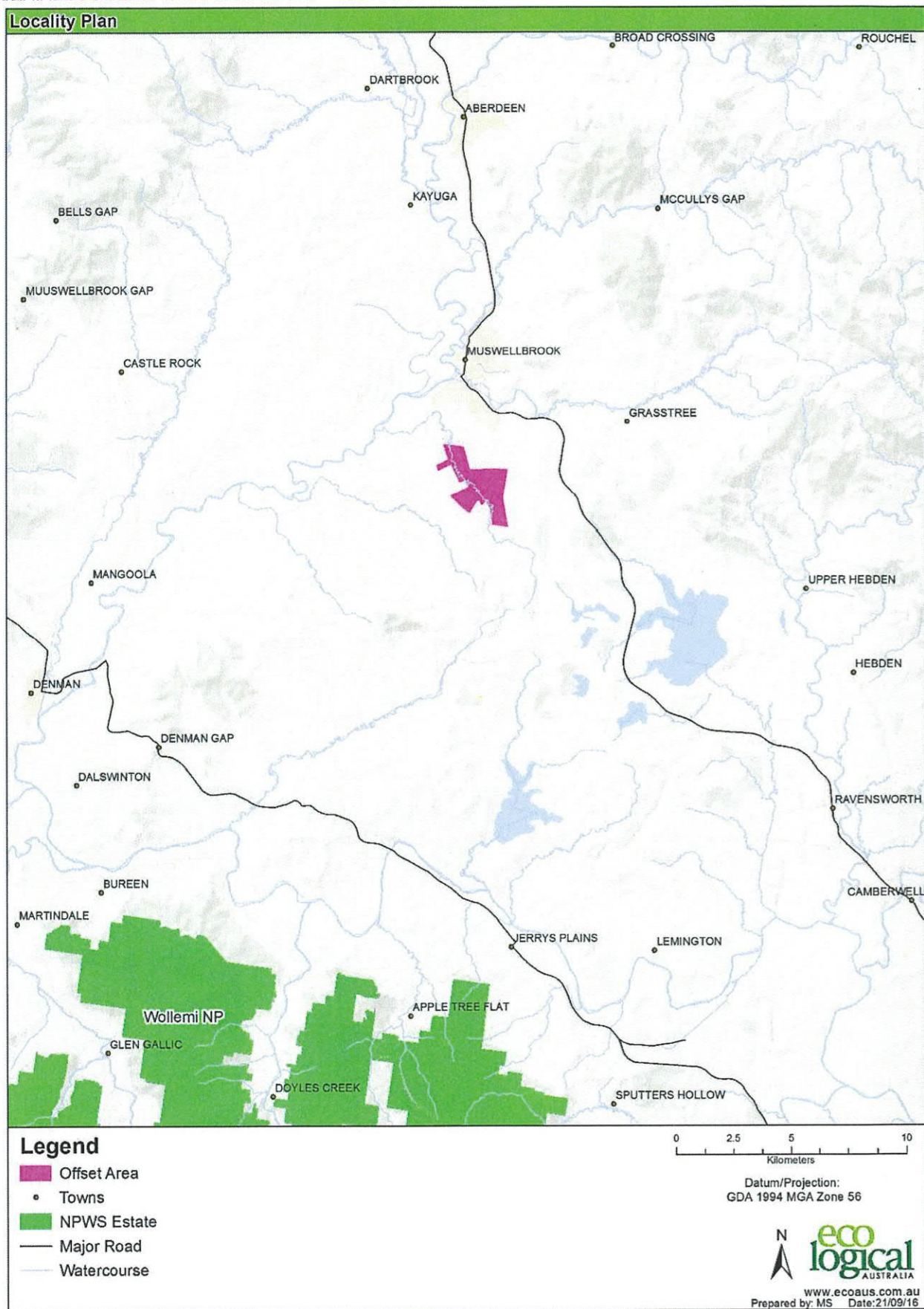
Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
Birds				
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE	N
Eastern Great Egret	<i>Ardea alba</i>		M	N
Cattle Egret	<i>Ardea ibis</i>		M	N
Speckled Warbler	<i>Chthonicola sagittata</i>	V		Y
Spotted Harrier	<i>Circus assimilis</i>	V		Y
Brown Treecreeper (Eastern Sub- species)	<i>Climacteris picummus victoriae</i>	V		N
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V		N
Black Falcon	<i>Falco subniger</i>	V		N
Little Lorikeet	<i>Glossopsitta pusilla</i>	V		N
Little Eagle	<i>Hieraaetus morphnoides</i>	V		N
White-throated Needletail	<i>Hirundapus caudacutus</i>		M	N
Swift Parrot	<i>Lathamus discolor</i>	E	CE, Mar	N
Square-tailed Kite	<i>Lophoictinia isura</i>	V		N
Hooded Robin (South- eastern Form)	<i>Melanodryas cucullata cucullata</i>	V		N
Black-Chinned Honeyeater (Eastern Sub-species)	<i>Melithreptus gularis gularis</i>	V		N
Rainbow Bee-eater	<i>Merops ornatus</i>		M	N
Satin Flycatcher	<i>Myiagra cyano-leuca</i>		M	N
Powerful Owl	<i>Ninox strenua</i>	V		N
Scarlet Robin	<i>Petroica boodang</i>	V		N
Flame Robin	<i>Petroica phoenicea</i>	V		N
Grey-crowned Babbler (Eastern Sub-species)	<i>Pomatostomus temporalis temporalis</i>	V		N
Rufous Fantail	<i>Rhipidura rufifrons</i>		M	N
Diamond Firetail	<i>Stagonopleura guttata</i>	V		N
Mammals				
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	N
Spotted-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	V	E	N
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V		N
Little Bentwing-bat	<i>Miniopterus australis</i>	V		Y
Eastern Bentwing- bat	<i>Miniopterus schreibersii oceanensis</i>	V		N

Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	V		N
Southern Myotis	<i>Myotis macropus</i>	V		N
Eastern Long-eared Bat (SE Form) , Greater Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	N
Squirrel Glider	<i>Petaurus norfolcensis</i>	V		N
Koala	<i>Phascolarctos cinereus</i>	V	V	N
Grey-headed Flying- fox	<i>Pteropus poliocephalus</i>	V	V	N
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V		N
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V		N
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		N
Flora				
Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	E2		N
Pine Donkey Orchid	<i>Diuris tricolor</i>	V		N
<i>Diuris tricolor</i> population in the Muswellbrook LGA	<i>Diuris tricolor</i> population in the Muswellbrook LGA	E2		N
River red gum <i>Eucalyptus camaldulensis</i> in the Hunter Catchment	River Red Gum <i>Eucalyptus camaldulensis</i> in the Hunter Catchment	E2		N
Ecological communities				
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions		EEC	CEEC	Y
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		EEC	CEEC	Y
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions		EEC		Y

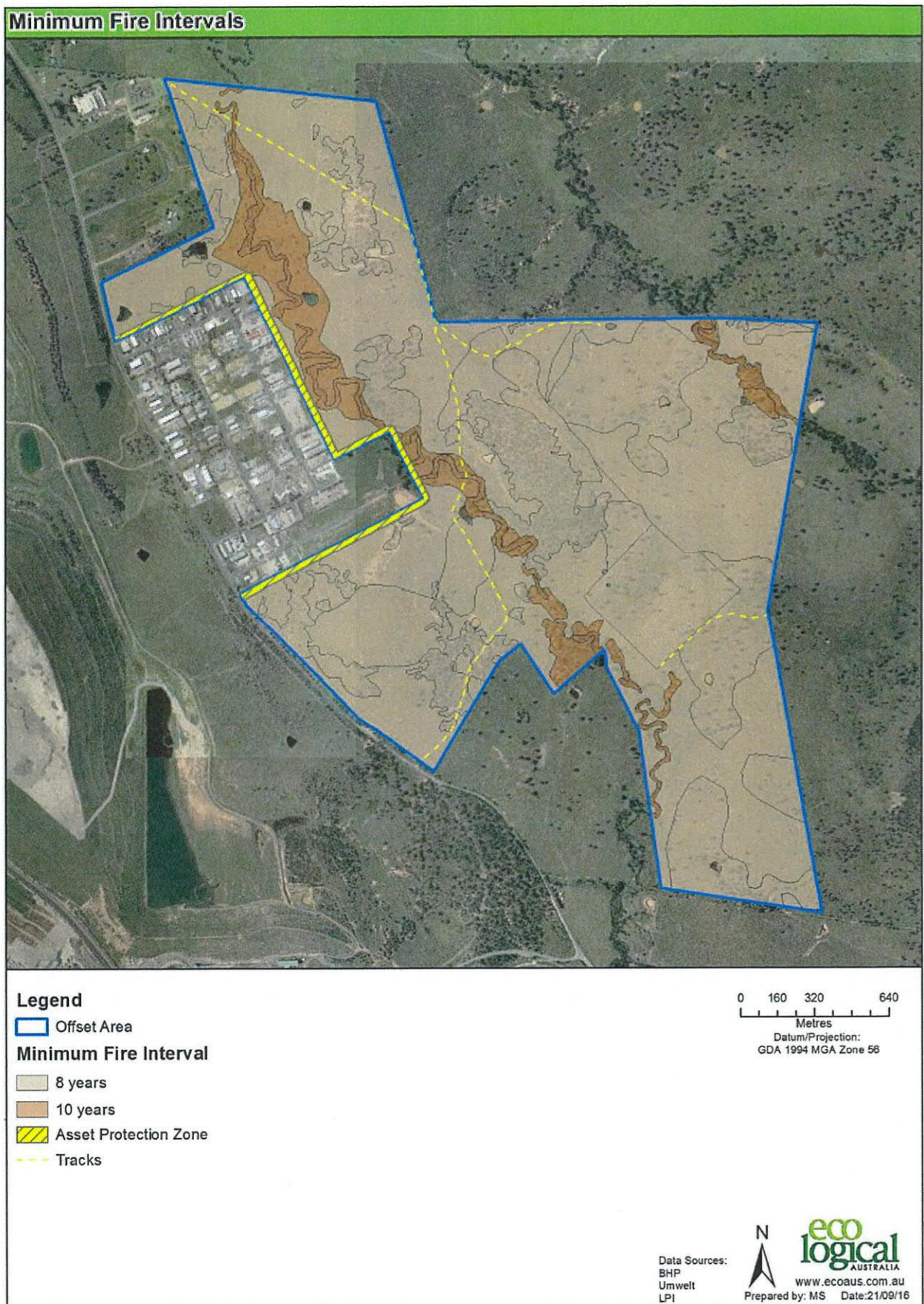
V= Vulnerable, E= Endangered, CE= Critically Endangered, M= Migratory, Mar= Marine, E2= Endangered Population, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

ANNEXURE B DIAGRAM B1 - LOCATION OF BIOMETRIC PLOTS AND PHOTO POINTS

ANNEXURE B DIAGRAM B2 – REGIONAL CONTEXT OF THE SITE

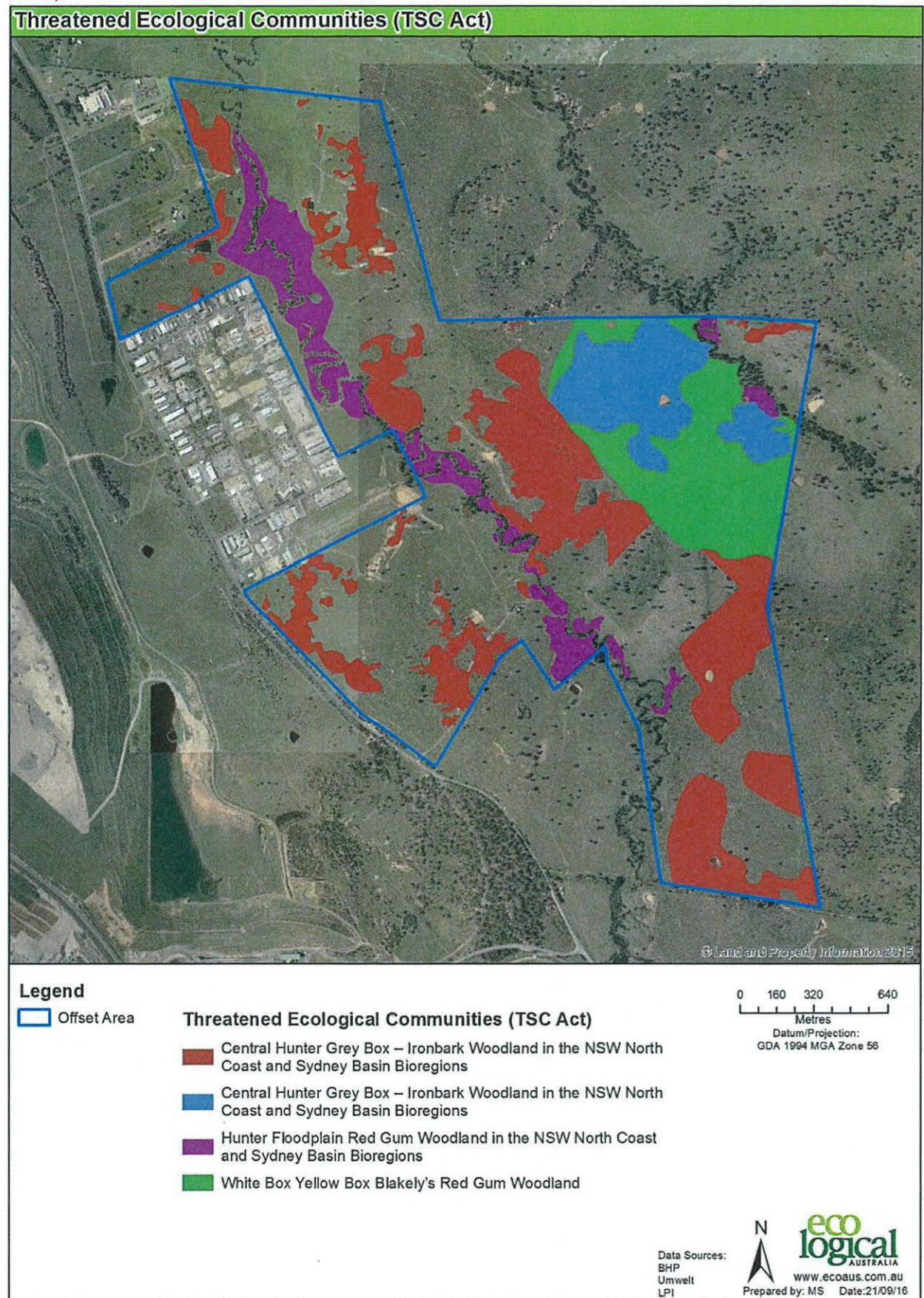


ANNEXURE B DIAGRAM B3 – FIRE MANAGEMENT ZONES

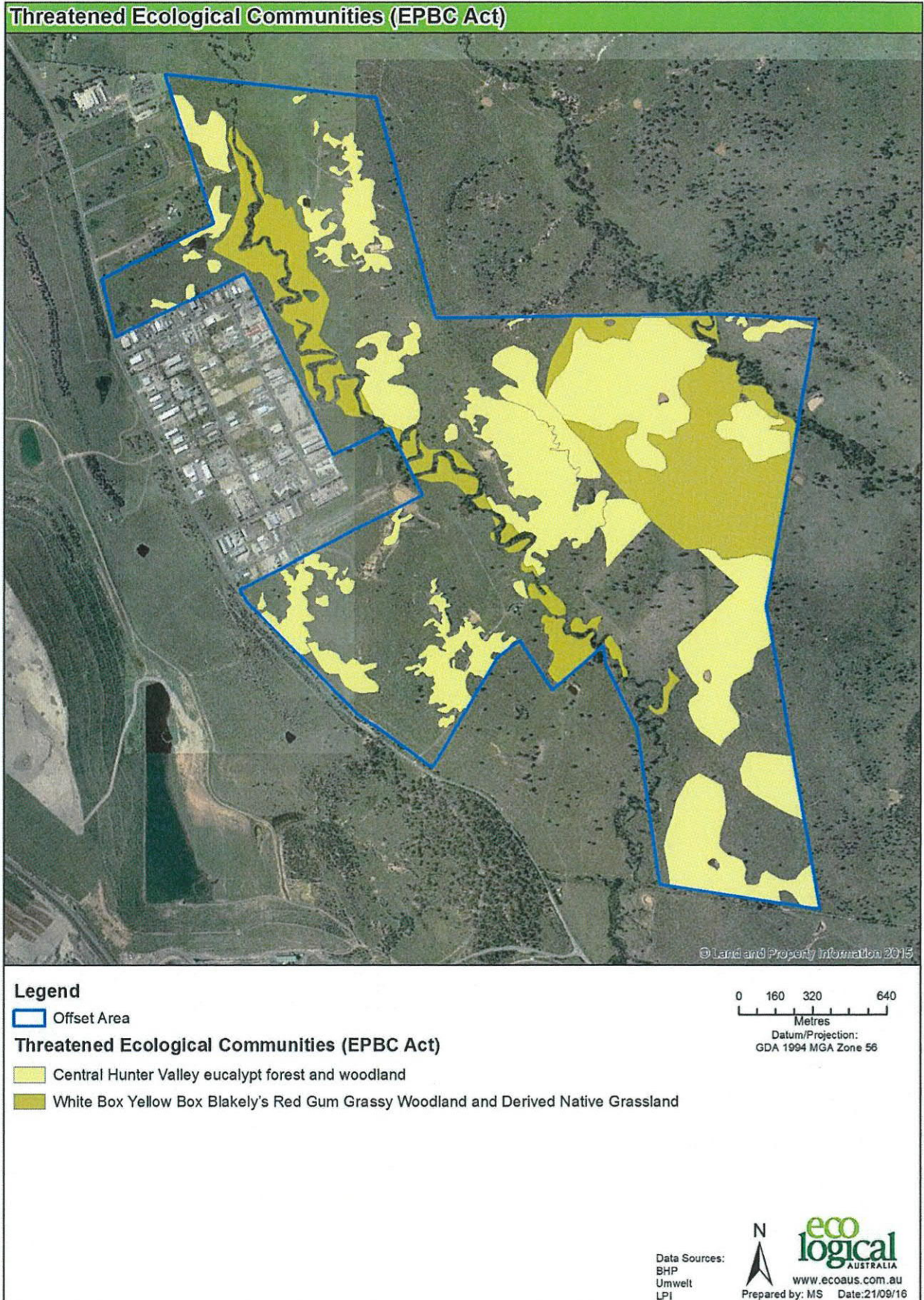


ANNEXURE B DIAGRAM B4 – THREATENED SPECIES RECORDED IN THE CONSERVATION AREA

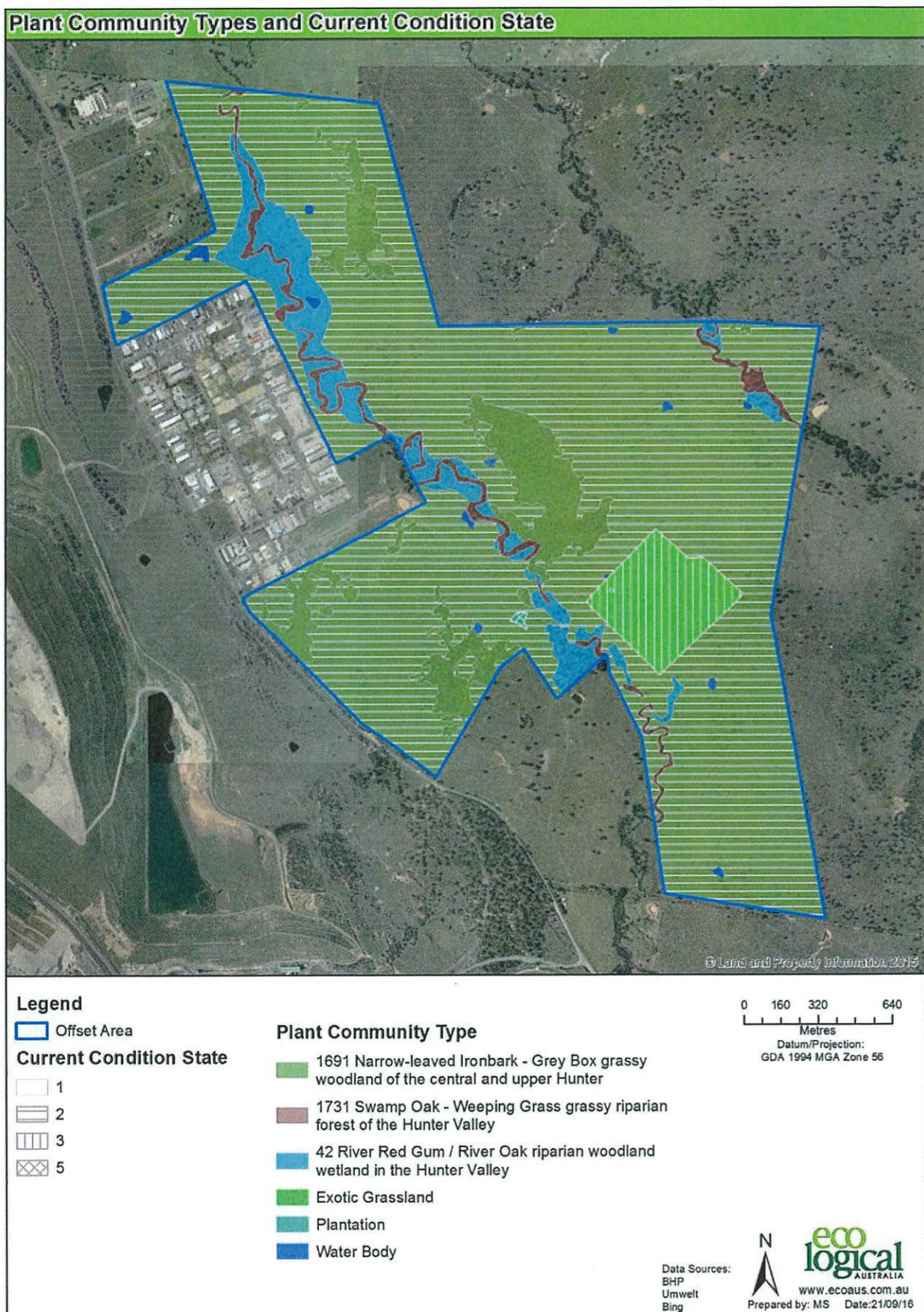
ANNEXURE B DIAGRAM B5 – THREATENED ECOLOGICAL COMMUNITIES (TSC ACT)



ANNEXURE B DIAGRAM B6 – THREATENED ECOLOGICAL COMMUNITIES (EPBC ACT)



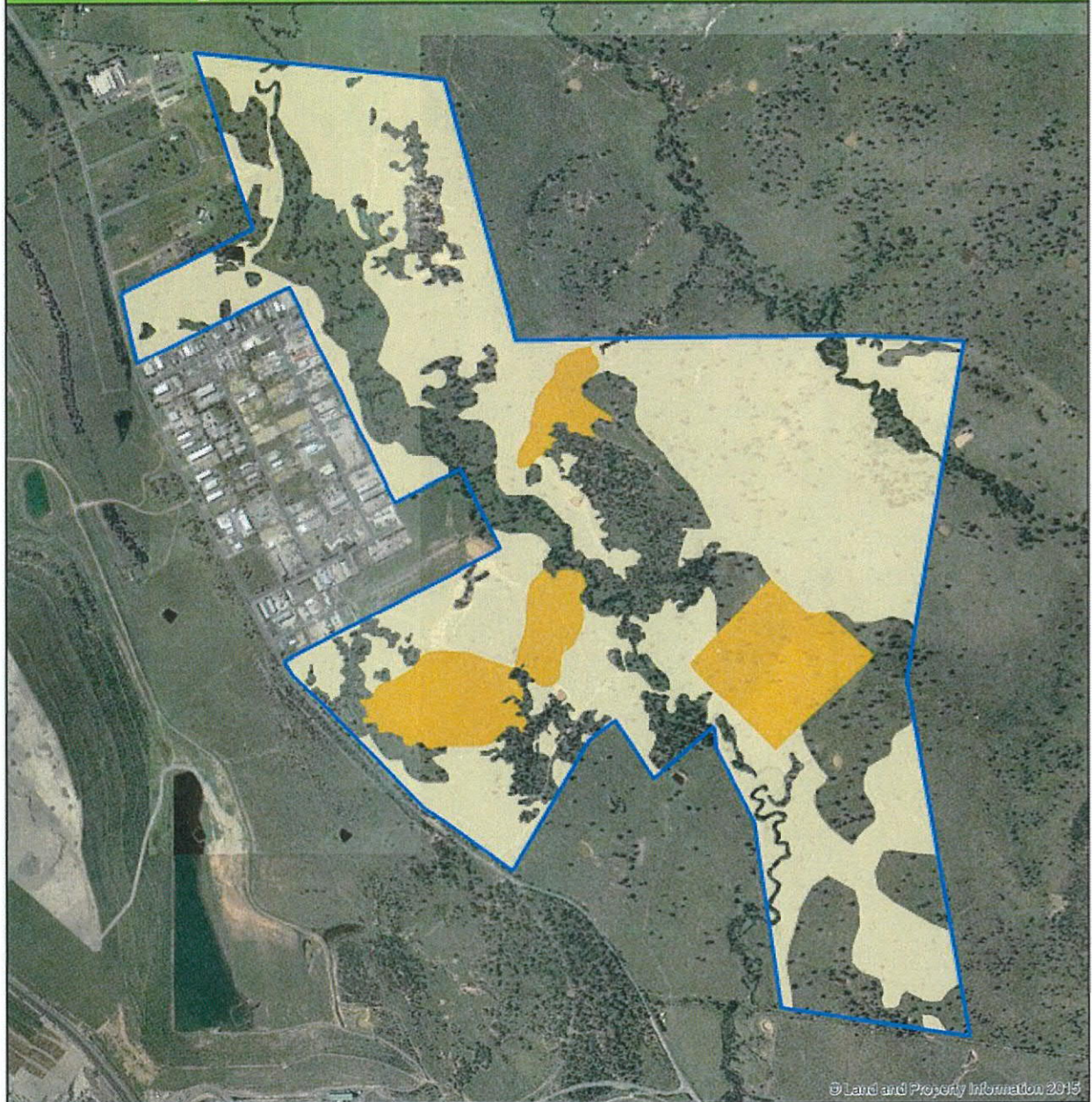
ANNEXURE B DIAGRAM B7 – CURRENT VEGETATION CONDITION



Note: State 1 = intact, State 2 = DNG, State 3 = exotic grassland, State 5 = plantation

ANNEXURE B DIAGRAM B8 – INDICATIVE REVEGETATION SCHEDULE

Indicative Revegetation Schedule



© Land and Property Information 2015

Legend

Offset Area

Revegetation Schedule

Year 2

Year 5 to 10

0 160 320 640

Metres

Datum/Projection:
GDA 1994 MGA Zone 56

Data Sources:
BHP
Umwelt
LPI



eco
logical
AUSTRALIA

www.ecoaus.com.au

Prepared by: MS Date: 21/09/16

ANNEXURE B - PHOTO POINT PHOTOGRAPHS

Two photo points were established per vegetation type present on the conservation area, giving a total of six points. Four photos were taken at each point, oriented in each direction (north, east, south, west). GPS reference points are provided in **Annexure D Table 1**.

Photos are presented below.

TMOF1 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG) with no remnant canopy. Dominant species include Barbed Wire Grass (*Cymbopogon refractus*), *Chloris* sp., *Bothriochloa* sp., Common Everlasting (*Chrysocephalum apiculatum*), and Wallaby Grass (*Rytidosperma* sp.).

Weed cover is low, consisting mainly of *Conyza* sp. and *Sida rhombifolia*.



N



E



S



W

TMOF2 monitors a hillside area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter dominated by young regrowth Narrow-leaved Ironbark (*Eucalyptus crebra*).

Weed cover is low, consisting of Prickly Pear (*Opuntia* sp.).



N



E



S



W

TMOF3 monitors a riparian area of Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley dominated by Swamp Oak (*Casuarina glauca*).

Weed cover is high, including species such as *Conyza* sp., Cobblers Pegs (*Bidens pilosa*) and Black-berry Nightshade (*Solanum nigrum*).



N



E



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W

TMOF4 monitors a riparian area of Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley dominated by Swamp Oak (*Casuarina glauca*).

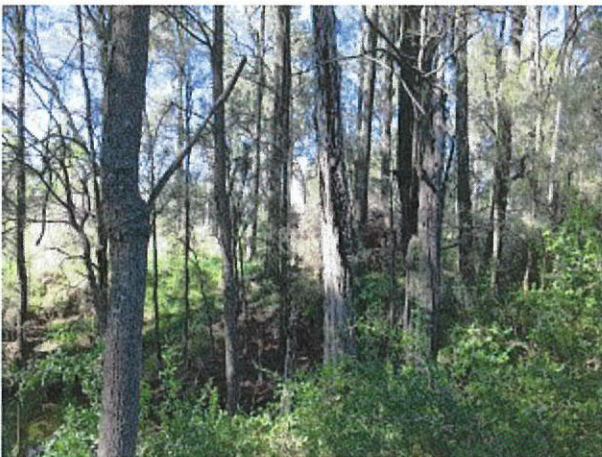
Weed cover at the site is high, consisting mainly of African Boxthorn (*Lycium ferocissimum*), *Ehrharta erecta* and *Sida rhombifolia*.



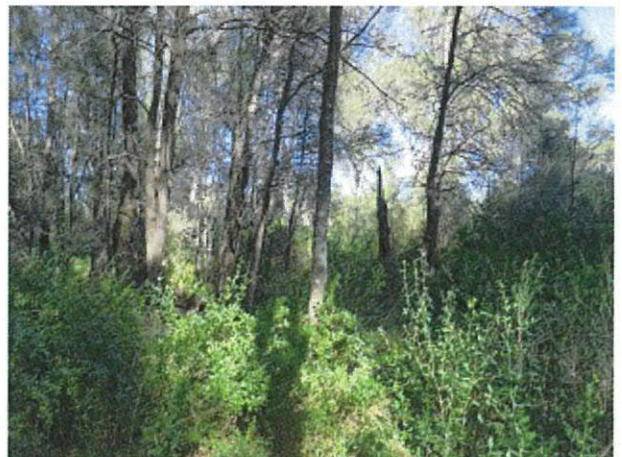
N



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TMOF5 monitors a riparian area of River Red Gum / River Oak riparian woodland wetland in the Hunter Valley dominated by River Red Gum (*Eucalyptus camaldulensis*) and Narrow-leaved Ironbark (*E. crebra*).

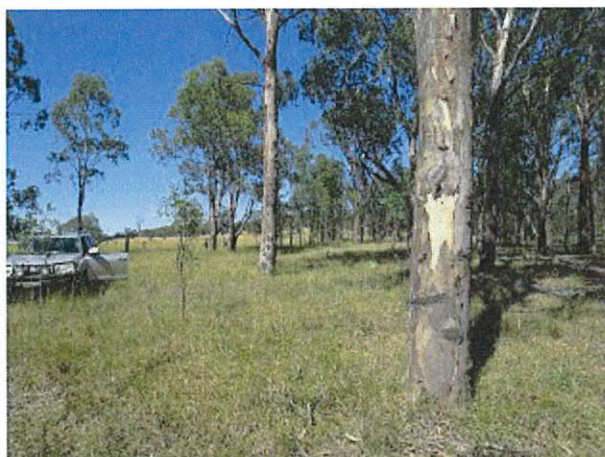
Weed cover is low and includes Fireweed (*Senecio madagascariensis*), and Prickly Pear (*Opuntia* sp.).



N



E



S



W

TMOF6 monitors a riparian area of River Red Gum / River Oak riparian woodland wetland in the Hunter Valley dominated by River Red Gum (*Eucalyptus camaldulensis*).

Weed cover is high, comprising *Galenia pubescens*, African Boxthorn (*Lycium ferocissimum*) and Spear Thistle (*Cirsium vulgare*).



N



E



S



W

Biodiversity Management Plan

Annexure C Management of the Conservation Area*Item 1: management aims and actions required to be undertaken for minimum period of 10 years.*

Aim	Timing	Management action
Weed control across the Conservation Area (focusing on noxious and environmental weeds)	Year 1	Primary weed control: 640 hours bush regeneration by qualified bush regeneration contractor over 12 month period. Techniques specified in Annexure C Item 3 must be used.
	Years 2-5	Follow up weed control: 320 hours bush regeneration per year for years 2-5 Techniques specified in Annexure C Item 3 must be used.
	Years 6 – 10	Annual ongoing maintenance weed control: 80 hours annually for 5 years. Techniques specified in Annexure C Item 3 must be used.
	Years 2 to 10	Seed collection, propagation of tubestock, site preparation works and planting are to be undertaken in designated areas within the Conservation Area. If planted trees are defoliated by native or introduced species, tree guards will be installed.
Pest animal monitoring and control (local co-ordination with Local Land Services and OEH)	Years 1-10	Pest animal control activities to be determined based on density and species of pest animals. Techniques specified in Annexure C Item 3 must be used.
Construct and maintain fire breaks and implement fire management hazard reduction burns. Operate with NSW Rural Fire Service or fire management contractor to implement mosaic or partial area hazard reduction burn.	Years 1-10. Liaise with RFS and NPWS regarding appropriate timing.	Implement 2 hazard reduction burns during low risk fire season according to guidelines specified in Annexure C Item 3.

Aim		Timing	Management action
Fencing		Years 2-10	Maintain fences as required. Replace 1/10 th of total length of fence every three years. Techniques specified in Annexure C Item 3 must be used.
	Annual Reports for Monitoring Program	Years 1-10	Annual reports to be prepared according to specifications in Annexure D Monitoring Program.
Threatened species, populations and endangered ecological communities (EEC)		Years 1-10	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.

Biodiversity Management Plan

Annexure C Management of the Conservation Area*Item 2: management actions required to be undertaken from year 11 onwards.*

Issue	Management action
Exotic plants	The Owner must take reasonable measures in relation to the control of exotic plants. Techniques specified in Annexure C Item 3 must be used.
Pest animals	The Owner must take reasonable measures in relation to monitoring of pest animals. Techniques specified in Annexure C Item 3 must be used.
Threatened species, populations and endangered ecological communities (EEC)	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.
Managing visitor impacts (visitors include OEH inspectors; weed control contractors; fire maintenance contractors; NSW Rural Fire Service; fencing and maintenance contractors and the Owner)	The Owner must take reasonable measures to ensure that visitor disturbance to the Conservation Area is minimised by keeping visitors to tracks and trails except for management purposes and ensuring all visitor vehicles and equipment entering the Conservation Area are clean and free from weeds and/or seeds. Guidance specified in Annexure C Item 3 Visitation and research must be used.
Maintain vehicle access to Conservation Area for visitor management, fire management, weed and fencing management	The Owner must take reasonable measures to ensure that vehicle access is maintained by maintaining and repairing access trails as required. Techniques specified in Annexure C Item 3 must be used.
Monitoring and Reporting	The Owner must complete a monitoring report at least every 3 years as described in Clause 8 of the Conservation Agreement.
Livestock	The Owner must remove any livestock which have entered the Conservation Area as soon as practical.
Fencing	The Owner must take reasonable measures to construct and maintain fences along the boundaries of the Conservation Area where adjacent land use cause or are likely to cause adverse impacts on or in the Conservation Area. Techniques specified in Annexure C Item 3 must be used.

ANNEXURE C ITEM 3: PERMISSIONS AND GUIDELINES

Control of pest animals and non-indigenous fauna (in addition to pest animal control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- a) Participate in community pest animal control programs, and encourage neighbours to implement pest animal control programs. Contact your Local Land Services office or National Parks and Wildlife Service Area office to find out where community control programs are occurring.
- b) Methods for pest animal control can include; shooting, trapping and use of poisonous baits consistent with advice from OEH and Local Land Services. Use control methods identified as 'humane' as defined in the NSW Codes of Practice and Standard Operating Procedures for Humane Pest Vertebrate Control (Control Capture and Destruction of Feral Animals in Australia) as developed by the NSW Department of Primary Industries.
- c) Pest animal control activities to be determined based on density and species of pest animals. Methods for monitoring pest animal activity should include:
 - i) observations and/or hearing calls,
 - ii) the use of standard "sand plots",
 - iii) the use of non-poisoned "bait stations",
 - iv) scat counts, and
 - v) other quantitative techniques which can be designed in discussion with OEH or Local Land Services.

Control of weeds and exotic plants (in addition to weed control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- d) Apply a range of techniques including:
 - i) Removal of weeds by hand ensuring that all plant parts which can reproduce are removed and that soils do not become prone to erosion.
 - ii) Use of carefully selected herbicide according to label directions and/or current off label permit, ensuring minimal off target damage.
 - iii) Use of appropriate control measures as recommended in the Department of Primary Industries Noxious and Environmental Weed Control Handbook 6th Edition 2014 or equivalent replacements for control of weeds, ensuring minimal off target damage.
 - iv) Use of forestry mulching or slashing machinery only with prior written permission from OEH.
 - v) Ensure control programs are commenced when timing and extent of weed removal will minimise adverse effects on wildlife (weeds may provide protection or habitat for native fauna). Dense thickets of lantana should be removed gradually in mosaic patterns to minimise disturbance to the habitat of native animals.
 - vi) Other weed control methods may only be undertaken with prior written permission of OEH.
 - vii) Contact OEH if any uncertainty exists regarding weed control methods.

Cultural heritage

- e) Recording and management of any newly identified Aboriginal Objects or artefacts, in consultation with OEH (and the relevant local Aboriginal community where applicable).

Development

- f) Carrying out any development as described in the Conservation Agreement and maintaining development (including existing fire trails, access trails and infrastructure), with the following conditions:
- i) clear a corridor not greater than 3 metres wide during construction or for maintenance for the installation of fences or other agreed rural structures;
 - ii) move fallen timber and any other obstructions to maintain access trails, tracks and fences;
 - iii) where clearing is permitted under the Agreement and necessary, undertake all works in a manner that minimises disturbance to soil and hydrological characteristics.

Fencing, tracks and trails

- g) Construction and maintenance of all fences using wildlife friendly materials including plain wire (non-barbed) on top and bottom strands.
- h) Construction of any new internal fence, access track or trail only with prior written approval from OEH.
- i) Maintaining existing access walking tracks in the Conservation Area to a maximum width of 2m.
- j) Maintaining existing access vehicular trails in the Conservation Area to a maximum width of 4m with 1m either side permissible for clearing.
- k) Removal of old fences and closing of unwanted tracks within the Conservation Area and facilitate restoration of indigenous vegetation according to Annexure 3 Item 3 (points 'n' and 'o' over page).

Fire management (in addition to fire management actions in Item 1 of Annexure C to the Conservation Agreement)

- l) Using fire hazard reduction burns and controlled burning which take into account the recommended fire intervals given in the *Bush Fire Environmental Assessment Code for New South Wales* (Rural Fire Service February 2006) and the guidelines contained in the *Threatened Species Hazard Reduction Lists for the Bush Fire Environmental Assessment Code* or equivalent replacements.

Current recommendations are:

- i) minimum fire intervals of:
 - 8 year fire interval for Narrow-leaved Ironbark - Grey Box grassy woodland (PCT 1691)
 - 10 year fire interval for Swamp Oak - Weeping Grass grassy riparian forest (PCT 1731)
 - 10 year fire interval for River Red Gum / River Oak riparian woodland wetland (PCT 42)
 - ii) wherever possible canopy or crown fires should be avoided.
 - iii) wherever possible no more than 50% of the Conservation Area should be burnt in any twelve month period.
 - iv) both live and dead trees with hollows should be protected from burning as far as practicable in order to preserve nesting habitat for hollow dwelling animals.
- m) Lighting a fire, or causing a fire to be lit on the Conservation Area if it complies with the *Rural Fires Act 1997* (NSW), and:
- i) the lighting of the fire is a necessary component of bush fire hazard reduction work carried out in accordance with a notice served on the Owner under the *Rural Fires Act 1997* (NSW) or other applicable legislation; or

- ii) life or property is in immediate threat by bush fire and the lighting of the fire is reasonably necessary to protect life or property; or
- iii) the fire is a camp fire, subject to the compliance with the Rural Fires Act 1997 (NSW), or
- iv) the Chief-Executive gives prior written consent to the lighting of the fire.

Restoration of indigenous vegetation

- n) Restoration of native vegetation on the Conservation Area using a preferred method of encouraging and retaining natural regeneration. Preferred methods include:
 - i) bush regeneration
 - ii) brush mulching; and/or
 - iii) direct seeding.
- o) Revegetation to establish indigenous plants to maintain the vegetation structure in keeping with the identified vegetation community, using species produced from material sourced locally and without fertilisers, where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion.

Seed collection

- p) Collection of seed on the Conservation Area for non-commercial use in accordance with Guidelines and Codes of Practice developed by Florabank (www.florabank.org.au), or subsequent equivalent and with the following limitations and permissions:
 - i) Collect seed in the Conservation Area only if seed of the particular species and genotype is not available elsewhere, or if the seed collected is intended for seedlings that will be planted within the Conservation Area or adjacent to the Conservation Area.
 - ii) Seeds may be collected from within endangered ecological communities.
 - iii) Seeds may not be collected from species individually listed in Schedules 1, 1A or 2 to the TSC Act without prior written approval from the Chief-Executive, or under a licence granted under section 132C of the NPW Act or section 91 of the TSC Act.
 - iv) Seeds may be collected from any protected species listed in Schedule 13 to the NPW Act.
 - v) Seeds may be collected from any other native species.

Thinning of indigenous vegetation

- q) Thinning of regenerating indigenous species which are altering the structure of the vegetation in the Conservation Area and/or reducing the Conservation Values only with prior written approval from the Chief-Executive OEH.

Threatened species

- r) Implementing any measures included in recovery plans for any threatened species, population or ecological communities which are or may be found in the Conservation Area.
- s) Implementing other specific management advice from OEH for any threatened species, populations or ecological communities which are or may be found in the Conservation Area.

Use of timber

- t) Harvesting of fallen non-hollow wood in amounts necessary for heating the Owner's dwelling on the Land and camp fires on the Conservation Area.

Visitation and research (in addition to management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

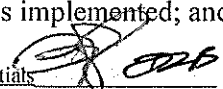
- u) Visitation, research and community use at a level that does not adversely impact on the Conservation Values or the amenity of the Owner. Research projects must be first discussed with OEH before being carried out.

ANNEXURE D - MONITORING PROGRAM

- (a) The Owner must engage a suitably qualified person (such as an ecologist) to undertake a monitoring event in each year, beginning in 2018 (Monitoring Event).
- (b) Each Monitoring Event must include:
- i) **photo monitoring** - four photos are required to be taken at each of the six established monitoring points shown in Annexure B. Photos must be taken from the exact location and bearing to allow subsequent comparison and assessment. Photo point locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Baseline photographs are provided in Annexure A to the Conservation Agreement. Photo monitoring must include the collection of at least the top five canopy, shrub-layer and groundcover species and the recording of any threats. The frequency of monitoring activities will be targeted by site type:
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - ii) **quadrat monitoring** – quadrat data must be collected at each of the six photo points above. Quadrat locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Results must be compared to baseline and benchmark quadrat data which is provided in **Tables 1 and 2** of Annexure D to the Conservation Agreement **below**.
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - iii) a **walk through assessment** to record opportunistic sightings within the Conservation Area including:
 - i. fire events or impacts of fire management
 - ii. weeds (including compiling a list of exotic species and recording new weed infestations including location and extent)
 - iii. pest animals (species and location must be recorded, including evidence of pest animals such as burrows, scats or disturbance)
 - iv. visitor impact and vehicle access (including evidence of any recent usage, and the presence of any new access tracks)
 - v. rubbish dumping
 - vi. natural regeneration of previously disturbed areas; and
 - vii. sightings of threatened species.
- (c) After each Monitoring Event, the Owner must produce a monitoring report on the Conservation Area by 30 December of each year, beginning in 2018 (Monitoring Report).

The Monitoring Report must include:

- i. a description of all completed management actions undertaken in the previous 12 month period;
- ii. total cost of all works completed in undertaking the management actions listed in items 1 and 2 of Annexure C to the Conservation Agreement;
- iii. completed monitoring data sheets (including photographs) using the template provided in **Table 3** of Annexure D to the Conservation Agreement (**below**);
- iv. a discussion of the changes recorded at monitoring points and quadrats;
- v. a summary of quadrat data for each photo point;
- vi. a discussion of the condition of Conservation Values;
- vii. a discussion of effectiveness of any management actions implemented; and



viii. recommendations and proposed management actions to be performed in following year(s).

The Monitoring Report must be submitted to OEH within **21 days** of it being received by the Owner.

- (d) The Monitoring Event and the Monitoring Report comprise the monitoring program (Monitoring Program). The Owner must complete the Monitoring Program to the satisfaction of OEH, for a minimum period of 10 years from the date of the Conservation Agreement.

ANNEXURE D TABLE 1 - MONITORING POINT LOCATIONS AND CORRESPONDING VEGETATION COMMUNITIES REPRESENTED AS AT FEBRUARY 2016

Photo Point / Quadrat No.	Easting/Northing GDA 94 MGA 56	Vegetation Community Represented
TMOF1	300957, 6422542	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG)
TMOF2	301903, 6423266	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
TMOF3	302723, 6423661	1731 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley
TMOF4	300571, 6424377	1731 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley
TMOF5	301998, 6422419	42 River Red Gum / River Oak riparian woodland wetland in the Hunter Valley
TMOF6	300682, 6424231	42 River Red Gum / River Oak riparian woodland wetland in the Hunter Valley

ANNEXURE D TABLE 2 – BIOMETRIC VEGETATION TYPE BENCHMARKS AND BASELINE QUADRAT SCORES AS AT FEBRUARY 2016

Photo Point / Quadrat no.	Native species richness	Overstorey cover %pfc	Mid-storey cover %	Ground cover – grasses %pfc	Ground cover – shrubs %pfc	Ground cover – other %pfc	Proportion overstorey regen.	Exotic cover	Number of Trees with Hollows	Total length of fallen logs
1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
TMOF1	17	1	1	0	1	31	0.5	17.5	TBC	TBC
TMOF2	16	1	36	3	1	57	1	14.5	TBC	TBC
1731 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley										
Benchmark values	24	15	10	5	5	5	N/A	N/A	0.2	5
TMOF3	11	1	1	1	0	31	1	14.5	TBC	TBC
TMOF4	15	1	3	1	0	34	1	16.5	TBC	TBC
42 River Red Gum / River Oak riparian woodland wetland in the Hunter Valley										
Benchmark values	38	10	10	20	1	10	N/A	N/A	0.1	10
TMOF5	11	1	1	1	0	31	1	14.5	TBC	TBC
TMOF6	14	0	12.5	15.5	0	63	1	12.5	TBC	TBC

Comprehensive baseline biodiversity studies of the Conservation Area were undertaken in 2013. During these studies, vegetation condition data was collected at most photo point locations. A modified 6-point Braun-Blanquet scale was used to estimate cover-abundances of all plant species. To develop baseline biometric quadrat data, this scale was modified as follows - all 1's (few individuals <5% cover) were removed due to low cover, 2's (Many individuals <5%) were converted to an assumed 1% total cover and then the midpoints of the remaining classes adopted (i.e. 12.5%, 35%, 62.5% and 87.5%).

The proportion of overstorey regeneration was inferred from the current condition class at each photo point i.e. Class 1 (remnant) was given a score of '1', Class 2 (derived native grassland EEC) was given a score of '0.5' and Class 3 was given a score of '0'.

Where photo monitoring points were not directly located at an existing baseline study site, the nearest baseline site, or a baseline site within the same PCT was selected. Biometric data (including number of trees with hollows and total length of fallen logs) will be collected and reviewed at each photo point during subsequent years monitoring.

MAC-STE-MTP-050

Biodiversity Management Plan



Thomas Mitchell Drive On-Site Offset Conservation Area
Lodgement Invoice Number: C892129
Commencement date: 28 April 2017

Note: The Crown road traversing the southern section of the offset area has been formally excluded from the Conservation Agreement as such there is no intention for this Crown road to be closed.

