Australian Government
Department of Climate Change, Energy, the Environment and Water

EPBC 2009/5003

Mr Andrew Wright
Superintendent – Group Biodiversity
Whitehaven Coal Limited
231 Conadilly Street,
Gunnedah NSW 2380
AWright@whitehavencoal.com.au

Approval of Offset Management Plan for Narrabri Coal Mine, Stage 2 Longwall Project, Narrabri, NSW

Dear Mr Wright

Thank you for your email dated 19 December 2024 to the Department of Climate Change, Energy, the Environment and Water (the department), seeking approval of a revision to the Offset Management Plan, required under Condition 14 of the approval of the above project, under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Officers of the department have advised me on the Offset Management Plan and the requirements of the conditions of the approval for this project. On this basis, and as a delegate of the Minister for the Environment and Water, I have decided to approve the *Narrabri Stage 2 Offset Management Plan, Edition 3, Rev. 1, dated 9 April 2025*.

Now this revised plan has been approved, it must be implemented.

As you are aware, the department has an active monitoring program which includes monitoring inspections, desk top document reviews and audits. Please ensure that you maintain accurate records of all activities associated with, or relevant to, the conditions of approval so that they can be made available to the department on request.

Should you require any further information please contact Tony Dowd by email to PostApproval@dcceew.gov.au.

Yours sincerely

Kate Gowland
Branch Head
Nature Positive Regulation Division | Environment Assessments (NSW, ACT)
23 May 2025

NARRABRI STAGE 2 OFFSET MANAGEMENT PLAN

(Offset Areas approved for the Narrabri Coal Mine SSD-10269 and EPBC 2009/5003)

Prepared by Whitehaven Coal
ABN: 68 124 425 396

9th April 2025

Document History

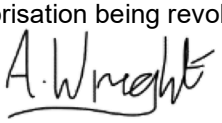
Edition	Rev.	Comments	Date
	2	Final draft of *Kenna Biodiversity Offset Management Plan* (ELA 2014) for Kenna BOA	16 April 2014
1.2	1	Final draft of *Narrabri Mine On-site Biodiversity Offset Management Plan* (WHC 2014) for Onsite BOA	16 April 2014
2	0	Initial draft of WHC BOMP to consolidate and standardise management requirements of subsidiary-owned WHC Biodiversity Offset Areas (Biobank, Kenna, Onsite, Werris and Willeroi) into one Management Plan following securement of Conservation Agreements CA0060, VCA0486, VC00528, VC00496, VC00530, VC00495, VC00529 and VC00531.	10 March 2023
3	0	Initial draft of Narrabri Stage 2 OMP after consultation with NSW DPHI and Commonwealth DCCEEW requesting individual management plans for each WHC Mining Operation. Where relevant, amendments have been made following consultation with the Biodiversity, Conservation and Science Group (BCS) of the NSW DCCEEW including incorporating feedback on other WHC OMPs to ensure consistency between documents.	18 December 2024
3	1	Draft to incorporate relevant feedback received from Commonwealth DCCEEW on other WHC OMPs (Yarrari/Belah, Tarrawonga and Maules), to ensure consistency between documents.	9 April 2025

DECLARATION OF ACCURACY

In making this declaration, I:

a) am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (EPBC Regulations). The offence is punishable on conviction imprisonment or a fine, or both.

b) am authorised to bind Whitehaven Coal to this declaration and have no knowledge of that authorisation being revoked at the time of making this declaration.

Signature 

Full name (please print) Andrew Wright (Group Superintendent - Biodiversity)

Organisation (please print) Whitehaven Coal Mining Limited as the Approval Holder for EPBC 2009/5003

Date: 09 / 04 / 2025

CONTENTS

APPENDICES

FIGURES

TABLES

GLOSSARY AND ABBREVIATIONS

Acronym	Description
ASC	Australian Soil Classification
BBAM	Biobanking Assessment Method
BC Act	Biodiversity Conservation Act 2016
BCS	Biodiversity, Conservation and Science Group within NSW DCCEEW
BCT	Biodiversity Conservation Trust
BOA	Biodiversity Offset Area
BOMP	Biodiversity Offset Management Plan
BOS	Biodiversity Offset Strategy
CA	Conservation Agreement
CDCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water (formerly Department of Agriculture, Water and the Environment [DAWE])
CEEC	Critically Endangered Ecological Community
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment, now Commonwealth Department of Climate Change, Energy, the Environment and Water (CDCCEEW)
DNG	Derived Native Grassland
DPE	Former NSW Department of Planning and Environment, now NSW Department of Planning, Housing and Infrastructure (DPHI) and NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)
EEC	Endangered Ecological Community
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GSG	Greater Soil Group
ha	Hectares
HTE	Hight Threat Exotic
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key Threatening Process
LGA	Local Government Area
Narrabri BOA	Encompassing the Kenna BOA (formerly Offsite BOA) and the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs (formerly Onsite BOA)
NCM	Narrabri Coal Mine
NCO	Narrabri Coal Operations Pty Limited
NPWS	NSW National Parks and Wildlife Service