ANNEXURE B - CONSERVATION VALUES

1. CONSERVATION VALUES

The Owner and the Minister recognise that the Conservation Area contains the following conservation values:

A The Conservation Area contains two biometric communities:

- Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
- Bull Oak grassy woodland of the central Hunter Valley

Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (PCT 1691)

This community supports a typically sparse canopy (10 to 40 per cent projected foliage cover) dominated by either Grey/White Box hybrids (*Eucalyptus albens* x *mohuccana*), or Narrow-leaved Ironbark (*Eucalyptus crebra*). The occurrences of this community have been separated based on the dominance of these two species in order to identify areas of White Box – Yellow Box – Blakely's Red Gum Woodland EEC (listed under the TSC Act) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC (listed under the EPBC Act). In some areas, Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*) may occur in low abundance. Height of the canopy ranges from 7 to 20 metres.

The shrub layer is generally very sparse (1 to 10 per cent cover), comprising regrowth of the above listed canopy species, *Cassinia quinquefaria*, Western Golden Wattle (*Acacia decora*), Kangaroo Thorn (*Acacia paradoxa*), Native Blackthorn (*Bursaria spinosa*), Western Boobialla (*Myoporum montanum*), and Native Olive (*Notelaea microcarpa* var. *microcarpa*). It also includes an unusual almost monospecific stand of Yarran Shrubland (*Acacia homalophylla* – *melvillei* complex) near the southern boundary which is an unusual and uncommon variant of the Narrow-leaved Ironbark – Grey Box grassy woodland community – as described in the report 'Baseline Ecological Study of Mt Arthur Coal Biodiversity Offset and Conservation Areas' (Umwelt (Australia) Pty Limited,, 2014). The shrub layer ranges from 0.5 to 4 metres in height.

This community is characterised by a diverse and dense ground layer (up to 85 per cent cover) between 0.1 and 1 metre in height. Common herbs and sub-shrubs include Yellow Burr-Daisy (*Calotis lappulacea*), Common Everlasting (*Chrysocephalum apiculatum*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Corrugated Sida (*Sida corrugata*), *Rostellularia adscendens*, Climbing Saltbush (*Einadia nutans*), Many-flowered Mat-Rush (*Lomandra multiflora* subsp. *multiflora*), Amulla (*Eremophila debilis*), *Glycine tabacina*, *Maireana microphylla*, and Kidney Weed (*Dichondra repens*). Native grasses include Barbed Wire Grass (*Cymbopogon refractus*), Wallaby Grass (*Rytidosperma fulvum*), Speargrass (*Austrostipa scabra*), Weeping Grass (*Microlaena stipoides* var. *stipoides*), Shorthair Plumegrass (*Dichelachne micrantha*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*), Paddock Lovegrass (*Eragrostis leptostachya*), Tall Chloris (*Chloris ventricosa*), Pitted Bluegrass (*Bothriochloa decipiens* var. *decipiens*) and Red Grass (*Bothriochloa macra*).

This community is consistent with the EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. The community complies with the final determination (NSW Scientific Committee 2011) for the EEC with regard to the following attributes:

- The community occurs on Permian sediments within the NSW Sydney Basin Bioregion;
- It occurs in the Muswellbrook Local Government Area (LGA) where the EEC has previously been recorded;

- It supports a high proportion of species that are in the list of characteristic species for the EEC: 31 out of 163 (19 per cent) native species recorded in this community are in the EEC listing, and 31 out of 38 (82 per cent) species in the characteristic species list for the EEC were recorded in this community.

The Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*) dominated areas of this community are also consistent with the EPBC-listed CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act for the following reasons:

- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;
- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectare or greater in size;
- All patches contain at least one important species (DEH 2006);
- The species composition is consistent with the Commonwealth listing advice (TSSC 2006) and associated species list (DEH 2006b); and
- All patches contain at least 12 native understorey species (excluding grasses).

Bull Oak grassy woodland of the central Hunter Valley (PCT 1692)

This community supports a mid – dense canopy (up to 50 per cent cover) dominated by Bulloak (*Allocasuarina luehmannii*). There are occurrences of Narrow-leaved Ironbark (*Eucalyptus crebra*) and Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), however these species typically only form a minor component of the canopy. Height of the canopy ranges from 8 to 15 metres. The shrub layer is generally absent, however, in some areas a very sparse (less than 5 per cent cover) shrub layer occurs, comprising *Dodonaea viscosa* subsp. *angustifolia*, Cooba (*Acacia salicina*) and regenerating Bulloak (*Allocasuarina luehmannii*). When present, the shrub layer ranges from 2 to 4 metres in height.

This community is characterised by a sparse to very sparse ground layer (5 to 20 per cent cover) between 0.1 and 1 metre in height. Common herbs include Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), Wattle Mat-rush (*Lomandra filiformis*) and Ruby Saltbush (*Enchylaena tomentosa*). Native grass species present include Slender Rat's Tail Grass (*Sporobolus creber*), Speargrass (*Austrostipa scabra*), Barbed Wire Grass (*Cymbopogon refractus*), Tall Chloris (*Chloris ventricosa*) and Purple Wiregrass (*Aristida ramosa*).

This community is not consistent with any listed TEC under the TSC Act or EPBC Act

Table 1 shows the area of each plant community type by condition state (see also **Diagram B7**).

Table 1: Plant community types present in the Conservation Area

PCT code	Plant community type (PCT)	Condition	Area (ha)
1691	Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	Intact	36.68
		DNG	106.69
1692	Bull Oak grassy woodland of the central Hunter Valley	Intact	15.11
		DNG	27.87
TOTAL		186.35	

B The Conservation Area contains the following threatened fauna species (and refer to **Table 3 Annexure B** and **Diagram B4**):

- *Chthonicola sagittata* (Speckled Warbler) (Vulnerable (V) – TSC Act)
- *Miniopterus australis* (Little Bentwing-bat) (V – TSC Act)
- *Petaurus norfolcensis* (Squirrel Glider) (V – TSC Act)
- *Circus assimilis* (Spotted Harrier) (V- TSC Act)
- *Pteropus poliocephalus* (Grey-headed Flying-fox) (V – TSC Act and EPBC Act)

One species listed as migratory under the EPBC Act was also recorded on site:

- *Hirundapus caudacutus* (White-throated Needletail)

The Conservation Area contains two Endangered Populations listed under the TSC Act:

- *Acacia pendula* population in the Hunter catchment
- Pine Donkey Orchid (*Diuris tricolor*) population in the Muswellbrook local government area

Diuris tricolor is also listed as Vulnerable under the TSC Act

The following Endangered Ecological Communities are present in the Conservation Area (see **Diagram B5** and **B6**):

- *Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions* (EEC – TSC Act)
- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EEC – TSC Act, CEEC – EPBC Act)

As shown in **Table 2**, 142 ha of the vegetation present on the Conservation Area corresponds to listed threatened ecological communities under the TSC and / or EPBC Act. These are shown by condition state and listing status.

Table 2: Threatened ecological communities present in the Conservation Area

Threatened ecological community	Condition	TSC listed (ha)	EPBC listed (ha)
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions (TSC Act) / Central Hunter Valley eucalypt forest and woodland (EPBC Act)	Intact	35.39	-
	DNG	0	-
White Box - Yellow Box - Blakely's Red Gum Woodland (TSC Act) / White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)	Intact	0	35.39
	DNG	106.69	106.69
Total		142.08	142.08

- C The Conservation Area is located to the east of the Hunter Valley section of the Great Eastern Ranges Initiative. The Great Eastern Ranges Initiative aims to maintain and improve the 'corridor' connectivity of mountain ecosystems running the length of eastern Australia. The focal area of the Initiative includes the Great Dividing Range and the Great Escarpment of Eastern Australia which extend along the majority of Australia's east coast. The current area of focus for this Initiative is the 1,200 kilometres section of the Great Eastern Ranges that falls within NSW.

The Hunter Valley has been identified as one of the five priority areas along the ranges and is considered to be the most diverse and complex in regards to its biodiversity and connectivity and its social and economic factors. The Hunter Valley represents a significant east-west linkage of natural vegetation in the Great Eastern Ranges, with the potential for north-south 'stepping stones' of vegetation such as this Conservation Area, to allow species movement and improve connectivity across areas of the Hunter Valley that have been historically cleared and/ or grazed.

- D The Conservation Area is likely to contain Aboriginal heritage values; however, no detailed studies have been undertaken.

ANNEXURE B TABLE 3 Threatened species found within 20 km radius of site which may occur within the Conservation Area due to the presence of suitable habitat (search conducted March 2016).

Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
Birds				
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE, M	N
Eastern Great Egret	<i>Ardea modesta</i>		M	N
Cattle Egret	<i>Ardea ibis</i>		M	N
Speckled Warbler	<i>Chthonicola sagittata</i>	V		Y
Spotted Harrier	<i>Circus assimilis</i>	V		Y
Brown Treecreeper (Eastern Sub- species)	<i>Climacteris picummus victoriae</i>	V		N
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V		N
Black Falcon	<i>Falco subniger</i>	V		N
Little Lorikeet	<i>Glossopsitta pusilla</i>	V		N
Little Eagle	<i>Hieraaetus morphnoides</i>	V		N
White-throated Needletail	<i>Hirundapus caudacutus</i>		M	Y
Swift Parrot	<i>Lathamus discolor</i>	E	CE, M	N
Square-tailed Kite	<i>Lophoictinia isura</i>	V		N
Hooded Robin (South- eastern Form)	<i>Melanodryas cucullata cucullata</i>	V		N
Black-Chinned Honeyeater (Eastern Sub-species)	<i>Melithreptus gularis gularis</i>	V		N
Rainbow Bee-eater	<i>Merops ornatus</i>		M	N
Satin Flycatcher	<i>Myiagra cyanoleuca</i>		M	N
Powerful Owl	<i>Ninox strenua</i>	V		N
Scarlet Robin	<i>Petroica boodang</i>	V		N
Flame Robin	<i>Petroica phoenicea</i>	V		N
Grey-crowned Babbler (Eastern Sub-species)	<i>Pomatostomus temporalis temporalis</i>	V		N
Rufous Fantail	<i>Rhipidura rufifrons</i>		M	N
Diamond Firetail	<i>Stagonopleura guttata</i>	V		N
Mammals				
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	N
Spotted-tailed Quoll (SE Mainland Population)	<i>Dasyurus maculatus maculatus</i>	V	E	N
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V		N
Little Bentwing-bat	<i>Miniopterus australis</i>	V		Y
Eastern Bentwing- bat	<i>Miniopterus schreibersii oceanensis</i>	V		N

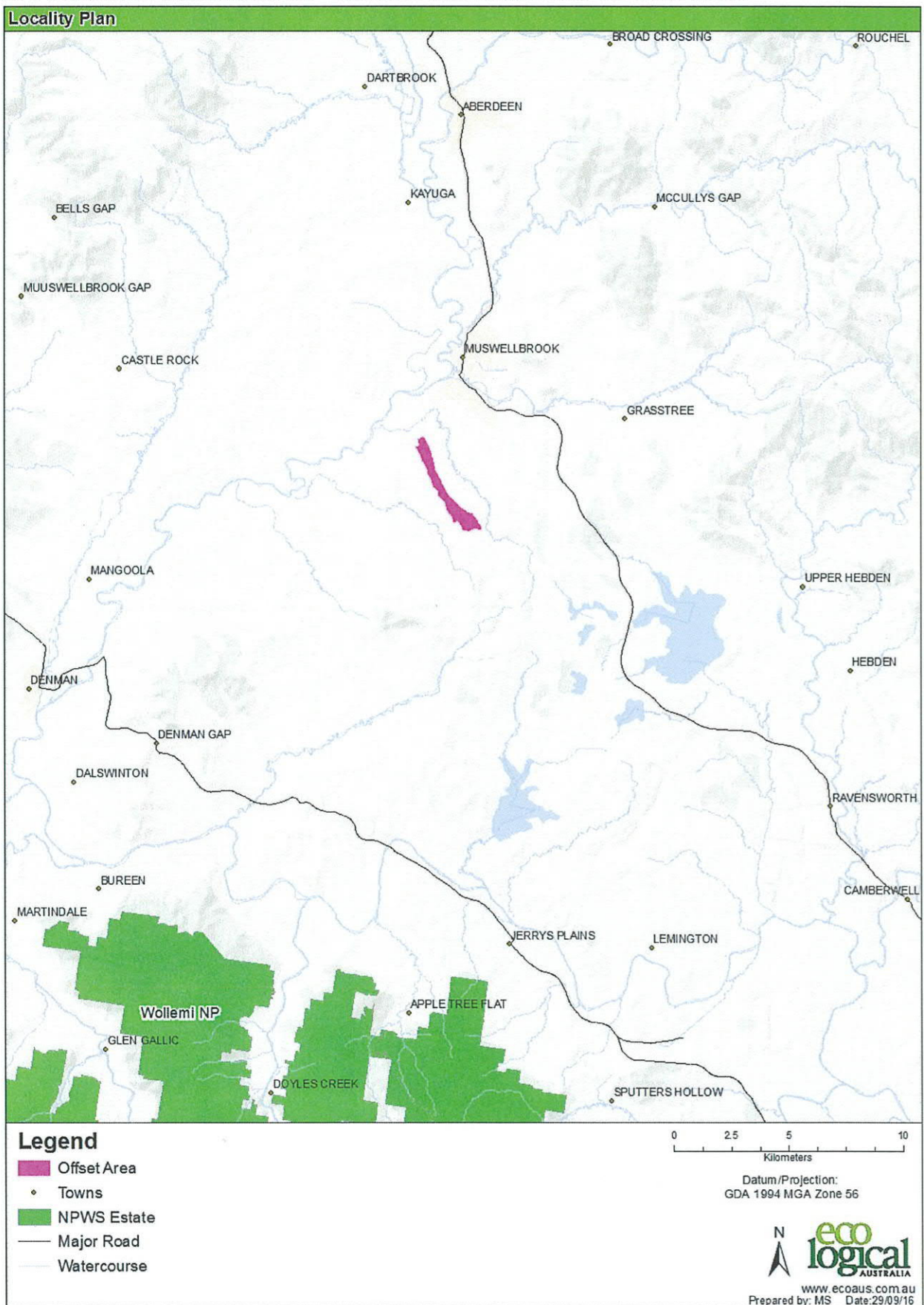
Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	V		N
Southern Myotis	<i>Myotis macropus</i>	V		N
South-eastern Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	N
Squirrel Glider	<i>Petaurus norfolcensis</i>	V		Y
Koala	<i>Phascolarctos cinereus</i>	V	V	N
Grey-headed Flying- fox	<i>Pteropus poliocephalus</i>	V	V	Y
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V		N
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V		N
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		N
Flora				
Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	Weeping Myall <i>Acacia Pendula</i> population in the Hunter Catchment	E2		Y
Pine Donkey Orchid	<i>Diuris tricolor</i>	V		Y
<i>Diuris tricolor</i> population in the Muswellbrook LGA	<i>Diuris tricolor</i> population in the Muswellbrook LGA	E2		Y
River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	E2		N
Ecological communities				
Central Hunter Grey Box – Ironbark Woodland In The NSW North Coast And Sydney Basin Bioregions		EEC		Y
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland And Derived Native Grassland		EEC	CEEC	Y

V= Vulnerable, E= Endangered, CE= Critically Endangered, M= Migratory, Mar= Marine, E2= Endangered Population, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

ANNEXURE B DIAGRAM B1 - LOCATION OF BIOMETRIC PLOTS AND PHOTO POINTS



ANNEXURE B DIAGRAM B2 – REGIONAL CONTEXT OF THE SITE



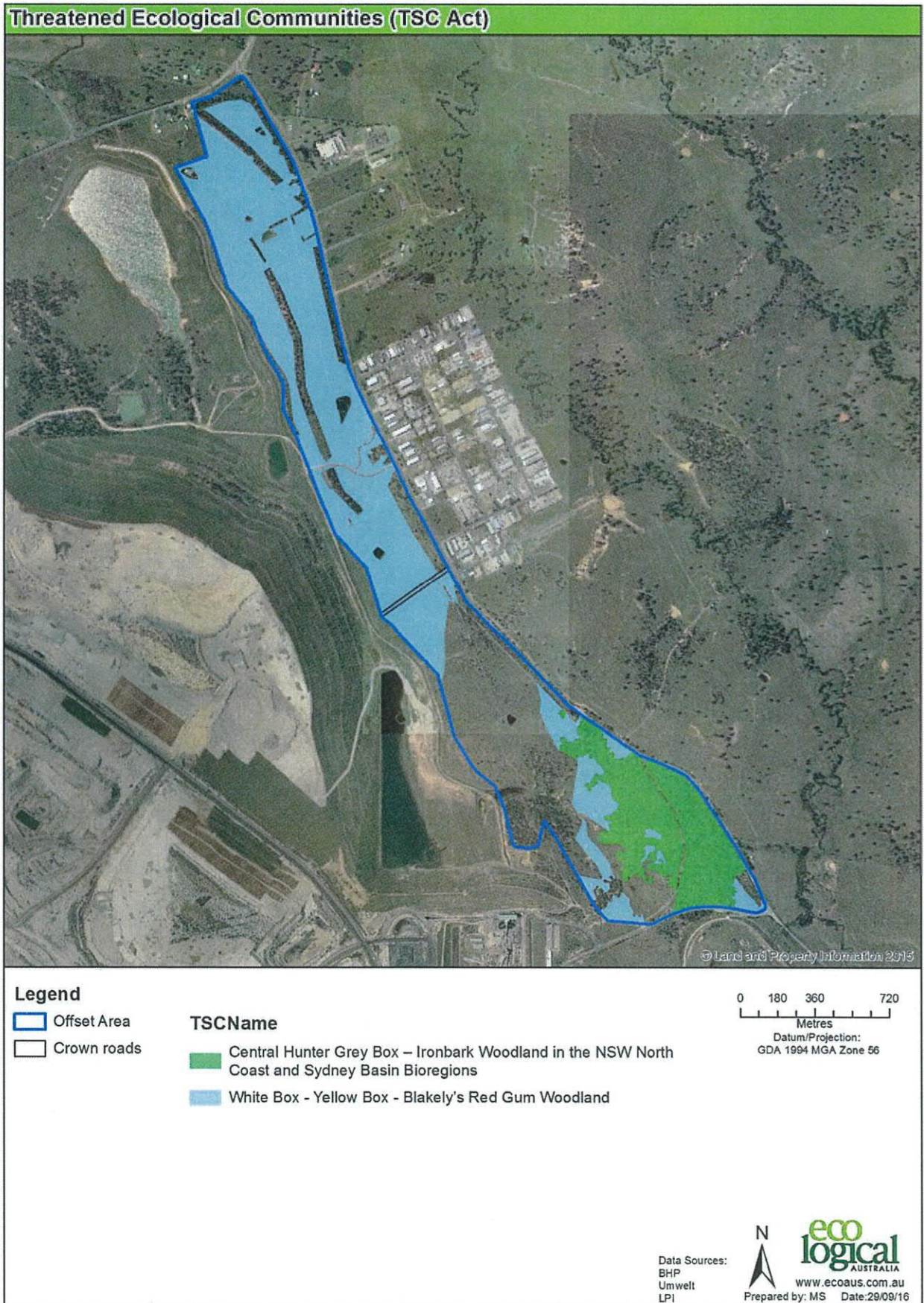
ANNEXURE B DIAGRAM B3 – FIRE MANAGEMENT ZONES



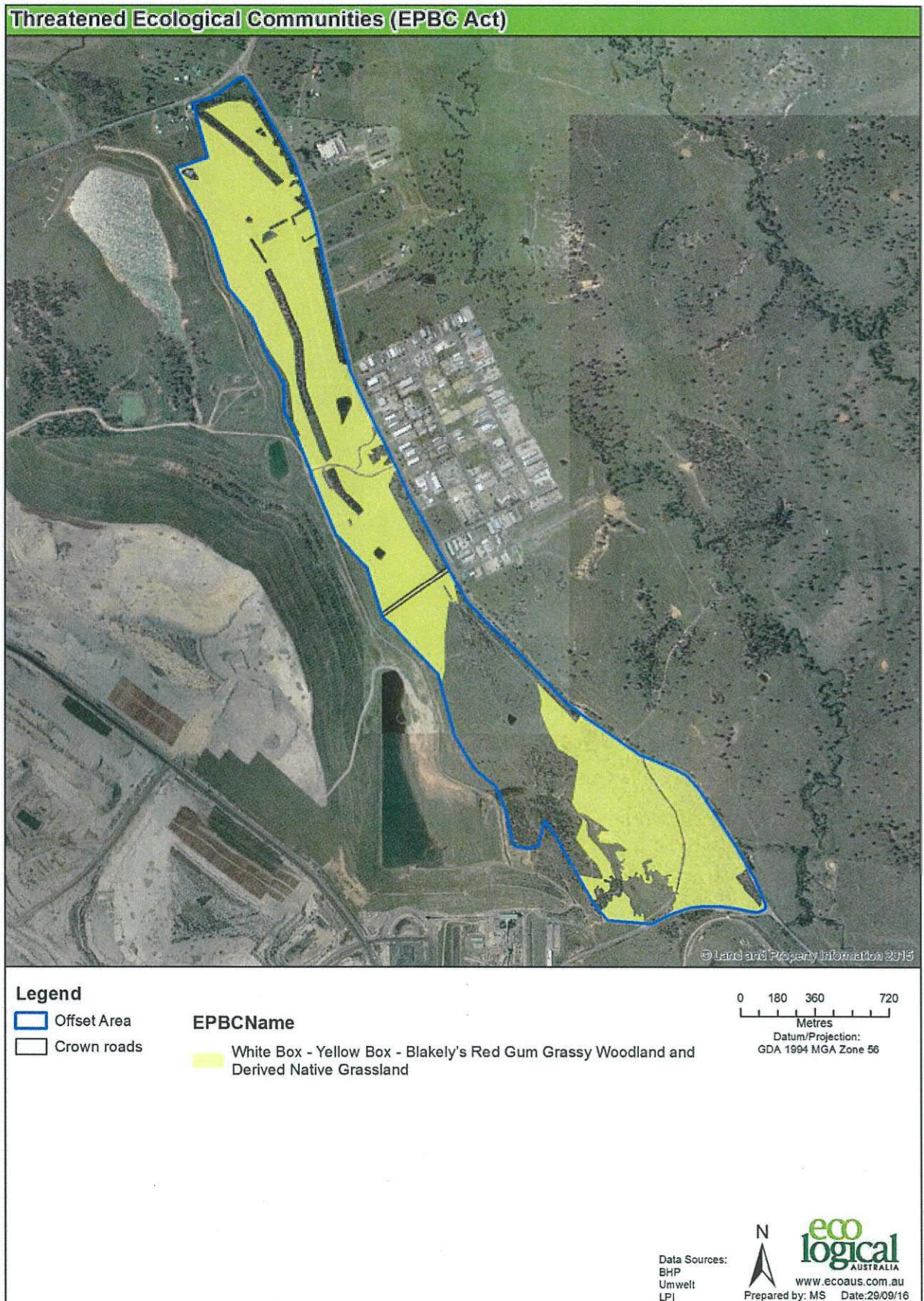
ANNEXURE B DIAGRAM B4 – THREATENED SPECIES RECORDED IN THE CONSERVATION AREA



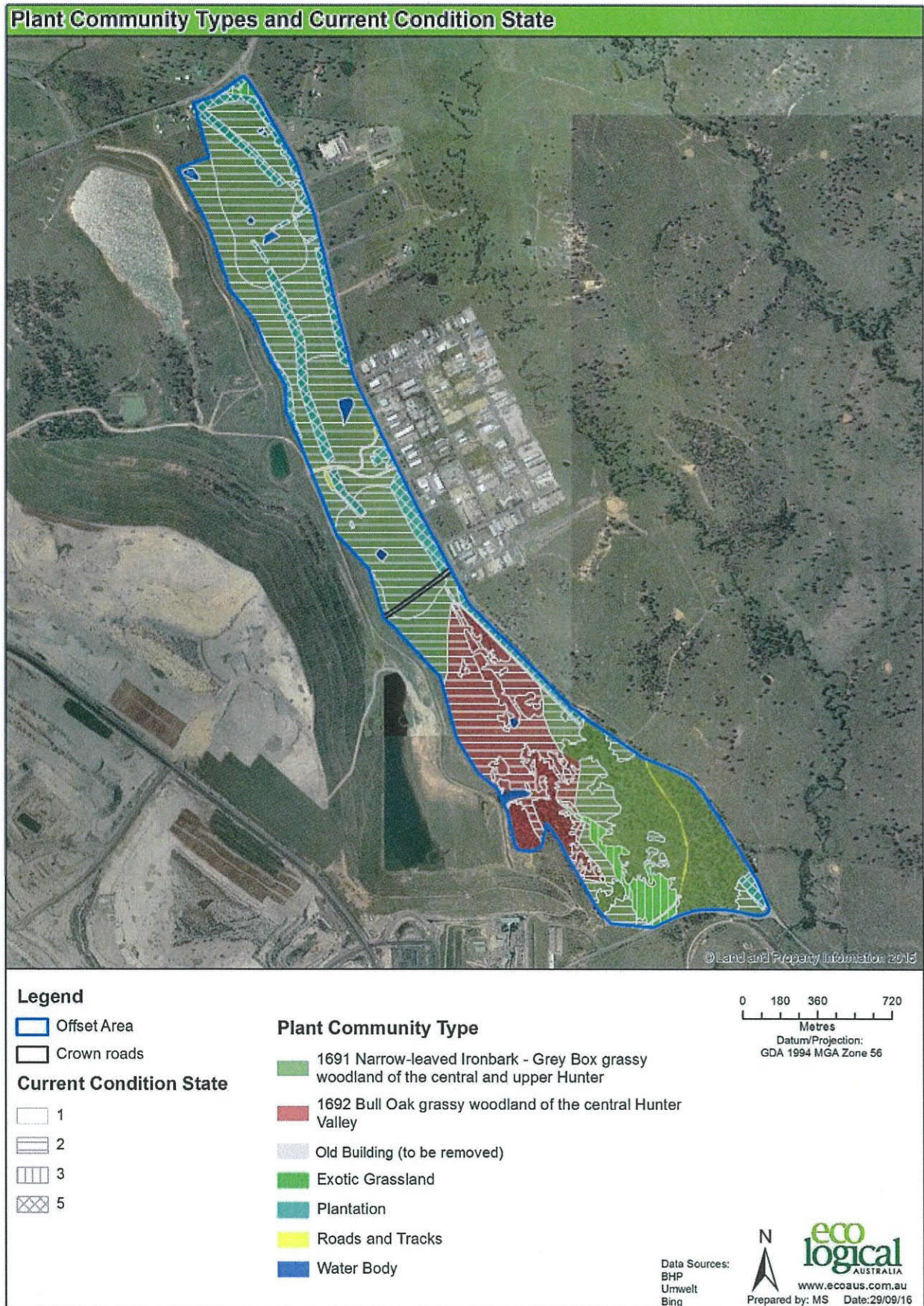
ANNEXURE B DIAGRAM B5 – THREATENED ECOLOGICAL COMMUNITIES (TSC ACT)



ANNEXURE B DIAGRAM B6 – THREATENED ECOLOGICAL COMMUNITIES (EPBC ACT)

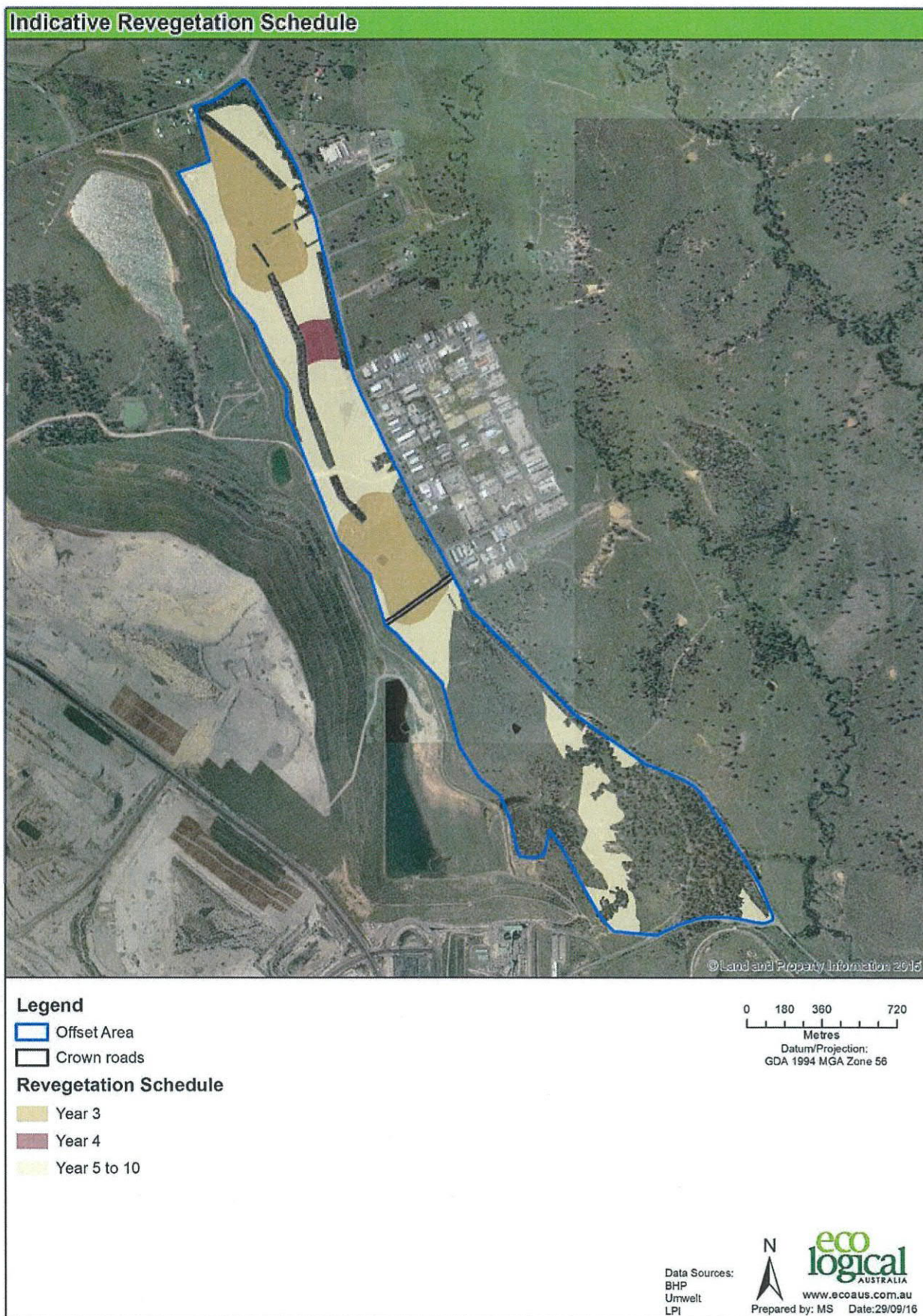


ANNEXURE B DIAGRAM B7 – CURRENT VEGETATION CONDITION



Note: State 1 = intact, State 2 = DNG, State 3 = exotic grassland, State 5 = plantation

ANNEXURE B DIAGRAM B8 – INDICATIVE REVEGETATION SCHEDULE



ANNEXURE B - PHOTO POINT PHOTOGRAPHS

Two photo points were established per vegetation type present on the conservation area, giving a total of four points. Four photos were taken at each point, oriented in each direction (north, east, south, west). GPS reference points are provided in **Annexure D Table 1**.

Photos are presented below.

TMON1 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG) with minimal remnant canopy (one Grey Box (*Eucalyptus moluccana*)). Dominant species include Barbed Wire Grass (*Cymbopogon refractus*), *Chloris* sp., *Bothriochloa* sp., *Aristida* sp. and *Panicum* sp.

Weed cover is low, consisting mainly of *Conyza* sp.



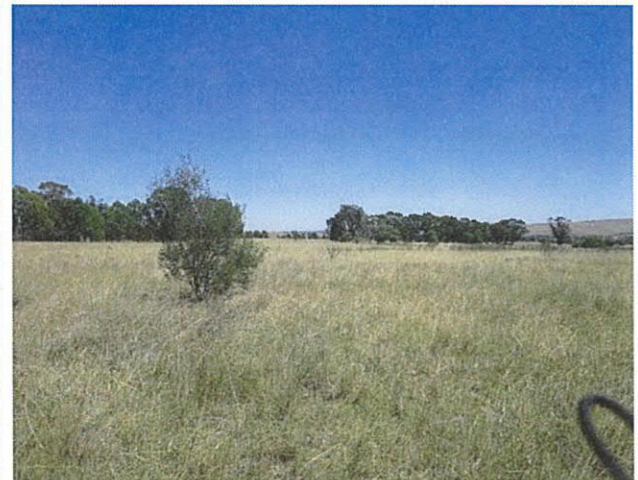
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TMON2 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Grey Box (*Eucalyptus moluccana*). Weed cover is low, consisting of Prickly Pear (*Opuntia* sp.) and *Conyza* sp.



N



E



S



W

TMON3 monitors an area of Bull Oak grassy woodland of the central Hunter Valley (DNG) with sparse Bulloak (*Allocasuarina luehmannii*) and some nearby Narrow-leaved Ironbark (*Eucalyptus crebra*). The ground layer is dominated by Barbed Wire Grass (*Cymbopogon refractus*), *Aristida* sp., and Common Everlasting (*Chrysocephalum apiculatum*).

Weed cover is low and includes Blue Heliotrope (*Heliotropium amplexicaule*).



N



E



S



W

TMOF4 monitors an area of Bull Oak grassy woodland of the central Hunter Valley dominated by Bulloak (*Allocasuarina luehmannii*).

Weed cover at the site is low, consisting mainly of *Galenia pubescens*, *Opuntia* sp. (Prickly Pear) and Tiger Pear (*Opuntia aurantiaca*).



N



E



S



W

Annexure C Management of the Conservation Area

Item 1: management aims and actions required to be undertaken for minimum period of 10 years.

Aim	Timing	Management action
Weed control across the Conservation Area (focusing on noxious and environmental weeds)	Year 1	Primary weed control: 480 hours bush regeneration by qualified bush regeneration contractor over 12 month period. Techniques specified in Annexure C Item 3 must be used.
	Years 2-5	Follow up weed control: 224 hours bush regeneration per year for years 2-5 Techniques specified in Annexure C Item 3 must be used.
	Years 6 – 10	Annual ongoing maintenance weed control: 80 hours annually for 5 years. Techniques specified in Annexure C Item 3 must be used.
	Years 2 to 10	Seed collection, propagation of tubestock, site preparation works and planting are to be undertaken in designated areas within the Conservation Area. If planted trees are defoliated by native or introduced species, tree guards will be installed. Plantings will be replaced if substantial mortalities occur within the first three years.
Pest animal monitoring and control (local co-ordination with Local Land Services and OEH)	Years 1-10	Pest animal control activities to be determined based on density and species of pest animals. Techniques specified in Annexure C Item 3 must be used.
Construct and maintain fire breaks and implement fire management hazard reduction burns. Operate with NSW Rural Fire Service or fire management contractor to implement mosaic or partial area hazard reduction burn.	Years 1-10. Liaise with RFS and NPWS regarding appropriate timing.	Implement 2 hazard reduction burns during low risk fire season according to guidelines specified in Annexure C Item 3.

Fencing	Years 2-10	Maintain fences as required. Replace 1/10 th of total length of fence every three years (beginning year 2). Techniques specified in Annexure C Item 3 must be used.
Annual Reports for Monitoring Program	Years 1-10	Annual reports to be prepared according to specifications in Annexure D Monitoring Program.
Threatened species, populations and endangered ecological communities (EEC)	Years 1-10	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.

Annexure C Management of the Conservation Area

Item 2: management actions required to be undertaken from year 11 onwards.

Issue	Management action
Exotic plants	The Owner must take reasonable measures in relation to the control of exotic plants. Techniques specified in Annexure C Item 3 must be used.
Pest animals	The Owner must take reasonable measures in relation to monitoring of pest animals. Techniques specified in Annexure C Item 3 must be used.
Threatened species, populations and endangered ecological communities (EEC)	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.
Managing visitor impacts (visitors include OEH inspectors; weed control contractors; fire maintenance contractors; NSW Rural Fire Service; fencing and maintenance contractors and the Owner)	The Owner must take reasonable measures to ensure that visitor disturbance to the Conservation Area is minimised by keeping visitors to tracks and trails except for management purposes and ensuring all visitor vehicles and equipment entering the Conservation Area are clean and free from weeds and/or seeds. Guidance specified in Annexure C Item 3 Visitation and research must be used.
Maintain vehicle access to Conservation Area for visitor management, fire management, weed and fencing management	The Owner must take reasonable measures to ensure that vehicle access is maintained by maintaining and repairing access trails as required. Techniques specified in Annexure C Item 3 must be used.
Monitoring and Reporting	The Owner must complete a monitoring report at least every 3 years as described in Clause 8 of the Conservation Agreement.
Livestock	The Owner must remove any livestock which have entered the Conservation Area as soon as practical.
Fencing	The Owner must take reasonable measures to construct and maintain fences along the boundaries of the Conservation Area where adjacent land use cause or are likely to cause adverse impacts on or in the Conservation Area. Techniques specified in Annexure C Item 3 must be used.

ANNEXURE C ITEM 3: PERMISSIONS AND GUIDELINES

Control of pest animals and non-indigenous fauna (in addition to pest animal control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- a) Participate in community pest animal control programs, and encourage neighbours to implement pest animal control programs. Contact your Local Land Services office or National Parks and Wildlife Service Area office to find out where community control programs are occurring.
- b) Methods for pest animal control can include; shooting, trapping and use of poisonous baits consistent with advice from OEH and Local Land Services. Use control methods identified as 'humane' as defined in the NSW Codes of Practice and Standard Operating Procedures for Humane Pest Vertebrate Control (Control Capture and Destruction of Feral Animals in Australia) as developed by the NSW Department of Primary Industries.
- c) Pest animal control activities to be determined based on density and species of pest animals. Methods for monitoring pest animal activity should include:
 - i) observations and/or hearing calls,
 - ii) the use of standard "sand plots",
 - iii) the use of non-poisoned "bait stations",
 - iv) scat counts, and
 - v) other quantitative techniques which can be designed in discussion with OEH or Local Land Services.

Control of weeds and exotic plants (in addition to weed control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- d) Apply a range of techniques including:
 - i) Removal of weeds by hand ensuring that all plant parts which can reproduce are removed and that soils do not become prone to erosion.
 - ii) Use of carefully selected herbicide according to label directions and/or current off label permit, ensuring minimal off target damage.
 - iii) Use of appropriate control measures as recommended in the Department of Primary Industries Noxious and Environmental Weed Control Handbook 6th Edition 2014 or equivalent replacements for control of weeds, ensuring minimal off target damage.
 - iv) Use of forestry mulching or slashing machinery only with prior written permission from OEH.
 - v) Ensure control programs are commenced when timing and extent of weed removal will minimise adverse effects on wildlife (weeds may provide protection or habitat for native fauna). Dense thickets of lantana should be removed gradually in mosaic patterns to minimise disturbance to the habitat of native animals.
 - vi) Other weed control methods may only be undertaken with prior written permission of OEH.
 - vii) Contact OEH if any uncertainty exists regarding weed control methods.

Cultural heritage

- e) Recording and management of any newly identified Aboriginal Objects or artefacts, in consultation with OEH (and the relevant local Aboriginal community where applicable).

Development

- f) Carrying out any development as described in the Conservation Agreement and maintaining development (including existing fire trails, access trails and infrastructure), with the following conditions:
- i) clear a corridor not greater than 3 metres wide during construction or for maintenance for the installation of fences or other agreed rural structures;
 - ii) move fallen timber and any other obstructions to maintain access trails, tracks and fences;
 - iii) where clearing is permitted under the Agreement and necessary, undertake all works in a manner that minimises disturbance to soil and hydrological characteristics.

Fencing, tracks and trails

- g) Construction and maintenance of all fences using wildlife friendly materials including plain wire (non-barbed) on top and bottom strands.
- h) Construction of any new internal fence, access track or trail only with prior written approval from OEH.
- i) Maintaining existing access walking tracks in the Conservation Area to a maximum width of 2m.
- j) Maintaining existing access vehicular trails in the Conservation Area to a maximum width of 4m with 1m either side permissible for clearing.
- k) Removal of old fences and closing of unwanted tracks within the Conservation Area and facilitate restoration of indigenous vegetation according to Annexure 3 Item 3 (points 'n' and 'o' over page).

Fire management (in addition to fire management actions in Item 1 of Annexure C to the Conservation Agreement)

- l) Using fire hazard reduction burns and controlled burning which take into account the recommended fire intervals given in the *Bush Fire Environmental Assessment Code for New South Wales* (Rural Fire Service February 2006) and the guidelines contained in the *Threatened Species Hazard Reduction Lists for the Bush Fire Environmental Assessment Code* or equivalent replacements.

Current recommendations are:

- i) minimum fire intervals of:
 - 8 year fire interval for Narrow-leaved Ironbark - Grey Box grassy woodland (PCT 1691)
 - 8 year fire interval for Bull Oak grassy woodland of the central Hunter Valley (PCT 1692)
- ii) wherever possible canopy or crown fires should be avoided.
- iii) wherever possible no more than 50% of the Conservation Area should be burnt in any twelve month period.
- iv) both live and dead trees with hollows should be protected from burning as far as practicable in order to preserve nesting habitat for hollow dwelling animals.
- m) Lighting a fire, or causing a fire to be lit on the Conservation Area if it complies with the *Rural Fires Act 1997* (NSW), and:
 - i) the lighting of the fire is a necessary component of bush fire hazard reduction work carried out in accordance with a notice served on the Owner under the Rural Fires Act 1997 (NSW) or other applicable legislation; or
 - ii) life or property is in immediate threat by bush fire and the lighting of the fire is reasonably necessary to protect life or property; or

- iii) the fire is a camp fire, subject to the compliance with the Rural Fires Act 1997 (NSW), or
- iv) the Chief-Executive gives prior written consent to the lighting of the fire.

Restoration of indigenous vegetation

- n) Restoration of native vegetation on the Conservation Area using a preferred method of encouraging and retaining natural regeneration. Preferred methods include:
 - i) bush regeneration
 - ii) brush mulching; and/or
 - iii) direct seeding.
- o) Revegetation to establish indigenous plants to maintain the vegetation structure in keeping with the identified vegetation community, using species produced from material sourced locally and without fertilisers, where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion.

Seed collection

- p) Collection of seed on the Conservation Area for non-commercial use in accordance with Guidelines and Codes of Practice developed by Florabank (www.florabank.org.au), or subsequent equivalent and with the following limitations and permissions:
 - i) Collect seed in the Conservation Area only if seed of the particular species and genotype is not available elsewhere, or if the seed collected is intended for seedlings that will be planted within the Conservation Area or adjacent to the Conservation Area.
 - ii) Seeds may be collected from within endangered ecological communities.
 - iii) Seeds may not be collected from species individually listed in Schedules 1, 1A or 2 to the TSC Act without prior written approval from the Chief-Executive, or under a licence granted under section 132C of the NPW Act or section 91 of the TSC Act.
 - iv) Seeds may be collected from any protected species listed in Schedule 13 to the NPW Act.
 - v) Seeds may be collected from any other native species.

Thinning of indigenous vegetation

- q) Thinning of regenerating indigenous species which are altering the structure of the vegetation in the Conservation Area and/or reducing the Conservation Values only with prior written approval from the Chief-Executive OEH.

Threatened species

- r) Implementing any measures included in recovery plans for any threatened species, population or ecological communities which are or may be found in the Conservation Area.
- s) Implementing other specific management advice from OEH for any threatened species, populations or ecological communities which are or may be found in the Conservation Area.

Use of timber

- t) Harvesting of fallen non-hollow wood in amounts necessary for heating the Owner's dwelling on the Land and camp fires on the Conservation Area.

Visitation and research (in addition to management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- u) Visitation, research and community use at a level that does not adversely impact on the Conservation Values or the amenity of the Owner. Research projects must be first discussed with OEH before being carried out.

ANNEXURE D - MONITORING PROGRAM

(a) The Owner must engage a suitably qualified person (such as an ecologist) to undertake a monitoring event in each year, beginning in 2018 (Monitoring Event).

(b) Each Monitoring Event must include:

i) **photo monitoring** - four photos are required to be taken at each of the four established monitoring points shown in **Annexure B**. Photos must be taken from the exact location and bearing to allow subsequent comparison and assessment. Photo point locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Baseline photographs are provided in Annexure A to the Conservation Agreement. Photo monitoring must include the collection of at least the top five canopy, shrub-layer and groundcover species and the recording of any threats. The frequency of monitoring activities will be targeted by site type:

- i. Reference sites are to be monitored biennially commencing 2018
- ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)

ii) **quadrat monitoring** – quadrat data must be collected at each of the four photo points above. Quadrat locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Results must be compared to baseline and benchmark quadrat data which is provided in **Tables 1** and **2** of Annexure D to the Conservation Agreement **below**. For active regeneration sites, data will also be collected on the survivorship and health of planted species so as to identify those which are best suited for future regeneration efforts within the same vegetation community.

- i. Reference sites are to be monitored biennially commencing 2018
- ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)

iii) **a walk through assessment** to record opportunistic sightings within the Conservation Area including:

- i. fire events or impacts of fire management
- ii. weeds (including compiling a list of exotic species and recording new weed infestations including location and extent)
- iii. pest animals (species and location must be recorded, including evidence of pest animals such as burrows, scats or disturbance)
- iv. visitor impact and vehicle access (including evidence of any recent usage, and the presence of any new access tracks)
- v. rubbish dumping
- vi. natural regeneration of previously disturbed areas; and
- vii. sightings of threatened species. Voucher specimens of potential threatened plants will be taken where doing so will not adversely affect the local population, and sent to a recognised museum or herbarium for identification.

(c) After each Monitoring Event, the Owner must produce a monitoring report on the Conservation Area by 30 December of each year, beginning in 2018 (Monitoring Report).

The Monitoring Report must include:

- i. a description of all completed management actions undertaken in the previous 12 month period;
- ii. total cost of all works completed in undertaking the management actions listed in items 1 and 2 of Annexure C to the Conservation Agreement;
- iii. completed monitoring data sheets (including photographs) using the template provided in **Table 3** of Annexure D to the Conservation Agreement (**below**);

- iv. a discussion of the changes recorded at monitoring points and quadrats;
- v. a summary of quadrat data for each photo point;
- vi. a discussion of the condition of Conservation Values;
- vii. a discussion of effectiveness of any management actions implemented; and
- viii. recommendations and proposed management actions to be performed in following year(s).

The Monitoring Report must be submitted to OEH within **21 days** of it being received by the Owner.

- (d) The Monitoring Event and the Monitoring Report comprise the monitoring program (Monitoring Program). The Owner must complete the Monitoring Program to the satisfaction of OEH, for a minimum period of 10 years from the date of the Conservation Agreement.

ANNEXURE D TABLE 1 - MONITORING POINT LOCATIONS AND CORRESPONDING VEGETATION COMMUNITIES REPRESENTED AS AT FEBRUARY 2016

Photo Point / Quadrat No.	Easting/Northing GDA 94 MGA 56	Vegetation Community Represented
TMON1	299666, 6424256	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG)
TMON2	301503, 6421602	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
TMON3	300550, 6422079	1692 Bull Oak grassy woodland of the central Hunter Valley (DNG)
TMON4	300885, 6421637	1692 Bull Oak grassy woodland of the central Hunter Valley

ANNEXURE D TABLE 2 – BIOMETRIC VEGETATION TYPE BENCHMARKS AND BASELINE QUADRAT SCORES AS AT FEBRUARY 2016

Photo Point / Quadrat no.	Native species richness	Overstorey cover %pfc	Mid-storey cover %pfc	Ground cover – grasses %pfc	Ground cover – shrubs %pfc	Ground cover – other %pfc	Proportion overstorey regen.	Exotic cover	Number of Trees with Hollows	Total length of fallen logs
1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
TMON1	29	1	3	14.5	12.5	81	0.5	5	TBC	TBC
TMON2	28	1	3	4	2	70.5	1	14	TBC	TBC
1692 Bull Oak grassy woodland of the central Hunter Valley										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
TMON3	19	0	3	1	1	72	0.5	3	TBC	TBC
TMON4	18	0	0	36	0	16.5	1	0	TBC	TBC

Comprehensive baseline biodiversity studies of the Conservation Area were undertaken in 2013. During these studies, vegetation condition data was collected at most photo point locations. A modified 6-point Braun-Blanquet scale was used to estimate cover-abundances of all plant species. To develop baseline biometric quadrat data, this scale was modified as follows - all 1's (few individuals <5% cover) were removed due to low cover, 2's (Many individuals <5%) were converted to an assumed 1% total cover and then the midpoints of the remaining classes adopted (i.e. 12.5%, 35%, 62.5% and 87.5%).

The proportion of overstorey regeneration was inferred from the current condition class at each photo point i.e. Class 1 (remnant) was given a score of '1', Class 2 (derived native grassland EEC) was given a score of '0.5' and Class 3 was given a score of '0'.

Where photo monitoring points were not directly located at an existing baseline study site, the nearest baseline site, or a baseline site within the same PCT was selected. Biometric data (including number of trees with hollows and total length of fallen logs) will be collected and reviewed at each photo point during subsequent years monitoring. Note that care must be taken when interpreting baseline Braun-Blanquet cover-abundance data against future biometric data, due to slight differences in the methodology used for estimating vegetation cover.

Middle Deep Creek and Oakvale Offset Conservation Area

Lodgement number: C923341

Commencement date: 16 December 2016

ANNEXURE B - CONSERVATION VALUES

1. CONSERVATION VALUES

The Owner and the Minister recognise that the Conservation Area contains the following conservation values:

A The Conservation Area contains three biometric communities:

- Silvertop Stringybark - Rough-barked Apple - Bundy open forest of the Liverpool Ranges and Northern Tablelands escarpment
- Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
- White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley

Silvertop Stringybark - Rough-barked Apple - Bundy open forest of the Liverpool Ranges and Northern Tablelands escarpment (PCT 1684)

This community occurs on steep slopes of shallow soils in the western corner of the Middle Deep Creek property, and on the upper south and south-east facing slopes in the western portion of the Oakvale property.

The community is dominated by a sparse to mid-dense canopy of Silver-top Stringybark (*Eucalyptus laevopinea*) and in the western extent a high proportion of Bundy (*Eucalyptus nortonii*); There are also occurrences of Rough-barked Apple (*Angophora floribunda*) and White Box/Grey box intergrade (*Eucalyptus albens* <-> *moluccana*) throughout this community. The canopy ranges between 15 to 20 metres in height.

The community supports a very sparse to mid-dense shrub layer, between 1 to 2.5 metres in height. The dominant species include Blackthorn (*Bursaria spinosa*), Velvet Mock Olive (*Notelaea microcarpa* var. *microcarpa*), Sticky Daisy Bush (*Olearia elliptica* subsp. *elliptica*), *Cassinia quinquefaria*, and Smooth Darling Pea (*Swainsona galegifolia*).

The understorey is characterised by a mid-dense to dense groundcover of native grasses and forbs between 0.5 to 1 metre in height. Common grasses include Snowgrass (*Poa sieberiana*), Wild Sorghum (*Sorghum leiocladum*), Barbed Wire Grass (*Cymbopogon refractus*), Purple Wiregrass (*Aristida ramosa*), Wild Sorghum (*Sorghum leiocladum*), Red Grass (*Bothriochloa macra*) and *Rytidosperma racemosa* var. *racemosa*. Frequently recorded forbs include Shade Plantain (*Plantago debilis*), Native Geranium (*Geranium solanderi* var. *solanderi*), Pale Vanilla Lily (*Arthropodium milleflorum*), *Acaena* sp., *Galium leptogonium*, Native Carrot (*Daucus glochidiatus*), Wattle Mat-rush (*Lomandra filiformis*), *Glycine tabacina* and Kidney Weed (*Dichondra repens*).

This community is not consistent with any listed TEC under the TSC Act or EPBC Act.

Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion (PCCT 281)

This community occurs along the main drainage line flowing west to east through the centre of the Conservation Area. On the upstream areas of the drainage line within the Oakvale property, the community is characterised by a mid - dense canopy dominated by Rough-barked Apple (*Angophora floribunda*) and Silver-top Stringybark (*Eucalyptus laevopinea*), 20 to 25 metres in height. White Box/Grey box intergrade (*Eucalyptus albens* <-> *moluccana*) is also occasionally present.

Downstream, on the fertile alluvial soils on lower slopes of the Oakvale property and the lower slopes of the Middle Deep Creek property, the community is characterised by a sparse tall canopy of the Blakely's Red Gum/Forest Red Gum intergrade (*Eucalyptus blakelyi* <-> *E. tereticornis*) and Yellow Box (*Eucalyptus melliodora*), 12 to 28 metres in height. Other canopy species include White Box/Grey Box intergrade (*Eucalyptus albens* <-> *moluccana*) and Rough-barked Apple (*Angophora floribunda*).

A very sparse mid-storey 4 to 8 metres in height may be present, comprising Hickory Wattle (*Acacia implexa*) and regenerating eucalypt species. The shrub layer is typically very sparse to sparse, ranging from 1 to 2 metres in height. Common shrubs may include Kangaroo Thorn (*Acacia paradoxa*), Velvet Mock Olive (*Notelaea microcarpa* var. *microcarpa*), *Cassinia quinquefaria*, Native Blackthorn (*Bursaria spinosa* subsp. *spinosa*) and Smooth Darling Pea (*Swainsona galegifolia*).

The understorey of this community is characterised by a dense groundcover dominated by native grasses, forbs and ferns. Dominant grasses include Snowgrass (*Poa sieberiana*), Tussock (*Poa labillardieri* var. *labillardieri*), Purple Wiregrass (*Aristida ramosa*), *Rytidosperma racemosa* var. *racemosa*, Slender Bamboo Grass (*Austrostipa verticillata*), Pitted Blue Grass (*Bothriochloa decipiens* var. *decipiens*), *Rytidosperma laeve*, Spear Grass (*Austrostipa scabra* subsp. *falcata*), *Rytidosperma racemosa* var. *racemosa*, and Windmill Grass (*Chloris truncata*). Common fern species include Common Maidenhair (*Adiantum aethiopicum*) and Sickie Fern (*Pellaea falcata*). Frequently recorded forbs include Native Geranium (*Geranium solanderi* var. *solanderi*), *Carex inversa*, Native Carrot (*Daucus glochidiatus*), Indian Weed (*Sigesbeckia orientalis*) and Kidney Weed (*Dichondra repens*), *Acaena* sp., Winter Apple (*Eremophila debilis*), *Minuria leptophylla*, Yellow Autumn-lily (*Tricoryne elatior*), Corrugated Sida (*Sida corrugata*), Sprawling Bluebell (*Wahlenbergia gracilis*), Creeping Mint (*Mentha satuireioides*), Nodding Chocolate-lily (*Dichopogon fimbriatus*), *Oxalis exilis*, Climbing Saltbush (*Einadia nutans*), Stinging Nettle (*Urtica incisa*), and *Glycine tabacina*. Common vines include Wonga Wonga Vine (*Pandorea pandorana* subsp. *pandorana*), Native Raspberry (*Rubus parviflorus*) and Wombat Berry (*Eustrephus latifolius*).

This community is consistent with the EEC White Box - Yellow Box - Blakely's Red Gum Woodland listed under the TSC Act, and the CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act.

This community corresponds with the Final Determination of White Box - Yellow Box - Blakely's Red Gum Woodland EEC (NSW Scientific Committee 2011) with regard to the following attributes:

- The community occurs within the NSW Sydney Basin Bioregion;
- It supports a canopy dominated by the characteristic species Yellow Box (*Eucalyptus melliodora*) and Blakely's Red Gum/Forest Red Gum intergrade (*Eucalyptus blakelyi* <-> *tereticornis*);
- It supports a predominantly native understorey; and
- It supports a moderate to high proportion of species that are in the list of characteristic species for the EEC (18 out of 43 (42 per cent)).

This vegetation community is consistent with the *White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland* CEEC (EPBC Act) for the following reasons:

- The community occurs within the NSW Sydney Basin Bioregion as listed in the Commonwealth Listing Advice (TSSC 2006);
- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus*

meliiodora), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;

- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectares or greater in size;
- All patches contain at least one 'important species' (DEH 2006b). Common important species include *Glycine tabacina*, Corrugated Sida (*Sida corrugata*), Nodding Chocolate Lily (*Dichopogon fimbriatus*), Pale Vanilla Lily (*Arthropodium milleflorum*) and Common Woodruff (*Asperula conferta*);
- The species composition is consistent with the Commonwealth Listing Advice (TSSC 2006) and associated species list (DEH 2006b); and
- All patches contain at least 12 native understorey species (excluding grasses).

White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (PCT618)

White Box - Blakely's Red Gum Grassy Woodland occurs on the upper to lower slopes across most of Oakvale property and is widely distributed across the Middle Deep Creek property, with the exception of the north-western portion of the property. This community is characterised by a sparse canopy of White Box/Grey Box intergrade (*Eucalyptus albens* <-> *moluccana*) and Blakely's Red Gum/Forest Red Gum intergrade (*Eucalyptus blakelyi* <-> *tereticornis*), 15 to 20 metres in height. Rough-barked Apple (*Angophora floribunda*) also occurs occasionally, particularly in minor drainage lines.

The community supports a very sparse to sparse shrub layer, between 1 to 2.5 metres in height. The dominant species include Blackthorn (*Bursaria spinosa*), Velvet Mock Olive (*Notelaea microcarpa* var. *microcarpa*), *Cassinia quinquefaria*, Sticky Daisy Bush (*Olearia elliptica* subsp. *elliptica*), Urn Heath (*Melichrus urceolatus*), Smooth Darling Pea (*Swainsona galegifolia*) and Broom Bitter Pea (*Daviesia genistifolia*).

The understorey is characterised by a mid-dense to dense groundcover of native grasses and forbs generally less than 1 metre in height. Dominant species include Purple Wiregrass (*Aristida ramosa*), Red Grass (*Bothriochloa macra*), Barbed Wire Grass (*Cymbopogon refractus*), Wild Sorghum (*Sorghum leiocladum*), Kangaroo Grass (*Themeda australis*), *Rytidosperma racemosum* subsp. *racemosum*. Common forbs include Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), Native Carrot (*Daucus glochidiatus*), Pale Vanilla Lily (*Arthropodium milleflorum*), Wattle Mat-rush (*Lomandra filiformis*), Kidney Weed (*Dichondra repens*), Stinking Pennywort (*Hydrocotyle laxiflora*), *Glycine tabacina*, Common Woodruff (*Asperula conferta*), Cobbler's Tack (*Glossocardia bidens*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*) and Large Tick-trefoil (*Desmodium brachypodium*).

This community is consistent with the EEC White Box - Yellow Box - Blakely's Red Gum Woodland listed under the TSC Act, and the CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act.

The community corresponds with the Final Determination of White Box - Yellow Box - Blakely's Red Gum Woodland EEC (NSW Scientific Committee 2011) with regard to the following attributes:

- The community occurs within the NSW Sydney Basin Bioregion;

- It supports a canopy dominated by the characteristic species White Box/Grey Box intergrade (*Eucalyptus albens* <-> *moluccana*) and Blakely's Red Gum/Forest Red Gum intergrade (*Eucalyptus blakelyi* <-> *tereticornis*);
- It supports a predominantly native understorey; and
- It supports a moderate to high proportion of species that are in the list of characteristic species for the EEC (27 out of 65 (42 per cent)).

This vegetation community is consistent with the *White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland* CEEC (EPBC Act) for the following reasons:

- The community occurs within the NSW Sydney Basin Bioregion as listed in the Commonwealth Listing Advice (TSSC 2006);
- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;
- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectares or greater in size;
- All patches contain at least one 'important species' (DEH 2006b). Common important species include *Glycine tabacina*, Corrugated Sida (*Sida corrugata*), Nodding Chocolate Lily (*Dichopogon fimbriatus*), Pale Vanilla Lily (*Arthropodium milleflorum*) and Common Woodruff (*Asperula conferta*);
- The species composition is consistent with the Commonwealth Listing Advice (TSSC 2006) and associated species list (DEH 2006b); and
- All patches contain at least 12 native understorey species (excluding grasses).

Table 1 shows the area of each plant community type by condition state (see also Diagram B6).

Table 1: Plant community types present in the Conservation Area

PCT code	Plant community type (PCT)	Condition	Area (ha)
1684	Silvertop Stringybark - Rough-barked Apple - Bundy open forest of the Liverpool Ranges and Northern Tablelands escarpment	Intact	87.68
		DNG	11.86
281	Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Intact	92.22
		DNG	16.25
618	White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley	Intact	553.16
		DNG	490.44
TOTAL		1,251.62	

B The Conservation Area contains the following threatened fauna species (and refer to **Table 3 Annexure B** and **Diagram B4**):

- *Chthonicola sagittata* (Speckled Warbler) (Vulnerable (V) – TSC Act);
- *Climacteris picumnus victoriae* (Brown Treecreeper (eastern subspecies)) (V – TSC Act);
- *Falco subniger* (Black Falcon) (Vulnerable (V) – TSC Act);
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) (V – TSC Act);
- *Glossopsitta pusilla* (Little Lorikeet) (V – TSC Act).
- *Melanodryas cucullata* (Hooded Robin) (V – TSC Act);
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat) (V – TSC Act);
- *Myotis macropus* (Large-footed Myotis) (V – TSC Act);
- *Petaurus norfolcensis* (Squirrel Glider) (V – TSC Act);
- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler (eastern subspecies)) (V – TSC Act).
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat) (V – TSC Act);
- *Stagonopleura guttata* (Diamond Firetail) (V – TSC Act);
- *Vespadelus troungtoni* (Eastern Cave Bat) (V – TSC Act).

The following EPBC-listed migratory species have been recorded within the Conservation Area:

- *Merops ornatus* (Rainbow Bee-Eater)
- *Hirundapus caudacutus* (White-throated Needletail).

The Conservation Area also contains the following threatened flora:

- *Picris evae* (Hawkweed) which is listed as vulnerable under the TSC Act and EPBC Act
- *Cymbidium canaliculatum* endangered population in the Hunter Catchment (E – TSC Act).

One Endangered Ecological Community is present in the Conservation Area (see **Diagram B5**):

- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EEC – TSC Act, CEEC – EPBC Act)

As shown in **Table 2**, 1,102 ha of the vegetation present on the Conservation Area corresponds to listed threatened ecological communities under the TSC and / or EPBC Act. These are shown by condition state and listing status.

Table 2: Threatened ecological communities present in the Conservation Area

Threatened ecological community	Condition	TSC listed (ha)	EPBC listed (ha)
White Box - Yellow Box - Blakely's Red Gum Woodland (TSC Act) / White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)	Intact	645.38	645.38
	DNG	456.16	456.16
Total		1,101.54	1,101.54

- C The Conservation Area is part of a large area of similarly positioned woodlands that extend to the north, west and south in excess of 10 kilometres. The woodland of the Conservation Area provides habitat and vegetated connectivity for woodland species moving throughout the local landscape.

The Conservation Area is located on the eastern edge of a large scale vegetation corridor which runs along the Great Dividing Range. On a broad scale, this corridor connects the Liverpool Ranges to the north with Wollemi and Yengo National Parks to the south and Barrington Tops National Park to the east. The Conservation Area is broadly connected to Wallabadah Nature Reserve to the north, Camerons Gorge Nature Reserve to the south and Towarri National Park to the south west.

The Conservation Area falls within the Hunter Valley section of the Great Eastern Ranges Initiative. The Great Eastern Ranges Initiative aims to maintain and improve the 'corridor' connectivity of mountain ecosystems running the length of eastern Australia. The focal area of the Initiative includes the Great Dividing Range and the Great Escarpment of Eastern Australia which extend along the majority of Australia's east coast. The corridor includes un-fragmented natural ecosystems along extensive sections of these two major geomorphic structures.

The Hunter Valley has been identified as one of the five priority areas along the ranges and is considered to be the most diverse and complex in regards to its biodiversity and connectivity and its social and economic factors. The Hunter Valley represents a significant east-west linkage of natural vegetation in the Great Eastern Ranges, with the potential for north-south 'stepping stones' of vegetation such as this Conservation Area to allow species movement and improve connectivity across areas of the Hunter Valley that have been historically cleared and/ or grazed.

- D The Conservation Area is likely to contain Aboriginal heritage values; however, no detailed studies have been undertaken.

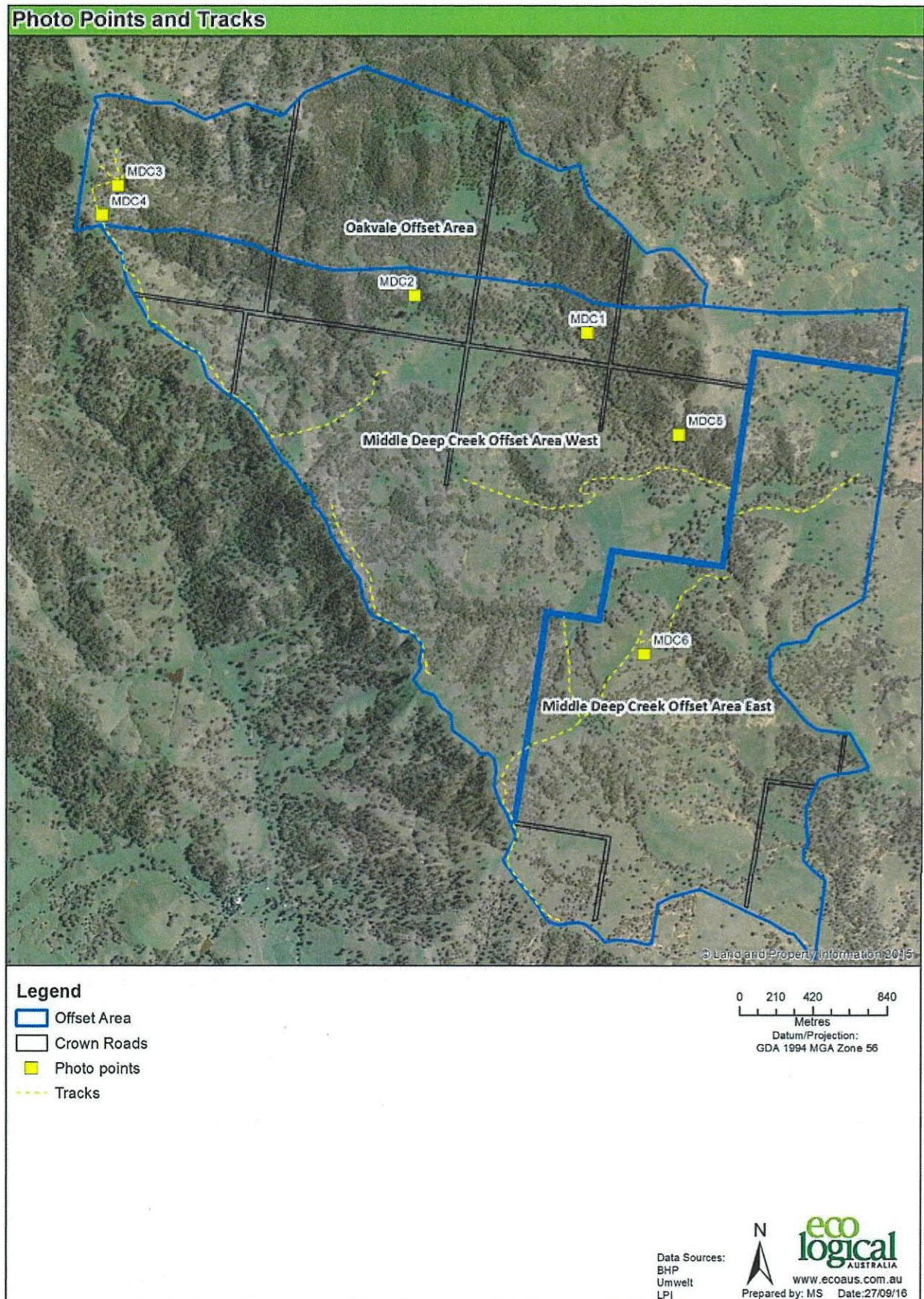
ANNEXURE B TABLE 3 Threatened species found within 20 km radius of site which may occur within the Conservation Area due to the presence of suitable habitat (search conducted March 2016).

Common Name	Scientific Name	TSC Act listing	EPBC Act Listing	Confirmed on site Y/N
Birds				
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE, M	N
Cattle Egret	<i>Ardea ibis</i>		M	N
Glossy Black-cockatoo	<i>Calyptorhynchus lathami</i>	V		N
Speckled Warbler	<i>Chthonicola sagittata</i>	V		Y
Spotted Harrier	<i>Circus assimilis</i>	V		N
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	V		Y
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V		N
Black Falcon	<i>Falco subniger</i>	V		Y
Little Lorikeet	<i>Glossopsitta pusilla</i>	V		Y
Painted Honeyeater	<i>Grantiella picta</i>	V	V	N
Little Eagle	<i>Hieraaetus morphnoides</i>	V		N
White-throated Needletail	<i>Hirundapus caudacutus</i>		M	Y
Swift Parrot	<i>Lathamus discolor</i>	E	CE, M	N
Hooded Robin (South-Eastern Form)	<i>Melanodryas cucullata cucullata</i>	V		Y
Black-chinned Honeyeater (Eastern Subspecies)	<i>Melithreptus gularis gularis</i>	V		N
Rainbow Bee-eater	<i>Merops ornatus</i>		M	Y
Black-faced Monarch	<i>Monarcha melanopsis</i>		M	N
Satin Flycatcher	<i>Myiagra cyanoleuca</i>		M	N
Turquoise Parrot	<i>Neophema pulchella</i>	V		N
Powerful Owl	<i>Ninox strenua</i>	V		N
Flame Robin	<i>Petroica phoenicea</i>	V		N
Scarlet Robin	<i>Petroica boodang</i>	V		N
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	V		Y
Rufous Fantail	<i>Rhipidura rufifrons</i>		M	N
Diamond Firetail	<i>Stagonopleura guttata</i>	V		Y
Masked Owl	<i>Tyto novaehollandiae</i>	V		N
Mammals				
Koala	<i>Phascolarctos cinereus</i>	V	V	N
Grey-Headed Flying-Fox	<i>Pteropus poliocephalus</i>	V	V	N
Large-Eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	N
Spotted-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	V	E	N
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V		Y

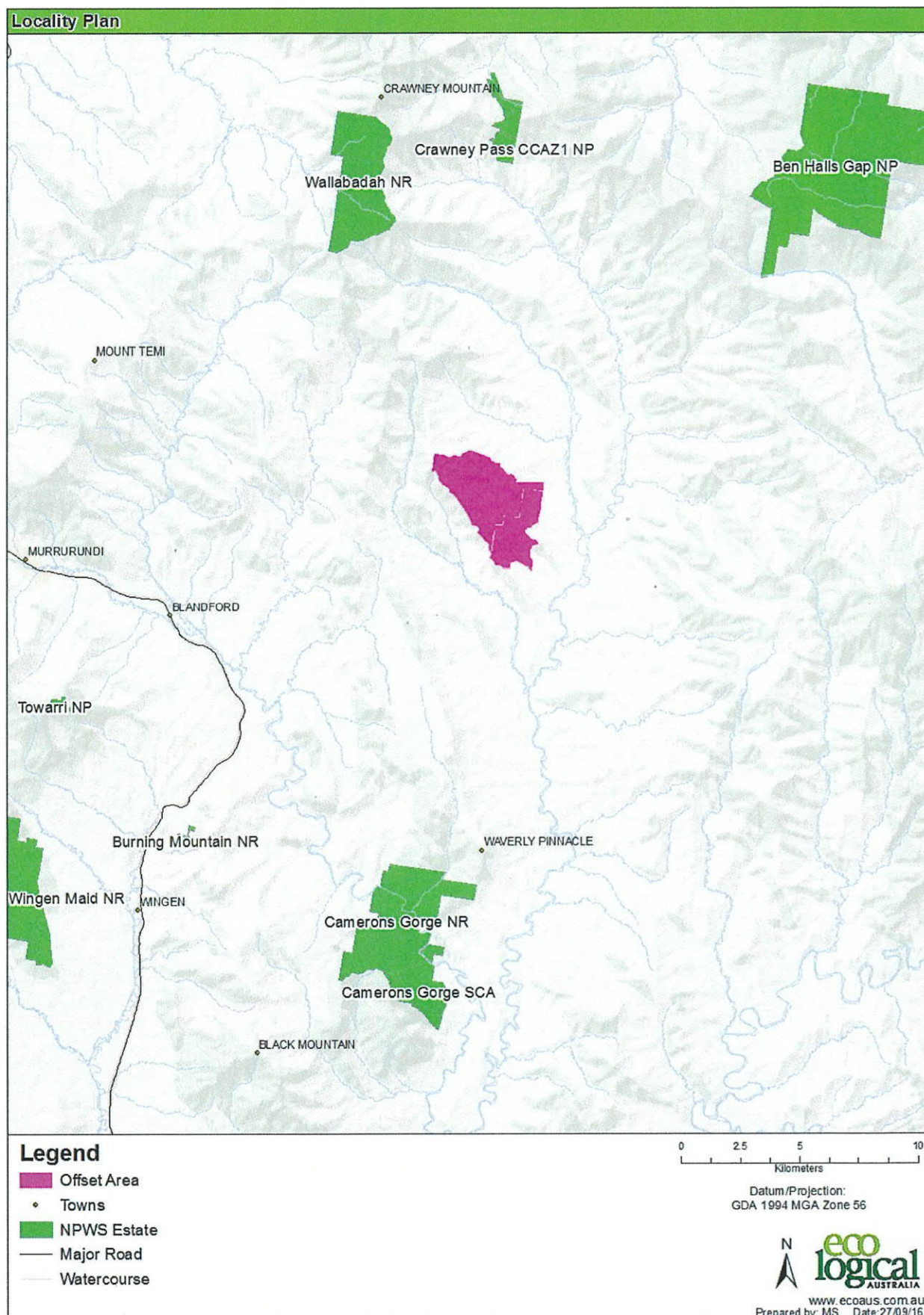
Common Name	Scientific Name	TSC Act listing	EPBC Act Listing	Confirmed on site Y/N
Little Bentwing-bat	<i>Miniopterus australis</i>	V		N
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V		Y
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	V		N
Southern Myotis	<i>Myotis macropus</i>	V		Y
South-eastern Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	N
Squirrel Glider	<i>Petaurus norfolcensis</i>	V		Y
Koala	<i>Phascolarctos cinereus</i>	V	V	N
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V		Y
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V		N
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		Y
Flora				
Barrington Tops Ant Orchid	<i>Chiloglottis platyptera</i>	V		N
<i>Cymbidium canaliculatum</i> population in the Hunter Catchment	<i>Cymbidium canaliculatum</i> - endangered population	E2		Y
Bluegrass	<i>Dichanthium setosum</i>	V	V	N
Hawkweed	<i>Picris evae</i>	V	V	Y
Leek Orchid	<i>Prasophyllum petilum</i>	E	E	N
Austral Toadflax	<i>Thesium australe</i>	V	V	N
Ecological Communities				
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland		EEC	CEEC	Y

V= Vulnerable, E= Endangered, CE= Critically Endangered, M= Migratory, Mar= Marine, E2= Endangered Population, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

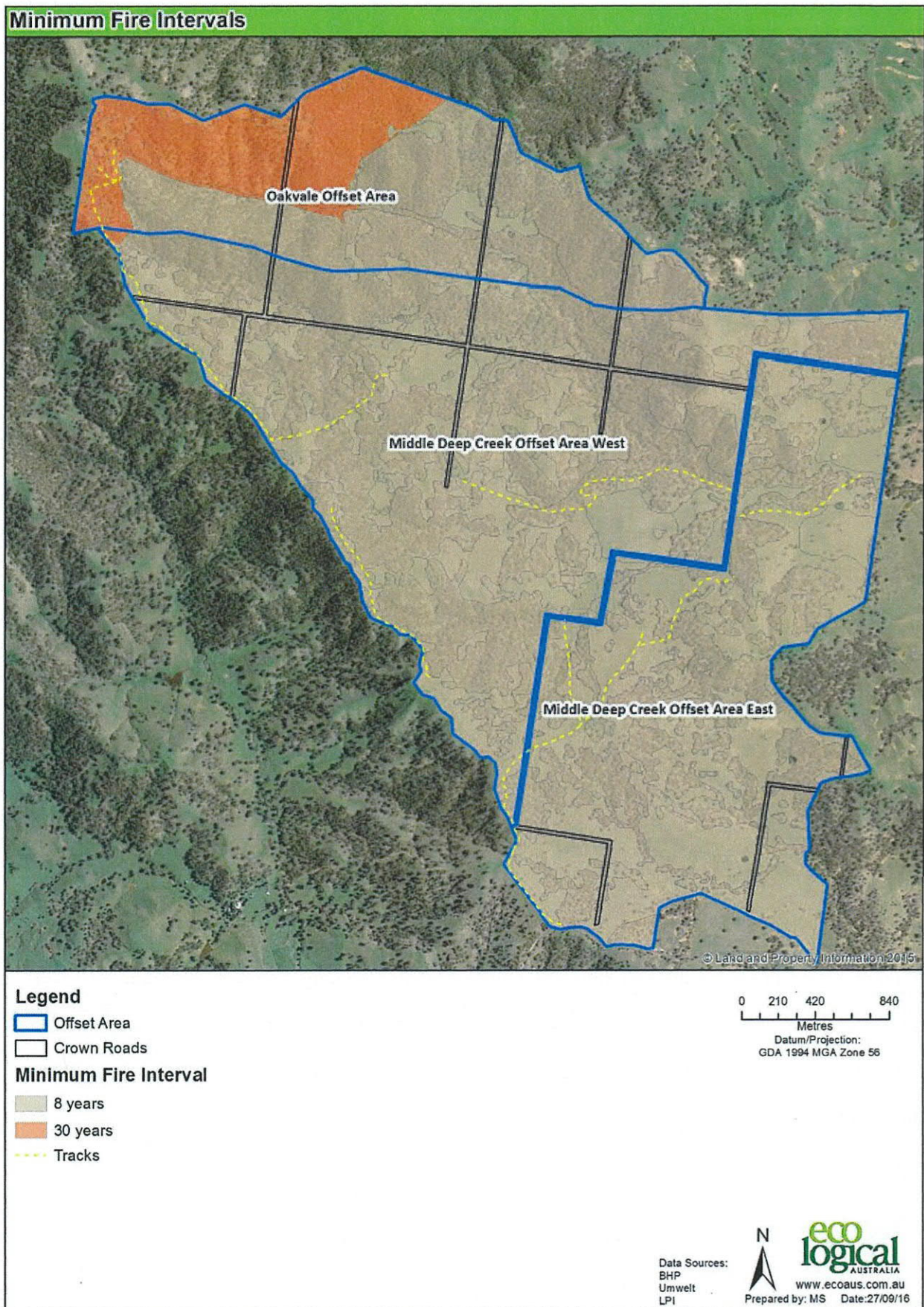
ANNEXURE B DIAGRAM B1 - LOCATION OF BIOMETRIC PLOTS AND PHOTO POINTS



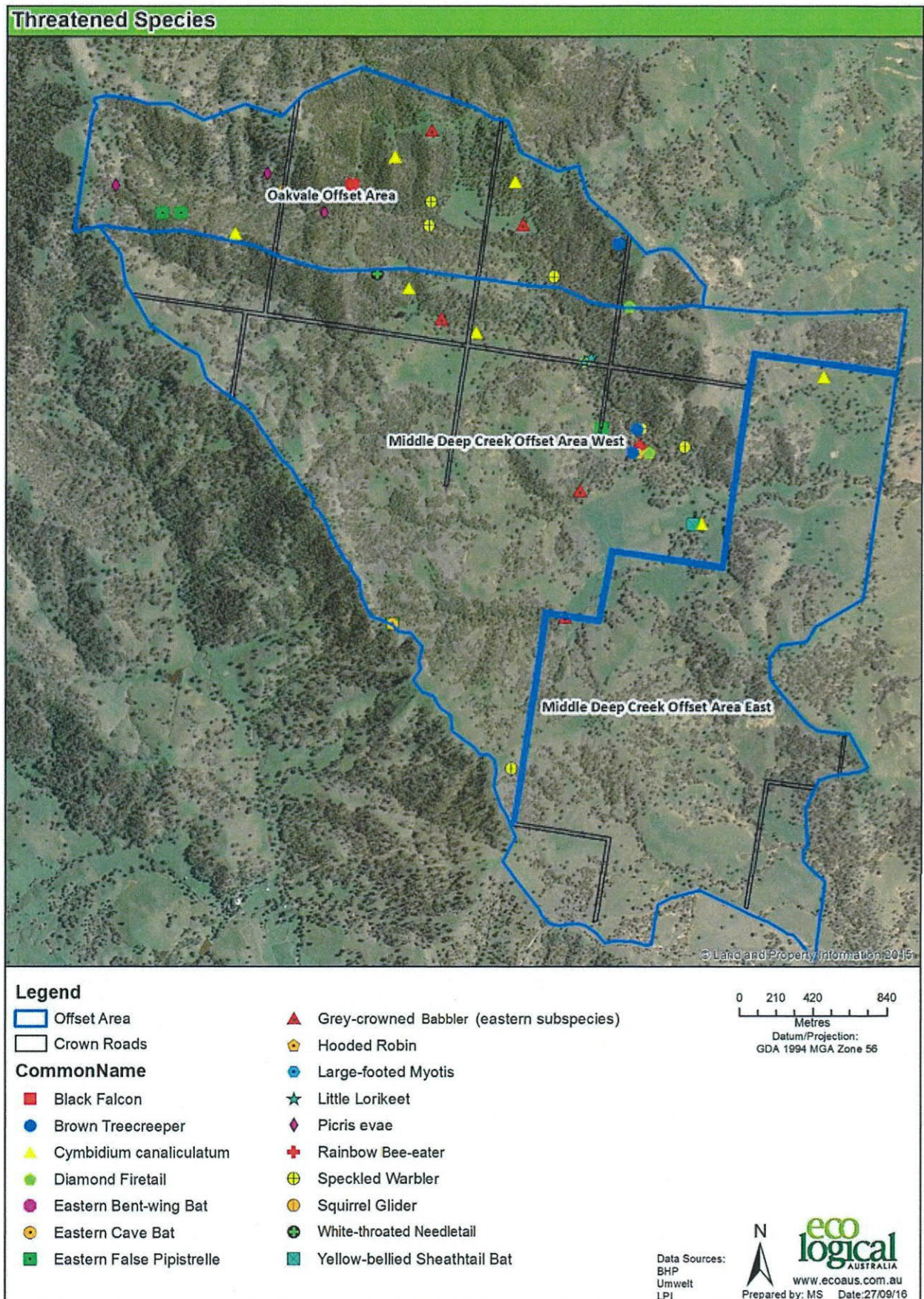
ANNEXURE B DIAGRAM B2 – REGIONAL CONTEXT OF THE SITE



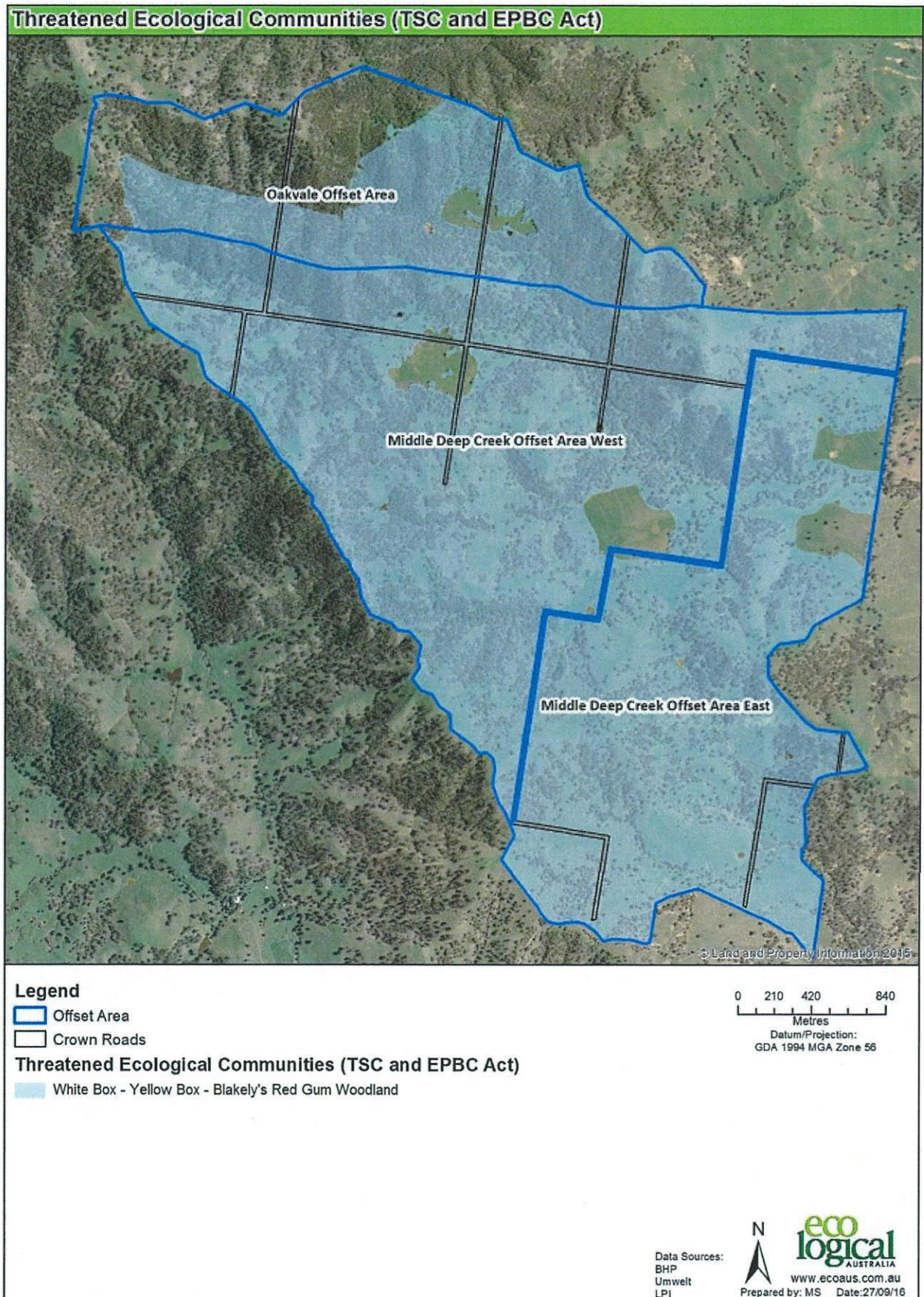
ANNEXURE B DIAGRAM B3 – FIRE MANAGEMENT ZONES



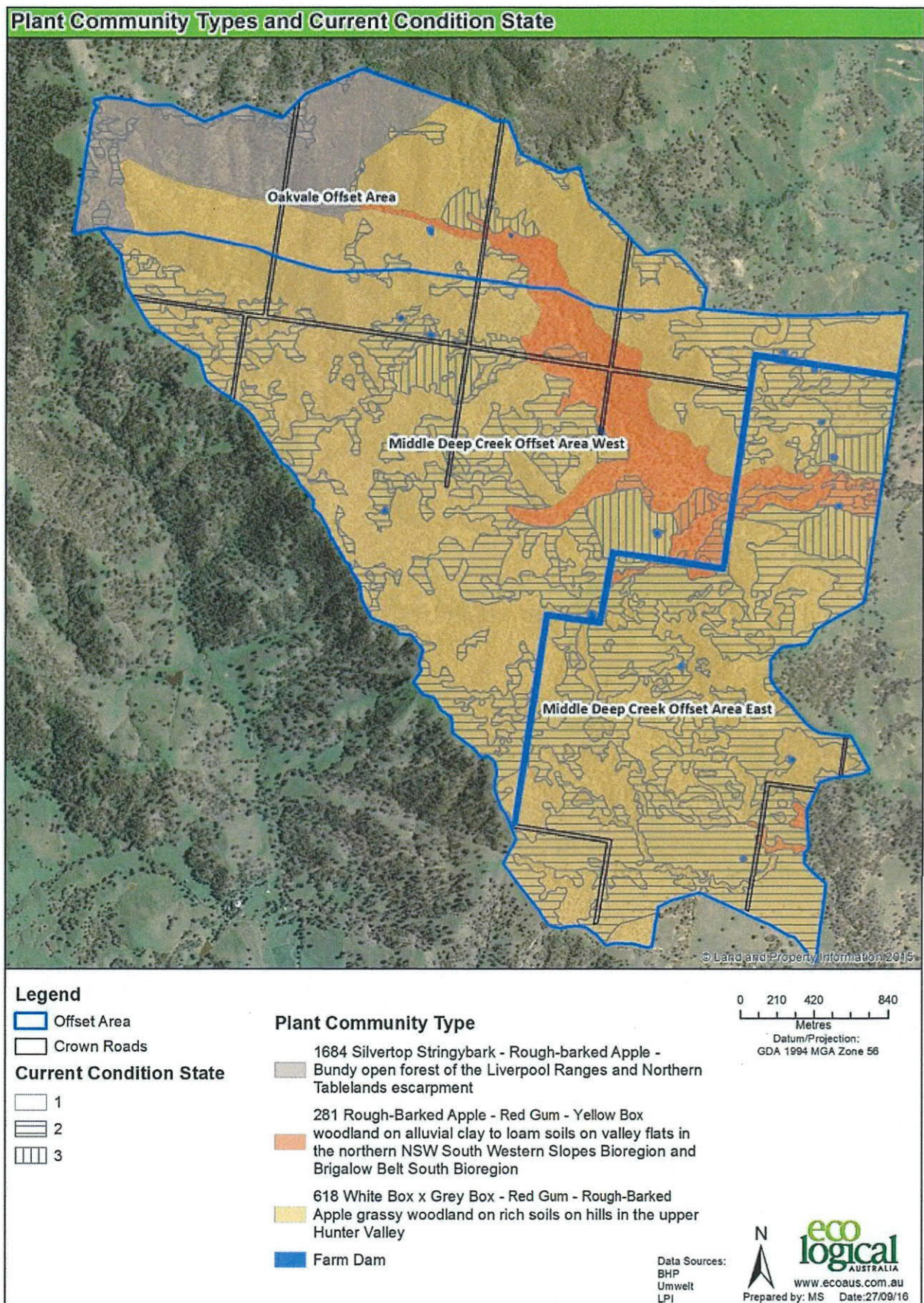
ANNEXURE B DIAGRAM B4 – THREATENED SPECIES RECORDED IN THE CONSERVATION AREA



ANNEXURE B DIAGRAM B5 – THREATENED ECOLOGICAL COMMUNITIES

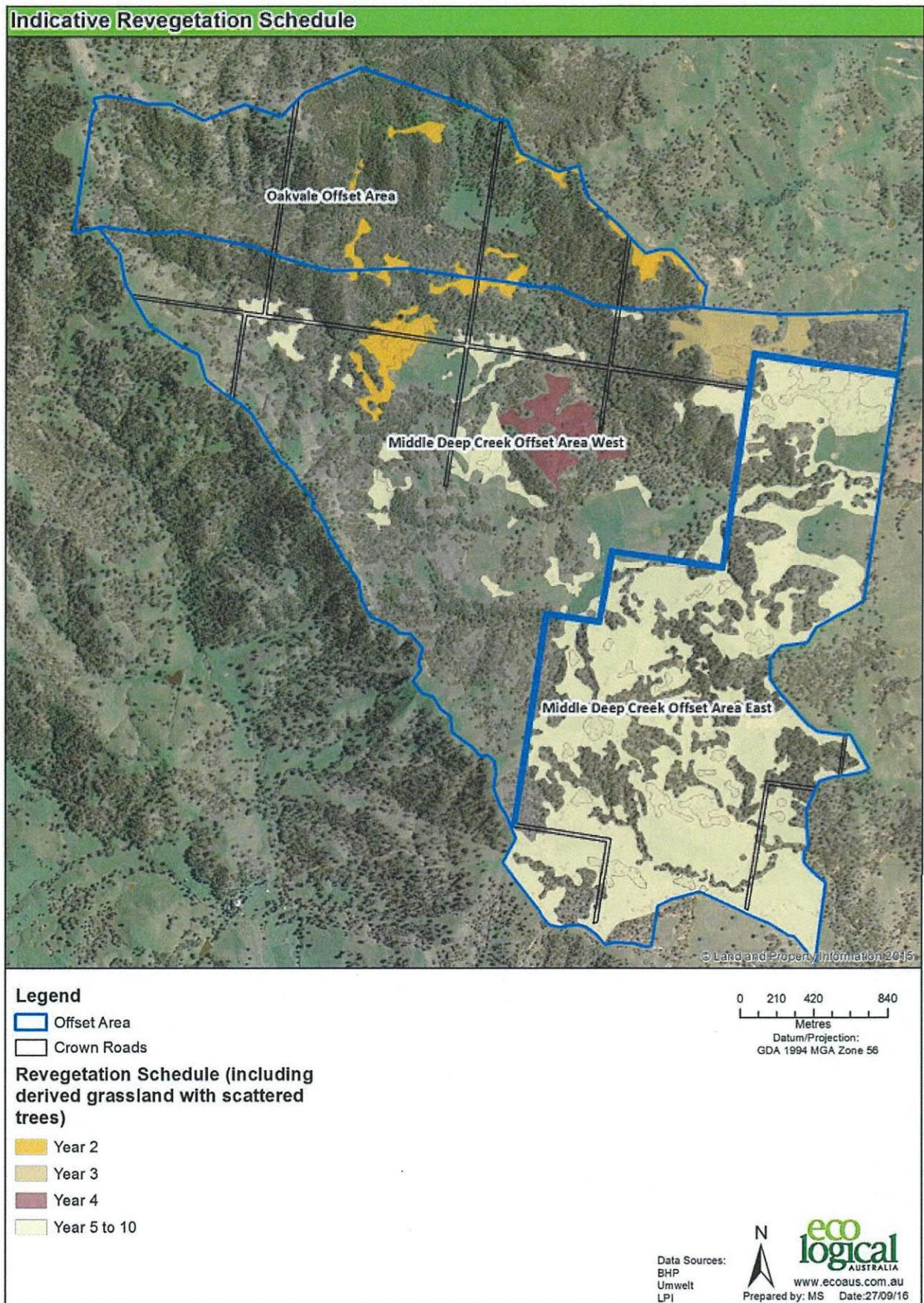


ANNEXURE B DIAGRAM B6 – CURRENT VEGETATION CONDITION



Note: State 1 = intact, State 2 = DNG, State 3 = exotic grassland

ANNEXURE B DIAGRAM B7 – INDICATIVE REVEGETATION SCHEDULE



ANNEXURE B - PHOTO POINT PHOTOGRAPHS

Two photo points were established per vegetation type present on the Conservation Area, giving a total of six points. Four photos were taken at each point, oriented in each direction (north, east, south, west). GPS reference points are provided in **Annexure D Table 1**.

Photos are presented below.

MDC1 monitors an area of Rough-Barked Apple - Red Gum - Yellow Box woodland dominated by Blakely's Red Gum (*Eucalyptus blakelyi*), Rough-barked Apple (*Angophora floribunda*) and White Box (*E. albens*).