Acronym	Description
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
NSW DPHI	NSW Department of Planning, Housing and Infrastructure (formerly Office of Environment and Heritage [OEH])
NWRSWMP	North West Regional Strategic Weed Management Plan 2017 – 2022
OEH	Former Office of Environment and Heritage, now NSW Department of Planning, Housing and Infrastructure (DPHI)
OMP	Offset Management Plan
PCT	Plant Community Type
RBOS	Revised Biodiversity Offset Strategy
SSD	State Significant Development
TEC	Threatened Ecological Community
VZ	Vegetation Zone
WHC	Whitehaven Coal Limited
WoNS	Weeds of National Significance

EXECUTIVE SUMMARY

The Narrabri Offset Management Plan (OMP) has been prepared in accordance with the Commonwealth EPBC approval for Narrabri Coal Mine (NCM) Stage 2. The OMP provides a plan for the management of the WHC company-owned Biodiversity Offset Areas (BOAs), approved for the NCM as documented in the Narrabri Coal Mine Stage 1 and 2 Revised Biodiversity Offset Strategy (RBOS) (AMBS 2024a; Appendix D).

This OMP describes the management methods to be applied to the Narrabri BOA, which consists of the grouping of Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs (formerly known as Onsite BOA); and the Kenna BOA (formerly known as Offsite BOA). The management methods are based on standardised management actions utilised across all other WHC company-owned BOA properties, ensuring contemporary management methods are being applied effectively and efficiently to deliver the required ecological objectives of various OMPs and in accordance with the State and Commonwealth approval requirements for the BOA within this OMP.

Following submission of a consolidated WHC BOMP in 2023; this standalone OMP has not previously been submitted to the New South Wales (NSW) Department of Planning, Housing and Infrastructure (NSW DPHI), NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) and to the Commonwealth Department of Climate Change, Energy, the Environment and Water (CDCCEEW).

Further, this OMP has been prepared following securement of the following Conservation Agreements (CA) incorporating the new requirements imposed by the Biodiversity Conservation Trust (BCT):

- Kenna VCA0486 (Registered 27 September 2019)
- Omeo VC00495 (Registered 16 July 2021)
- Greylands Road VC00496 (Registered 9 July 2021)
- Greylands VC00528 (Registered 9 July 2021)
- Rosevale VC00529 (Registered 9 July 2021)
- Kurrajong Park VC00530 (Registered 26 June 2021)
- West Haven VC00531 (Registered 9 July 2021)

To prepare and register Conservation Agreements (CAs) for the Narrabri BOA, the BCT (under the *Biodiversity Conservation Act 2016*) required WHC to undertake detailed cadastral surveys and utilise contemporary vegetation mapping. The cadastral survey was undertaken by registered surveyors and involved redefining the cadastral boundary to a very high accuracy, resulting in variations to the previous extent of the BOAs when compared to the lower accuracy digital cadastre spatial data that was used in mapping the originally approved BOA.

Further, the BCT requires the use of the NSW Plant Community Type (PCT) vegetation mapping classification system. As a result, the original NCM BOS vegetation mapping (undertaken by Ecotone 2009 using an older classification system) was updated for the preparation of the CAs. These updates necessitated the revision of the NCM BOS, with the revised NCM BOS finalised in 2024 (AMBS 2024a; APPENDIX C:). The revised NCM BOS documents the relevant changes to the originally approved BOAs and/or previously approved but now superseded mapping of the vegetation communities. These changes have been incorporated into this version of the Narrabri Stage 2 OMP document.

This OMP will be finalised following consultation with stakeholders; including the Biodiversity Conservation and Science (BCS) team (a part of NSW DCCEWW); and following approval by the Planning Secretary of NSW DPHI of the Stage 2 Revised BOS (AMBS 2024a; APPENDIX C:) (following consultation with the BCS). This OMP is to be approved by CDCCEEW. Upon its approval, this OMP

will be appended to the approved Narrabri Mine Stage 3 Biodiversity Management Plan (WHC 2023a) for approval by the Planning Secretary of NSW DPHI (and following consultation with the BCS).

1 INTRODUCTION

1.1 BACKGROUND

Whitehaven Coal Limited (WHC) operates numerous coal mines within the Gunnedah Basin (**Figure 1-1**). This Offset Management Plan (OMP) has been prepared to address the requirements of the Commonwealth EPBC Approval 2009/5003 for Narrabri Coal Mine (NCM) (approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* [EPBC Act]) and has been guided by the *EPBC Act Environmental Offset Policy* (2012). This OMP also addresses the requirements of the State (NSW) approval SSD-10269 for NCM (approval under the NSW *Environmental Planning and Assessment Act* [EP&A Act]). Details regarding NCM, its location, ownership and relevant approvals are summarised in **Table 1-1** and legally binding conservation covenant for the BOA is documented in **Table 1-2**.