Weed cover is low, and mainly comprises *Aster* sp.



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MDC2 monitors an area of White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland dominated by White Box/Grey Box intergrade (*Eucalyptus albens* <-> *moluccana*) and Blakely's Red Gum/Forest Red Gum intergrade (*Eucalyptus blakelyi* <-> *tereticornis*).

Weed cover is low and includes *Bidens pilosa*, *Aster* sp. and *Sida rhombifolia*.



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MDC3 monitors a hillside area of Silvertop Stringybark - Rough-barked Apple - Bundy open forest dominated by Bundy (*Eucalyptus nortonii*), Silver-top Stringybark (*Eucalyptus laevopinea*) and White Box/Grey box intergrade (*Eucalyptus albens* <--> *moluccana*).

Weed cover is low, consisting of *Bidens pilosa*, *Aster* sp. and Sweet Briar (*Rosa rubiginosa*).



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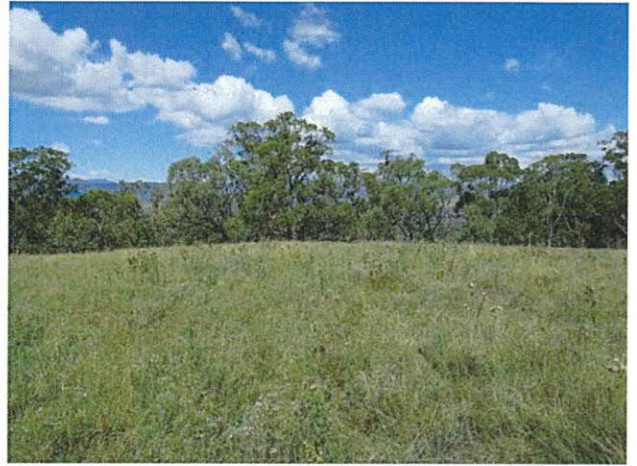
W

MDC4 monitors a riparian area of Silvertop Stringybark - Rough-barked Apple - Bundy open forest (DNG) with no remnant canopy. The ground layer is dominated by *Aristida* sp., *Bothriochloa* sp. and *Panicum* sp.

Weed cover at the site is moderate to high and comprises *Paspalum dilatatum*, Spear Thistle (*Cirsium vulgare*) and *Aster* sp.



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MDC5 monitors an area of Rough-Barked Apple - Red Gum - Yellow Box woodland dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Yellow Box (*E. melliodora*).

Weed cover is low to moderate and includes St John's Wort (*Hypericum perforatum*), *Conyza* sp. and Prickly Pear (*Opuntia* sp.)



N



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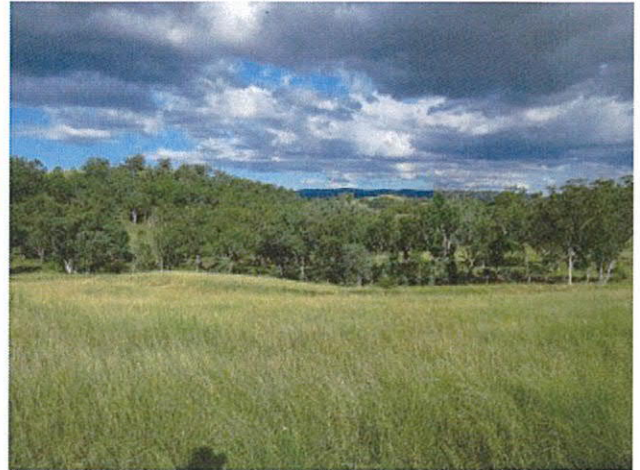
W

MDC6 monitors an area of White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland (DNG) with no remnant canopy. The ground layer is dominated by *Aristida* sp., Common Everlasting (*Chrysocephalum apiculatum*) and Common Woodruff (*Asperula conferta*).

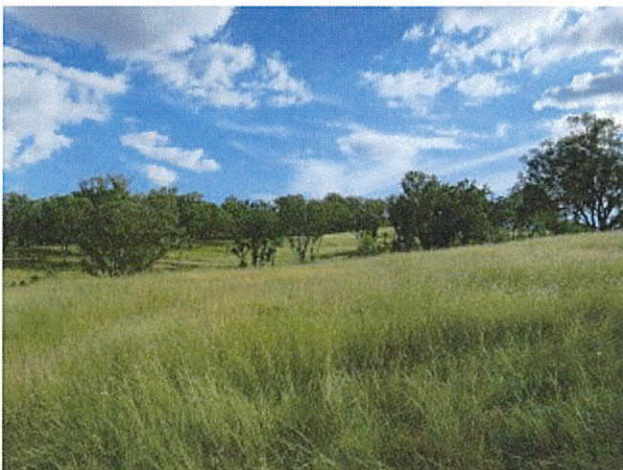
Weed cover is low and includes *Paspalum dilatatum*.



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Biodiversity Management Plan

Annexure C Management of the Conservation Area

Item 1: management aims and actions required to be undertaken for minimum period of 10 years.

Aim	Timing	Management action
Weed control across the Conservation Area (focusing on noxious and environmental weeds)	Year 1	Primary weed control: 640 hours bush regeneration by qualified bush regeneration contractor over 12 month period. Techniques specified in Annexure C Item 3 must be used.
	Years 2-5	Follow up weed control: 320 hours bush regeneration per year for years 2-5 Techniques specified in Annexure C Item 3 must be used.
	Years 6 – 10	Annual ongoing maintenance weed control: 80 hours annually for 5 years. Techniques specified in Annexure C Item 3 must be used.
	Years 2 to 10	Seed collection, propagation of tubestock, site preparation works and planting are to be undertaken in designated areas within the Conservation Area. If planted trees are defoliated by native or introduced species, tree guards will be installed. Plantings will be replaced if substantial mortalities occur within the first three years
Pest animal monitoring and control (local co-ordination with Local Land Services and OEH)	Years 1-10	Pest animal control activities to be determined based on density and species of pest animals. Techniques specified in Annexure C Item 3 must be used.
Construct and maintain fire breaks and implement fire management hazard reduction burns. Operate with NSW Rural Fire Service or fire management contractor to implement mosaic or partial area hazard reduction burn.	Years 1-10. Liaise with RFS and NPWS regarding appropriate timing.	Implement 2 hazard reduction burns during low risk fire season according to guidelines specified in Annexure C Item 3.

Fencing	Years 2-10	Maintain fences as required. Replace 1/10 th of total length of fence every three years. Techniques specified in Annexure C Item 3 must be used.
		Install temporary fencing as required to facilitate grazing management
Annual Reports for Monitoring Program	Years 1-10	Annual reports to be prepared according to specifications in Annexure D Monitoring Program.
Threatened species, populations and endangered ecological communities (EEC)	Years 1-10	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.

Annexure C Management of the Conservation Area*Item 2: management actions required to be undertaken from year 11 onwards.*

Issue	Management action
Exotic plants	The Owner must take reasonable measures in relation to the control of exotic plants. Techniques specified in Annexure C Item 3 must be used.
Pest animals	The Owner must take reasonable measures in relation to monitoring of pest animals. Techniques specified in Annexure C Item 3 must be used.
Threatened species, populations and endangered ecological communities (EEC)	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.
Trans	The Owner must take reasonable measures to ensure that visitor disturbance to the Conservation Area is minimised by keeping visitors to tracks and trails except for management purposes and ensuring all visitor vehicles and equipment entering the Conservation Area are clean and free from weeds and/or seeds. Guidance specified in Annexure C Item 3 Visitation and research must be used.
Maintain vehicle access to Conservation Area for visitor management, fire management, weed and fencing management	The Owner must take reasonable measures to ensure that vehicle access is maintained by maintaining and repairing access trails as required. Techniques specified in Annexure C Item 3 must be used.
Monitoring and Reporting	The Owner must complete a monitoring report at least every 3 years as described in Clause 8 of the Conservation Agreement.
Livestock	The Owner must remove any livestock which have entered the Conservation Area as soon as practical.
Fencing	The Owner must take reasonable measures to construct and maintain fences along the boundaries of the Conservation Area where adjacent land use cause or are likely to cause adverse impacts on or in the Conservation Area. Techniques specified in Annexure C Item 3 must be used.

ANNEXURE C ITEM 3: PERMISSIONS AND GUIDELINES

Control of pest animals and non-indigenous fauna (in addition to pest animal control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- a) Participate in community pest animal control programs, and encourage neighbours to implement pest animal control programs. Contact your Local Land Services office or National Parks and Wildlife Service Area office to find out where community control programs are occurring.
- b) Methods for pest animal control can include; shooting, trapping and use of poisonous baits consistent with advice from OEH and Local Land Services. Use control methods identified as 'humane' as defined in the NSW Codes of Practice and Standard Operating Procedures for Humane Pest Vertebrate Control (Control Capture and Destruction of Feral Animals in Australia) as developed by the NSW Department of Primary Industries.
- c) Pest animal control activities to be determined based on density and species of pest animals. Methods for monitoring pest animal activity should include:
 - i) observations and/or hearing calls,
 - ii) the use of standard "sand plots",
 - iii) the use of non-poisoned "bait stations",
 - iv) scat counts, and
 - v) other quantitative techniques which can be designed in discussion with OEH or Local Land Services.

Control of weeds and exotic plants (in addition to weed control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- d) Apply a range of techniques including:
 - i) Removal of weeds by hand ensuring that all plant parts which can reproduce are removed and that soils do not become prone to erosion.
 - ii) Use of carefully selected herbicide according to label directions and/or current off label permit, ensuring minimal off target damage.
 - iii) Use of appropriate control measures as recommended in the Department of Primary Industries Noxious and Environmental Weed Control Handbook 6th Edition 2014 or equivalent replacements for control of weeds, ensuring minimal off target damage.
 - iv) Use of forestry mulching or slashing machinery only with prior written permission from OEH.
 - v) Ensure control programs are commenced when timing and extent of weed removal will minimise adverse effects on wildlife (weeds may provide protection or habitat for native fauna). Dense thickets of lantana should be removed gradually in mosaic patterns to minimise disturbance to the habitat of native animals.
 - vi) Other weed control methods may only be undertaken with prior written permission of OEH.
 - vii) Contact OEH if any uncertainty exists regarding weed control methods.

Cultural heritage

- e) Recording and management of any newly identified Aboriginal Objects or artefacts, in consultation with OEH (and the relevant local Aboriginal community where applicable).

Development

- f) Carrying out any development as described in the Conservation Agreement and maintaining development (including existing fire trails, access trails and infrastructure), with the following conditions:
- i) clear a corridor not greater than 3 metres wide during construction or for maintenance for the installation of fences or other agreed rural structures;
 - ii) move fallen timber and any other obstructions to maintain access trails, tracks and fences;
 - iii) where clearing is permitted under the Agreement and necessary, undertake all works in a manner that minimises disturbance to soil and hydrological characteristics.

Fencing, tracks and trails

- g) Construction and maintenance of all fences using wildlife friendly materials including plain wire (non-barbed) on top and bottom strands.
- h) Construction of any new internal fence, access track or trail only with prior written approval from OEH.
- i) Maintaining existing access walking tracks in the Conservation Area to a maximum width of 2m.
- j) Maintaining existing access vehicular trails in the Conservation Area to a maximum width of 4m with 1m either side permissible for clearing.
- k) Removal of old fences and closing of unwanted tracks within the Conservation Area and facilitate restoration of indigenous vegetation according to Annexure 3 Item 3 (points 'n' and 'o' over page).

Fire management (in addition to fire management actions in Item 1 of Annexure C to the Conservation Agreement)

- l) Using fire hazard reduction burns and controlled burning which take into account the recommended fire intervals given in the *Bush Fire Environmental Assessment Code for New South Wales* (Rural Fire Service February 2006) and the guidelines contained in the *Threatened Species Hazard Reduction Lists for the Bush Fire Environmental Assessment Code* or equivalent replacements.

Current recommendations are:

- i) minimum fire intervals of:
 - 30 year fire interval (low intensity only) for Silvertop Stringybark – Rough-barked Apple – Bundy open forest (PCT 1684)
 - 8 year fire interval for Rough-Barked Apple - Red Gum - Yellow Box woodland (PCT 281)
 - 8 year fire interval for White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland (PCT 618)
- ii) wherever possible canopy or crown fires should be avoided.
- iii) wherever possible no more than 50% of the Conservation Area should be burnt in any twelve month period.
- iv) both live and dead trees with hollows should be protected from burning as far as practicable in order to preserve nesting habitat for hollow dwelling animals.
- m) Lighting a fire, or causing a fire to be lit on the Conservation Area if it complies with the *Rural Fires Act 1997* (NSW), and:
 - i) the lighting of the fire is a necessary component of bush fire hazard reduction work carried out in accordance with a notice served on the Owner under the *Rural Fires Act 1997* (NSW) or other applicable legislation; or

- ii) life or property is in immediate threat by bush fire and the lighting of the fire is reasonably necessary to protect life or property; or
- iii) the fire is a camp fire, subject to the compliance with the Rural Fires Act 1997 (NSW), or
- iv) the Chief-Executive gives prior written consent to the lighting of the fire.

Restoration of indigenous vegetation

- n) Restoration of native vegetation on the Conservation Area using a preferred method of encouraging and retaining natural regeneration. Preferred methods include:
 - i) bush regeneration
 - ii) brush mulching; and/or
 - iii) direct seeding.
- o) Revegetation to establish indigenous plants to maintain the vegetation structure in keeping with the identified vegetation community, using species produced from material sourced locally and without fertilisers, where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion.

Seed collection

- p) Collection of seed on the Conservation Area for non-commercial use in accordance with Guidelines and Codes of Practice developed by Florabank (www.florabank.org.au), or subsequent equivalent and with the following limitations and permissions:
 - i) Collect seed in the Conservation Area only if seed of the particular species and genotype is not available elsewhere, or if the seed collected is intended for seedlings that will be planted within the Conservation Area or adjacent to the Conservation Area.
 - ii) Seeds may be collected from within endangered ecological communities.
 - iii) Seeds may not be collected from species individually listed in Schedules 1, 1A or 2 to the TSC Act without prior written approval from the Chief-Executive, or under a licence granted under section 132C of the NPW Act or section 91 of the TSC Act.
 - iv) Seeds may be collected from any protected species listed in Schedule 13 to the NPW Act.
 - v) Seeds may be collected from any other native species.

Thinning of indigenous vegetation

- q) Thinning of regenerating indigenous species which are altering the structure of the vegetation in the Conservation Area and/or reducing the Conservation Values only with prior written approval from the Chief-Executive OEH.

Threatened species

- r) Implementing any measures included in recovery plans for any threatened species, population or ecological communities which are or may be found in the Conservation Area.
- s) Implementing other specific management advice from OEH for any threatened species, populations or ecological communities which are or may be found in the Conservation Area.

Use of timber

- t) Harvesting of fallen non-hollow wood in amounts necessary for heating the Owner's dwelling on the Land and camp fires on the Conservation Area.

Visitation and research (in addition to management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- u) Visitation, research and community use at a level that does not adversely impact on the Conservation Values or the amenity of the Owner. Research projects must be first discussed with OEH before being carried out.

ANNEXURE D - MONITORING PROGRAM

- (a) The Owner must engage a suitably qualified person (such as an ecologist) to undertake a monitoring event in each year, beginning in 2018 (Monitoring Event).
- (b) Each Monitoring Event must include:
- i) **photo monitoring** - 4 photos are required to be taken at each of the six established monitoring points shown in Annexure B. Photos must be taken from the exact location and bearing to allow subsequent comparison and assessment. Photo point locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Baseline photographs are provided in Annexure B to the Conservation Agreement. Photo monitoring must include the collection of at least the top five canopy, shrub-layer and groundcover species and the recording of any threats. The frequency of monitoring activities will be targeted by site type:
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - ii) **quadrat monitoring** – quadrat data must be collected at each of the six photo points above. Quadrat locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Results must be compared to baseline and benchmark quadrat data which is provided in **Tables 1** and **2** of Annexure D to the Conservation Agreement **below**. For active regeneration sites, data will also be collected on the survivorship and health of planted species so as to identify those which are best suited for future regeneration efforts within the same vegetation community.
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - iii) a **walk through assessment** to record opportunistic sightings within the Conservation Area including:
 - i. fire events or impacts of fire management
 - ii. weeds (including compiling a list of exotic species and recording new weed infestations including location and extent)
 - iii. pest animals (species and location must be recorded, including evidence of pest animals such as burrows, scats or disturbance)
 - iv. visitor impact and vehicle access (including evidence of any recent usage, and the presence of any new access tracks)
 - v. rubbish dumping
 - vi. natural regeneration of previously disturbed areas; and
 - vii. sightings of threatened species. Voucher specimens of potential threatened plants will be taken where doing so will not adversely affect the local population, and sent to a recognised museum or herbarium for identification.
- (c) After each Monitoring Event, the Owner must produce a monitoring report on the Conservation Area by 30 December of each year, beginning in 2018 (Monitoring Report).

The Monitoring Report must include:

- i. a description of all completed management actions undertaken in the previous 12 month period;
- ii. total cost of all works completed in undertaking the management actions listed in items 1 and 2 of Annexure C to the Conservation Agreement;
- iii. completed monitoring data sheets (including photographs) using the template provided in **Table 3** of Annexure D to the Conservation Agreement (**below**);
- iv. a discussion of the changes recorded at monitoring points and quadrats;

- v. a summary of quadrat data for each photo point;
- vi. a discussion of the condition of Conservation Values;
- vii. a discussion of effectiveness of any management actions implemented; and
- viii. recommendations and proposed management actions to be performed in following year(s).

The Monitoring Report must be submitted to OEHL within **21 days** of it being received by the Owner.

- (d) The Monitoring Event and the Monitoring Report comprise the monitoring program (Monitoring Program). The Owner must complete the Monitoring Program to the satisfaction of OEHL, for a minimum period of 10 years from the date of the Conservation Agreement.

ANNEXURE D TABLE 1 - MONITORING POINT LOCATIONS AND CORRESPONDING VEGETATION COMMUNITIES REPRESENTED AS AT FEBRUARY 2016

Photo Point / Quadrat No.	Easting/Northing GDA 94 MGA 56	Vegetation Community Represented
MDC1	314714, 6487108	281 Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
MDC2	313728, 6487316	618 White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley
MDC3	312029, 6487948	1684 Silvertop Stringybark - Rough-barked Apple - Bundy open forest of the Liverpool Ranges and Northern Tablelands escarpment
MDC4	311939, 6487777	1684 Silvertop Stringybark - Rough-barked Apple - Bundy open forest of the Liverpool Ranges and Northern Tablelands escarpment
MDC5	315235, 6486525	281 Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
MDC6	315042, 6485274	618 White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley

ANNEXURE D TABLE 2 – BIOMETRIC VEGETATION TYPE BENCHMARKS AND BASELINE QUADRAT SCORES AS AT FEBRUARY 2016

Photo Point / Quadrat no.	Native species richness	Overstorey cover %pfc	Mid-storey cover %pfc	Ground cover – grasses %pfc	Ground cover – shrubs %pfc	Ground cover – other %pfc	Proportion overstorey regen.	Exotic cover	Number of Trees with Hollows	Total length of fallen logs
1684 Silvertop Stringybark - Rough-barked Apple - Bundy open forest of the Liverpool Ranges and Northern Tablelands escarpment										
Benchmark values	48	15	25	0	0	10	N/A	N/A	1	20
MDC4	23	35	12.5	12.5	3	12.5	0.5	3	TBC	TBC
MDC3	23	35	12.5	12.5	3	12.5	1	3	TBC	TBC
281 Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion										
Benchmark values	25	10	2	20	2	5	N/A	N/A	1.5	30
MDC5	33	25	1	1	2	27	1	20.5	TBC	TBC
MDC1	22	26	12.5	12.5	13.5	12.5	1	2	TBC	TBC
618 White Box x Grey Box - Red Gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
MDC6	22	35	13.5	13.5	3	13.5	0.5	15.5	TBC	TBC
MDC2	22	48.5	12.5	12.5	12.5	10	1	7	TBC	TBC

Comprehensive baseline biodiversity studies of the Conservation Area were undertaken in 2013. During these studies, vegetation condition data was collected at most photo point locations. A modified 6-point Braun-Blanquet scale was used to estimate cover-abundances of all plant species. To develop baseline biometric quadrat data, this scale was modified as follows - all 1's (few individuals <5% cover) were removed due to low cover, 2's (Many individuals <5%) were converted to an assumed 1% total cover and then the midpoints of the remaining classes adopted (i.e. 12.5%, 35%, 62.5% and 87.5%).

The proportion of overstorey regeneration was inferred from the current condition class at each photo point i.e. Class 1 (remnant) was given a score of '1', Class 2 (derived native grassland EEC) was given a score of '0.5' and Class 3 was given a score of '0'.

Where photo monitoring points were not directly located at an existing baseline study site, the nearest baseline site, or a baseline site within the same PCT was selected. Biometric data (including number of trees with hollows and total length of fallen logs) will be collected and reviewed at each photo point during subsequent years monitoring. Note that care must be taken when interpreting baseline Braun-Blanquet cover-abundance data against future biometric data, due to slight differences in the methodology used for estimating vegetation cover.

MAC-STE-MTP-050

Biodiversity Management Plan



Mount Arthur Conservation Area
Lodgement number: C993803P
Commencement date: 3 May 2017

ANNEXURE B - CONSERVATION VALUES

1. CONSERVATION VALUES

The Owner and the Minister recognise that the Conservation Area contains the following conservation values:

A The Conservation Area contains eight biometric communities:

- Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley
- White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley
- Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter
- White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter
- Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest of the central Hunter
- Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley
- Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
- Bull Oak grassy woodland of the central Hunter Valley

Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley (PCT 1543)

A small pocket of this vegetation community is confined to a rocky outcrop on the southern slope of Mount Arthur. This community supports a closed canopy (70 per cent cover) solely dominated by Port Jackson Fig (*Ficus rubiginosa*), ranging from 10 to 12 metres in height. Water Vine (*Cissus antarctica*) is also a common plant growing throughout the canopy of this community.

The shrub layer is sparse (up to 10 per cent cover), comprising Native Olive (*Notelaea microcarpa* var. *microcarpa*), Hairy Clerodendrum (*Clerodendrum tomentosum*), Coffee Bush (*Breynia oblongifolia*), *Spartothamnella juncea* and Native Peach (*Trema tomentosa* var. *aspera*). The shrub layer ranges from 1 to 3 metres in height.

This community is characterised by a sparse ground layer (15 per cent cover) between 0.1 and 0.5 metres in height. Common herbs include Common Maidenhair (*Adiantum aethiopicum*) and Necklace Fern (*Asplenium flabellifolium*). Vines are also common and include Wombat Berry (*Eustrephus latifolius*) and Native Grape (*Cayratia clematidea*). Native grass species include Weeping Grass (*Microlaena stipoides* var. *stipoides*). The rocky outcrop supports habitat for the lithophytic rock orchid *Dendrobium speciosum*.

This community does not conform to any TECs listed under the EPBC Act or TSC Act. This community was compared to the vulnerable ecological community (VEC) Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions, however it was found not to conform to the scientific determination (NSW Scientific Committee 2011) with regard to the following attributes:

- The VEC typically occurs on the Carboniferous sediments of the Barrington footslopes;
- The community supports a low proportion of species that are in the list of characteristic species for the VEC (20 per cent native species recorded in this community are in the VEC listing; and three out of 59 (5 per cent) species in the characteristic species list for the VEC were recorded in this community).

White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley (PCT 1586)

This community occurs at the midslopes of Mount Arthur, with the larger patches occurring within and on the upper margins of a wide drainage line.

The community supports a mid – dense canopy (up to 60 per cent cover) dominated by Native Olive (*Notelaea microcarpa* var. *microcarpa*), with occurrences of Western Boobialla (*Myoporum montanum*). Height of the canopy ranged from 2.5 to 4 metres in height. Low shrubs also present include *Spartothamnella juncea* and Smooth Darling Pea (*Swainsona galegifolia*). On the edges of this community Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*) are common.

This community is characterised by a dense ground layer (up to 60 per cent cover) between 0.5 and 1 metre in height. Common herbs and sub-shrubs include Kidney Weed (*Dichondra repens*) and Large Tick-Trefoil (*Desmodium brachypodum*). Native grass species include Barbed Wire Grass (*Cymbopogon refractus*), Tall Chloris (*Chloris ventricosa*) and Purple Wiregrass (*Aristida ramosa*).

This community is consistent with the EEC Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. This community complies with the final determination (NSW Scientific Committee 2011) with regard to the following attributes:

- Occurs in the Muswellbrook Local Government Area (LGA) where the EEC has previously been recorded;
- Occurs on carboniferous sediments on rocky slopes;
- Is a low closed forest dominated by trees and vines;
- The dominant species present in the community including Native Olive (*Notelaea microcarpa* var. *microcarpa*), White Box (*Eucalyptus albens*), *Spartothamnella juncea* are listed as characteristic species for the EEC.

Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter (PCT 1604)

This vegetation community is confined to small remnants on the eastern portion of the Mount Arthur Conservation Area, where it occurs on a south-facing midslope. The community supports a sparse canopy (up to 30 per cent cover) dominated by Spotted Gum (*Corymbia maculata*). The height of the canopy ranges from 15 to 22 metres.

The shrub layer is generally sparse (up to 10 per cent cover) and comprises Cooba (*Acacia salicina*), Native Olive (*Notelaea microcarpa* var. *microcarpa*), Native Blackthorn (*Bursaria spinosa*), Shiny-Leaved Canthium (*Psydrax odorata*) and Western Boobialla (*Myoporum montanum*). The shrub layer ranges from 1.5 to 3 metres in height.

This community is characterised by a dense ground layer (up to 70 per cent cover) between 0.1 and 1 metre in height. Common herbs and subshrubs include Corrugated Sida (*Sida corrugata*), Blue Trumpet (*Bruniella australis*), Common Woodruff (*Asperula conferta*), Climbing Saltbush (*Einadia nutans*), Fuzzweed (*Vittadinia cuneata*), Many-Flowered Mat-Rush (*Lomandra multiflora* subsp. *multiflora*), *Glycine tabacina*, Common Everlasting (*Chrysocephalum apiculatum*), Forest Nightshade (*Solanum prinophyllum*), Wattle Mat-Rush (*Lomandra filiformis*) and Kidney Weed (*Dichondra repens*). Native grasses include Wallaby Grass (*Rytidosperma fulvum*), *Rytidosperma racemosum* var. *racemosum*, Purple Wiregrass (*Aristida ramosa*), Barbed Wire Grass (*Cymbopogon refractus*) and Slender Rat's Tail Grass (*Sporobolus creber*).

This community is consistent with the EEC Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. In summary this community complies with the final determination (NSW Scientific Committee 2011) with regard to the following attributes:

- The community occurs on Permian sediments within the NSW Sydney Basin Bioregion;
- It occurs in the Muswellbrook Local Government Area (LGA) where the EEC has previously been recorded;
- It supports a canopy dominated by Spotted Gum (*Corymbia maculata*), which is a characteristic species;
- It supports a high proportion of species that are in the list of characteristic species for the EEC: 12 out of 42 (29 per cent) native species recorded in this community are in the EEC listing, and 12 out of 44 (27 per cent) species in the characteristic species list for the EEC were recorded in this community.

White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter (PCT 1606)

This vegetation community is confined to the mid to upper slopes on the western portion of the Mount Arthur Conservation Area. The community supports a mid - dense canopy (up to 30 per cent cover) dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), with occurrences of Grey Gum (*Eucalyptus punctata*), Rough-Barked Apple (*Angophora floribunda*) and Kurrajong (*Brachychiton populneus* subsp. *populneus*). The height of the canopy ranges from 15 to 20 metres.

The understorey is typically very shrubby (up to 70 per cent cover) and comprises *Spartothamnella juncea*, Native Olive (*Notelaea microcarpa* var. *microcarpa*), Western Boobialla (*Myoporum montanum*), Sticky Daisy-Bush (*Olearia elliptica* subsp. *elliptica*), Smooth Darling Pea (*Swainsona galegifolia*). The shrub layer ranges from 0.5 to 4 metres in height.

This community is characterised by a diverse and dense ground layer (up to 90 per cent cover) between 0.1 and 1 metre in height. Common herbs and subshrubs include Yellow Burr-Daisy (*Calotis lappulacea*), Many-flowered Mat-Rush (*Lomandra multiflora* subsp. *multiflora*), Large Tick-Trefoil (*Desmodium brachypodum*), Wattle Mat-rush (*Lomandra filiformis*) and Kidney Weed (*Dichondra repens*). Native grasses include *Rytidosperma racemosum* var. *racemosum*, Barbed Wire Grass (*Cymbopogon refractus*), Purple Wiregrass (*Aristida ramosa*), Tussock (*Poa labillardieri* var. *labillardieri*) and Tall Chloris (*Chloris ventricosa*). The cycad *Macrozamia spiralis* is unique to this community.

This community is not consistent with any listed TEC under the TSC Act or EPBC Act.

Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest of the central Hunter (PCT 1608)

This vegetation community is confined to the north-west slope of Mount Arthur. The community supports a mid - dense canopy (up to 40 per cent cover) dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*), with occurrences of

Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*) and Rough-Barked Apple (*Angophora floribunda*). Height of the canopy ranges from 10 to 18 metres.

A mid-storey can be present and includes Kurrajong (*Brachychiton populneus* subsp. *populneus*), Bulloak (*Allocasuarina luehmannii*) and Hickory Wattle (*Acacia implexa*). The mid - storey is generally sparse (less than 10 per cent cover) and between 2 and 6 metres in height.

The shrub layer is generally very sparse (up to 5 per cent cover), however further upslope portions of this community may contain a shrub layer at slightly higher cover levels. Shrubs comprise *Spartothamnella juncea*, Native Olive (*Notelaea microcarpa* var. *microcarpa*), Shiny-Leaved Canthium (*Psydrax odorata*), Western Boobialla (*Myoporum montanum*) and Western Golden Wattle (*Acacia decora*). The shrub layer ranges from 0.5 to 3 metres in height.

This community is characterised by a diverse and dense ground layer (up to 75 per cent cover) between 0.1 and 1 metre in height. Common herbs and subshrubs include Indian Weed (*Sigesbeckia orientalis*), *Vernonia cinerea*, Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), *Rostellularia adscendens*, Large Tick-trefoil (*Desmodium brachypodum*), *Glycine tabacina*, Dwarf Skullcap (*Scutellaria humilis*), *Maireana microphylla*, Wattle Mat-rush (*Lomandra filiformis*), *Desmodium gunnii*, Blueberry Lily (*Dianella longifolia*), Violet Nightshade (*Solanum brownii*) and Kidney Weed (*Dichondra repens*). Native grasses include Weeping Grass (*Microlaena stipoides* var. *stipoides*), Wallaby Grass (*Rytidosperma fulvum*), *Rytidosperma racemosum* var. *racemosum*, Paddock Lovegrass (*Eragrostis leptostachya*), Speargrass (*Austrostipa scabra*), Barbed Wire Grass (*Cymbopogon refractus*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*) and Tall Chloris (*Chloris ventricosa*).

This community is consistent with the EEC White Box - Yellow Box - Blakely's Red Gum Woodland listed under the TSC Act and the CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act. The presence of these communities in the Conservation Area was determined by comparing the 'assemblage of species' present, the 'particular area' in which they occur, and other physical descriptors against the Final Determination (NSW) and/or the listing and conservation advice (Commonwealth).

The community is consistent with the EPBC-listed Box Gum Woodland CEEC for the following reasons:

- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;
- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectare or greater in size;
- All patches contain at least one important species (DEH 2006);
- The species composition is consistent with the Commonwealth listing advice (TSSC 2006) and associated species list (DEH 2006); and
- All patches contain at least 12 native understorey species (excluding grasses).

The community complies with the final determination for the TSC-listed EEC *White Box - Yellow Box - Blakely's Red Gum Woodland* (NSW Scientific Committee 2011) with regard to the following attributes:

- The community occurs within the NSW Sydney Basin Bioregion;
- The overstorey comprises, or prior to clearing would have comprised the characteristic species Blakely's Red Gum (*Eucalyptus blakelyi*) and Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*);
- It supports a predominantly native understorey;
- It supports a high proportion of species that are in the list of characteristic species for the EEC: for intact patches, 26 out of 72 (28 per cent) native species recorded in this community are in the EEC listing, and 26 out of 95 (27 per cent) species in the characteristic species list for the EEC were recorded in this community). For DNG patches, eight out of 13 (62 per cent) native species recorded in this community are in the EEC listing; and eight out of 95 (9 per cent) species in the characteristic species list for the EEC were recorded in this community.

Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley (PCT 1654)

This vegetation community is confined to south facing upper slopes and two small areas on west facing slopes in the Mount Arthur Conservation Area.

This community has a canopy dominated by Narrow-leaved Ironbark (*Eucalyptus crebra*), with occurrences of Grey Gum (*Eucalyptus punctata*), or dominated by Grey Gum (*Eucalyptus punctata*) and Rough-barked Apple (*Angophora floribunda*), with occurrences of Blakely's Red Gum (*Eucalyptus blakelyi*), Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), Port Jackson Fig (*Ficus rubiginosa*) and Kurrajong (*Brachychiton populneus* subsp. *populneus*). Height of the canopy ranges from 12 to 25 metres. A sparse sub-canopy (up to 20 per cent cover) may also be present, being dominated by Black Cypress Pine (*Callitris endlicheri*) 8 to 12 metres in height.

The shrub layer is generally dense (up to 55 per cent cover) and comprises a combination of *Spartothamnella juncea*, Native Olive (*Notelaea microcarpa* var. *microcarpa*), Sticky Daisy-bush (*Olearia elliptica* subsp. *elliptica*), Western Golden Wattle (*Acacia decora*), Shiny-leaved Canthium (*Psydrax odorata*), Hairy Clerodendrum (*Clerodendrum tomentosum*), Narrow-Leaved Orangebark (*Maytenus silvestris*), Hickory Wattle (*Acacia implexa*), Coffee Bush (*Breynia oblongifolia*), Violet Nightshade (*Solanum brownii*), Smooth Darling Pea (*Swainsona galegifolia*) and Western Boobialla (*Myoporum montanum*). The shrub layer ranges from 1 to 4 metres in height.

This community is characterised by a dense ground layer (up to 80 per cent cover) between 0.1 and 1 metre in height. Common herbs and subshrubs include Rough Saw-sedge (*Gahnia aspera*), *Hibbertia acicularis*, Blue Trumpet (*Brunoniella australis*), Bristly Cloak Fern (*Cheilanthes distans*), Yellow Burr-Daisy (*Calotis lappulacea*), Cobblers Tack (*Glossocardia bidens*), Fuzzweed (*Vittadinia cuneata*), *Desmodium gunnii*, Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), *Glycine tabacina*, Large Tick-trefoil (*Desmodium brachypodum*), Wattle Mat-rush (*Lomandra filiformis*), Common Maidenhair (*Adiantum aethiopicum*), Dwarf Skullcap (*Scutellaria humilis*), Necklace Fern (*Asplenium flabellifolium*), Fireweed Groundsel (*Senecio linearifolius*), Indian Weed (*Sigesbeckia orientalis*) Prickly Starwort (*Stellaria pungens*), Berry Saltbush (*Einadia hastata*), *Glycine clandestina*, Cockspur Flower (*Plectranthus parviflorus*), *Plantago debilis*, Large Tick-trefoil (*Desmodium brachypodum*), Maori Bedstraw (*Galium propinquum*) and Kidney Weed (*Dichondra*

repens). Common vines include Wombat Berry (*Eustrephus latifolius*) and Headache Vine (*Clematis glycinoides*).

Native grasses include Hairy Panic (*Panicum effusum*), Wallaby Grass (*Rytidosperma fulvum*), Purple Wiregrass (*Aristida ramosa*), Paddock Lovegrass (*Eragrostis leptostachya*), Tall Chloris (*Chloris ventricosa*), *Rytidosperma racemosum* var. *racemosum*, Slender Bamboo Grass (*Austrostipa verticillata*), Weeping Grass (*Microlaena stipoides* var. *stipoides*), Creeping Beard Grass (*Oplismenus imbecillis*), Wavy Beard Grass (*Oplismenus aemulus*) and Long-leaved Wallaby Grass (*Rytidosperma longifolium*). Grass Tree (*Xanthorrhoea glauca*) is unique to this community.

This community is not consistent with any listed TEC under the TSC Act or EPBC Act.

Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (PCT 1691)

This community supports a typically sparse canopy (10 to 40 per cent cover) dominated by either Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), or Narrow-leaved Ironbark (*Eucalyptus crebra*). The occurrences of this community have been separated based on the dominance of these two species in order to identify areas of White Box – Yellow Box – Blakely's Red Gum Woodland EEC (listed under the TSC Act) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC (listed under the EPBC Act). In some areas, Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*) may occur in low abundance. Height of the canopy ranges from 7 to 20 metres.

The shrub layer is generally very sparse (1 to 10 per cent cover), comprising regrowth of the above listed canopy species, *Cassinia quinquefaria*, Western Golden Wattle (*Acacia decora*), Kangaroo Thorn (*Acacia paradoxa*), Native Blackthorn (*Bursaria spinosa*), Western Boobialla (*Myoporum montanum*), and Native Olive (*Notelaea microcarpa* var. *microcarpa*). The shrub layer ranges from 0.5 to 4 metres in height.

This community is characterised by a diverse and dense ground layer (up to 85 per cent cover) between 0.1 and 1 metre in height. Common herbs and sub-shrubs include Yellow Burr-Daisy (*Calotis lappulacea*), Common Everlasting (*Chrysocephalum apiculatum*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Corrugated Sida (*Sida corrugata*), *Rostellularia adscendens*, Climbing Saltbush (*Einadia nutans*), Many-flowered Mat-Rush (*Lomandra multiflora* subsp. *multiflora*), Amulla (*Eremophila debilis*), *Glycine tabacina*, *Maireana microphylla*, and Kidney Weed (*Dichondra repens*). Native grasses include Barbed Wire Grass (*Cymbopogon refractus*), Wallaby Grass (*Rytidosperma fulvum*), Speargrass (*Austrostipa scabra*), Weeping Grass (*Microlaena stipoides* var. *stipoides*), Shorthair Plumegrass (*Dichelachne micrantha*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*), Paddock Lovegrass (*Eragrostis leptostachya*), Tall Chloris (*Chloris ventricosa*), Pitted Bluegrass (*Bothriochloa decipiens* var. *decipiens*) and Red Grass (*Bothriochloa macra*).

This community is consistent with the EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. The community complies with the final determination (NSW Scientific Committee 2011) for the EEC with regard to the following attributes:

- The community occurs on Permian sediments within the NSW Sydney Basin Bioregion;
- It occurs in the Muswellbrook Local Government Area (LGA) where the EEC has previously been recorded;
- It supports a high proportion of species that are in the list of characteristic species for the EEC: 31 out of 163 (19 per cent) native species recorded in this community are in the EEC listing, and

31 out of 38 (82 per cent) species in the characteristic species list for the EEC were recorded in this community.

The Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*) dominated areas of this community are also consistent with the EPBC-listed CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act for the following reasons:

- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;
- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectare or greater in size;
- All patches contain at least one important species (DEH 2006);
- The species composition is consistent with the Commonwealth listing advice (TSSC 2006) and associated species list (DEH 2006b); and
- All patches contain at least 12 native understorey species (excluding grasses).

Bull Oak grassy woodland of the central Hunter Valley (PCT 1692)

A small pocket of this vegetation community occurs in the Mount Arthur Conservation Area. This community supports a mid – dense canopy (up to 50 per cent cover) dominated by Bulloak (*Allocasuarina luehmannii*). There are occurrences of Narrow-leaved Ironbark (*Eucalyptus crebra*) and Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), however these species typically only form a minor component of the canopy. Height of the canopy ranges from 8 to 15 metres. The shrub layer is generally absent, however, in some areas a very sparse (less than 5 per cent cover) shrub layer occurs, comprising *Dodonaea viscosa* subsp. *angustifolia*, Cooba (*Acacia salicina*) and regenerating Bulloak (*Allocasuarina luehmannii*). When present, the shrub layer ranges from 2 to 4 metres in height.

This community is characterised by a sparse to very sparse ground layer (5 to 20 per cent cover) between 0.1 and 1 metre in height. Common herbs include Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), Wattle Mat-rush (*Lomandra filiformis*) and Ruby Saltbush (*Enchylaena tomentosa*). Native grass species present include Slender Rat's Tail Grass (*Sporobolus creber*), Speargrass (*Austrostipa scabra*), Barbed Wire Grass (*Cymbopogon refractus*), Tall Chloris (*Chloris ventricosa*) and Purple Wiregrass (*Aristida ramosa*).

This community is not consistent with any listed TEC under the TSC Act or EPBC Act.

Table 1 shows the area of each plant community type by condition state (see also **Diagram B7**).

Table 1: Plant community types present in the Conservation Area

PCT code	Plant community type (PCT)	Condition	Area (ha)
1543	Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley	Intact	0.23
		DNG	0
1586	White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley	Intact	0
		DNG	4.20
1604	Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter	Intact	0.36
		DNG	2.94
1606	White Box - Narrow-leaved Ironbark – Blakely’s Red Gum shrubby open forest of the central and upper Hunter	Intact	21.13
		DNG	7.53
1608	Grey Box - Grey Gum - Rough-barked Apple – Blakely’s Red Gum grassy open forest of the central Hunter	Intact	9.41
		DNG	6.29
1654	Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley	Intact	24.28
		DNG	1.30
1691	Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	Intact	12.45
		DNG	9.22
1692	Bull Oak grassy woodland of the central Hunter Valley	Intact	0.85
		DNG	0
TOTAL			100.19

B The Conservation Area contains the following threatened fauna species (and refer to **Table 3 Annexure B** and **Diagram B4**):

- *Petaurus norfolcensis* (Squirrel Glider) (Vulnerable (V) – TSC Act)

The following Endangered Ecological Communities are present in the Conservation Area (see **Diagram B5** and **B6**):

- *Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions* (EEC – TSC Act and EPBC Act)
- *Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions* (EEC – TSC Act and EPBC Act)
- *Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions* (EEC – TSC Act)
- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EEC – TSC Act, CEEC – EPBC Act)

As shown in **Table 2**, 39.61 ha of the vegetation present on the Conservation Area corresponds to listed threatened ecological communities under the TSC and / or EPBC Act. These are shown by condition state and listing status.

Table 2: Threatened ecological communities present in the Conservation Area

Threatened ecological community	Condition	TSC listed (ha)	EPBC listed (ha)
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions (TSC Act) / Central Hunter Valley eucalypt forest and woodland (EPBC Act)	Intact	12.45	0.36
	DNG	0	0
Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions (TSC Act) / Central Hunter Valley eucalypt forest and woodland (EPBC Act)	Intact	0.36	(Same community as above under EPBC Act)
	DNG	0	0
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions (TSC Act)	Intact	0	-
	DNG	4.20	-
White Box Yellow Box Blakely's Red Gum Woodland (TSC Act) / White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)	Intact	9.41	21.86
	DNG	13.19	13.19
Total		39.61	35.41

- C The Conservation Area is located to the east of the Hunter Valley section of the Great Eastern Ranges Initiative. The Great Eastern Ranges Initiative aims to maintain and improve the 'corridor' connectivity of mountain ecosystems running the length of eastern Australia. The focal area of the Initiative includes the Great Dividing Range and the Great Escarpment of Eastern Australia which extend along the majority of Australia's east coast. The current area of focus for this Initiative is the 1,200 kilometres section of the Great Eastern Ranges that falls within NSW.

The Hunter Valley has been identified as one of the five priority areas along the ranges and is considered to be the most diverse and complex in regards to its biodiversity and connectivity and its social and economic factors. The Hunter Valley represents a significant east-west linkage of natural vegetation in the Great Eastern Ranges, with the potential for north-south 'stepping stones' of vegetation such as this Conservation Area, to allow species movement and improve connectivity across areas of the Hunter Valley that have been historically cleared and/ or grazed.

- D The Conservation Area is likely to contain Aboriginal heritage values; however, no detailed studies have been undertaken.

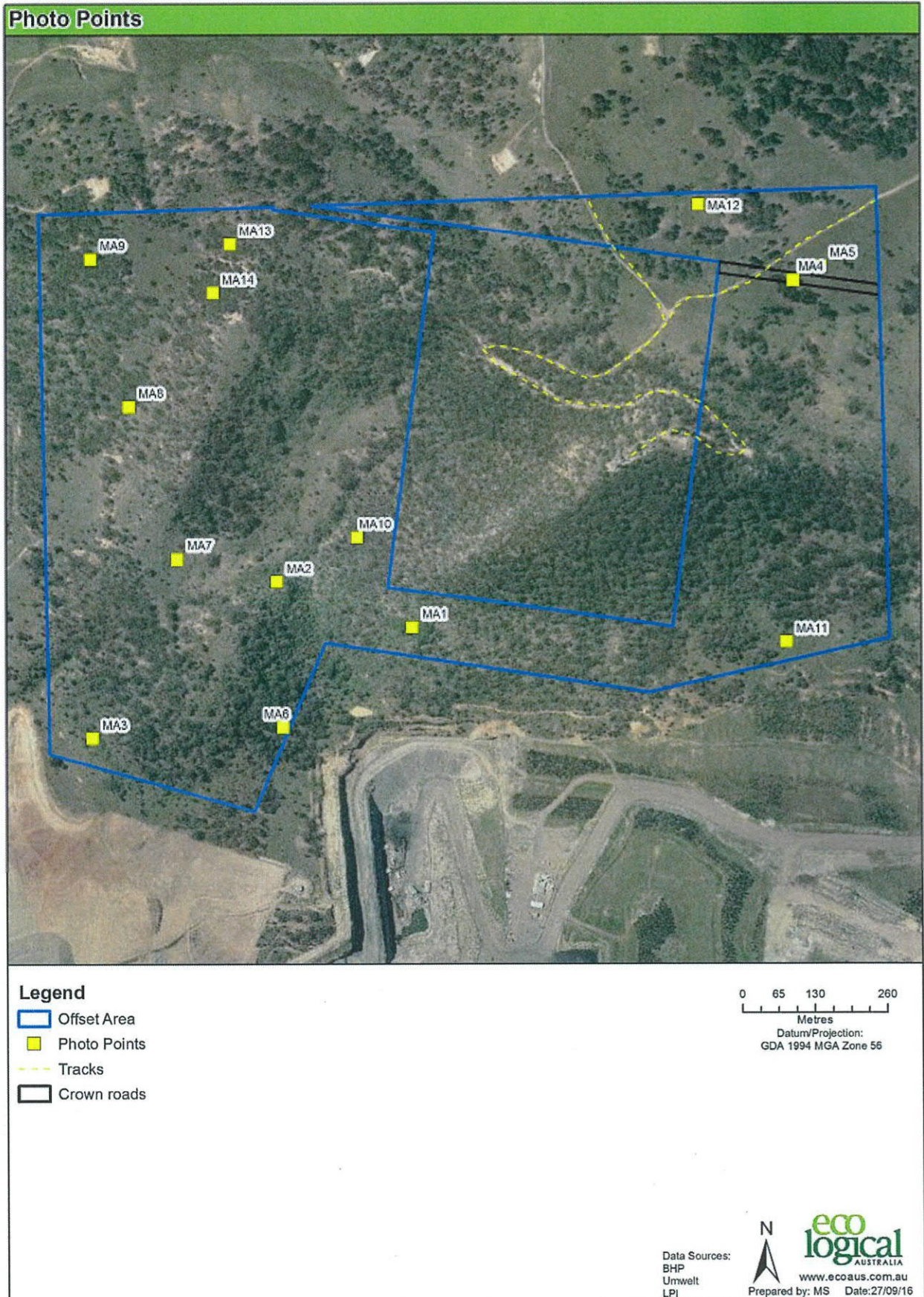
ANNEXURE B TABLE 3 Threatened species found within 20 km radius of site which may occur within the Conservation Area due to the presence of suitable habitat (search conducted March 2016).

Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
Birds				
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE, M	N
Eastern Great Egret	<i>Ardea modesta</i>		M	N
Cattle Egret	<i>Ardea ibis</i>		M	N
Speckled Warbler	<i>Chthonicola sagittata</i>	V		N
Spotted Harrier	<i>Circus assimilis</i>	V		N
Brown Treecreeper (Eastern Sub-Species)	<i>Climacteris picumnus victoriae</i>	V		N
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V		N
Black Falcon	<i>Falco subniger</i>	V		N
Little Lorikeet	<i>Glossopsitta pusilla</i>	V		N
Little Eagle	<i>Hieraaetus morphnoides</i>	V		N
White-Throated Needletail	<i>Hirundapus caudacutus</i>		M	N
Swift Parrot	<i>Lathamus discolor</i>	E	CE, M	N
Square-tailed Kite	<i>Lophoictinia isura</i>	V		N
Hooded Robin (South- eastern Form)	<i>Melanodryas cucullata cucullata</i>	V		N
Black-chinned Honeyeater (Eastern Sub-species)	<i>Melithreptus gularis gularis</i>	V		N
Rainbow Bee-Eater	<i>Merops ornatus</i>		M	N
Satin Flycatcher	<i>Myiagra cyanoleuca</i>		M	N
Powerful Owl	<i>Ninox strenua</i>	V		N
Scarlet Robin	<i>Petroica boodang</i>	V		N
Flame Robin	<i>Petroica phoenicea</i>	V		N
Grey-crowned Babbler (Eastern Sub-species)	<i>Pomatostomus temporalis temporalis</i>	V		N
Rufous Fantail	<i>Rhipidura rufifrons</i>		M	N
Diamond Firetail	<i>Stagonopleura guttata</i>	V		N
Mammals				
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	N
Spotted-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	V	E	N
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V		N
Little Bentwing-bat	<i>Miniopterus australis</i>	V		N
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V		N
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	V		N
Southern Myotis	<i>Myotis macropus</i>	V		N

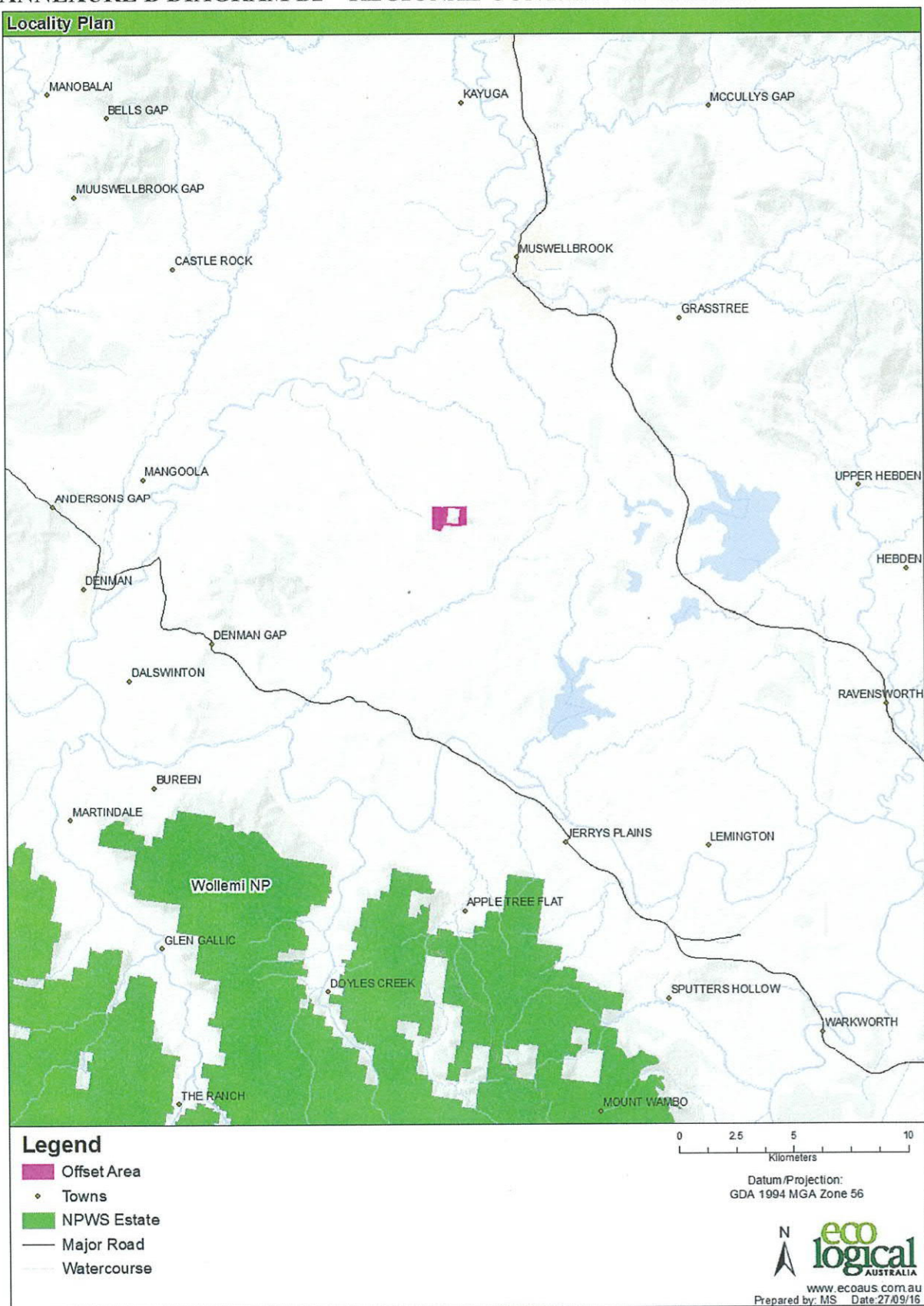
Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
South-eastern Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	N
Squirrel Glider	<i>Petaurus norfolcensis</i>	V		Y
Koala	<i>Phascolarctos cinereus</i>	V	V	N
Grey-Headed Flying- Fox	<i>Pteropus poliocephalus</i>	V	V	N
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V		N
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V		N
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		N
Flora				
Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	E2		N
Pine Donkey Orchid	<i>Diuris tricolor</i>	V		N
<i>Diuris tricolor</i> Fitz. population in the Muswellbrook LGA	<i>Diuris tricolor</i> Fitz. population in the Muswellbrook LGA	E2		N
River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	E2		N
Ecological communities				
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions		EEC	CEEC	Y
Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions		EEC	CEEC	Y
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		EEC	CEEC	Y
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions		EEC		Y

V= Vulnerable, E= Endangered, CE= Critically Endangered, M= Migratory, Mar= Marine, E2= Endangered Population, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

ANNEXURE B DIAGRAM B1 - LOCATION OF BIOMETRIC PLOTS AND PHOTO POINTS



ANNEXURE B DIAGRAM B2 – REGIONAL CONTEXT OF THE SITE



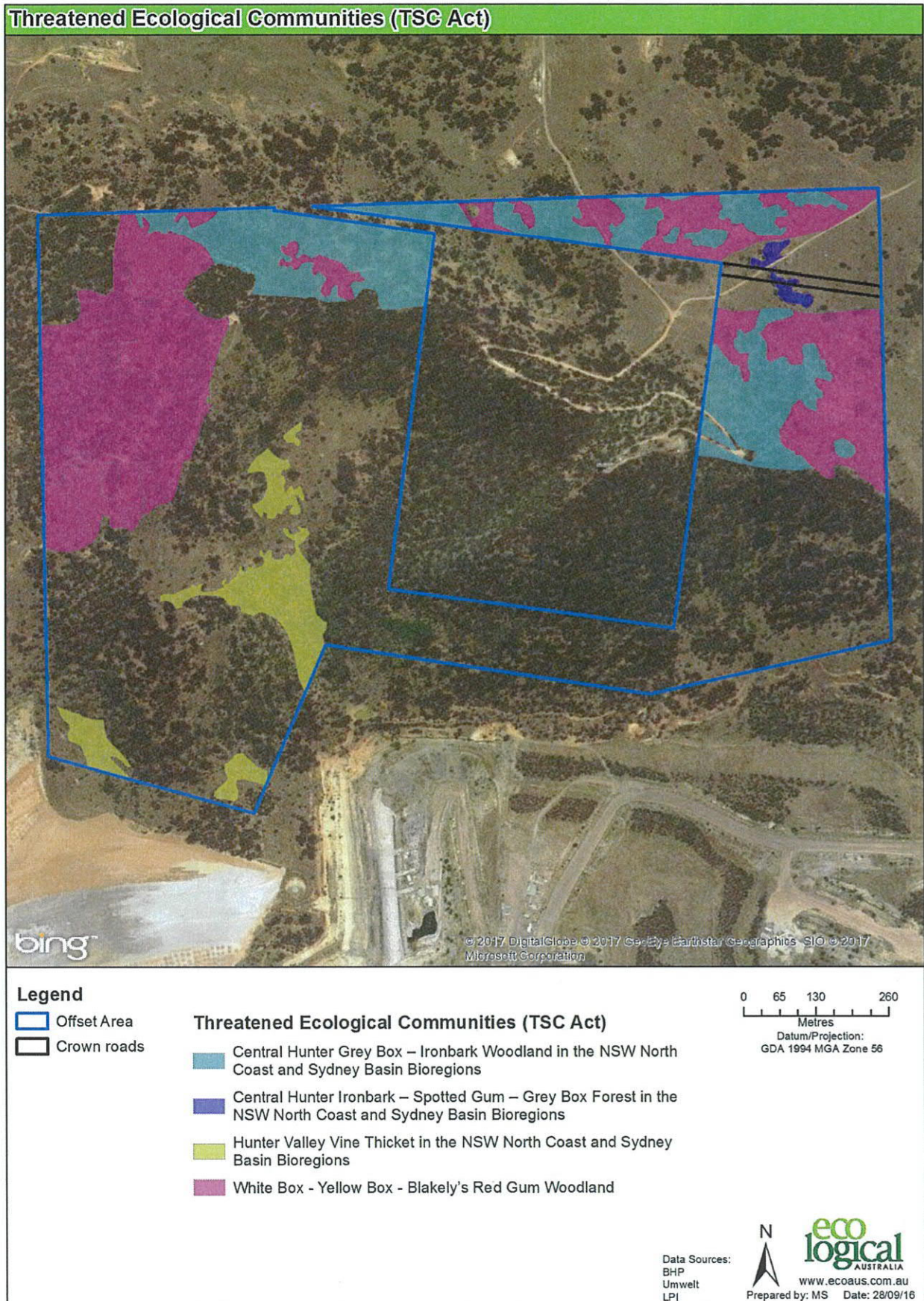
ANNEXURE B DIAGRAM B3 – FIRE MANAGEMENT ZONES



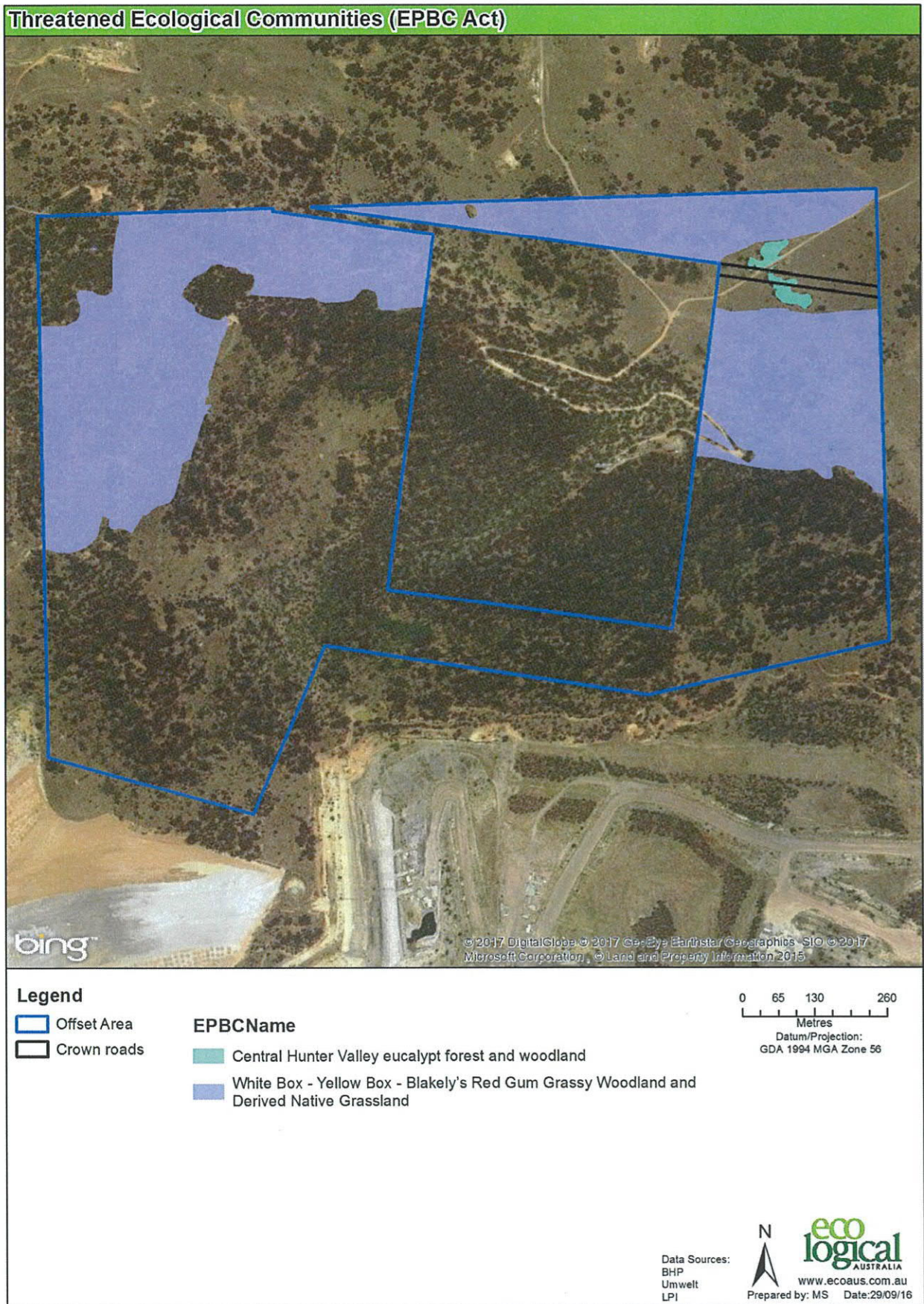
ANNEXURE B DIAGRAM B4 – THREATENED SPECIES RECORDED IN THE CONSERVATION AREA



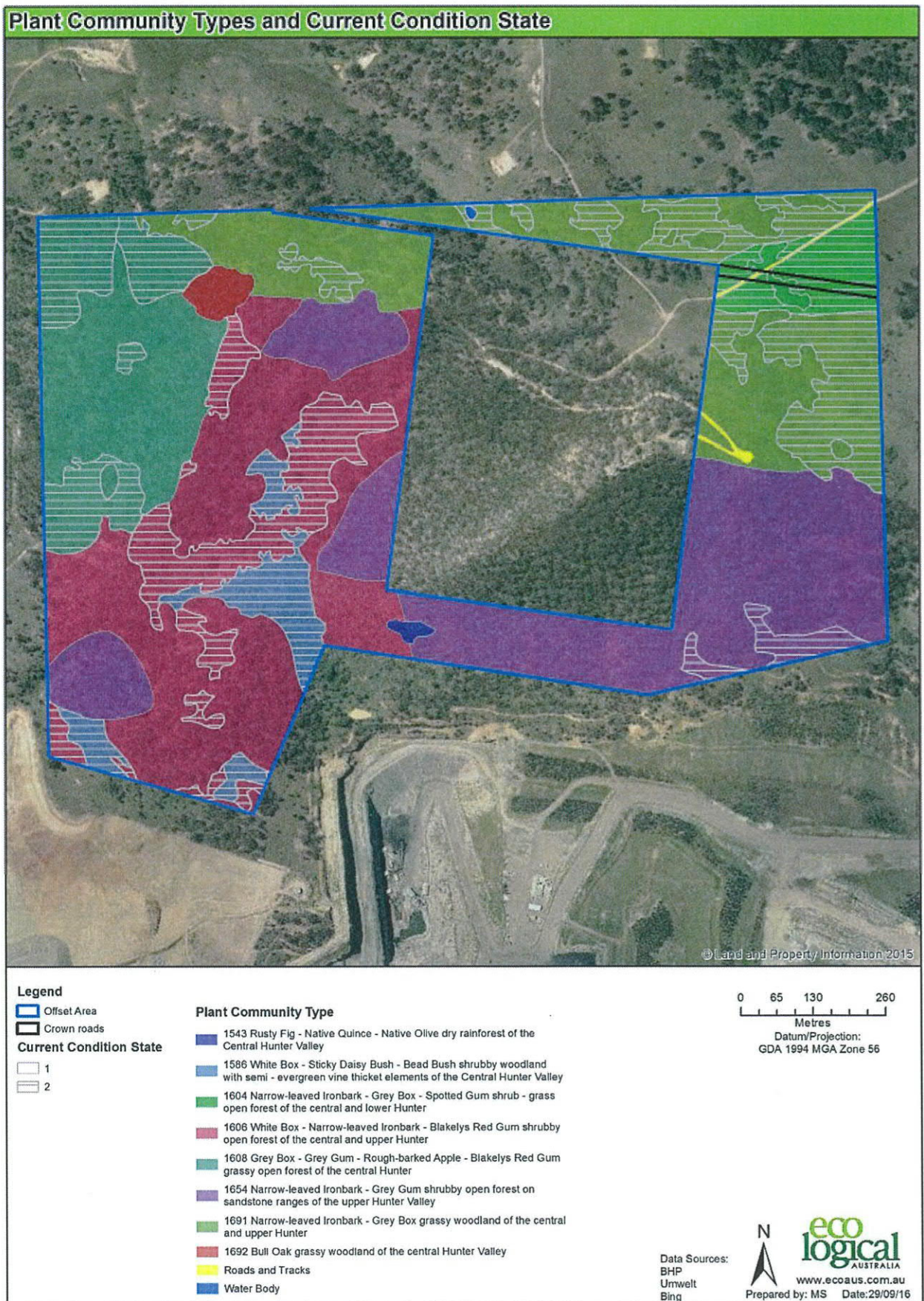
ANNEXURE B DIAGRAM B5 – THREATENED ECOLOGICAL COMMUNITIES (TSC ACT)



ANNEXURE B DIAGRAM B6 – THREATENED ECOLOGICAL COMMUNITIES (EPBC ACT)

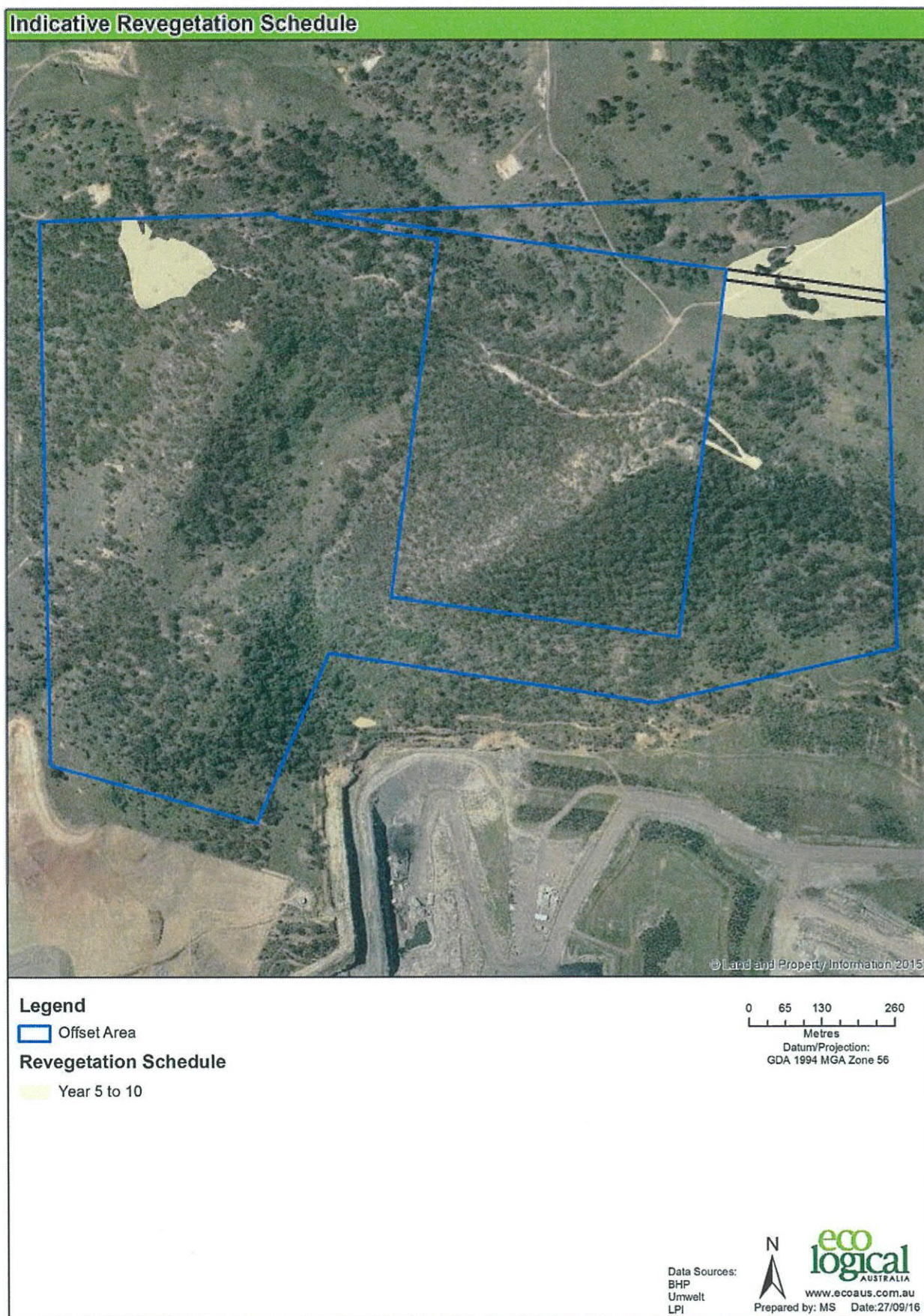


ANNEXURE B DIAGRAM B7 – CURRENT VEGETATION CONDITION



Note: State 1 = intact, State 2 = DNG

ANNEXURE B DIAGRAM B8 – INDICATIVE REVEGETATION SCHEDULE



ANNEXURE B - PHOTO POINT PHOTOGRAPHS

Two photo points were established per vegetation type present on the conservation area (except for PCT 1543 Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley and PCT 1692 Bull Oak grassy woodland of the central Hunter Valley, both of which have areas of less than 1 ha and have thus been allocated one photo point each), giving a total of 14 points. Four photos were taken at each point, oriented in each direction (north, east, south, west). GPS reference points are provided in **Annexure D Table 1**.

Photos are presented below.

MA1 monitors a rocky outcrop in an area of Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley dominated by Port Jackson Fig (*Ficus rubiginosa*) and Water Vine (*Cissus antarctica*), with Kurrajong (*Brachychiton populneus*) and Rough-barked Apple (*Angophora floribunda*). Weed cover is low and consists of Prickly Pear (*Opuntia* sp.).



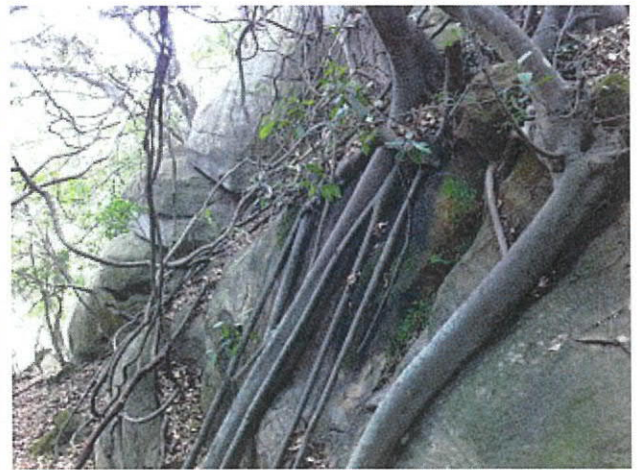
N



E



S



W

MA2 monitors a hillside area of White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi-evergreen vine thicket elements of the Central Hunter Valley dominated by Bead Bush *Spartothamnella juncea*, Sticky Hop Bush (*Dodonaea viscosa*), Cooba (*Acacia salicina*), Native Olive (*Notelaea microcarpa* var. *microcarpa*) and Western Boobialla (*Myoporum montanum*)

No weeds were recorded.



N



E



S



W

MA3 monitors a hillside area of White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley dominated by Native Olive (*Notelaea microcarpa* var. *microcarpa*), Native Blackthorn (*Bursaria spinosa*), *Cassinia* sp., Cooba (*Acacia salicina*). Blakely's Red Gum (*Eucalyptus blakelyi*), Bulloak (*Allocasuarina luehmannii*) and Grey Box (*E. moluccana*) occur nearby.

Weed cover is low, consisting of Cotton Bush (*Gomphocarpus fruticosus*) and Prickly Pear (*Opuntia* sp.).



N



E



S



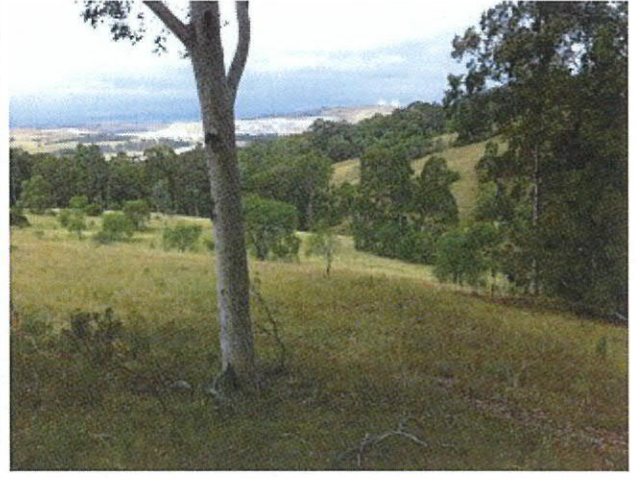
W

MA4 monitors a hillside area of Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter dominated by Spotted Gum (*Corymbia maculata*).

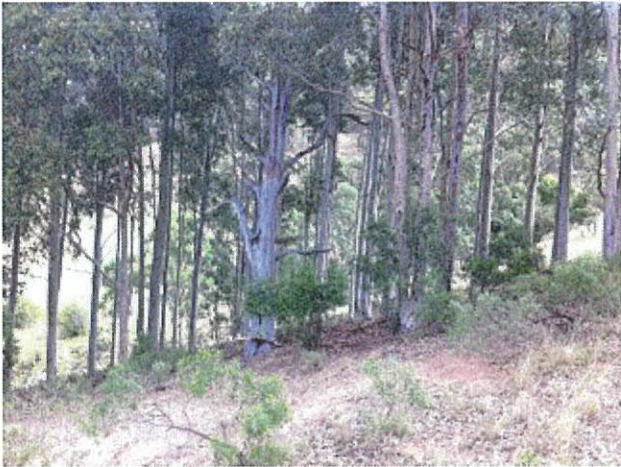
Weed cover at the site is low and includes Prickly Pear (*Opuntia* sp.) and *Bidens* sp.



N



E



S



W

MA5 monitors a hillside area of Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter (DNG) with isolated Spotted Gum (*Corymbia maculata*) and scattered Cooba (*Acacia salicina*). The ground layer is dominated by *Aristida* sp., *Rytidosperma* sp., *Bothriochloa* sp. and Barbed Wire Grass (*Cymbopogon refractus*).

Weed cover is low and includes Prickly Pear (*Opuntia* sp.), Spear Thistle (*Cirsium vulgare*), *Conyza* sp., Cotton Bush (*Gomphocarpus fruticosus*)



N



E



S



W

MA6 monitors an area of White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter dominated by Blakely's Red Gum (*Eucalyptus blakelyi*), White Box (*E. albens*) and Kurrajong (*Brachychiton populneus*).

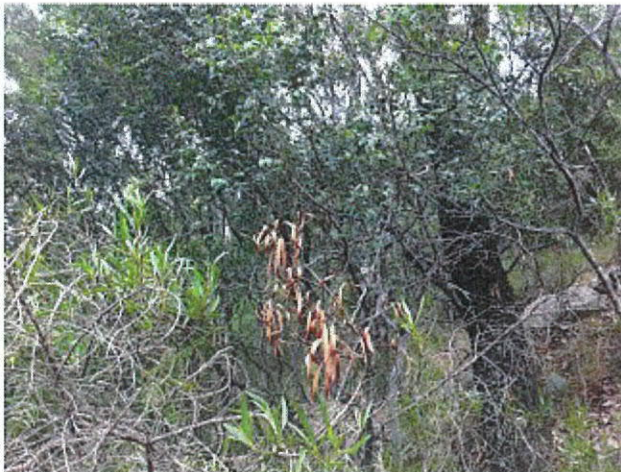
No weeds were recorded at the site.



N



E



S



W

MA7 monitors a hillside area of White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter (DNG) dominated by *Chloris* sp. and Barbed Wire Grass (*Cymbopogon refractus*), with White / Grey Box (*Eucalyptus albens* x *moluccana*) hybrids nearby.

Weed cover is low, comprising Cotton Bush (*Gomphocarpus fruticosus*) and Spear Thistle (*Cirsium vulgare*).



N



E



S



W

MA8 monitors an area of Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest of the central Hunter dominated by Blakely's Red Gum (*Eucalyptus blakelyi*).

No weeds were recorded at the site.



N



E



S



W

MA9 monitors an area of Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest of the central Hunter dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*).

Weed cover is low and includes *Sida rhombifolia* and Prickly Pear (*Opuntia* sp.).



N



E



S



W

MA10 monitors a hillside area of Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley dominated by Black Cypress Pine (*Callitris endlicheri*), Narrow-leaved Ironbark (*Eucalyptus crebra*), Grey Box (*Eucalyptus moluccana*) and Blakely's Red Gum (*Eucalyptus blakelyi*).

Weed cover is low, comprising Cotton Bush (*Gomphocarpus fruticosus*) and *Aster* sp.



N



E



S



W

MA11 monitors an area of Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley (DNG) with scattered Narrow-leaved Ironbark (*Eucalyptus crebra*), Rough-barked Apple (*Angophora floribunda*), White Box (*E. albens*) and Kurrajong (*Brachychiton populneus*). Native Olive (*Notelaea microcarpa*) is also common. The ground layer is dominated by *Aristida* sp. and *Mentha* sp.

Weed cover is moderate and includes *Paspalum dilatatum*, *Sida rhombifolia*, *Verbena* sp., Cotton Bush (*Gomphocarpus fruticosus*) and Spear Thistle (*Cirsium vulgare*).



N



E



S



W

MA12 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG) with some Grey Box (*Eucalyptus moluccana*) nearby, and scattered Cooba (*Acacia salicina*) and Kurrajong (*Brachychiton populneus*). The ground layer is dominated by Barbed Wire Grass (*Cymbopogon refractus*), Wallaby Grass (*Rytidosperma* sp.), *Aristida* sp., Common Everlasting (*Chrysocephalum apiculatum*) and *Mentha* sp.

Weed cover is low to moderate and comprises Cotton Bush (*Gomphocarpus fruticosus*), Spear Thistle (*Cirsium vulgare*), Prickly Pear (*Opuntia* sp.) and Fireweed (*Senecio madagascariensis*).



N



E



S



W

MA13 monitors a hillside area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter dominated by Grey Box (*Eucalyptus moluccana*) and Blakely's Red Gum (*Eucalyptus blakelyi*).

Weed cover is very low and includes *Aster* sp. and Prickly Pear (*Opuntia* sp.)



N



E



S



W

MA14 monitors a hillside area of Bull Oak grassy woodland of the central Hunter Valley dominated by Bulloak (*Allocasuarina leuhmannii*) and Rough-barked Apple (*Angophora floribunda*).

Weed cover is low and includes scattered Prickly Pear (*Opuntia* sp.)



N



E



S



W

Annexure C Management of the Conservation Area*Item 1: management aims and actions required to be undertaken for minimum period of 10 years.*

Aim	Timing	Management action
Weed control across the Conservation Area (focusing on noxious and environmental weeds)	Year 1	Primary weed control: 320 hours bush regeneration by qualified bush regeneration contractor over 12 month period. Techniques specified in Annexure C Item 3 must be used.
	Years 2-5	Follow up weed control: 160 hours bush regeneration per year for years 2-5 Techniques specified in Annexure C Item 3 must be used.
	Years 6 – 10	Annual ongoing maintenance weed control: 80 hours annually for 5 years. Techniques specified in Annexure C Item 3 must be used.
	Years 2 to 10	Seed collection, propagation of tubestock, site preparation works and planting are to be undertaken in designated areas within the Conservation Area. If planted trees are defoliated by native or introduced species, tree guards will be installed. Plantings will be replaced if substantial mortalities occur within the first three years.
Pest animal monitoring and control (local co-ordination with Local Land Services and OEH)	Years 1-10	Pest animal control activities to be determined based on density and species of pest animals. Techniques specified in Annexure C Item 3 must be used.
Construct and maintain fire breaks and implement fire management hazard reduction burns. Operate with NSW Rural Fire Service or fire management contractor to implement mosaic or partial area hazard reduction burn.	Years 1-10. Liaise with RFS and NPWS regarding appropriate timing.	Implement 2 hazard reduction burns during low risk fire season according to guidelines specified in Annexure C Item 3. This must be in the form of mosaic burning so that the same areas are not burned twice – but note that some communities must be avoided completely.

Fencing	Years 2-10	Maintain fences as required. Replace 1/10 th of total length of fence every three years. Techniques specified in Annexure C Item 3 must be used.
Annual Reports for Monitoring Program	Years 1-10	Annual reports to be prepared according to specifications in Annexure D Monitoring Program.
Threatened species, populations and endangered ecological communities (EEC)	Years 1-10	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.

Annexure C Management of the Conservation Area

Item 2: management actions required to be undertaken from year 11 onwards.

Issue	Management action
Exotic plants	The Owner must take reasonable measures in relation to the control of exotic plants. Techniques specified in Annexure C Item 3 must be used.
Pest animals	The Owner must take reasonable measures in relation to monitoring of pest animals. Techniques specified in Annexure C Item 3 must be used.
Threatened species, populations and endangered ecological communities (EEC)	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.
Managing visitor impacts (visitors include OEH inspectors; weed control contractors; fire maintenance contractors; NSW Rural Fire Service; fencing and maintenance contractors and the Owner)	The Owner must take reasonable measures to ensure that visitor disturbance to the Conservation Area is minimised by keeping visitors to tracks and trails except for management purposes and ensuring all visitor vehicles and equipment entering the Conservation Area are clean and free from weeds and/or seeds. Guidance specified in Annexure C Item 3 Visitation and research must be used.
Maintain vehicle access to Conservation Area for visitor management, fire management, weed and fencing management	The Owner must take reasonable measures to ensure that vehicle access is maintained by maintaining and repairing access trails as required. Techniques specified in Annexure C Item 3 must be used.
Monitoring and Reporting	The Owner must complete a monitoring report at least every 3 years as described in Clause 8 of the Conservation Agreement.
Livestock	The Owner must remove any livestock which have entered the Conservation Area as soon as practical.
Fencing	The Owner must take reasonable measures to construct and maintain fences along the boundaries of the Conservation Area where adjacent land use cause or are likely to cause adverse impacts on or in the Conservation Area. Techniques specified in Annexure C Item 3 must be used.

ANNEXURE C ITEM 3: PERMISSIONS AND GUIDELINES

Control of pest animals and non-indigenous fauna (in addition to pest animal control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- a) Participate in community pest animal control programs, and encourage neighbours to implement pest animal control programs. Contact your Local Land Services office or National Parks and Wildlife Service Area office to find out where community control programs are occurring.
- b) Methods for pest animal control can include; shooting, trapping and use of poisonous baits consistent with advice from OEH and Local Land Services. Use control methods identified as 'humane' as defined in the NSW Codes of Practice and Standard Operating Procedures for Humane Pest Vertebrate Control (Control Capture and Destruction of Feral Animals in Australia) as developed by the NSW Department of Primary Industries.
- c) Pest animal control activities to be determined based on density and species of pest animals. Methods for monitoring pest animal activity should include:
 - i) observations and/or hearing calls,
 - ii) the use of standard "sand plots",
 - iii) the use of non-poisoned "bait stations",
 - iv) scat counts, and
 - v) other quantitative techniques which can be designed in discussion with OEH or Local Land Services.

Control of weeds and exotic plants (in addition to weed control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- d) Apply a range of techniques including:
 - i) Removal of weeds by hand ensuring that all plant parts which can reproduce are removed and that soils do not become prone to erosion.
 - ii) Use of carefully selected herbicide according to label directions and/or current off label permit, ensuring minimal off target damage.
 - iii) Use of appropriate control measures as recommended in the Department of Primary Industries Noxious and Environmental Weed Control Handbook 6th Edition 2014 or equivalent replacements for control of weeds, ensuring minimal off target damage.
 - iv) Use of forestry mulching or slashing machinery only with prior written permission from OEH.
 - v) Ensure control programs are commenced when timing and extent of weed removal will minimise adverse effects on wildlife (weeds may provide protection or habitat for native fauna). Dense thickets of lantana or similar weeds such as African Olive (*Olea europaea* subsp. *cuspidata*) or Privet (*Ligustrum* spp.) should be removed gradually in mosaic patterns to minimise disturbance to the habitat of native animals.
 - vi) Other weed control methods may only be undertaken with prior written permission of OEH.
 - vii) Contact OEH if any uncertainty exists regarding weed control methods.

Cultural heritage

- e) Recording and management of any newly identified Aboriginal Objects or artefacts, in consultation with OEH (and the relevant local Aboriginal community where applicable).

Development

- f) Carrying out any development as described in the Conservation Agreement and maintaining development (including existing fire trails, access trails and infrastructure), with the following conditions:
- i) clear a corridor not greater than 3 metres wide during construction or for maintenance for the installation of fences or other agreed rural structures;
 - ii) move fallen timber and any other obstructions to maintain access trails, tracks and fences;
 - iii) where clearing is permitted under the Agreement and necessary, undertake all works in a manner that minimises disturbance to soil and hydrological characteristics.

Fencing, tracks and trails

- g) Construction and maintenance of all fences using wildlife friendly materials including plain wire (non-barbed) on top and bottom strands.
- h) Construction of any new internal fence, access track or trail only with prior written approval from OEH.
- i) Maintaining existing access walking tracks in the Conservation Area to a maximum width of 2m.
- j) Maintaining existing access vehicular trails in the Conservation Area to a maximum width of 4m with 1m either side permissible for clearing.
- k) Removal of old fences and closing of unwanted tracks within the Conservation Area and facilitate restoration of indigenous vegetation according to Annexure 3 Item 3 (points 'n' and 'o' over page).

Fire management (in addition to fire management actions in Item 1 of Annexure C to the Conservation Agreement)

- l) Using fire hazard reduction burns and controlled burning which take into account the recommended fire intervals given in the *Bush Fire Environmental Assessment Code for New South Wales* (Rural Fire Service February 2006) and the guidelines contained in the *Threatened Species Hazard Reduction Lists for the Bush Fire Environmental Assessment Code* or equivalent replacements.

Current recommendations are:

- i) minimum fire intervals of:
 - No burning permitted for Rusty Fig - Native Quince - Native Olive dry rainforest (PCT 1543)
 - 8 year minimum fire interval for White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements (PCT 1586)
 - 8 year minimum fire interval for Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest (PCT 1604)
 - 10 year minimum fire interval for White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest (PCT 1606)
 - 8 year minimum fire interval for Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest (PCT 1608)
 - 10 year minimum fire interval for Narrow-leaved Ironbark - Grey Gum shrubby open forest (PCT 1654)
 - 8 year minimum fire interval for Narrow-leaved Ironbark - Grey Box grassy woodland (PCT 1691)

- 8 year minimum fire interval for Bull Oak grassy woodland of the central Hunter Valley (PCT 1692)
 - ii) wherever possible canopy or crown fires should be avoided.
 - iii) wherever possible no more than 50% of the Conservation Area should be burnt in any twelve month period.
 - iv) both live and dead trees with hollows should be protected from burning as far as practicable in order to preserve nesting habitat for hollow dwelling animals.
- m) Lighting a fire, or causing a fire to be lit on the Conservation Area if it complies with the *Rural Fires Act 1997* (NSW), and:
- i) the lighting of the fire is a necessary component of bush fire hazard reduction work carried out in accordance with a notice served on the Owner under the Rural Fires Act 1997 (NSW) or other applicable legislation; or
 - ii) life or property is in immediate threat by bush fire and the lighting of the fire is reasonably necessary to protect life or property; or
 - iii) the fire is a camp fire, subject to the compliance with the Rural Fires Act 1997 (NSW), or
 - iv) the Chief-Executive gives prior written consent to the lighting of the fire.

Restoration of indigenous vegetation

- n) Restoration of native vegetation on the Conservation Area using a preferred method of encouraging and retaining natural regeneration. Preferred methods include:
- i) bush regeneration
 - ii) brush mulching; and/or
 - iii) direct seeding.
- o) Revegetation to establish indigenous plants to maintain the vegetation structure in keeping with the identified vegetation community, using species produced from material sourced locally and without fertilisers, where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion.

Seed collection

- p) Collection of seed on the Conservation Area for non-commercial use in accordance with Guidelines and Codes of Practice developed by Florabank (www.florabank.org.au), or subsequent equivalent and with the following limitations and permissions:
- i) Collect seed in the Conservation Area only if seed of the particular species and genotype is not available elsewhere, or if the seed collected is intended for seedlings that will be planted within the Conservation Area or adjacent to the Conservation Area.
 - ii) Seeds may be collected from within endangered ecological communities.
 - iii) Seeds may not be collected from species individually listed in Schedules 1, 1A or 2 to the TSC Act without prior written approval from the Chief-Executive, or under a licence granted under section 132C of the NPW Act or section 91 of the TSC Act.
 - iv) Seeds may be collected from any protected species listed in Schedule 13 to the NPW Act.
 - v) Seeds may be collected from any other native species.

Thinning of indigenous vegetation

- q) Thinning of regenerating indigenous species which are altering the structure of the vegetation in the Conservation Area and/or reducing the Conservation Values only with prior written approval from the Chief-Executive OEH.

Threatened species

- r) Implementing any measures included in recovery plans for any threatened species, population or ecological communities which are or may be found in the Conservation Area.
- s) Implementing other specific management advice from OEH for any threatened species, populations or ecological communities which are or may be found in the Conservation Area.

Use of timber

- t) Harvesting of fallen non-hollow wood in amounts necessary for heating the Owner's dwelling on the Land and camp fires on the Conservation Area.

Visitation and research (in addition to management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- u) Visitation, research and community use at a level that does not adversely impact on the Conservation Values or the amenity of the Owner. Research projects must be first discussed with OEH before being carried out.

ANNEXURE D - MONITORING PROGRAM

- (a) The Owner must engage a suitably qualified person (such as an ecologist) to undertake a monitoring event in each year, beginning in 2018 (Monitoring Event).
- (b) Each Monitoring Event must include:
- i) **photo monitoring** - four photos are required to be taken at each of the 14 established monitoring points shown in **Annexure B**. Photos must be taken from the exact location and bearing to allow subsequent comparison and assessment. Photo point locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Baseline photographs are provided in Annexure A to the Conservation Agreement. Photo monitoring must include the collection of at least the top five canopy, shrub-layer and groundcover species and the recording of any threats. The frequency of monitoring activities will be targeted by site type:
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - ii) **quadrat monitoring** – quadrat data must be collected at each of the 14 photo points above. Quadrat locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Results must be compared to baseline and benchmark quadrat data which is provided in **Tables 1 and 2** of Annexure D to the Conservation Agreement **below**. For active regeneration sites, data will also be collected on the survivorship and health of planted species so as to identify those which are best suited for future regeneration efforts within the same vegetation community.
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - iii) a **walk through assessment** to record opportunistic sightings within the Conservation Area including:
 - i. fire events or impacts of fire management
 - ii. weeds (including compiling a list of exotic species and recording new weed infestations including location and extent)
 - iii. pest animals (species and location must be recorded, including evidence of pest animals such as burrows, scats or disturbance)
 - iv. visitor impact and vehicle access (including evidence of any recent usage, and the presence of any new access tracks)
 - v. rubbish dumping
 - vi. natural regeneration of previously disturbed areas; and
 - vii. sightings of threatened species. Voucher specimens of potential threatened plants will be taken where doing so will not adversely affect the local population, and sent to a recognised museum or herbarium for identification.
- (c) After each Monitoring Event, the Owner must produce a monitoring report on the Conservation Area by 30 December of each year, beginning in 2018 (Monitoring Report).

The Monitoring Report must include:

- i. a description of all completed management actions undertaken in the previous 12 month period;
- ii. total cost of all works completed in undertaking the management actions listed in items 1 and 2 of Annexure C to the Conservation Agreement;
- iii. completed monitoring data sheets (including photographs) using the template provided in **Table 3** of Annexure D to the Conservation Agreement (**below**);
- iv. a discussion of the changes recorded at monitoring points and quadrats;

- v. a summary of quadrat data for each photo point;
- vi. a discussion of the condition of Conservation Values;
- vii. a discussion of effectiveness of any management actions implemented; and
- viii. recommendations and proposed management actions to be performed in following year(s).

The Monitoring Report must be submitted to OEH within **21 days** of it being received by the Owner.

- (d) The Monitoring Event and the Monitoring Report comprise the monitoring program (Monitoring Program). The Owner must complete the Monitoring Program to the satisfaction of OEH, for a minimum period of 10 years from the date of the Conservation Agreement.

ANNEXURE D TABLE 1 - MONITORING POINT LOCATIONS AND CORRESPONDING VEGETATION COMMUNITIES REPRESENTED AS AT FEBRUARY 2016

Photo Point / Quadrat No.	Easting/Northing GDA 94 MGA 56	Vegetation Community Represented
MA1	298063, 6416954	1543 Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley
MA2	297819, 6417037	1586 White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley
MA3	297486, 6416755	1586 White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley
MA4	298750, 6417578	1604 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter
MA5	298799, 6417602	1604 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter
MA6	297830, 6416775	1606 White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter
MA7	297640, 6417077	1606 White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter
MA8	297553, 6417350	1608 Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest of the central Hunter
MA9	297485, 6417616	1608 Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest of the central Hunter
MA10	297964, 6417116	1654 Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley
MA11	298736, 6416927	1654 Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley
MA12	298581, 6417714	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
MA13	297737, 6417643	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
MA14	297705, 6417556	1692 Bull Oak grassy woodland of the central Hunter Valley

ANNEXURE D TABLE 2 – BIOMETRIC VEGETATION TYPE BENCHMARKS AND BASELINE QUADRAT SCORES AS AT FEBRUARY 2016

Photo Point / Quadrat no.	Native species richness	Overstorey cover %pfc	Mid-storey cover %pfc	Ground cover – grasses %pfc	Ground cover – shrubs %pfc	Ground cover – other %pfc	Proportion overstorey regen.	Exotic cover	Number of Trees with Hollows	Total length of fallen logs
1543 Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley										
Benchmark values	25	10	10	5	5	10	N/A	N/A	0.2	15
MA1	25	87.5	1	15.5	0	1	1	4	TBC	TBC
1586 White Box - Sticky Daisy Bush - Bead Bush shrubby woodland with semi - evergreen vine thicket elements of the Central Hunter Valley										
Benchmark values	35	25	11	5	5	5	N/A	N/A	3	73
MA2	26	0	0	1	0	53	0.5	62.5	TBC	TBC
MA3	26	0	0	1	0	53	0.5	62.5	TBC	TBC
1604 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass open forest of the central and lower Hunter										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
MA4	35	1	1	46	0	46.5	1	4	TBC	TBC
MA5	22	1	0	1	0	29	0.5	14.5	TBC	TBC
1606 White Box - Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter										
Benchmark values	30	15	5	5	5	5	N/A	N/A	1.2	15
MA6	41	0	13.5	18.5	1	49.5	1	36	TBC	TBC
MA7	24	0	1	27	0	32	0.5	1	TBC	TBC
1608 Grey Box - Grey Gum - Rough-barked Apple – Blakely's Red Gum grassy open forest of the central Hunter										
Benchmark values	38	15	4	30	3	10	N/A	N/A	1.2	10
MA8	39	1	1	8	1	142	1	3	TBC	TBC
MA9	38	0	1	63	0	92	0.5	13.5	TBC	TBC
1654 Narrow-leaved Ironbark - Grey Gum shrubby open forest on sandstone ranges of the upper Hunter Valley										
Benchmark values	25	20	10	5	5	5	N/A	N/A	0.8	66
MA10	40	12.5	23.5	14	2	93.5	1	27	TBC	TBC
MA11	37	35	0	94	1	24.5	0.5	27	TBC	TBC
1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
MA12	36	3	2	4	1	66	0.5	13.5	TBC	TBC
MA13	27	0	36	1	1	42.5	1	36	TBC	TBC
1692 Bull Oak grassy woodland of the central Hunter Valley										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
MA14	23	1	1	35	0	5	1	2	TBC	TBC

Comprehensive baseline biodiversity studies of the Conservation Area were undertaken in 2013. During these studies, vegetation condition data was collected at most photo point locations. A modified 6-point Braun-Blanquet scale was used to estimate cover-abundances of all plant species. To develop baseline biometric quadrat data, this scale was modified as follows - all 1's (few individuals <5% cover) were removed due to low cover, 2's (Many individuals <5%) were converted to an assumed 1% total cover and then the midpoints of the remaining classes adopted (i.e. 12.5%, 35%, 62.5% and 87.5%).

The proportion of overstorey regeneration was inferred from the current condition class at each photo point i.e. Class 1 (remnant) was given a score of '1', Class 2 (derived native grassland EEC) was given a score of '0.5' and Class 3 was given a score of '0'.

Where photo monitoring points were not directly located at an existing baseline study site, the nearest baseline site, or a baseline site within the same PCT was selected. Biometric data (including number of trees with hollows and total length of fallen logs) will be collected and reviewed at each photo point during subsequent years monitoring. Note that care must be taken when interpreting baseline Braun-Blanquet cover-abundance data against future biometric data, due to slight differences in the methodology used for estimating vegetation cover.

MAC-STE-MTP-050

Biodiversity Management Plan



Roxburgh Road Offset Conservation Area
Lodgement number: C1023991
Commencement date: 20 June 2017

Note: The condition of the Roxburgh Road Offset Conservation Area does not require revegetation

ANNEXURE B - CONSERVATION VALUES

1. CONSERVATION VALUES

The Owner and the Minister recognise that the Conservation Area contains the following conservation values:

A The Conservation Area contains one biometric community:

- Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter

Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (PCT 1691)

This community supports a typically sparse canopy (10 to 40 per cent cover **) dominated by either Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), or Narrow-leaved Ironbark (*Eucalyptus crebra*). The occurrences of this community have been separated based on the dominance of these two species in order to identify areas of White Box – Yellow Box – Blakely's Red Gum Woodland EEC (listed under the TSC Act) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC (listed under the EPBC Act). In some areas, Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*) may occur in low abundance. Height of the canopy ranges from 7 to 20 metres.

[** Vegetation cover measured as percent foliage cover, that is the percentage of ground that would be covered by a vertical projection of the foliage and branches and trunk of a plant or plants.]

The shrub layer is generally very sparse (1 to 10 per cent cover), comprising regrowth of the above listed canopy species, *Cassinia quinquefaria*, Western Golden Wattle (*Acacia decora*), Kangaroo Thorn (*Acacia paradoxa*), Native Blackthorn (*Bursaria spinosa*), Western Boobialla (*Myoporum montanum*), and Native Olive (*Notelaea microcarpa* var. *microcarpa*). The shrub layer ranges from 0.5 to 4 metres in height.

This community is characterised by a diverse and dense ground layer (up to 85 per cent cover) between 0.1 and 1 metre in height. Common herbs and sub-shrubs include Yellow Burr-Daisy (*Calotis lappulacea*), Common Everlasting (*Chrysocephalum apiculatum*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Corrugated Sida (*Sida corrugata*), *Rostellularia adscendens*, Climbing Saltbush (*Einadia nutans*), Many-flowered Mat-Rush (*Lomandra multiflora* subsp. *multiflora*), Amulla (*Eremophila debilis*), *Glycine tabacina*, *Maireana microphylla*, and Kidney Weed (*Dichondra repens*). Native grasses include Barbed Wire Grass (*Cymbopogon refractus*), Wallaby Grass (*Rytidosperma fulvum*), Speargrass (*Austrostipa scabra*), Weeping Grass (*Microlaena stipoides* var. *stipoides*), Shorthair Plumegrass (*Dichelachne micrantha*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*), Paddock Lovegrass (*Eragrostis leptostachya*), Tall Chloris (*Chloris ventricosa*), Pitted Bluegrass (*Bothriochloa decipiens* var. *decipiens*) and Red Grass (*Bothriochloa macra*).

This community is consistent with the EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. The community complies with the final determination (NSW Scientific Committee 2011) for the EEC with regard to the following attributes:

- The community occurs on Permian sediments within the NSW Sydney Basin Bioregion;
- It occurs in the Muswellbrook Local Government Area (LGA) where the EEC has previously been recorded;
- It supports a high proportion of species that are in the list of characteristic species for the EEC: 31 out of 163 (19 per cent) native species recorded in this community are in the EEC listing, and

31 out of 38 (82 per cent) species in the characteristic species list for the EEC were recorded in this community.

The Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*) dominated areas of this community are also consistent with the EPBC-listed CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act for the following reasons:

- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;
- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectare or greater in size;
- All patches contain at least one important species (DEH 2006);
- The species composition is consistent with the Commonwealth listing advice (TSSC 2006) and associated species list (DEH 2006b); and
- All patches contain at least 12 native understorey species (excluding grasses).

Table 1 shows the area of the plant community type by condition state (see also **Diagram B6**).

Table 1: Plant community type present in the Conservation Area

PCT code	Plant community type (PCT)	Condition	Area (ha)
1691	Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	Intact	77.53
		DNG	31.85
TOTAL		109.38	

B The Conservation Area is not known to contain any threatened flora or fauna species (but refer to **Table 3 Annexure B** for species with potential to occur on site).

The following Endangered Ecological Communities are present in the Conservation Area (see **Diagram B4** and **B5**):

- *Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions* (EEC - TSC Act and EPBC Act)
- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (CEEC – EPBC Act)

As shown in **Table 2.2**, approximately 78 ha of the vegetation present on the Conservation Area corresponds to listed threatened ecological communities under the TSC and / or EPBC Act. These are shown by condition state and listing status.

Table 2.2 Threatened ecological communities present in the Conservation Area

Threatened ecological community	Condition	TSC listed (ha)	EPBC listed (ha)
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions (TSC Act) / Central Hunter Valley eucalypt forest and woodland (EPBC Act)	Intact	77.53	77.23
	DNG	0	0
White Box - Yellow Box - Blakely's Red Gum Woodland (TSC Act) / White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)	Intact	-	0.29
	DNG	-	0
Total		77.53	77.52

- C The Conservation Area is located to the east of the Hunter Valley section of the Great Eastern Ranges Initiative. The Great Eastern Ranges Initiative aims to maintain and improve the 'corridor' connectivity of mountain ecosystems running the length of eastern Australia. The focal area of the Initiative includes the Great Dividing Range and the Great Escarpment of Eastern Australia which extend along the majority of Australia's east coast. The current area of focus for this Initiative is the 1,200 kilometre section of the Great Eastern Ranges that falls within NSW.

The Hunter Valley has been identified as one of the five priority areas along the ranges and is considered to be the most diverse and complex in regards to its biodiversity and connectivity and its social and economic factors. The Hunter Valley represents a significant east-west linkage of natural vegetation in the Great Eastern Ranges, with the potential for north-south 'stepping stones' of vegetation such as this Conservation Area, to allow species movement and improve connectivity across areas of the Hunter Valley that have been historically cleared and/or grazed.

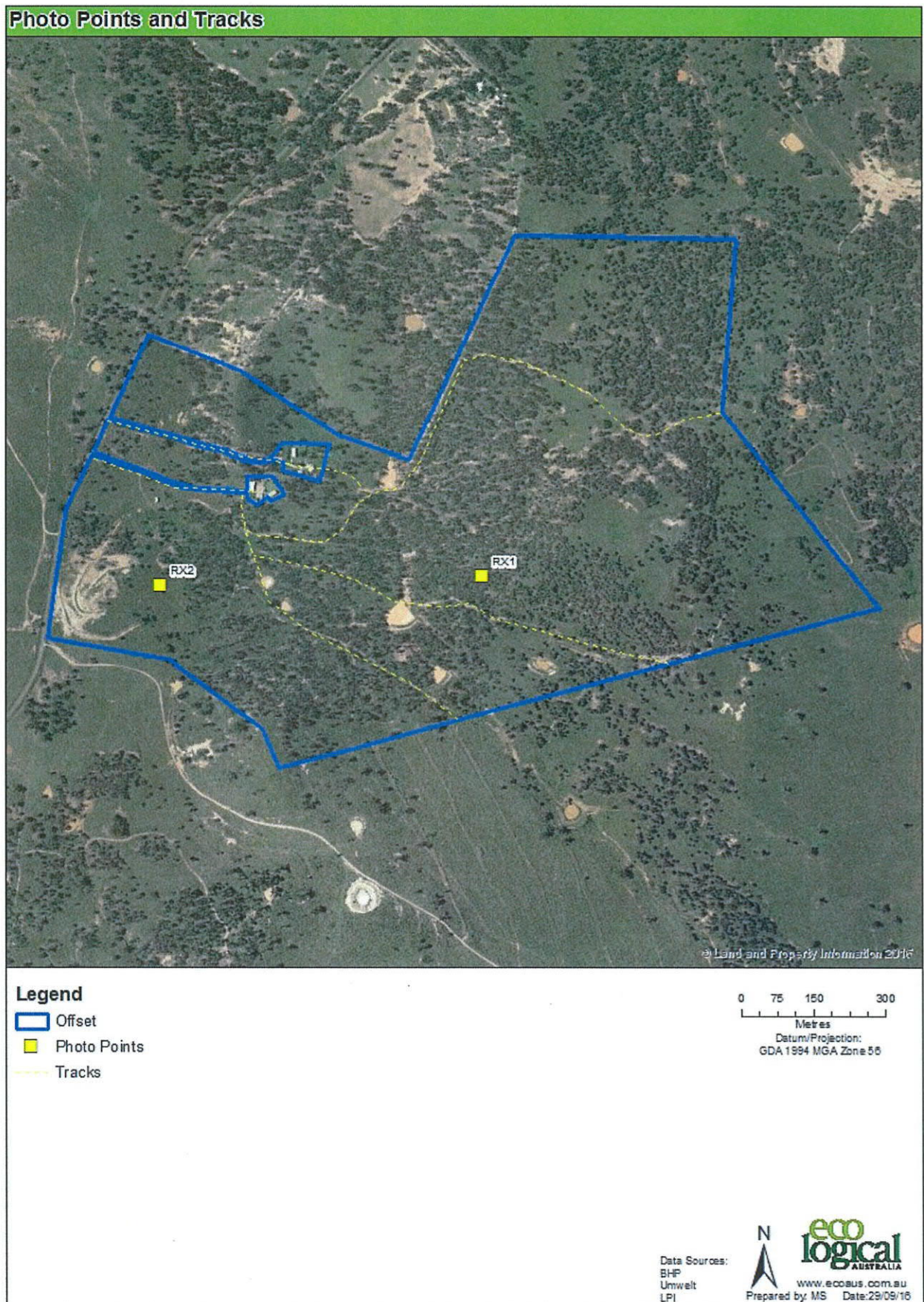
- D The Conservation Area is likely to contain Aboriginal heritage values; however, no detailed studies have been undertaken.

ANNEXURE B TABLE 3 Threatened species found within 20 km radius of site which may occur within the Conservation Area due to the presence of suitable habitat (search conducted March 2016).

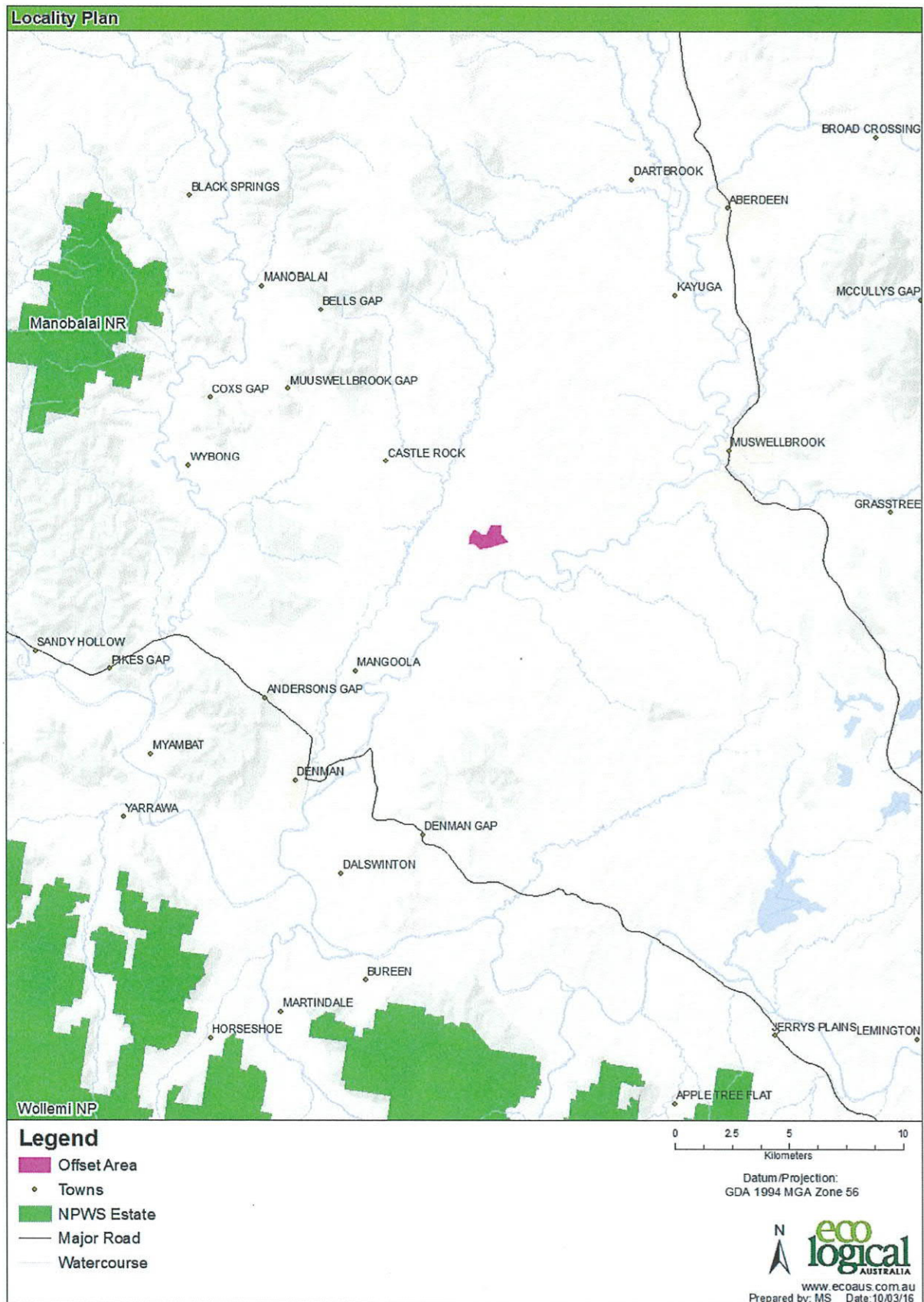
Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
Birds				
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE, M	N
Eastern Great Egret	<i>Ardea modesta</i>		M	N
Cattle Egret	<i>Ardea ibis</i>		M	N
Speckled Warbler	<i>Chthonicola sagittata</i>	V		N
Spotted Harrier	<i>Circus assimilis</i>	V		N
Brown Treecreeper (Eastern Sub- Species)	<i>Climacteris picummus victoriae</i>	V		N
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V		N
Black Falcon	<i>Falco subniger</i>	V		N
Little Lorikeet	<i>Glossopsitta pusilla</i>	V		N
Little Eagle	<i>Hieraaetus morphnoides</i>	V		N
White-throated Needletail	<i>Hirundapus caudacutus</i>		M	N
Swift Parrot	<i>Lathamus discolor</i>	E	CE, M	N
Square-tailed Kite	<i>Lophoictinia isura</i>	V		N
Hooded Robin (South-eastern Form)	<i>Melanodryas cucullata cucullata</i>	V		N
Black-chinned Honeyeater* (Eastern Sub-Species)	<i>Melithreptus gularis gularis</i>	V		N
Rainbow Bee-Eater	<i>Merops ornatus</i>		M	N
Satin Flycatcher	<i>Myiagra cyanoleuca</i>		M	N
Powerful Owl	<i>Ninox strenua</i>	V		N
Scarlet Robin	<i>Petroica boodang</i>	V		N
Flame Robin	<i>Petroica phoenicea</i>	V		N
Grey-crowned Babbler (Eastern Sub-Species)	<i>Pomatostomus temporalis temporalis</i>	V		N
Rufous Fantail	<i>Rhipidura rufifrons</i>		M	N
Diamond Firetail	<i>Stagonopleura guttata</i>	V		N
Mammals				
Large-Eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	N
Spotted-Tailed Quoll	<i>Dasyurus maculatus maculatus</i>	V	E	N
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V		N
Little Bentwing-Bat	<i>Miniopterus australis</i>	V		N
Eastern Bentwing- Bat	<i>Miniopterus schreibersii oceanensis</i>	V		N
Eastern Freetail-Bat	<i>Mormopterus norfolkensis</i>	V		N
Southern Myotis	<i>Myotis macropus</i>	V		N

Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
South-eastern Long-Eared Bat	<i>Nyctophilus corbeni</i>	V	V	N
Squirrel Glider	<i>Petaurus norfolcensis</i>	V		N
Koala	<i>Phascolarctos cinereus</i>	V	V	N
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V	V	N
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V		N
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V		N
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		N
Flora				
Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	E2		N
Pine Donkey Orchid	<i>Diuris tricolor</i>	V		N
<i>Diuris tricolor</i> Fitz., population in the Muswellbrook LGA	<i>Diuris tricolor</i> Fitz., population in the Muswellbrook LGA	E2		N
River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	E2		N
Ecological communities				
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions		EEC	CEEC	Y
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland		EEC	CEEC	Y

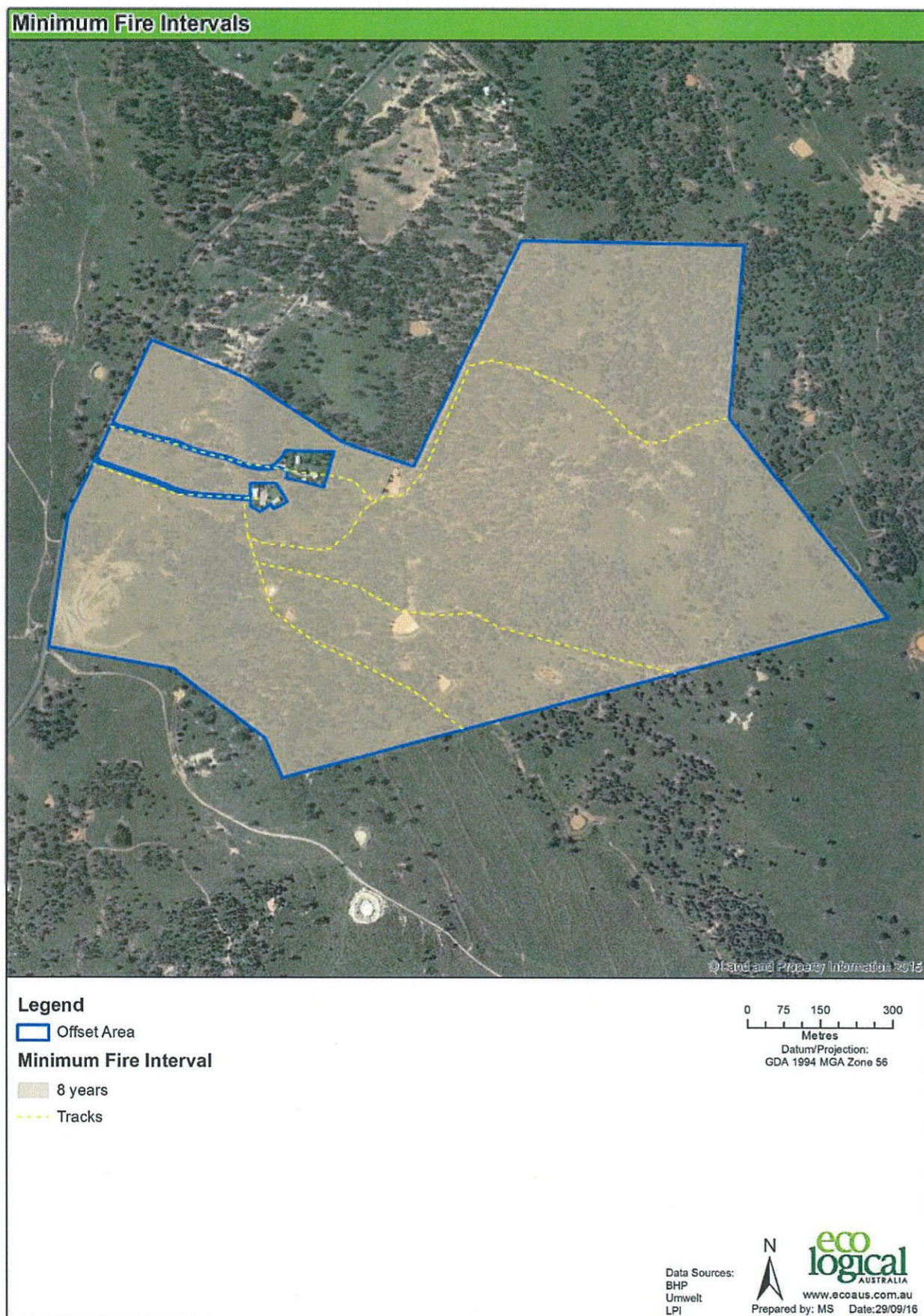
V= Vulnerable, E= Endangered, CE= Critically Endangered, M= Migratory, Mar= Marine, E2= Endangered Population, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

ANNEXURE B DIAGRAM B1 - LOCATION OF BIOMETRIC PLOTS AND PHOTO POINTS

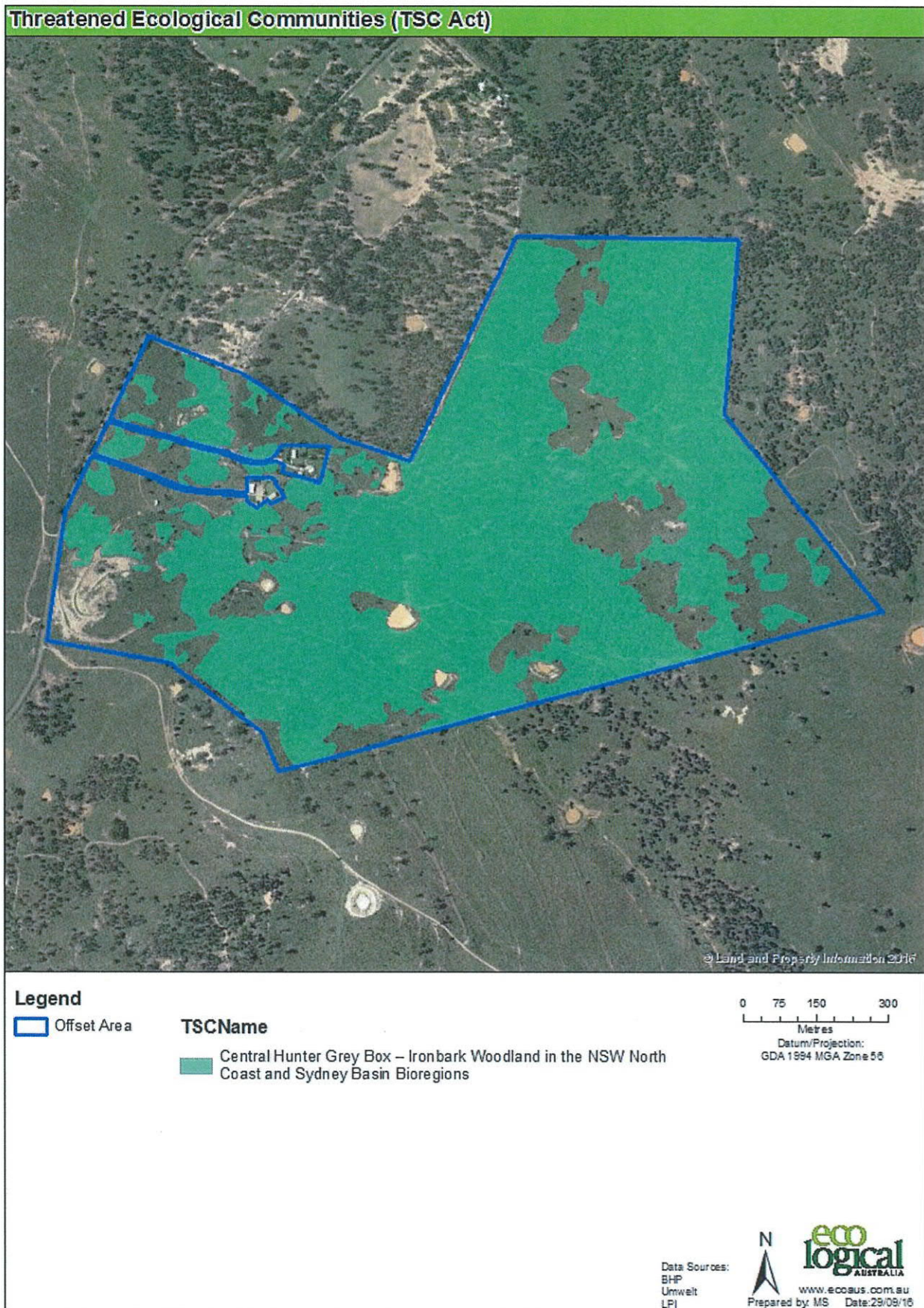
ANNEXURE B DIAGRAM B2 – REGIONAL CONTEXT OF THE SITE



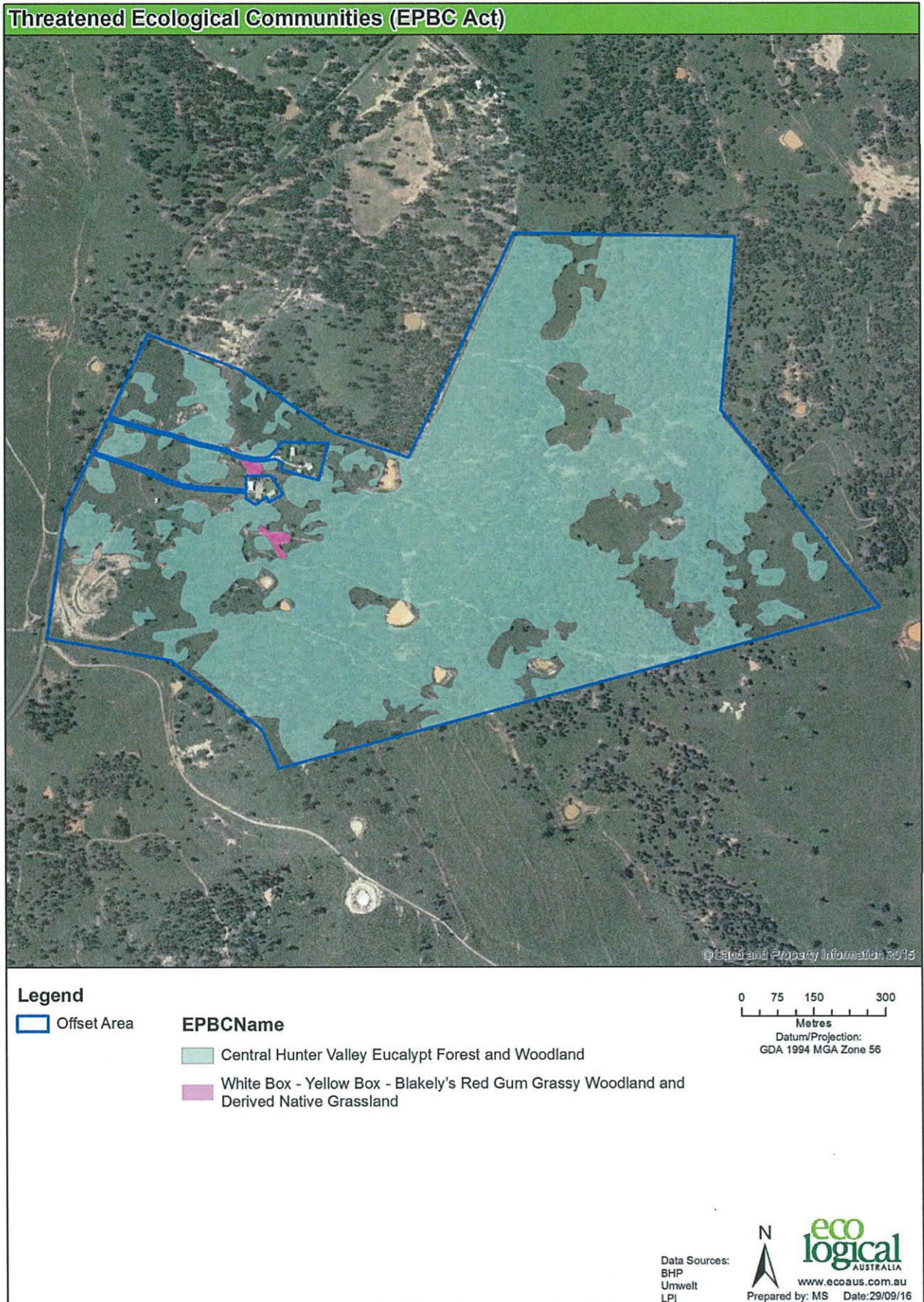
ANNEXURE B DIAGRAM B3 – FIRE MANAGEMENT ZONES



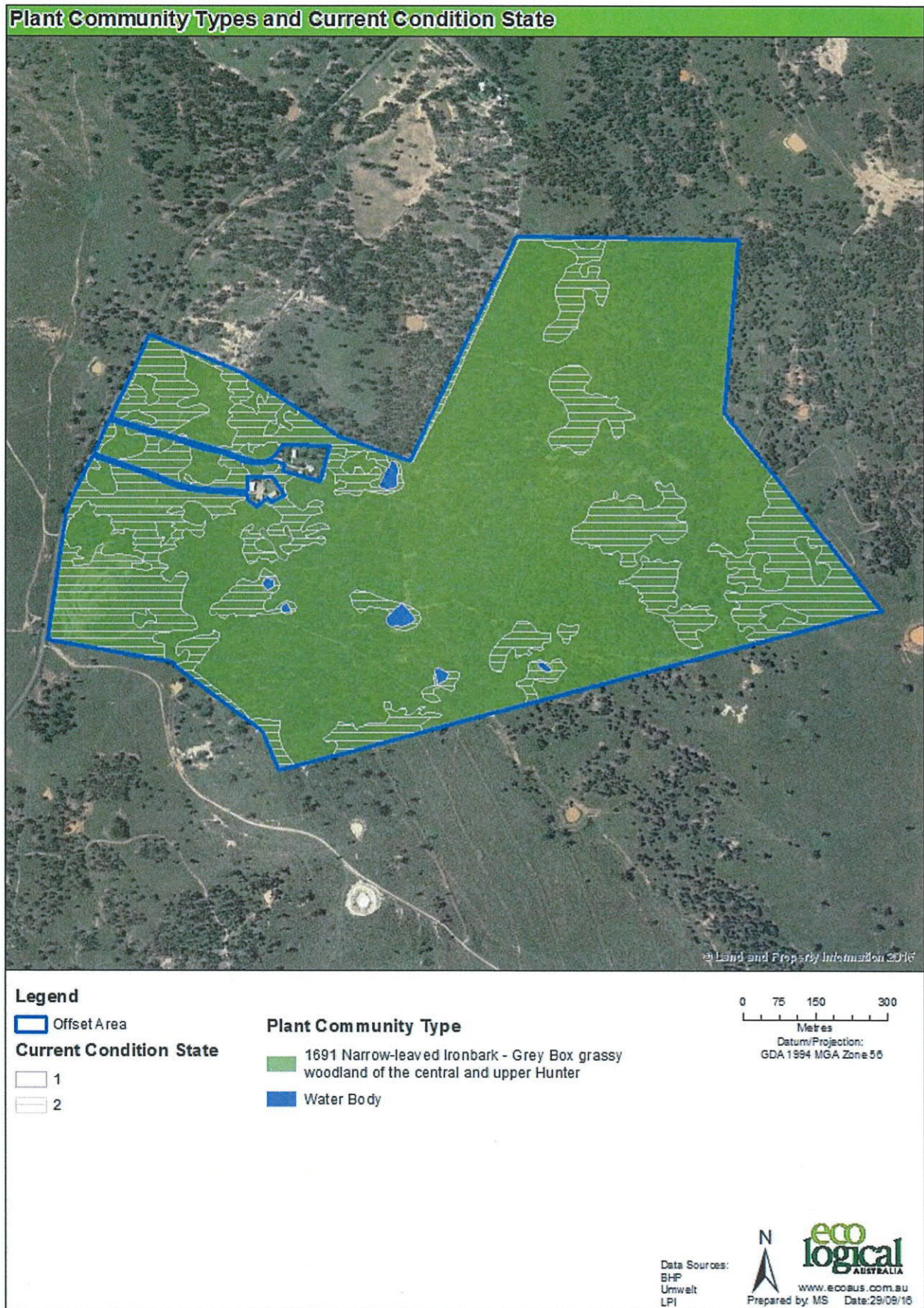
ANNEXURE B DIAGRAM B4 – THREATENED ECOLOGICAL COMMUNITIES (TSC Act)



ANNEXURE B DIAGRAM B5 – THREATENED ECOLOGICAL COMMUNITIES (EPBC ACT)



ANNEXURE B DIAGRAM B6 – CURRENT VEGETATION CONDITION



Note: State 1 = intact, State 2 = DNG, State 3 = exotic grassland, State 5 = plantation

ANNEXURE B - PHOTO POINT PHOTOGRAPHS

Two photo points were established per vegetation type present on the conservation area, giving a total of two points. Four photos were taken at each point, oriented in each direction (north, east, south, west). GPS reference points are provided in **Annexure D Table 1**.

Photos are presented below.

RX1 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter dominated by Narrow-leaved Ironbark (*Eucalyptus crebra*), with an understorey of *Acacia paradoxa* and *Dodonaea* sp.

Weed cover is low, and includes Prickly Pear (*Opuntia* sp.) and Tiger Pear (*Opuntia aurantiaca*).



N



E



S



W

RX2 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG) with scattered Narrow-leaved Ironbark (*Eucalyptus crebra*).

Weed cover is low to moderate and includes *Verbena bonariensis*, *Cirsium vulgare* and *Sida rhombifolia*.



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Biodiversity Management Plan

Annexure C Management of the Conservation Area

Item 1: Management Aims and actions required to be undertaken for minimum period of 10 years.

Aim	Timing	Management action
Weed control across the Conservation Area (focusing on noxious and environmental weeds)	Year 1	Primary weed control: 320 hours bush regeneration by qualified bush regeneration contractor over 12 month period. Techniques specified in Annexure C Item 3 must be used.
	Years 2-5	Follow up weed control: 160 hours bush regeneration per year for years 2-5 Techniques specified in Annexure C Item 3 must be used.
	Years 6 – 10	Annual ongoing maintenance weed control: 80 hours annually for 5 years. Techniques specified in Annexure C Item 3 must be used.
	Year 2	Seed collection undertaken if deemed necessary.
Pest animal monitoring and control (local co-ordination with Local Land Services and OEH)	Years 1-10	Pest animal control activities to be determined based on density and species of pest animals. Techniques specified in Annexure C Item 3 must be used.
Construct and maintain fire breaks and implement fire management hazard reduction burns. Operate with NSW Rural Fire Service or fire management contractor to implement mosaic or partial area hazard reduction burn.	Years 1-10. Liaise with RFS and NPWS regarding appropriate timing.	Implement 2 hazard reduction burns during low risk fire season according to guidelines specified in Annexure C Item 3.
Fencing	Years 2-10	Maintain fences as required. Replace 1/10 th of total length of fence every three years. Techniques specified in Annexure C Item 3 must be used.

Annual Reports for Monitoring Program	Years 1-10	Annual reports to be prepared according to specifications in Annexure D Monitoring Program.
Threatened species, populations and endangered ecological communities (EEC)	Years 1-10	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.

Annexure C Management of the Conservation Area*Item 2: Management actions required to be undertaken from Year 11 onwards.*

Issue	Management action
Exotic plants	The Owner must take reasonable measures in relation to the control of exotic plants. Techniques specified in Annexure C Item 3 must be used.
Pest animals	The Owner must take reasonable measures in relation to monitoring of pest animals. Techniques specified in Annexure C Item 3 must be used.
Threatened species, populations and endangered ecological communities (EEC)	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.
Managing visitor impacts (visitors include OEH inspectors; weed control contractors; fire maintenance contractors; NSW Rural Fire Service; fencing and maintenance contractors and the Owner)	The Owner must take reasonable measures to ensure that visitor disturbance to the Conservation Area is minimised by keeping visitors to tracks and trails except for management purposes and ensuring all visitor vehicles and equipment entering the Conservation Area are clean and free from weeds and/or seeds. Guidance specified in Annexure C Item 3 Visitation and research must be used.
Maintain vehicle access to Conservation Area for visitor management, fire management, weed and fencing management	The Owner must take reasonable measures to ensure that vehicle access is maintained by maintaining and repairing access trails as required. Techniques specified in Annexure C Item 3 must be used.
Monitoring and Reporting	The Owner must complete a monitoring report at least every 3 years as described in Clause 8 of the Conservation Agreement.
Livestock	The Owner must remove any livestock which have entered the Conservation Area as soon as practical.
Fencing	The Owner must take reasonable measures to construct and maintain fences along the boundaries of the Conservation Area where adjacent land use cause or are likely to cause adverse impacts on or in the Conservation Area. Techniques specified in Annexure C Item 3 must be used.

ANNEXURE C ITEM 3: PERMISSIONS AND GUIDELINES

Control of pest animals and non-indigenous fauna (in addition to pest animal control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- a) Participate in community pest animal control programs, and encourage neighbours to implement pest animal control programs. Contact your Local Land Services office or National Parks and Wildlife Service Area office to find out where community control programs are occurring.
- b) Methods for pest animal control can include; shooting, trapping and use of poisonous baits consistent with advice from OEH and Local Land Services. Use control methods identified as 'humane' as defined in the NSW Codes of Practice and Standard Operating Procedures for Humane Pest Vertebrate Control (Control Capture and Destruction of Feral Animals in Australia) as developed by the NSW Department of Primary Industries.
- c) Pest animal control activities to be determined based on density and species of pest animals. Methods for monitoring pest animal activity should include:
 - i) observations and/or hearing calls,
 - ii) the use of standard "sand plots",
 - iii) the use of non-poisoned "bait stations",
 - iv) scat counts, and
 - v) other quantitative techniques which can be designed in discussion with OEH or Local Land Services.

Control of weeds and exotic plants (in addition to weed control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- d) Apply a range of techniques including:
 - i) Removal of weeds by hand ensuring that all plant parts which can reproduce are removed and that soils do not become prone to erosion.
 - ii) Use of carefully selected herbicide according to label directions and/or current off label permit, ensuring minimal off target damage.
 - iii) Use of appropriate control measures as recommended in the Department of Primary Industries Noxious and Environmental Weed Control Handbook 6th Edition 2014 or equivalent replacements for control of weeds, ensuring minimal off target damage.
 - iv) Use of forestry mulching or slashing machinery only with prior written permission from OEH.
 - v) Ensure control programs are commenced when timing and extent of weed removal will minimise adverse effects on wildlife (weeds may provide protection or habitat for native fauna). Dense thickets of lantana should be removed gradually in mosaic patterns to minimise disturbance to the habitat of native animals.
 - vi) Other weed control methods may only be undertaken with prior written permission of OEH.
 - vii) Contact OEH if any uncertainty exists regarding weed control methods.

Cultural heritage

- e) Recording and management of any newly identified Aboriginal Objects or artefacts, in consultation with OEH (and the relevant local Aboriginal community where applicable).

Development

- f) Carrying out any development as described in the Conservation Agreement and maintaining development (including existing fire trails, access trails and infrastructure), with the following conditions:
- i) clear a corridor not greater than 3 metres wide during construction or for maintenance for the installation of fences or other agreed rural structures;
 - ii) move fallen timber and any other obstructions to maintain access trails, tracks and fences;
 - iii) where clearing is permitted under the Agreement and necessary, undertake all works in a manner that minimises disturbance to soil and hydrological characteristics.

Fencing, tracks and trails

- g) Construction and maintenance of all fences using wildlife friendly materials including plain wire (non-barbed) on top and bottom strands.
- h) Construction of any new internal fence, access track or trail only with prior written approval from OEH.
- i) Maintaining existing access walking tracks in the Conservation Area to a maximum width of 2m.
- j) Maintaining existing access vehicular trails in the Conservation Area to a maximum width of 4m with 1m either side permissible for clearing.
- k) Removal of old fences and closing of unwanted tracks within the Conservation Area and facilitate restoration of indigenous vegetation according to Annexure 3 Item 3 (points 'n' and 'o' over page).

Fire management (in addition to fire management actions in Item 1 of Annexure C to the Conservation Agreement)

- l) Using fire hazard reduction burns and controlled burning which take into account the recommended fire intervals given in the *Bush Fire Environmental Assessment Code for New South Wales* (Rural Fire Service February 2006) and the guidelines contained in the *Threatened Species Hazard Reduction Lists for the Bush Fire Environmental Assessment Code* or equivalent replacements.

Current recommendations are:

- i) minimum fire intervals of:
 - 8 year fire interval for Narrow-leaved Ironbark - Grey Box grassy woodland (PCT 1691)
- ii) wherever possible canopy or crown fires should be avoided.
- iii) wherever possible no more than 50% of the Conservation Area should be burnt in any twelve month period.
- iv) both live and dead trees with hollows should be protected from burning as far as practicable in order to preserve nesting habitat for hollow dwelling animals.
- m) Lighting a fire, or causing a fire to be lit on the Conservation Area if it complies with the *Rural Fires Act 1997* (NSW), and:
 - i) the lighting of the fire is a necessary component of bush fire hazard reduction work carried out in accordance with a notice served on the Owner under the Rural Fires Act 1997 (NSW) or other applicable legislation; or
 - ii) life or property is in immediate threat by bush fire and the lighting of the fire is reasonably necessary to protect life or property; or
 - iii) the fire is a camp fire, subject to the compliance with the Rural Fires Act 1997 (NSW), or

- iv) the Chief-Executive gives prior written consent to the lighting of the fire.

Restoration of indigenous vegetation

- n) Restoration of native vegetation on the Conservation Area using a preferred method of encouraging and retaining natural regeneration. Preferred methods include:
 - i) bush regeneration
 - ii) brush mulching; and/or
 - iii) direct seeding.
- o) Revegetation to establish indigenous plants to maintain the vegetation structure in keeping with the identified vegetation community, using species produced from material sourced locally and without fertilisers, where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion.

Seed collection

- p) Collection of seed on the Conservation Area for non-commercial use in accordance with Guidelines and Codes of Practice developed by Florabank (www.florabank.org.au), or subsequent equivalent and with the following limitations and permissions:
 - i) Collect seed in the Conservation Area only if seed of the particular species and genotype is not available elsewhere, or if the seed collected is intended for seedlings that will be planted within the Conservation Area or adjacent to the Conservation Area.
 - ii) Seeds may be collected from within endangered ecological communities.
 - iii) Seeds may not be collected from species individually listed in Schedules 1, 1A or 2 to the TSC Act without prior written approval from the Chief-Executive, or under a licence granted under section 132C of the NPW Act or section 91 of the TSC Act.
 - iv) Seeds may be collected from any protected species listed in Schedule 13 to the NPW Act.
 - v) Seeds may be collected from any other native species.

Thinning of indigenous vegetation

- q) Thinning of regenerating indigenous species which are altering the structure of the vegetation in the Conservation Area and/or reducing the Conservation Values only with prior written approval from the Chief-Executive OEH.

Threatened species

- r) Implementing any measures included in recovery plans for any threatened species, population or ecological communities which are or may be found in the Conservation Area.
- s) Implementing other specific management advice from OEH for any threatened species, populations or ecological communities which are or may be found in the Conservation Area.

Use of timber

- t) Harvesting of fallen non-hollow wood in amounts necessary for heating the Owner's dwelling on the Land and camp fires on the Conservation Area.

Visitation and research (in addition to management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- u) Visitation, research and community use at a level that does not adversely impact on the Conservation Values or the amenity of the Owner. Research projects must be first discussed with OEH before being carried out.

ANNEXURE D - MONITORING PROGRAM

- (a) The Owner must engage a suitably qualified person (such as an ecologist) to undertake a monitoring event in each year, beginning in 2018 (Monitoring Event).
- (b) Each Monitoring Event must include:
- i) **photo monitoring** - four photos are required to be taken at each of the two established monitoring points shown in **Annexure B**. Photos must be taken from the exact location and bearing to allow subsequent comparison and assessment. Photo point locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Baseline photographs are provided in Annexure A to the Conservation Agreement. Photo monitoring must include the collection of at least the top five canopy, shrub-layer and groundcover species and the recording of any threats. Sites are to be monitored biennially commencing 2018.
 - ii) **quadrat monitoring** – quadrat data must be collected at each of the two photo points above. Quadrat locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Results must be compared to baseline and benchmark quadrat data which is provided in **Tables 1 and 2** of Annexure D to the Conservation Agreement **below**. Sites are to be monitored biennially commencing 2018.
 - iii) a **walk through assessment** to record opportunistic sightings within the Conservation Area including:
 - i. fire events or impacts of fire management
 - ii. weeds (including compiling a list of exotic species and recording new weed infestations including location and extent)
 - iii. pest animals (species and location must be recorded, including evidence of pest animals such as burrows, scats or disturbance)
 - iv. visitor impact and vehicle access (including evidence of any recent usage, and the presence of any new access tracks)
 - v. rubbish dumping
 - vi. natural regeneration of previously disturbed areas; and
 - vii. sightings of threatened species. Voucher specimens of potential threatened plants will be taken where doing so will not adversely affect the local population, and sent to a recognised museum or herbarium for identification.
- (c) After each Monitoring Event, the Owner must produce a monitoring report on the Conservation Area by 30 December of each year, beginning in 2018 (Monitoring Report).

The Monitoring Report must include:

- i. a description of all completed management actions undertaken in the previous 12 month period;
- ii. total cost of all works completed in undertaking the management actions listed in items 1 and 2 of Annexure C to the Conservation Agreement;
- iii. completed monitoring data sheets (including photographs) using the template provided in **Table 3** of Annexure D to the Conservation Agreement (**below**);
- iv. a discussion of the changes recorded at monitoring points and quadrats;
- v. a summary of quadrat data for each photo point;
- vi. a discussion of the condition of Conservation Values;
- vii. a discussion of effectiveness of any management actions implemented; and
- viii. recommendations and proposed management actions to be performed in following year(s).

The Monitoring Report must be submitted to OEH within **21 days** of it being received by the Owner.

- (d) The Monitoring Event and the Monitoring Report comprise the monitoring program (Monitoring Program). The Owner must complete the Monitoring Program to the satisfaction of OEHL, for a minimum period of 10 years from the date of the Conservation Agreement.

ANNEXURE D TABLE 1 - MONITORING POINT LOCATIONS AND CORRESPONDING VEGETATION COMMUNITIES REPRESENTED AS AT FEBRUARY 2016

Photo Point / Quadrat No.	Easting/Northing GDA 94 MGA 56	Vegetation Community Represented
RX1	290655, 6424643	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
RX2	289983, 6424624	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG)



ANNEXURE D TABLE 2 – BIOMETRIC VEGETATION TYPE BENCHMARKS AND BASELINE QUADRAT SCORES AS AT FEBRUARY 2016

Photo Point / Quadrat no.	Native species richness	Overstorey cover %pfc	Mid-storey cover %pfc	Ground cover – grasses %pfc	Ground cover – shrubs %pfc	Ground cover – other %pfc	Proportion overstorey regen.	Exotic cover	Number of trees with hollows	Total length of fallen logs
1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
RX1	12	0	12.5	0	0	17.5	1	1	TBC	TBC
RX2	13	1	1	14.5	2	62	0.5	13.5	TBC	TBC

Comprehensive baseline biodiversity studies of the Conservation Area were undertaken in 2013. During these studies, vegetation condition data was collected at most photo point locations. A modified 6-point Braun-Blanquet scale was used to estimate cover-abundances of all plant species. To develop baseline biometric quadrat data, this scale was modified as follows - all 1's (few individuals <5% cover) were removed due to low cover, 2's (Many individuals <5%) were converted to an assumed 1% total cover and then the midpoints of the remaining classes adopted (i.e. 12.5%, 35%, 62.5% and 87.5%).

The proportion of overstorey regeneration was inferred from the current condition class at each photo point i.e. Class 1 (remnant) was given a score of '1', Class 2 (derived native grassland EEC) was given a score of '0.5' and Class 3 was given a score of '0'.

Where photo monitoring points were not directly located at an existing baseline study site, the nearest baseline site, or a baseline site within the same PCT was selected. Biometric data (including number of trees with hollows and total length of fallen logs) will be collected and reviewed at each photo point during subsequent years monitoring. Note that care must be taken when interpreting baseline Braun-Blanquet cover-abundance data against future biometric data, due to slight differences in the methodology used for estimating vegetation cover.

MAC-STE-MTP-050

Biodiversity Management Plan

Saddlers Creek Conservation Area
Lodgement number: C1023991
Commencement date: 21 June 2017

ANNEXURE B - CONSERVATION VALUES

1. CONSERVATION VALUES

The Owner and the Minister recognise that the Conservation Area contains the following conservation values:

A The Conservation Area contains six biometric communities:

- Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley
- Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
- Bull Oak grassy woodland of the central Hunter Valley
- Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley
- River Red Gum - River Oak grassy riparian woodland of the Hunter Valley
- Typha rushland

River Red Gum / River Oak riparian woodland wetland in the Hunter Valley (PCT 42)

This vegetation community is confined to the floodplains and associated low rises along Saddlers Creek. The community supports a sparse canopy (up to 20 per cent cover **) dominated by Yellow Box (*Eucalyptus melliodora*), Grey/White Box hybrids (*Eucalyptus albens x moluccana*), Red Gum hybrids (*Eucalyptus blakelyi x tereticornis*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Forest Red Gum (*Eucalyptus tereticornis*). In some areas Swamp Oak (*Casuarina glauca*) and Rough-barked Apple (*Angophora floribunda*) may occur in low abundance. The height of the canopy ranges from 14 to 25 metres. A sub-canopy of the above listed canopy species is often present (up to 20 per cent cover) and ranges between 2 to 8 metres in height.

[** Vegetation cover measured as percent foliage cover, that is the percentage of ground that would be covered by a vertical projection of the foliage and branches and trunk of a plant or plants.]

The shrub layer is generally sparse (up to 20 per cent cover), comprising regrowth of the above listed canopy species, Cooba (*Acacia salicina*) and Native Olive (*Notelaea microcarpa var. microcarpa*). The shrub layer ranges from 0.5 to 2 metres in height.

This community is characterised by a diverse and dense ground layer (up to 95 per cent cover) between 0.1 and 1 metre in height. Common herbs include Common Everlasting (*Chrysocephalum apiculatum*), Poison Rock Fern (*Cheilanthes sieberi subsp. sieberi*), Many- Flowered Mat-rush (*Lomandra multiflora subsp. multiflora*), Amulla (*Eremophila debilis*), Native Pennyroyal (*Mentha saturioides*), *Glycine tabacina*, *Maireana microphylla*, and Kidney Weed (*Dichondra repens*). Native grasses include Weeping Grass (*Microlaena stipoides var. stipoides*), Common Couch (*Cynodon dactylon*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*), Red Grass (*Bothriochloa macra*), Slender Rat's Tail Grass (*Sporobolus creber*), Tall Chloris (*Chloris ventricosa*), Kangaroo Grass (*Themeda australis*), Queensland Bluegrass (*Dichanthium sericeum subsp. sericeum*) and *Digitaria diffusa*.

This community is consistent with the EEC Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. In summary this community complies with the final determination (NSW Scientific Committee 2011) with regard to the following attributes:

- The community occurs on a floodplain within the NSW Sydney Basin Bioregion;
- It occurs in the Muswellbrook Local Government Area (LGA) where the EEC has previously been recorded;

- It supports a high proportion of species that are in the list of characteristic species for the EEC: 22 out of 99 (22 per cent) native species recorded in this community are in the EEC listing, and 22 out of 37 (60 per cent) species in the characteristic species list for the EEC were recorded in this community.

This community is also consistent with the CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act for the following reasons:

- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;
- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectare or greater in size;
- All patches contain at least one important species (DEH 2006);
- The species composition is consistent with the Commonwealth listing advice (TSSC 2006) and associated species list (DEH 2006b); and
- All patches contain at least 12 native understorey species (excluding grasses).

Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley (PCT 116)

This community consists of a woodland of Weeping Myall (*Acacia pendula*) and includes a shrub/small tree layer with species such as Coobah (*Acacia salicina*) and Scrub Wilga (*Geijera salicifolia*), Yarran (*Acacia homalophylla*) and Stiff Canthium (*Psyrax odorata* subsp. *buxifolia*).

The ground stratum may vary from dense to sparse and includes grasses such as Kangaroo Grass (*Themeda triandra*), Wallaby Grass (*Rytidosperma* sp.), Snow Grass (*Poa sieberiana*) and Barbed Wire Grass (*Cymbopogon refractus*) and low shrubs and herbs, such as Common Everlasting (*Chrysocephalum apiculatum*), Climbing Saltbush (*Einadia nutans* subsp. *nutans*), Ruby Saltbush (*Enchylaena tomentosa*), Eastern Cotton Bush (*Maireana microphylla*) and Mulla Mulla (*Ptilotus nobilis* subsp. *semilanatus*).

This community is consistent with the CEEC Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion listed under the TSC Act. This community complies with the final determination (NSW Scientific Committee 2011) with regard to the following attributes:

- The community occurs on heavy clay soils in the south-western area of the Hunter River valley floor within the Sydney Basin bioregion;
- The community occurs in the Muswellbrook LGA where the EEC has been recorded;
- Whilst 14 of 62 (23%) of the characteristic species of the EEC occur in the community, all of the dominant native species recorded in this community (those listed in the above paragraphs) are listed as characteristic species in the EEC listing.

The larger of the two patches of the community is likely to also be consistent with the CEEC Hunter Valley Weeping Myall (*Acacia pendula*) Woodland listed under the EPBC Act for the following reasons:

- The patch has a canopy dominated by *Acacia pendula*;

- Other native shrubs are present in the patch, including other *Acacia* species and *Psydrax odorata* subsp. *buxifolia*, and the ground layer includes native grasses, forbs and chenopod low shrubs;
- The patch occurs in the Hunter Valley region of NSW on undulating plains;
- The patch is over 0.1 ha in size;
- 14 native plant species listed in the Commonwealth conservation/listing advice (TSSC 2014) are present within the patch;
- Non-native perennial plants comprise less than 70% of the vegetation cover in each layer of the patch.

Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (PCT 1691)

This community supports a typically sparse canopy (10 to 40 per cent cover) dominated by either Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), or Narrow-leaved Ironbark (*Eucalyptus crebra*). The occurrences of this community have been separated based on the dominance of these two species in order to identify areas of White Box – Yellow Box – Blakely's Red Gum Woodland EEC (listed under the TSC Act) and White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC (listed under the EPBC Act). In some areas, Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*), Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*) may occur in low abundance. Height of the canopy ranges from 7 to 20 metres.

The shrub layer is generally very sparse (1 to 10 per cent cover), comprising regrowth of the above listed canopy species, *Cassinia quinquefaria*, Western Golden Wattle (*Acacia decora*), Kangaroo Thorn (*Acacia paradoxa*), Native Blackthorn (*Bursaria spinosa*), Western Boobialla (*Myoporum montanum*), and Native Olive (*Notelaea microcarpa* var. *microcarpa*). The shrub layer ranges from 0.5 to 4 metres in height.

This community is characterised by a diverse and dense ground layer (up to 85 per cent cover) between 0.1 and 1 metre in height. Common herbs and sub-shrubs include Yellow Burr-Daisy (*Calotis lappulacea*), Common Everlasting (*Chrysocephalum apiculatum*), Poison Rock Fern (*Cheilanthes sieberi* subsp. *sieberi*), Corrugated Sida (*Sida corrugata*), *Rostellularia adscendens*, Climbing Saltbush (*Einadia nutans*), Many-flowered Mat-Rush (*Lomandra multiflora* subsp. *multiflora*), Amulla (*Eremophila debilis*), *Glycine tabacina*, *Maireana microphylla*, and Kidney Weed (*Dichondra repens*). Native grasses include Barbed Wire Grass (*Cymbopogon refractus*), Wallaby Grass (*Rytidosperma fulvum*), Speargrass (*Austrostipa scabra*), Weeping Grass (*Microlaena stipoides* var. *stipoides*), Shorthair Plumegrass (*Dichelachne micrantha*), Slender Bamboo Grass (*Austrostipa verticillata*), Purple Wiregrass (*Aristida ramosa*), Paddock Lovegrass (*Eragrostis leptostachya*), Tall Chloris (*Chloris ventricosa*), Pitted Bluegrass (*Bothriochloa decipiens* var. *decipiens*) and Red Grass (*Bothriochloa macra*).

This community is consistent with the EEC Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions listed under the TSC Act. The community complies with the final determination (NSW Scientific Committee 2011) for the EEC with regard to the following attributes:

- The community occurs on Permian sediments within the NSW Sydney Basin Bioregion;
- It occurs in the Muswellbrook Local Government Area (LGA) where the EEC has previously been recorded;
- 163 native plant species have been recorded in this community in the Conservation Area. Of these, 31 (i.e. 19 per cent) are listed as 'characteristic species' in the NSW Scientific Committee

final determination for this EEC. This determination has 38 characteristic species, which means that a high proportion (82 per cent) of species characteristic of the EEC occur on the site.

The Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*) dominated areas of this community are also consistent with the EPBC-listed CEEC White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed under the EPBC Act for the following reasons:

- The overstorey comprises, or prior to clearing would have comprised, one or more of the three characteristic species, including White Box (*Eucalyptus albens*), Yellow Box (*Eucalyptus melliodora*), Blakely's Red Gum (*Eucalyptus blakelyi*) or their intergrades or hybrids, as the most common overstorey species;
- Each patch has a predominantly native understorey where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species;
- All patches are 0.1 hectare or greater in size;
- All patches contain at least one important species (DEH 2006);
- The species composition is consistent with the Commonwealth listing advice (TSSC 2006) and associated species list (DEH 2006b); and
- All patches contain at least 12 native understorey species (excluding grasses).

Bull Oak grassy woodland of the central Hunter Valley (PCT 1692)

This community supports a mid – dense canopy (up to 50 per cent cover) dominated by Bulloak (*Allocasuarina luehmannii*). There are occurrences of Narrow-leaved Ironbark (*Eucalyptus crebra*) and Grey/White Box hybrids (*Eucalyptus albens* x *moluccana*), however these species typically only form a minor component of the canopy. Height of the canopy ranges from 8 to 15 metres. The shrub layer is generally absent, however in some areas a very sparse (less than 5 per cent cover) shrub layer occurs, comprising *Dodonaea viscosa* subsp. *angustifolia*, Cooba (*Acacia salicina*) and regenerating Bulloak (*Allocasuarina luehmannii*). When present, the shrub layer ranges from 2 to 4 metres in height.

This community is characterised by a sparse to very sparse ground layer (5 to 20 per cent cover) between 0.1 and 1 metre in height. Common herbs include Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), Wattle Mat-rush (*Lomandra filiformis*) and Ruby Saltbush (*Enchylaena tomentosa*). Native grass species present include Slender Rat's Tail Grass (*Sporobolus creber*), speargrass (*Austrostipa scabra*), Barbed Wire Grass (*Cymbopogon refractus*), Tall Chloris (*Chloris ventricosa*) and Purple Wiregrass (*Aristida ramosa*).

This community is not consistent with any listed TEC under the TSC Act or EPBC Act. The community is not considered to comprise the EPBC-listed *Central Hunter Valley Eucalypt Forest and Woodland*, as the listing advice for the EEC specifically excludes patches dominated solely by *A. luehmannii*, in which all of the typically dominant eucalypt species are entirely or mostly absent.

Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley (PCT 1731)

This vegetation community is confined to the riparian zone along Saddlers Creek. The community supports a sparse to mid – dense canopy (up to 50 per cent cover) dominated by Swamp Oak (*Casuarina glauca*), with occurrences of Rough-Barked Apple (*Angophora floribunda*) and Red Gum hybrids (*Eucalyptus blakelyi* x *tereticornis*). Height of the canopy ranges from 14 to 20 metres. The shrub layer is generally absent; however, in some areas a very sparse (less than 5 per cent cover) shrub layer occurs,

comprising *Spartothamnella juncea* and regenerating Swamp Oak (*Casuarina glauca*). When present, the shrub layer ranges from 1 to 2 metres in height.

This community is characterised by a dense ground layer (50 to 90 per cent cover) between 0.1 and 1.5 metre in height. Common herbs and sub-shrubs include *Glycine tabacina*, Swamp Dock (*Rumex brownii*), Whiteroot (*Pratia purpurascens*), *Maireana microphylla*, Kidney Weed (*Dichondra repens*) and Stinking Pennywort (*Hydrocotyle laxiflora*). Weeping Grass (*Microlaena stipoides* var. *stipoides*) and Common Couch (*Cynodon dactylon*) are the dominant native grasses, as well as the taller Slender Bamboo Grass (*Austrostipa verticillata*).

This community is not consistent with any listed TEC under the TSC Act or EPBC Act.

Typha rushland (PCT 1737)

This community is confined to Saddlers Creek in areas where water flow has been artificially restricted and now pools. This has allowed the emergent aquatic plant Broad-leaved Cumbungi (*Typha orientalis*) to become established where the water is shallow enough.

The native aquatic plant species Broad-leaved Cumbungi (*Typha orientalis*) forms a dense (50 to 90 per cent cover) ground layer, with a height between 1.5 and 2 metres. The native grass species Common Couch (*Cynodon dactylon*) occurs on the landward edge of this community, as does the introduced Sharp Rush (*Juncus acutus* subsp. *acutus*).

This community is not consistent with any listed TEC under the TSC Act or EPBC Act. The community does not comply with the final determination for the TSC-listed EEC *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* (NSW Scientific Committee 2011) with regard to the following attributes:

- The EEC typically occurs below 20 metres in elevation; the mapped community occurs between approximately 130 and 150 metres in elevation;
- The community supports a low proportion of species that are in the list of characteristic species for the EEC: one out of seven (14 per cent) native species recorded in this community are in the EEC listing, and one out of 66 (1.5 per cent) species in the characteristic species list for the EEC were recorded in this community.

Table 1 shows the area of each plant community type by condition state (see also **Diagram B7**).

Table 1: Plant community types present in the Conservation Area

PCT code	Plant community type (PCT)	Condition	Area (ha)
42	River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	Intact	56.43
		DNG	166.57
116	Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley	Intact	0.38
		DNG	0
1691	Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	Intact	4.81
		DNG	123.36
1692	Bull Oak grassy woodland of the central Hunter Valley	Intact	34.43
		DNG	20.76
1731	Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley	Intact	14.41
		DNG	0
1737	Typha rushland	Intact	0
		DNG	3.26
TOTAL		424.42	

B The Conservation Area contains the following threatened fauna species (and refer to **Table 3 Annexure B** and **Diagram B4**):

- *Circus assimilis* (Spotted Harrier) (Vulnerable (V) – TSC Act)
- *Glossopsitta pusilla* (Little Lorikeet) (V – TSC Act)
- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler (Eastern Subspecies)) (V – TSC Act)
- *Pteropus poliocephalus* (Grey-headed Flying-fox) (V – TSC / EPBC Act)

The following Endangered Ecological Communities are present in the Conservation Area (see **Diagram B5** and **B6**):

- *Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions* (EEC – TSC Act)
- *Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions* (EEC – TSC Act)
- *Hunter Valley Weeping Myall Woodland* (CEEC – TSC Act)
- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (EEC – TSC Act, CEEC – EPBC Act)
- *Central Hunter Valley Eucalypt Forest and Woodland* (CEEC – EPBC Act)

As shown in **Table 2** (below), 351.55/351.51 ha of the vegetation present on the Conservation Area corresponds to listed threatened ecological communities under the TSC and / or EPBC Act. These are shown by condition state and listing status.

Table 2: Threatened ecological communities present in the Conservation Area

Threatened ecological community	Condition	TSC listed (ha)	EPBC listed (ha)
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions (TSC Act)	Intact	4.81	-
	DNG	0	-
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions (TSC Act)	Intact	56.43	-
	DNG	0	-
Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion (TSC Act) / Hunter Valley Weeping Myall (<i>Acacia pendula</i>) Woodland (EPBC Act)	Intact	0.38	0.33
	DNG	0	0
White Box - Yellow Box - Blakely's Red Gum Woodland (TSC Act) / White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)	Intact	0	61.25
	DNG	289.93	289.93
Central Hunter Valley eucalypt forest and woodland (EPBC Act)	Intact		*
Total		351.55	351.51

* The area of this CEEC has not been calculated, and is not required to be calculated for the associated development consent.

- C The Conservation Area is located to the east of the Hunter Valley section of the Great Eastern Ranges Initiative. The Great Eastern Ranges Initiative aims to maintain and improve the 'corridor' connectivity of mountain ecosystems running the length of eastern Australia. The focal area of the Initiative includes the Great Dividing Range and the Great Escarpment of Eastern Australia which extend along the majority of Australia's east coast. The current area of focus for this Initiative is the 1,200 kilometres section of the Great Eastern Ranges that falls within NSW.

The Hunter Valley has been identified as one of the five priority areas along the ranges and is considered to be the most diverse and complex in regards to its biodiversity and connectivity and its social and economic factors. The Hunter Valley represents a significant east-west linkage of natural vegetation in the Great Eastern Ranges, with the potential for north-south 'stepping stones' of vegetation such as this Conservation Area, to allow species movement and improve connectivity across areas of the Hunter Valley that have been historically cleared and/ or grazed.

- D The Conservation Area is likely to contain Aboriginal heritage values; however, no detailed studies have been undertaken.

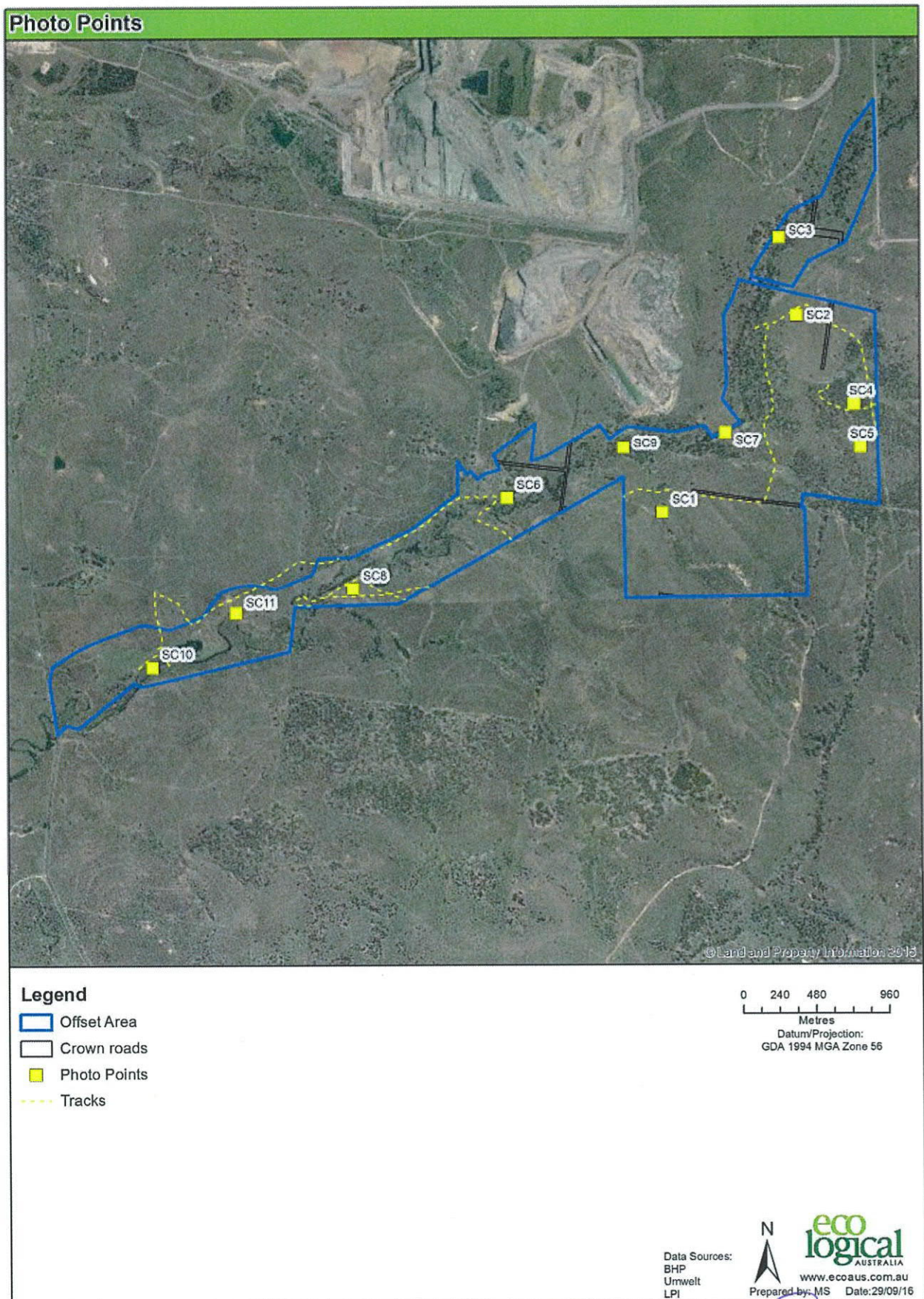
ANNEXURE B TABLE 3 Threatened species found within 20 km radius of site which may occur within the Conservation Area due to the presence of suitable habitat (search conducted March 2016).

Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
Birds				
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE,M	N
Eastern Great Egret	<i>Ardea modesta</i>		M	N
Cattle Egret	<i>Ardea ibis</i>		M	N
Speckled Warbler	<i>Chthonicola sagittata</i>	V		N
Spotted Harrier	<i>Circus assimilis</i>	V		Y
Brown Treecreeper (Eastern Sub- species)	<i>Climacteris picumnus victoriae</i>	V		N
Varied Sittella	<i>Daphoenositta chrysoptera</i>	V		N
Black Falcon	<i>Falco subniger</i>	V		N
Little Lorikeet	<i>Glossopsitta pusilla</i>	V		Y
Little Eagle	<i>Hieraaetus morphnoides</i>	V		N
White-throated Needletail	<i>Hirundapus caudacutus</i>		M	N
Swift Parrot	<i>Lathamus discolor</i>	E	CE, M	N
Square-tailed Kite	<i>Lophoictinia isura</i>	V		N
Hooded Robin (South- eastern Form)	<i>Melanodryas cucullata cucullata</i>	V		N
Black-chinned Honeyeater (Eastern Sub-species)	<i>Melithreptus gularis gularis</i>	V		N
Rainbow Bee-eater	<i>Merops ornatus</i>		M	N
Satin Flycatcher	<i>Myiagra cyanoleuca</i>		M	N
Powerful Owl	<i>Ninox strenua</i>	V		N
Scarlet Robin	<i>Petroica boodang</i>	V		N
Flame Robin	<i>Petroica phoenicea</i>	V		N
Grey-crowned Babbler (Eastern Sub-species)	<i>Pomatostomus temporalis temporalis</i>	V		Y
Rufous Fantail	<i>Rhipidura rufifrons</i>		M	N
Diamond Firetail	<i>Stagonopleura guttata</i>	V		N
Mammals				
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	N
Spotted-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	V	E	N
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V		N
Little Bentwing-bat	<i>Miniopterus australis</i>	V		N
Eastern Bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	V		N
Eastern Freetail-bat	<i>Mormopterus norfolkensis</i>	V		N
Southern Myotis	<i>Myotis macropus</i>	V		N

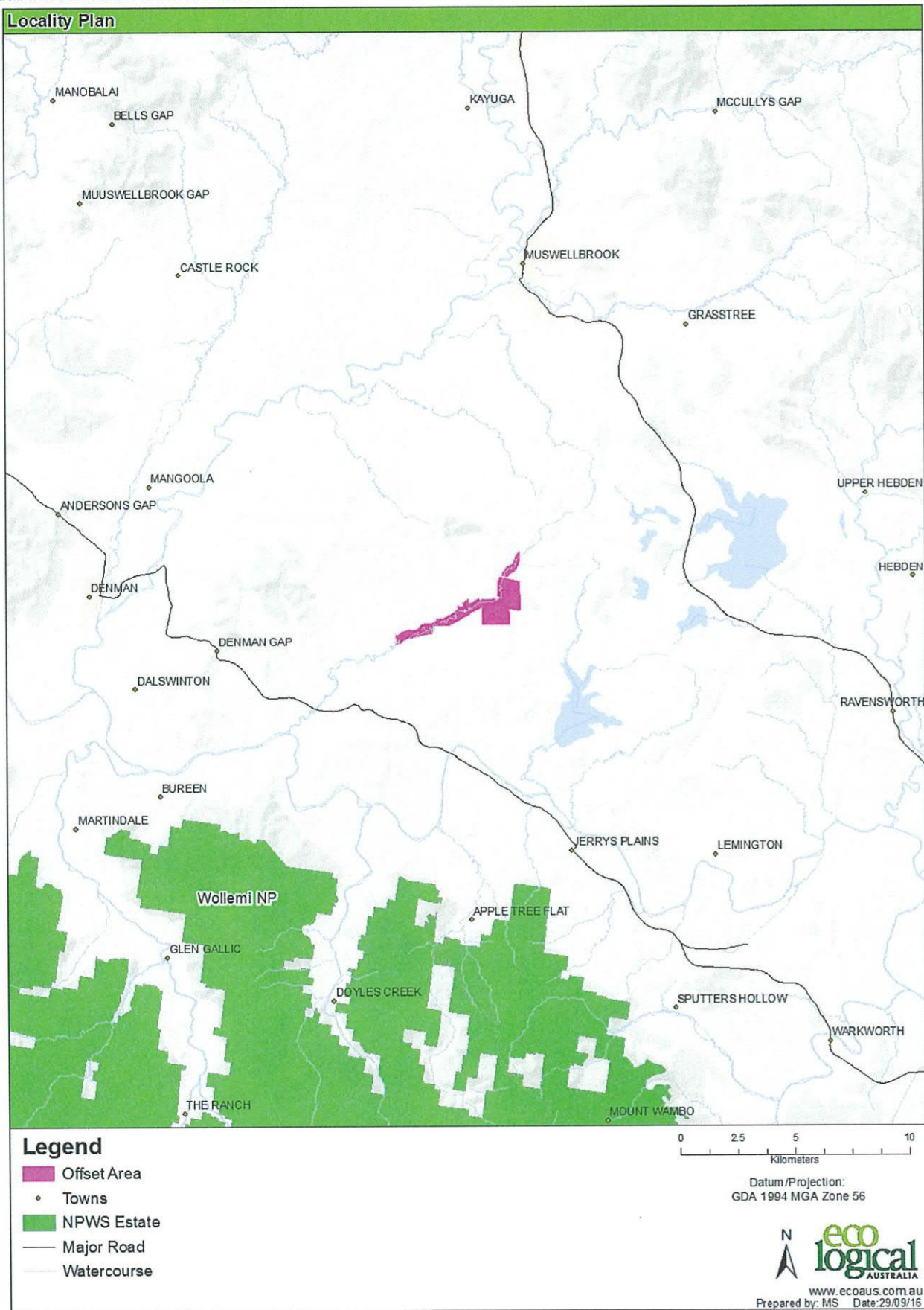
Common Species Name	Scientific Species Name	TSC Act Listing	EPBC Act Listing	Confirmed on site Y/N
South-eastern Long-eared Bat	<i>Nyctophilus corbeni</i>	V	V	N
Squirrel Glider	<i>Petaurus norfolcensis</i>	V		N
Koala	<i>Phascolarctos cinereus</i>	V	V	N
Grey-headed Flying- fox	<i>Pteropus poliocephalus</i>	V	V	Y
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V		N
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V		N
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		N
Flora				
Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	Weeping Myall <i>Acacia pendula</i> population in the Hunter Catchment	E2		N
Pine Donkey Orchid	<i>Diuris tricolor</i>	V		N
<i>Diuris tricolor</i> Fitz population in the Muswellbrook LGA	<i>Diuris tricolor</i> Fitz population in the Muswellbrook LGA	E2		N
River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	River Red Gum <i>Eucalyptus camaldulensis</i> population in the Hunter Catchment	E2		N
Ecological communities				
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		EEC	CEEC	Y
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions		EEC		Y
Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions		EEC	CEEC	Y
Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion		CEEC	CEEC	Y

V= Vulnerable, E= Endangered, CE= Critically Endangered, M= Migratory, Mar= Marine, E2= Endangered Population, EEC= Endangered Ecological Community, CEEC= Critically Endangered Ecological Community

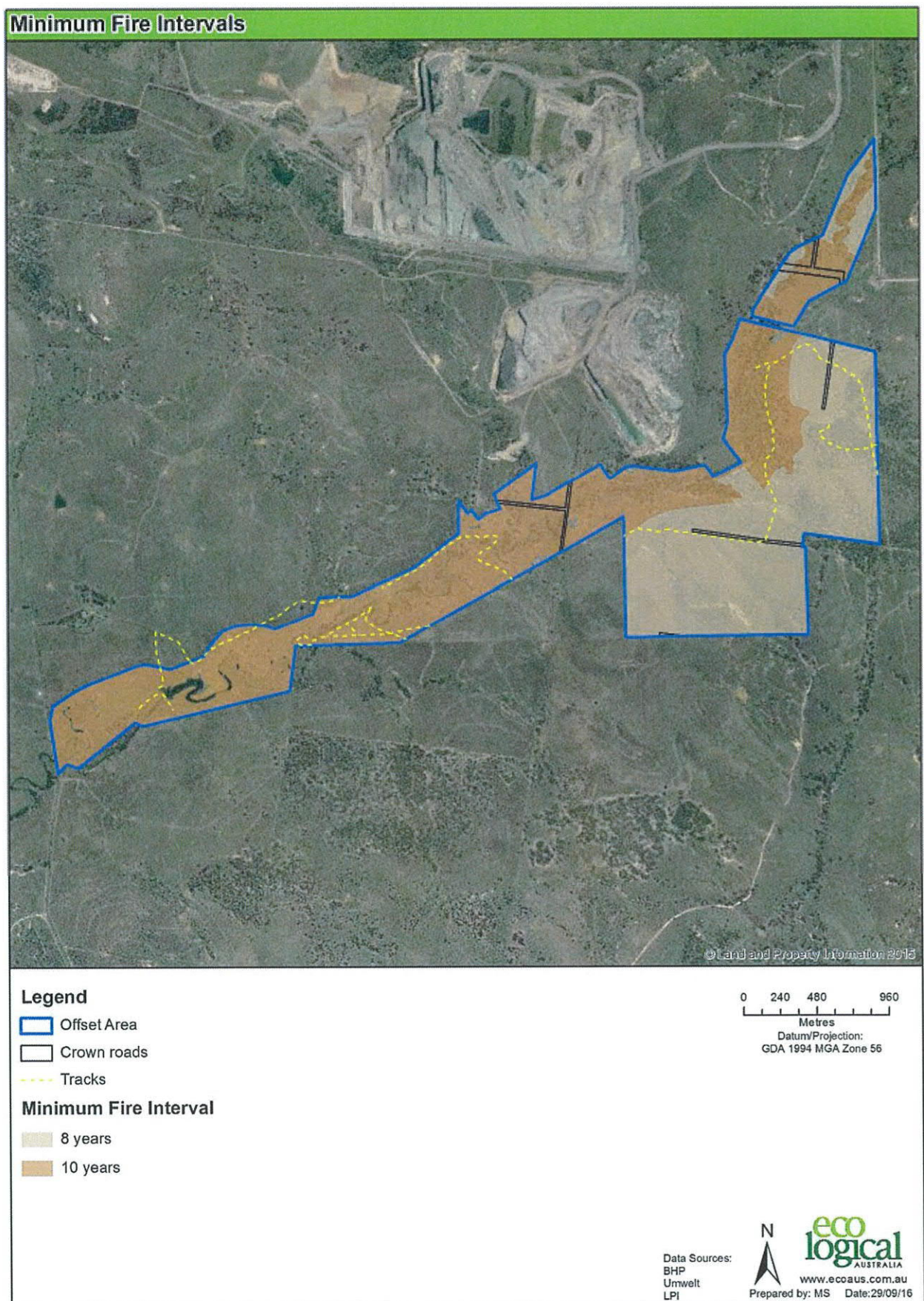
ANNEXURE B DIAGRAM B1 - LOCATION OF BIOMETRIC PLOTS AND PHOTO POINTS



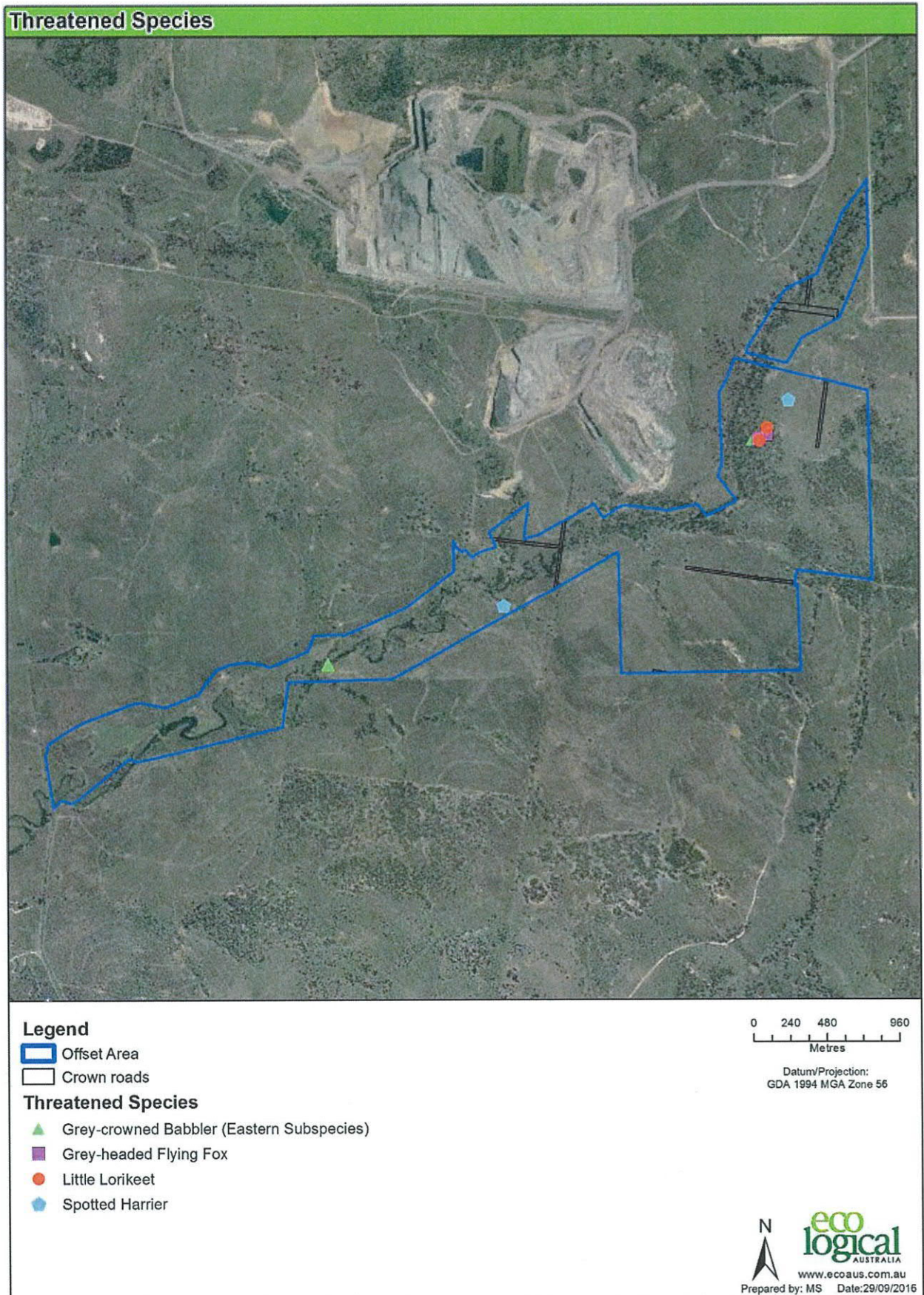
ANNEXURE B DIAGRAM B2 – REGIONAL CONTEXT OF THE SITE



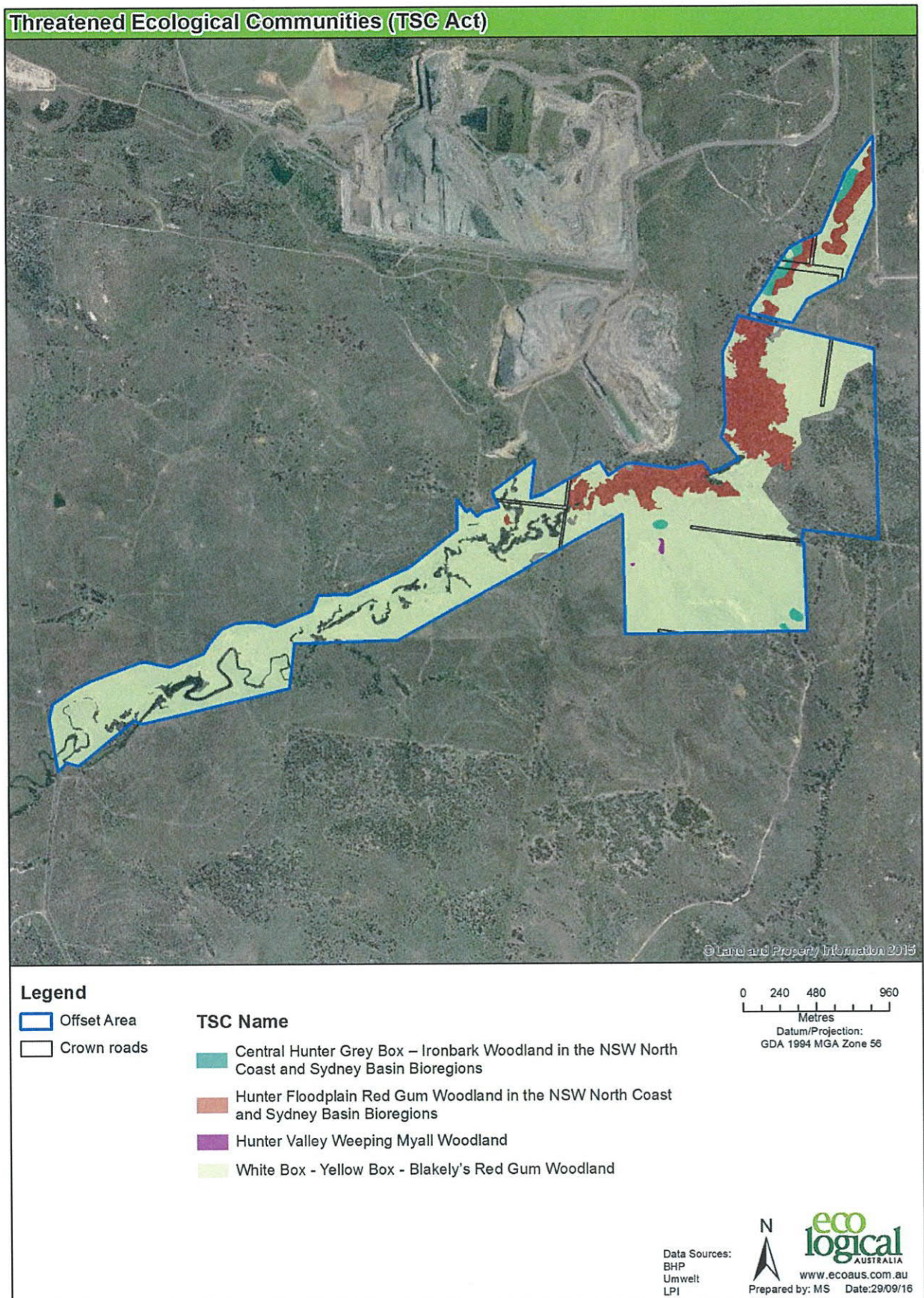
ANNEXURE B DIAGRAM B3 – FIRE MANAGEMENT ZONES



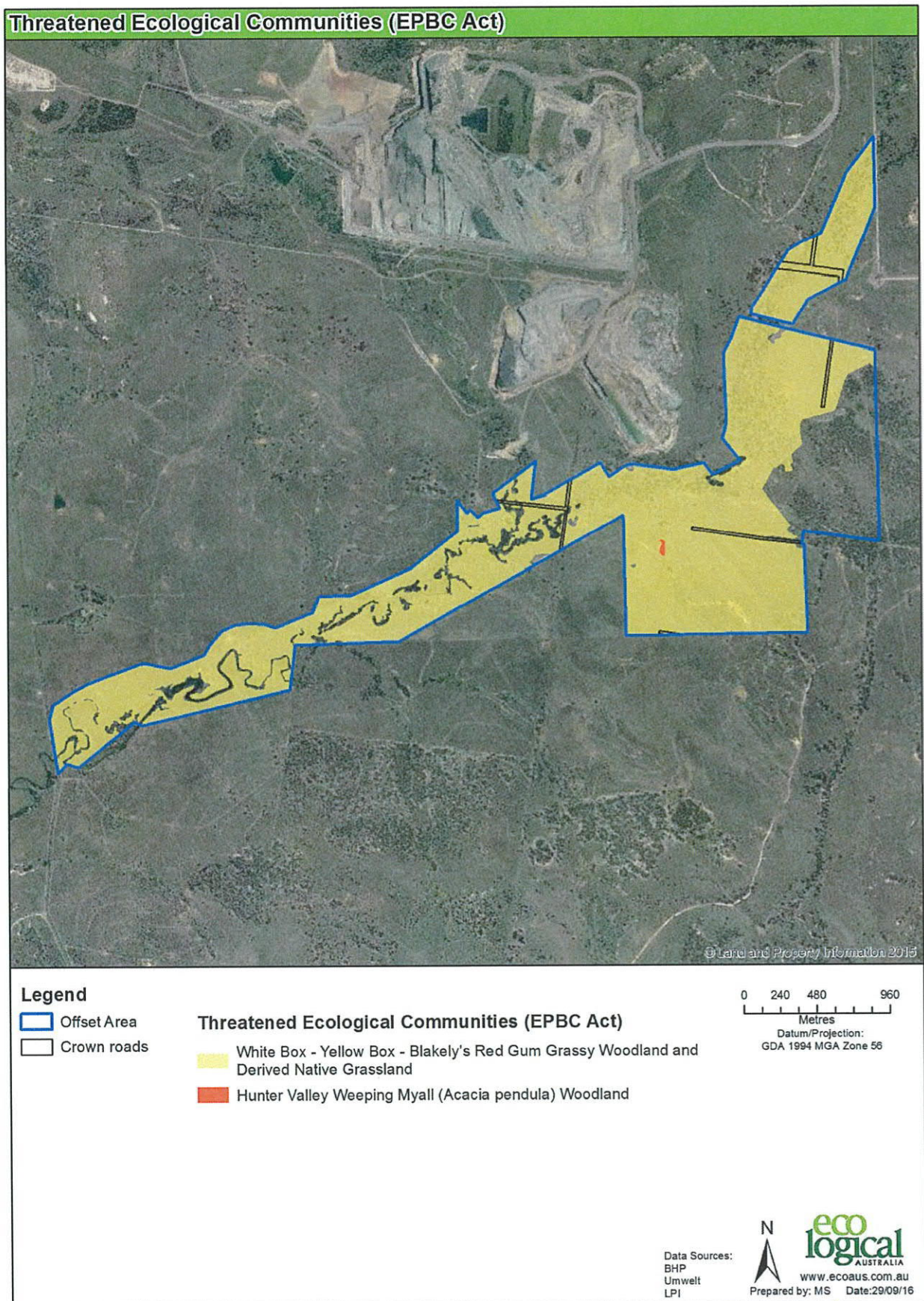
ANNEXURE B DIAGRAM B4 – THREATENED SPECIES RECORDED IN THE CONSERVATION AREA



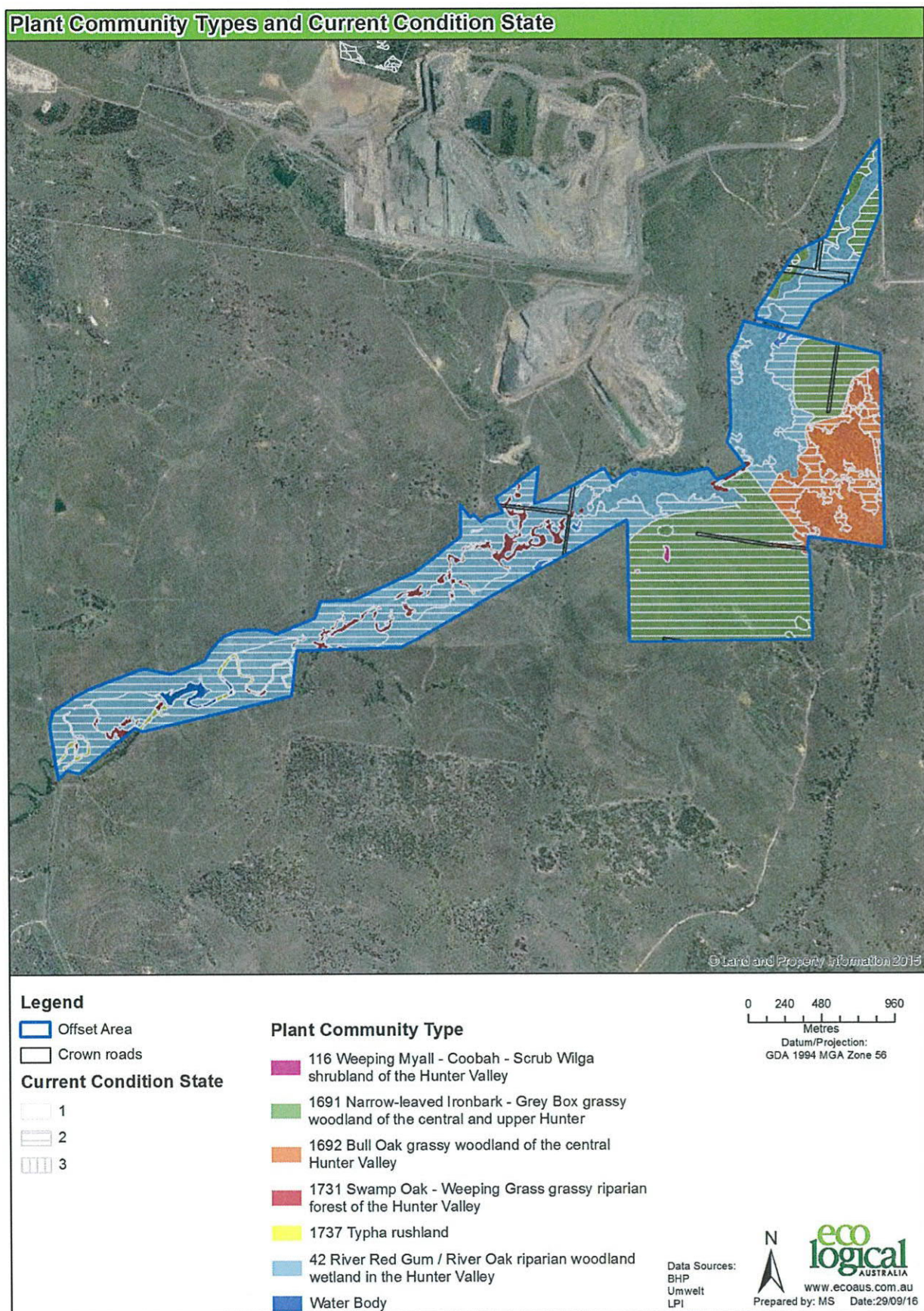
ANNEXURE B DIAGRAM B5 – THREATENED ECOLOGICAL COMMUNITIES (TSC ACT)



ANNEXURE B DIAGRAM B6 – THREATENED ECOLOGICAL COMMUNITIES (EPBC ACT)

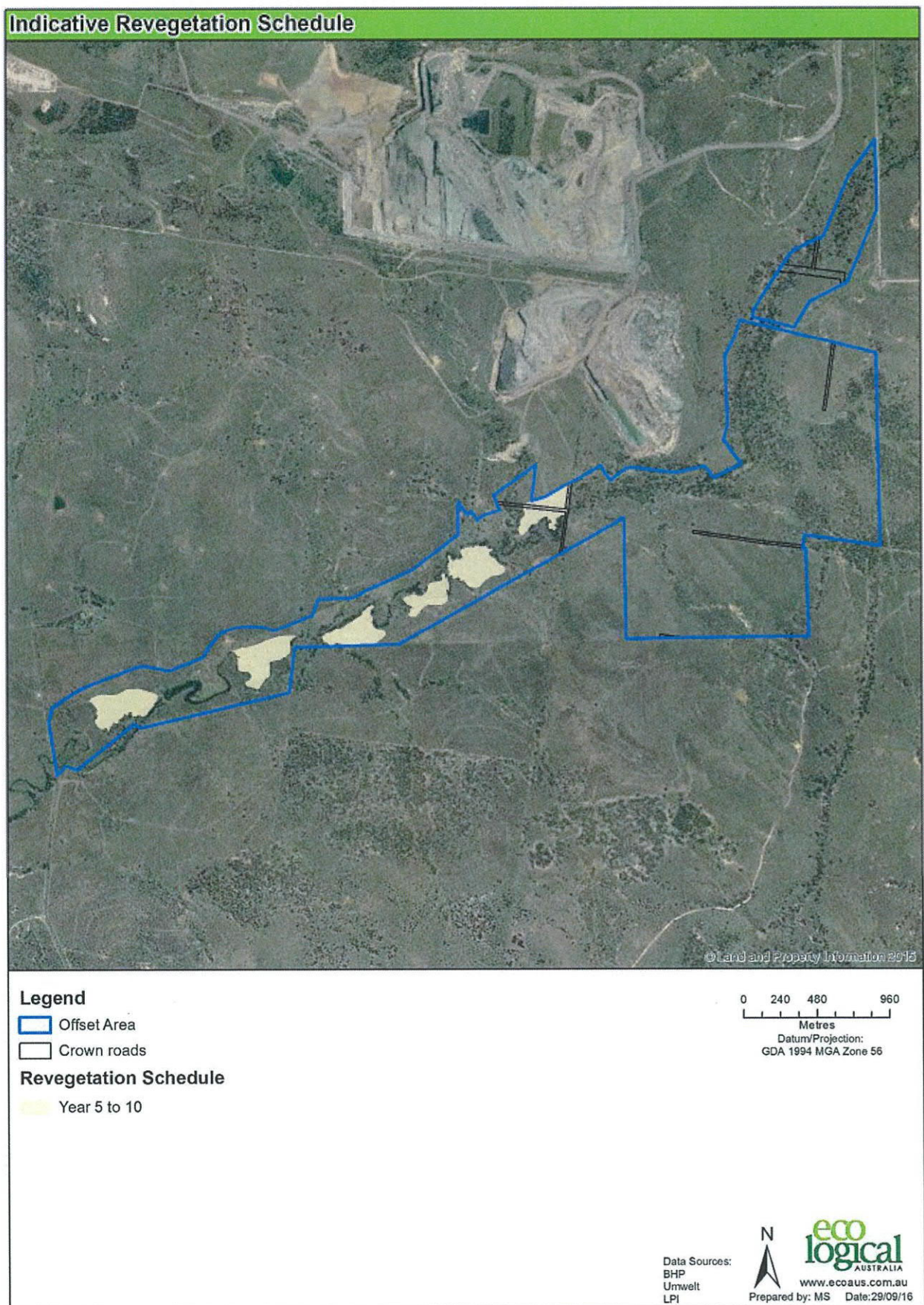


ANNEXURE B DIAGRAM B7 – CURRENT VEGETATION CONDITION



Note: State 1 = intact, State 2 = DNG, State 3 = exotic grassland

ANNEXURE B DIAGRAM B8 – INDICATIVE REVEGETATION SCHEDULE



ANNEXURE B - PHOTO POINT PHOTOGRAPHS

Two photo points were established per vegetation type present on the conservation area (except PCT 116 Weeping Myall – Coobah – Scrub Wilga shrubland which comprises less than 0.5 ha and thus has been allocated one photopoint only), giving a total of 11 points. Four photos were taken at each point, oriented in each direction (north, east, south, west). GPS reference points are provided in **Annexure D Table 1**.

Photos are presented below.

SC1 monitors an area of Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley dominated by Weeping Myall (*Acacia pendula*) with Small-leaf Bluebush (*Maireana microphylla*).

Weed cover is moderate, comprising *Sida rhombifolia* and *Bidens pilosa*.



N



E



S



W

SC2 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter (DNG) dominated by *Panicum* sp., *Sporobolus* sp. and Barbed Wire Grass (*Cymbopogon refractus*).

Weed cover is moderate and includes *Conyza* sp., Cotton Bush (*Gomphocarpus fruticosus*) and Spear Thistle (*Cirsium vulgare*).



N



E



S



W

SC3 monitors an area of Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter dominated by Grey Box (*Eucalyptus moluccana*).

Weed cover is high, comprising Rhodes Grass (*Chloris gayana*), *Bidens pilosa* and Mother of Millions (*Bryophyllum* sp.).



N



E



S



W

SC4 monitors an area of Bull Oak grassy woodland of the central Hunter Valley dominated by Bulloak (*Allocasuarina luehmannii*).

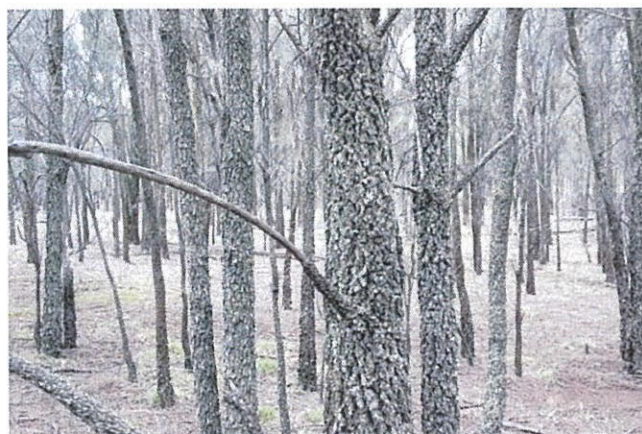
Weed cover at the site is moderate to high, including Prickly Pear (*Opuntia* sp.) and Mother of Millions (*Bryophyllum* sp.). There is a particularly large dense patch of *Bryophyllum* sp. close to the site.



N



E



S



W

SC5 monitors an area of Bull Oak grassy woodland of the central Hunter Valley (DNG) with scattered Bulloak (*Allocasuarina luehmannii*) and dominated by *Chloris* sp., *Panicum* sp., *Sporobolus* sp., *Mentha* sp.

Weed cover is low to moderate and comprises Cotton Bush (*Gomphocarpus fruticosus*) and Spear Thistle (*Cirsium vulgare*).



N



E



S



W

SC6 monitors a riparian area of Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley dominated by Swamp Oak (*Casuarina glauca*) and Rough-barked Apple (*Angophora floribunda*).

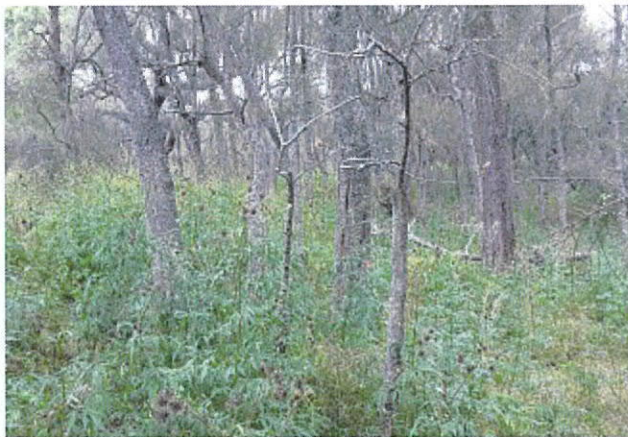
Weed cover is high, comprising *Bidens subalternans*, *Sida rhombifolia* and Mother of Millions (*Bryophyllum* sp.).



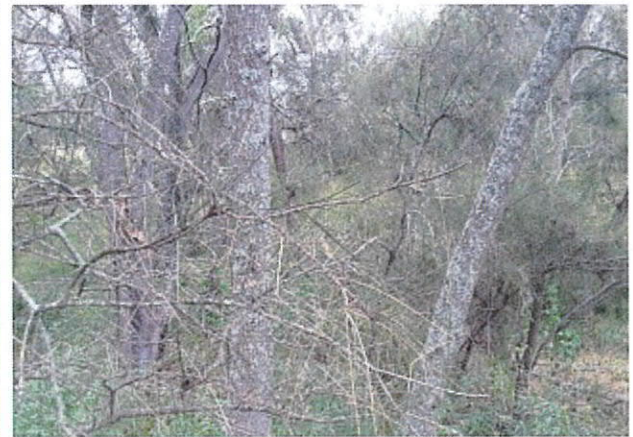
N



E



S



W

SC7 monitors a riparian area of Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley dominated by Swamp Oak (*Casuarina glauca*).

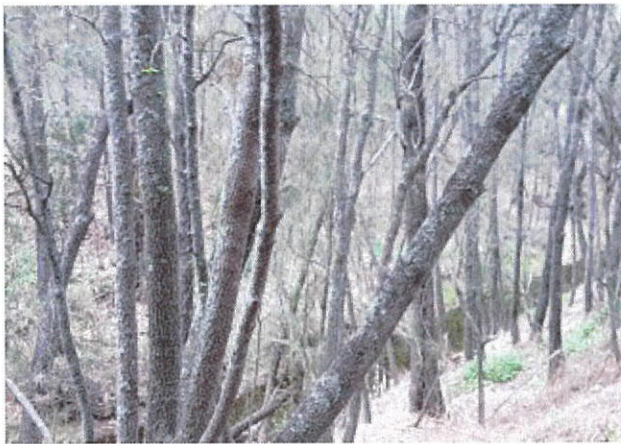
Weed cover is low to moderate, including *Sida rhombifolia* and Mother of Millions (*Bryophyllum* sp.).



N



E



S



W

SC8 monitors an area of River Red Gum / River Oak riparian woodland wetland in the Hunter Valley (DNG) dominated by *Sporobolus* sp. and *Panicum* sp.

Weed cover is moderate and includes *Paspalum dilatatum*, *Sida rhombifolia*, Rhodes grass (*Chloris gayana*), Spear Thistle (*Cirsium vulgare*) and *Conyza* sp.



N



E



S



W

SC9 monitors a riparian area of River Red Gum / River Oak riparian woodland wetland in the Hunter Valley dominated by River Red Gum (*Eucalyptus camaldulensis*), Grey Box (*E. moluccana*) and River Oak (*Casuarina cunninghamiana*).

Weed cover is low, with some *Sida rhombifolia*; however, the nearby creek line has a high cover of *Sida rhombifolia*, *Bidens pilosa* and Mother of Millions (*Bryophyllum* sp.).



N



E



S



W

SC10 monitors a creek line area of Typha rushland dominated by Common Reed (*Phragmites australis*) and Broadleaf Cumbungi (*Typha orientalis*).

Weed cover is high and includes *Juncus acutus*, Spear Thistle (*Cirsium vulgare*), and Pepper Tree (*Schinus areira*).



N



E



S



W

SC11 monitors a creek line area of *Typha* rushland dominated by Broadleaf Cumbungi (*Typha orientalis*).

Weed cover is high and includes *Juncus acutus*, *Paspalum dilatatum* and Spear Thistle (*Cirsium vulgare*).



N



E



S



W

Biodiversity Management Plan

Annexure C Management of the Conservation Area

Item 1: management aims and actions required to be undertaken for minimum period of 10 years.

Aim	Timing	Management action
Weed control across the Conservation Area (focusing on noxious and environmental weeds)	Year 1	Primary weed control: 480 hours bush regeneration by qualified bush regeneration contractor over 12 month period. Techniques specified in Annexure C Item 3 must be used.
	Years 2-5	Follow up weed control: 224 hours bush regeneration per year for years 2-5 Techniques specified in Annexure C Item 3 must be used.
	Years 6 – 10	Annual ongoing maintenance weed control: 80 hours annually for 5 years. Techniques specified in Annexure C Item 3 must be used.
	Years 2 to 10	Seed collection, propagation of tubestock, site preparation works and planting are to be undertaken in designated areas within the Conservation Area. If planted trees are defoliated by native or introduced species, tree guards will be installed. Plantings will be replaced if substantial mortalities occur within the first three years.
Pest animal monitoring and control (local co-ordination with Local Land Services and OEH)	Years 1-10	Pest animal control activities to be determined based on density and species of pest animals. Techniques specified in Annexure C Item 3 must be used.
Construct and maintain fire breaks and implement fire management hazard reduction burns. Operate with NSW Rural Fire Service or fire management contractor to implement mosaic or partial area hazard reduction burn.	Years 1-10. Liaise with RFS and NPWS regarding appropriate timing.	Implement 2 hazard reduction burns during low risk fire season according to guidelines specified in Annexure C Item 3. This must be in the form of mosaic burning so that the same areas are not burned twice.

Fencing	Years 2-10	Maintain fences as required. Replace 1/10 th of total length of fence every three years beginning in year 2. Techniques specified in Annexure C Item 3 must be used.
Annual Reports for Monitoring Program	Years 1-10	Annual reports to be prepared according to specifications in Annexure D Monitoring Program.
Threatened species, populations and endangered ecological communities (EEC)	Years 1-10	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.

Annexure C Management of the Conservation Area

Item 2: management actions required to be undertaken from year 11 onwards.

Issue	Management action
Exotic plants	The Owner must take reasonable measures in relation to the control of exotic plants. Techniques specified in Annexure C Item 3 must be used.
Pest animals	The Owner must take reasonable measures in relation to monitoring of pest animals. Techniques specified in Annexure C Item 3 must be used.
Threatened species, populations and endangered ecological communities (EEC)	The Owner must follow current best practice advice regarding the management of threatened species when carrying out any activities within the Conservation Area. This advice may be provided by OEH, Local Land Services, the Commonwealth Department of Environment or subsequent authorities.
Managing visitor impacts (visitors include OEH inspectors; weed control contractors; fire maintenance contractors; NSW Rural Fire Service; fencing and maintenance contractors and the Owner)	The Owner must take reasonable measures to ensure that visitor disturbance to the Conservation Area is minimised by keeping visitors to tracks and trails except for management purposes and ensuring all visitor vehicles and equipment entering the Conservation Area are clean and free from weeds and/or seeds. Guidance specified in Annexure C Item 3 Visitation and research must be used.
Maintain vehicle access to Conservation Area for visitor management, fire management, weed and fencing management	The Owner must take reasonable measures to ensure that vehicle access is maintained by maintaining and repairing access trails as required. Techniques specified in Annexure C Item 3 must be used.
Monitoring and Reporting	The Owner must complete a monitoring report at least every 3 years as described in Clause 8 of the Conservation Agreement.
Livestock	The Owner must remove any livestock which have entered the Conservation Area as soon as practical.
Fencing	The Owner must take reasonable measures to construct and maintain fences along the boundaries of the Conservation Area where adjacent land use cause or are likely to cause adverse impacts on or in the Conservation Area. Techniques specified in Annexure C Item 3 must be used.

ANNEXURE C ITEM 3: PERMISSIONS AND GUIDELINES

Control of pest animals and non-indigenous fauna (in addition to pest animal control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- a) Participate in community pest animal control programs, and encourage neighbours to implement pest animal control programs. Contact your Local Land Services office or National Parks and Wildlife Service Area office to find out where community control programs are occurring.
- b) Methods for pest animal control can include; shooting, trapping and use of poisonous baits consistent with advice from OEH and Local Land Services. Use control methods identified as 'humane' as defined in the NSW Codes of Practice and Standard Operating Procedures for Humane Pest Vertebrate Control (Control Capture and Destruction of Feral Animals in Australia) as developed by the NSW Department of Primary Industries.
- c) Pest animal control activities to be determined based on density and species of pest animals. Methods for monitoring pest animal activity should include:
 - i) observations and/or hearing calls,
 - ii) the use of standard "sand plots",
 - iii) the use of non-poisoned "bait stations",
 - iv) scat counts, and
 - v) other quantitative techniques which can be designed in discussion with OEH or Local Land Services.

Control of weeds and exotic plants (in addition to weed control management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- d) Apply a range of techniques including:
 - i) Removal of weeds by hand ensuring that all plant parts which can reproduce are removed and that soils do not become prone to erosion.
 - ii) Use of carefully selected herbicide according to label directions and/or current off label permit, ensuring minimal off target damage.
 - iii) Use of appropriate control measures as recommended in the Department of Primary Industries Noxious and Environmental Weed Control Handbook 6th Edition 2014 or equivalent replacements for control of weeds, ensuring minimal off target damage.
 - iv) Use of forestry mulching or slashing machinery only with prior written permission from OEH.
 - v) Ensure control programs are commenced when timing and extent of weed removal will minimise adverse effects on wildlife (weeds may provide protection or habitat for native fauna). Dense thickets of lantana should be removed gradually in mosaic patterns to minimise disturbance to the habitat of native animals.
 - vi) Other weed control methods may only be undertaken with prior written permission of OEH.
 - vii) Contact OEH if any uncertainty exists regarding weed control methods.

Cultural heritage

- e) Recording and management of any newly identified Aboriginal Objects or artefacts, in consultation with OEH (and the relevant local Aboriginal community where applicable).



Development

- f) Carrying out any development as described in the Conservation Agreement and maintaining development (including existing fire trails, access trails and infrastructure), with the following conditions:
- i) clear a corridor not greater than 3 metres wide during construction or for maintenance for the installation of fences or other agreed rural structures;
 - ii) move fallen timber and any other obstructions to maintain access trails, tracks and fences;
 - iii) where clearing is permitted under the Agreement and necessary, undertake all works in a manner that minimises disturbance to soil and hydrological characteristics.

Fencing, tracks and trails

- g) Construction and maintenance of all fences using wildlife friendly materials including plain wire (non-barbed) on top and bottom strands.
- h) Construction of any new internal fence, access track or trail only with prior written approval from OEH.
- i) Maintaining existing access walking tracks in the Conservation Area to a maximum width of 2m.
- j) Maintaining existing access vehicular trails in the Conservation Area to a maximum width of 4m with 1m either side permissible for clearing.
- k) Removal of old fences and closing of unwanted tracks within the Conservation Area and facilitate restoration of indigenous vegetation according to Annexure 3 Item 3 (points 'n' and 'o' over page).

Fire management (in addition to fire management actions in Item 1 of Annexure C to the Conservation Agreement)

- l) Using fire hazard reduction burns and controlled burning which take into account the recommended fire intervals given in the *Bush Fire Environmental Assessment Code for New South Wales* (Rural Fire Service February 2006) and the guidelines contained in the *Threatened Species Hazard Reduction Lists for the Bush Fire Environmental Assessment Code* or equivalent replacements.

Current recommendations are:

- i) minimum fire intervals of:
 - 8 year fire interval for Weeping Myall - Coobah - Scrub Wilga shrubland (PCT 116)
 - 8 year fire interval for Narrow-leaved Ironbark - Grey Box grassy woodland (PCT 1691)
 - 8 year fire interval for Bull Oak grassy woodland (PCT 1692)
 - 10 year fire interval for Swamp Oak - Weeping Grass grassy riparian forest (PCT 1731)
 - 10 year fire interval for River Red Gum / River Oak riparian woodland wetland (PCT 42)
 - 10 year fire interval for Typha rushland (PCT 1737)
- ii) wherever possible canopy or crown fires should be avoided.
- iii) wherever possible no more than 50% of the Conservation Area should be burnt in any twelve month period.
- iv) both live and dead trees with hollows should be protected from burning as far as practicable in order to preserve nesting habitat for hollow dwelling animals.

- m) Lighting a fire, or causing a fire to be lit on the Conservation Area if it complies with the *Rural Fires Act 1997* (NSW), and:
- i) the lighting of the fire is a necessary component of bush fire hazard reduction work carried out in accordance with a notice served on the Owner under the *Rural Fires Act 1997* (NSW) or other applicable legislation; or
 - ii) life or property is in immediate threat by bush fire and the lighting of the fire is reasonably necessary to protect life or property; or
 - iii) the fire is a camp fire, subject to the compliance with the *Rural Fires Act 1997* (NSW), or
 - iv) the Chief-Executive gives prior written consent to the lighting of the fire.

Restoration of indigenous vegetation

- n) Restoration of native vegetation on the Conservation Area using a preferred method of encouraging and retaining natural regeneration. Preferred methods include:
- i) bush regeneration
 - ii) brush mulching; and/or
 - iii) direct seeding.
- o) Revegetation to establish indigenous plants to maintain the vegetation structure in keeping with the identified vegetation community, using species produced from material sourced locally and without fertilisers, where the ability to regenerate naturally within a reasonable time frame has been lost, or to prevent soil erosion.

Seed collection

- p) Collection of seed on the Conservation Area for non-commercial use in accordance with Guidelines and Codes of Practice developed by Florabank (www.florabank.org.au), or subsequent equivalent and with the following limitations and permissions:
- i) Collect seed in the Conservation Area only if seed of the particular species and genotype is not available elsewhere, or if the seed collected is intended for seedlings that will be planted within the Conservation Area or adjacent to the Conservation Area.
 - ii) Seeds may be collected from within endangered ecological communities.
 - iii) Seeds may not be collected from species individually listed in Schedules 1, 1A or 2 to the TSC Act without prior written approval from the Chief-Executive, or under a licence granted under section 132C of the NPW Act or section 91 of the TSC Act.
 - iv) Seeds may be collected from any protected species listed in Schedule 13 to the NPW Act.
 - v) Seeds may be collected from any other native species.

Thinning of indigenous vegetation

- q) Thinning of regenerating indigenous species which are altering the structure of the vegetation in the Conservation Area and/or reducing the Conservation Values only with prior written approval from the Chief-Executive OEH.

Threatened species

- r) Implementing any measures included in recovery plans for any threatened species, population or ecological communities which are or may be found in the Conservation Area.
- s) Implementing other specific management advice from OEH for any threatened species, populations or ecological communities which are or may be found in the Conservation Area.

Use of timber

- t) Harvesting of fallen non-hollow wood in amounts necessary for heating the Owner's dwelling on the Land and camp fires on the Conservation Area.

Visitation and research (in addition to management actions in Items 1 and 2 of Annexure C to the Conservation Agreement)

- u) Visitation, research and community use at a level that does not adversely impact on the Conservation Values or the amenity of the Owner. Research projects must be first discussed with OEH before being carried out.




ANNEXURE D - MONITORING PROGRAM

- (a) The Owner must engage a suitably qualified person (such as an ecologist) to undertake a monitoring event in each year, beginning in 2018 (Monitoring Event).
- (b) Each Monitoring Event must include:
- i) **photo monitoring** - four photos are required to be taken at each of the 11 established monitoring points shown in **Annexure B**. Photos must be taken from the exact location and bearing to allow subsequent comparison and assessment. Photo point locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Baseline photographs are provided in Annexure A to the Conservation Agreement. Photo monitoring must include the collection of at least the top five canopy, shrub-layer and groundcover species and the recording of any threats. The frequency of monitoring activities will be targeted by site type:
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - ii) **quadrat monitoring** – quadrat data must be collected at each of the six photo points above. Quadrat locations are provided in **Table 1** of Annexure D to the Conservation Agreement (**below**). Results must be compared to baseline and benchmark quadrat data which is provided in **Tables 1 and 2** of Annexure D to the Conservation Agreement **below**. For active regeneration sites, data will also be collected on the survivorship and health of planted species so as to identify those which are best suited for future regeneration efforts within the same vegetation community.
 - i. Reference sites are to be monitored biennially commencing 2018
 - ii. Active regeneration sites are to be monitored annually four years after planting/revegetation has been undertaken (estimated commencement 2019)
 - iii) a **walk through assessment** to record opportunistic sightings within the Conservation Area including:
 - i. fire events or impacts of fire management
 - ii. weeds (including compiling a list of exotic species and recording new weed infestations including location and extent)
 - iii. pest animals (species and location must be recorded, including evidence of pest animals such as burrows, scats or disturbance)
 - iv. visitor impact and vehicle access (including evidence of any recent usage, and the presence of any new access tracks)
 - v. rubbish dumping
 - vi. natural regeneration of previously disturbed areas; and
 - vii. sightings of threatened species. Voucher specimens of potential threatened plants will be taken where doing so will not adversely affect the local population, and sent to a recognised museum or herbarium for identification.
- (c) After each Monitoring Event, the Owner must produce a monitoring report on the Conservation Area by 30 December of each year, beginning in 2018 (Monitoring Report).

The Monitoring Report must include:

- i. a description of all completed management actions undertaken in the previous 12 month period;
- ii. total cost of all works completed in undertaking the management actions listed in items 1 and 2 of Annexure C to the Conservation Agreement;
- iii. completed monitoring data sheets (including photographs) using the template provided in **Table 3** of Annexure D to the Conservation Agreement (**below**);
- iv. a discussion of the changes recorded at monitoring points and quadrats;

- v. a summary of quadrat data for each photo point;
- vi. a discussion of the condition of Conservation Values;
- vii. a discussion of effectiveness of any management actions implemented; and
- viii. recommendations and proposed management actions to be performed in following year(s).

The Monitoring Report must be submitted to OEH within **21 days** of it being received by the Owner.

- (d) The Monitoring Event and the Monitoring Report comprise the monitoring program (Monitoring Program). The Owner must complete the Monitoring Program to the satisfaction of OEH, for a minimum period of 10 years from the date of the Conservation Agreement.



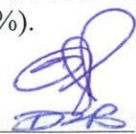
ANNEXURE D TABLE 1 - MONITORING POINT LOCATIONS AND CORRESPONDING VEGETATION COMMUNITIES REPRESENTED AS AT FEBRUARY 2016

Photo Point / Quadrat No.	Easting/Northing GDA 94 MGA 56	Vegetation Community Represented
SC1	299527, 6413472	116 Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley
SC2	300417, 6414759	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
SC3	300301, 6415270	1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
SC4	300790, 6414175	1692 Bull Oak grassy woodland of the central Hunter Valley
SC5	300830, 6413896	1692 Bull Oak grassy woodland of the central Hunter Valley
SC6	298503, 6413569	1731 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley
SC7	299944, 6413993	1731 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley
SC8	297492, 6412976	42 River Red Gum / River Oak riparian woodland wetland in the Hunter Valley
SC9	299272, 6413895	42 River Red Gum / River Oak riparian woodland wetland in the Hunter Valley
SC10	296170, 6412459	1737 Typha rushland
SC11	296722, 6412816	1737 Typha rushland

ANNEXURE D TABLE 2 – BIOMETRIC VEGETATION TYPE BENCHMARKS AND BASELINE QUADRAT SCORES AS AT FEBRUARY 2016

Photo Point / Quadrat no.	Native species richness	Overstorey cover %pfc	Mid-storey cover %pfc	Ground cover – grasses %pfc	Ground cover – shrubs %pfc	Ground cover – other %pfc	Proportion overstorey regen.	Exotic cover	Number of Trees with Hollows	Total length of fallen logs
116 Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
SC1	32	1	2	67.5	2	22.5	1	4	TBC	TBC
1691 Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
SC2	30	1	2	7	12.5	91.5	0.5	5	TBC	TBC
SC3	30	1	2	7	12.5	91.5	1	5	TBC	TBC
1692 Bull Oak grassy woodland of the central Hunter Valley										
Benchmark values	41	15	5	30	5	20	N/A	N/A	3	5
SC4	31	3	9	35	0	11	1	2	TBC	TBC
SC5	31	3	9	35	0	11	0.5	2	TBC	TBC
1731 Swamp Oak - Weeping Grass grassy riparian forest of the Hunter Valley										
Benchmark values	24	15	10	5	5	5	N/A	N/A	0.2	5
SC6	33	10	2	47	0	53.5	1	16	TBC	TBC
SC7	33	10	2	47	0	53.5	1	16	TBC	TBC
42 River Red Gum / River Oak riparian woodland wetland in the Hunter Valley										
Benchmark values	38	10	10	20	1	10	N/A	N/A	0.1	10
SC8	34	2	1	5	13.5	35	0.5	38	TBC	TBC
SC9	20	0	3	26	12.5	32	1	2	TBC	TBC
1737 Typha rushland										
Benchmark values	7	3	0	1	0	60	N/A	N/A	0	0
SC10	21	1	0	0	0	12.5	0	35	TBC	TBC
SC11	21	1	0	0	0	12.5	0	35	TBC	TBC

Comprehensive baseline biodiversity studies of the Conservation Area were undertaken in 2013. During these studies, vegetation condition data was collected at most photo point locations. A modified 6-point Braun-Blanquet scale was used to estimate cover-abundances of all plant species. To develop baseline biometric quadrat data, this scale was modified as follows - all 1's (few individuals <5% cover) were removed due to low cover, 2's (Many individuals <5%) were converted to an assumed 1% total cover and then the midpoints of the remaining classes adopted (i.e. 12.5%, 35%, 62.5% and 87.5%).



The proportion of overstorey regeneration was inferred from the current condition class at each photo point i.e. Class 1 (remnant) was given a score of '1', Class 2 (derived native grassland EEC) was given a score of '0.5' and Class 3 was given a score of '0'.

Where photo monitoring points were not directly located at an existing baseline study site, the nearest baseline site, or a baseline site within the same PCT was selected. Biometric data (including number of trees with hollows and total length of fallen logs) will be collected and reviewed at each photo point during subsequent years monitoring. Note that care must be taken when interpreting baseline Braun-Blanquet cover-abundance data against future biometric data, due to slight differences in the methodology used for estimating vegetation cover.

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Appendix 3 Threatened flora and fauna species

Common Name	Scientific Name	TSC Act status	EPBC Act Status	Offset / Revegetation area
Weeping Myall	<i>Acacia pendula</i>	EP		Thomas Mitchell Drive on-site
Speckled Warbler	<i>Chthonicola sagittata</i>	V		Middle Deep Creek Offset Area, Thomas Mitchell Drive Offsite, Thomas Mitchell Drive on-site
Spotted harrier	<i>Circus assimilis</i>	V		Saddlers Creek, Thomas Mitchell Drive Offsite, Thomas Mitchell Drive On-site, Edderton Road
Brown Treecreeper	<i>Climacteris picumnus</i>	V		Middle Deep Creek Offset Area
Tiger Orchid	<i>Cymbidium canaliculatum</i>	EP		Middle Deep Creek Offset Area
Painted Diuris	<i>Diuris tricolor</i>	V, EP		Thomas Mitchell Drive on-site
River Red Gum	<i>Eucalyptus camaldulensis</i>	EP		Outside of offset or revegetation areas
Black Falcon	<i>Falco subniger</i>	V		Middle Deep Creek Offset Area
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V		Middle Deep Creek Offset Area
Little Lorikeet	<i>Glossopsitta pusilla</i>	V		Saddlers Creek, Middle Deep Creek Offset Area
Hawkweed	<i>Picris evae</i>	V	V	Middle Deep Creek Offset Area
White-throated Needletail	<i>Hirundapus caudacutus</i>		M	Middle Deep Creek Offset Area ,Thomas Mitchell Drive on-site
Hooded Robin	<i>Melanodryas cucullata</i>	V		Middle Deep Creek Offset Area
Little Bentwing-bat	<i>Miniopterus australis</i>	V		Thomas Mitchell Drive Offsite, Thomas Mitchell Drive on-site
Eastern Bent-wing Bat	<i>Miniopterus schreibersii oceanensis</i>	V		Middle Deep Creek Offset Area
Large-footed Myotis	<i>Myotis macropus</i>	V		Middle Deep Creek Offset Area

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Common Name	Scientific Name	TSC Act status	EPBC Act Status	Offset / Revegetation area
Squirrel Glider	<i>Petaurus norfolcensis</i>	V		Mount Arthur Conservation Area, Thomas Mitchell Drive on-site
Scarlet Robin	<i>Petroica boodang</i>	V		Outside of offset or revegetation areas
Flame robin	<i>Petroica phoenicea</i>	V		Outside of offset or revegetation areas
Grey-crowned Babbler (Eastern Subspecies)	<i>Pomatostomus temporalis</i>	V		Saddlers Creek, Middle Deep Creek Offset Area
Grey-headed flying fox	<i>Pteropus poliocephalus</i>	V	V	Saddlers Creek, Thomas Mitchell Drive on-site
Yellow-bellied Sheath-tail Bat	<i>Saccolaimus flaviventris</i>	V		Middle Deep Creek Offset Area
Diamond Firetail	<i>Stagonopleura guttata</i>	V		Middle Deep Creek Offset Area
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		Middle Deep Creek Offset Area

V=Vulnerable, EP = Endangered Population, M = Migratory under EPBC Act.

Appendix 4 Consultation with OEH and Council

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Biodiversity Management Plan



Office of Environment & Heritage

From: Steven Cox <Steven.Cox@environment.nsw.gov.au>
Sent on: Monday, May 28, 2018 12:38:46 AM
To: Nock, Edward <Edward.Nock@bhpbilliton.com>
CC: Robert Gibson <Robert.Gibson@environment.nsw.gov.au>
Subject: RE: FOR ACTION: DOC18/319890 : HPE CM: Biodiversity Management Plan for Mt Arthur

Hi Ed,

We currently are unable to review your management plan and won't be providing comments. Please forward the management plan to DPE without comments from OEH on the biodiversity components of the plan.

Regards
Steven

Steven Cox
Senior Team Leader Planning
Hunter Central Coast Branch
Regional Operations Division
Office of Environment & Heritage

Level 4/26 Honeysuckle Drive Newcastle NSW 2300
Locked Bag 1002 Dangar NSW 2309
T 02 4927 3140
M 0472 800 088

From: Nock, Edward [<mailto:Edward.Nock@bhpbilliton.com>]
Sent: Friday, 11 May 2018 6:23 PM
To: OEH ROD Hunter Central Coast Mailbox <rog.hcc@environment.nsw.gov.au>
Cc: Gale, Michael (NEC) <Michael.Gale1@bhpbilliton.com>
Subject: HPE CM: Biodiversity Management Plan for Mt Arthur

ATTENTION: Robert Gibson

Dear Robert,

As discussed today attached is the latest version of the Biodiversity Management Plan for your review prepared in accordance with Condition 40 of the State Government Approval (09_0062) and Conditions 5, 6, 7, 8, 9 and 14 of EPBC 2011/5866 and Conditions 4, 5, 6, 7 and 8 of EPBC 2014/7377. We have tracked the changes relating to comments from the DOEE and DP& for ease of review and have included our responses to the comments made by the two departments.

Please do not hesitate to contact the undersigned if you have any questions or queries regarding the content therein.

Kind regards,

Ed Nock
HSE Superintendent
Non-process Infrastructure and Projects
edward.nock@bhp.com
T +61 (0)2 6544 5776
M +61 439309791
Muswellbrook

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Biodiversity Management Plan



Muswellbrook Shire Council



21 May 2018

**Ed Nock
HSE Superintendent
Mt Arthur Mine
PMB 8
MUSWELLBROOK 2333**

Dear Ed,

Mt Arthur Coal, Biodiversity Management Plan Revision Review

I refer to an application from BHP Billiton ("the Proponent") for the draft Biodiversity Management Plan revision submitted to Council for review. The Plan is required by Condition 40 Schedule 3 of the Mt Arthur Consent. We make the following submission on behalf of Muswellbrook Shire Council ("Council") with respect to the Biodiversity Management Plan (V1.1 21.05.2018) (BMP) received on the 1st May 2018. Council appreciates the opportunity for comment.

General comments on the Biodiversity Management Plan:

- Council note that the revised Plan has replaced the 6 site specific management plans in the former BMP with the 6 Conservation Agreement requirements. This is in response to OEH approving the 6 offset areas as being Conservation Areas;
- There have been a number of changes to the structure and text within the document to bring the former plan up to date and reflect changing requirements within both the State and Federal regulators;
- The revised document appears to be easier to follow and understand compared to the earlier BMP.

Comment on the Document

Comments from Council are outlined below and we ask if the following could be considered and where possible implemented by Mt Arthur Coal:

Condition 40, Schedule 3 of the Mt Arthur Consent requires:

The proponent shall prepare and implement a Biodiversity Management Plan for the project to the satisfaction of the Secretary. This Plan must:

1. *Be prepared in consultation with OEH and Council, and be submitted to the Secretary for approval by the end of March 2015, unless otherwise agreed with the Secretary.*
2. *Describe how the implementation of the offset strategy would be integrated with the overall rehabilitation of the site (see below)*
3. *Include, and here are a number of points included in the Consent.*

Muswellbrook Shire Council ABN 86 864 180 944

Address all communications to The General Manager Mail PO Box 122 Muswellbrook NSW 2333 Phone 02 6549 3700
Fax 02 6549 3701 Email council@muswellbrook.nsw.gov.au Web www.muswellbrook.nsw.gov.au

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At a first pass review of the draft document it would appear that the main text of the BMP has been provided to Council for review. This document is an improvement over the earlier version and includes what Council would expect the document to contain. It then refers to sections of the Conservation Agreements for the management detail of each site. These are not drafts. Council has been advised that the Agreements have been signed by OEH and are now fixed for the duration of the Agreements (in perpetuity). Council has not been consulted in the drafting of these Agreements, as required by Condition 40 (a).

As a part of our review Council's Landcare officer briefly reviewed the sections of the Conservation Agreements provided with the Draft BMP. It was found that, in Council's opinion, reasonable and feasible improvements could have been made to some of the land management requirements in the Agreements. These comments have not been provided in this response, as it is known the Agreements are signed and it is understood they cannot be changed. We also noticed the BMP has included the Middle Deep Creek and Oakvale Offset Area under the Thomas Mitchell Drive Offsite Offset by accident. It needs to be replaced by the correct pages.

Council are of the opinion that the current review of the BMP by Council is not consistent with the requirements of Condition 40(a) as a significant part of the document is not able to be amended.

Council appreciates the opportunity to comment and would be pleased to provide additional information if requested.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Derek', is positioned above the printed name.

Derek Finnigan
A/General Manager

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Biodiversity Management Plan



From: Nicholas Alexander [mailto:Nicholas.Alexander@muswellbrook.nsw.gov.au]
Sent: Friday, 8 June 2018 9:30 AM
To: Nock, Edward <Edward.Nock@bhpbilliton.com>
Cc: Scott Brooks <Scott.Brooks@muswellbrook.nsw.gov.au>; Carolyn O'Brien <Carolyn.O'Brien@muswellbrook.nsw.gov.au>
Subject: Biodiversity Management Plan and Conservation Agreements

Hi Ed,

Scott has asked me to look over your Biodiversity Management Plan and associated Conservation Agreements.

My main feedback is:

- Pages from the Middle Deep Creek and Oakvale Offset Area Conservation Agreement have been included under the Thomas Mitchell Drive Offsite Offset section of the Biodiversity Management Plan by accident (Pages A15-A22). It needs to be replaced by the correct pages.
- The Biodiversity Management Plan and conservation agreements state "focusing on noxious and environmental weeds". After recent changes, "noxious" is no longer the correct term to use, and "environmental weeds" is a very broad term. The conservation agreement should state the specific exotic or invasive species that are found onsite and going to be managed. From my knowledge of the TMD Offsite Offset site, *Juncus acutus* is a major exotic species found on the site, yet there is no mention of it or its management.
- There appears to be no value that weeds need to be reduced to e.g. <5% cover.
- Seed collection is mentioned but it is not specified how much i.e. in hours.
- Required survival rate of revegetation efforts needs to be specified e.g. >80%
- Species to be used in revegetation efforts for the different communities should be included.
- Benchmark values are given in Annexure D Table 2, yet including these values has no value if a statement is made to reach these values by the end of the management schedule.
- Is a yearly report going to be supplied to Muswellbrook Shire Council to prove that the yearly management actions are being completed? There is no evidence so far and the Conservation Agreement commenced in Dec 2016.

Regards,

Nicholas Alexander
Sustainability Team Leader
Muswellbrook Shire Council

Phone: 02 6549 3708

Mobile: 0418 858 420

Address: Administration Centre, 157 Maitland Street Muswellbrook

Postal: PO Box 122, Muswellbrook, NSW 2333

Email: nicholas.alexander@muswellbrook.nsw.gov.au

Web: www.muswellbrook.nsw.gov.au

Biodiversity Management Plan

Who?	What?	Response
Muswellbrook Shire Council Derek Finnigan A/General Manager Letter: 21 May 2018	...reasonable and feasible improvements could have been made to some of the land management requirements in the [Conservation] Agreements...	Noted.
Muswellbrook Shire Council Derek Finnigan A/General Manager Letter: 21 May 2018	...the BMP has included the Middle Deep Creek and Oakvale Offset Area under the Thomas Mitchell Drive Offsite Offset by accident...	Appendix 2 has been corrected in response to this.
Muswellbrook Shire Council Derek Finnigan A/General Manager Letter: 21 May 2018	"...Council are of the opinion that the current review of the BMP by Council is not consistent with the requirements of Condition 40(a) as a significant part of the document in <i>[sic]</i> not able to be amended..."	Council's opinion is noted. The Conservation Agreements (CAs) are established with the National Parks and Wildlife Service and were the mechanism agreed by the DP&E and OEH for securing offsets in perpetuity. These CAs are agreements that have been made in order to address Condition 7 of EPBC 2011/5866 and Condition 6 of EPBC 2014/7377 .
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Pages from the Middle Deep Creek and Oakvale Offset Area Conservation Agreement have been included under the Thomas Mitchell Drive Offsite Offset section of the Biodiversity Management Plan by accident (Pages A15-A22). It needs to be replaced by the correct pages.	Appendix 2 has been corrected in response to this.
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	The Biodiversity Management Plan and conservation agreements state "focusing on noxious and environmental weeds". After recent changes, "noxious" is no longer the correct term to use, and "environmental weeds" is a very broad term. The conservation agreement should state the specific exotic or invasive species that are found onsite and going to be managed. From my knowledge of the TMD Offsite Offset site, <i>Juncus acutus</i> is a major exotic species found on the site, yet there is no mention of it or its management.	Section 11.3.1 includes a description of the weed program for Mt Arthur. This includes the need to undertake an annual weed assessment and develop an annual program for weed control. As such the weed species that are targeted are refreshed each year as this is a live process.
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	There appears to be no value that weeds need to be reduced to e.g. <5% cover.	Biometric benchmarks are provided in Appendix 2, Annexure D Table 2. This includes percentage species richness and percentage exotic cover.

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Who?	What?	Response
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Seed collection is mentioned but it is not specified how much i.e. in hours.	Seed collection is undertaken on an as needs basis to deliver the rehabilitation outcomes.
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Required survival rate of revegetation efforts needs to be specified e.g. >80%	Biometric benchmarks are provided in Appendix 2, Annexure D Table 2. This includes percentage species richness. If we aren't meeting this criteria we will not have achieved the outcome.
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Species to be used in revegetation efforts for the different communities should be included.	This information is provided in Section 7.2.1 <i>Site wide programs and Table 10 Mt Arthur Coal Box Gum Woodland</i> in the <i>Mining Operations Plan (MOP)</i> .
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Benchmark values are given in Annexure D Table 2, yet including these values has no value if a statement is made to reach these values by the end of the management schedule.	Annexure D Table 2 is a guide to show progress trends. Performance indicators are provided in Section 13.
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Is a yearly report going to be supplied to Muswellbrook Shire Council to prove that the yearly management actions are being completed? There is no evidence so far and the Conservation Agreement commenced in Dec 2016.	As stated in Section 12.3 yearly progress is presented in the Annual Environmental Management Report.
Muswellbrook Shire Council Derek Finnigan A/General Manager Letter: 21 May 2018	...reasonable and feasible improvements could have been made to some of the land management requirements in the [Conservation] Agreements...	Noted.
Muswellbrook Shire Council Derek Finnigan A/General Manager Letter: 21 May 2018	...the BMP has included the Middle Deep Creek and Oakvale Offset Area under the Thomas Mitchell Drive Offsite Offset by accident...	Appendix 2 has been corrected in response to this.
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Who?	What?	Response
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Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Benchmark values are given in Annexure D Table 2, yet including these values has no value if a statement is made to reach these values by the end of the management schedule.	Annexure D Table 2 is a guide to show progress trends. Performance indicators are provided in Section 13.

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Who?	What?	Response
Muswellbrook Shire Council Nicholas Alexander Sustainability Team Leader Email: Friday, 8 June 2018 9:30 AM	Is a yearly report going to be supplied to Muswellbrook Shire Council to prove that the yearly management actions are being completed? There is no evidence so far and the Conservation Agreement commenced in Dec 2016.	As stated in Section 12.3 yearly progress is presented in the Annual Environmental Management Report.

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Biodiversity Management Plan



Authorisation

Business Process Owner Endorser Authorisation			
Position	Name	Date	Signature
(Reviewer 1)	Edward Nock	29 June 2017	
(Reviewer 2)	Edward Nock	15 December 2018	
(Reviewer 3)	Edward Nock	12 April 2019	

Approver Authorisation			
Position	Name	Date	Signature
Head of HSE	Sarah Withell	12 April 2019	

Amendment History			
Date	Version	Page	Details
29/6/2017	1	Entire	Complete review of MAC-ENC-MTP-050
7/12/2017	2	Entire	Incorporating Department of Energy and Environment comments
15/12/2018	3	Entire	Incorporating Department of Planning and Environment comments
12/04/2019	4	Entire	Incorporating Federal Department of Environment and Energy comments and clarifications for Department of Planning and Environment