Table 1-1: NCM Location, Ownership and NSW/Commonwealth Approval details.

Mine	Location	Owner	State (NSW) Approval	Commonwealth EPBC Approval
Narrabri Coal Mine (NCM)	Approximately 60 km northwest of Gunnedah and 28 km southwest of Narrabri in the northwest region of NSW	NCM is a joint venture ownership managed by Narrabri Coal Operations Pty Limited (NCO) on behalf of majority owner Narrabri Coal Pty Ltd (both are wholly owned subsidiaries of WHC).	SSD-10269 (1 April 2022)	EPBC 2009/5003 (24 March 2021)

Table 1-2: BOA and Legally Binding Conservation Covenants.

Mine	BOA	Legally Binding Conservation Covenant
NCM	Kenna (formerly Offsite BOA)	VCA0486
	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven (formerly Onsite BOA)	VC00528, VC00496, VC00530, VC00495, VC00529, VC00531

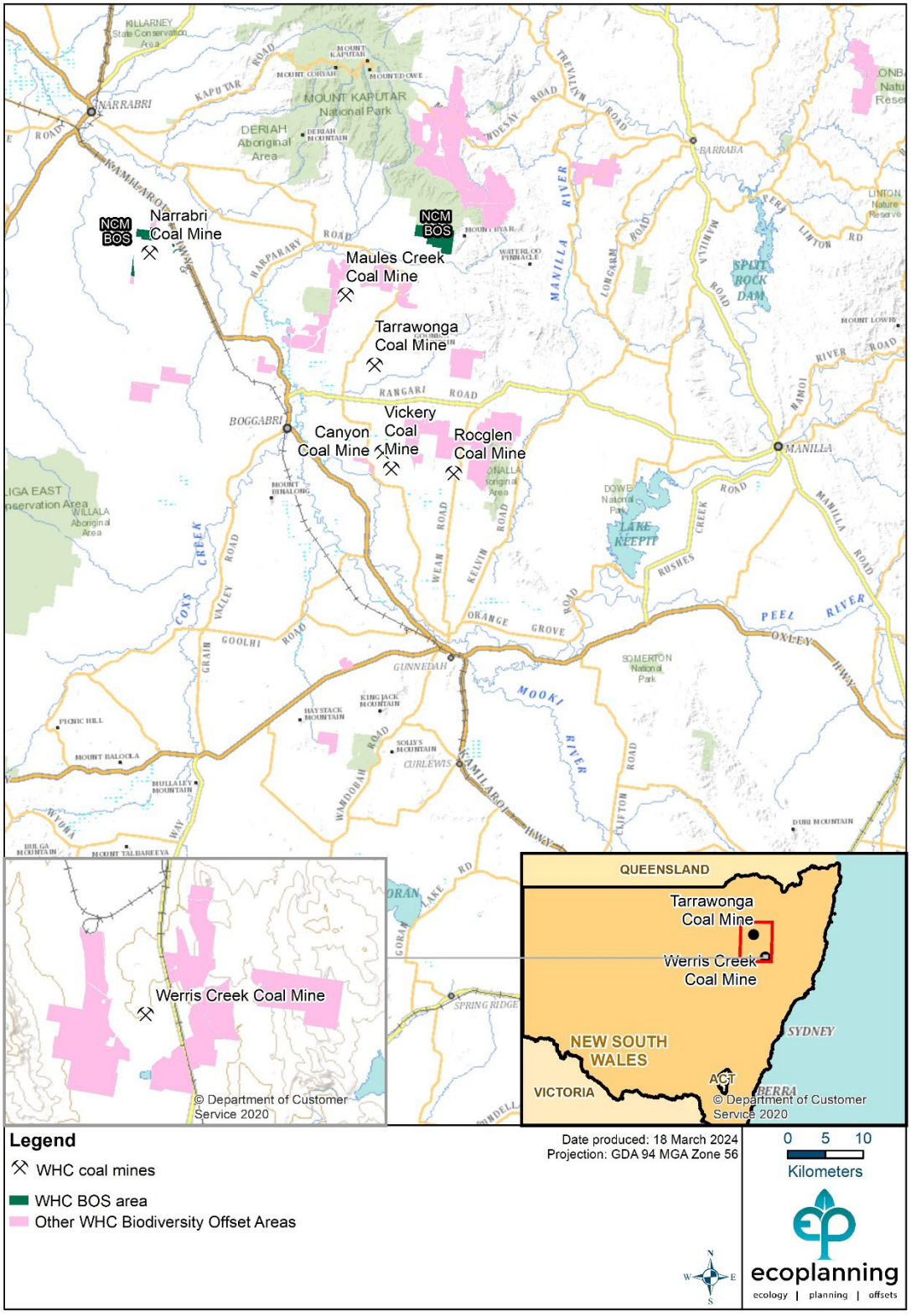


Figure 1-1: Regional setting of WHC coal mines and Biodiversity Offset Strategy (BOS) areas.

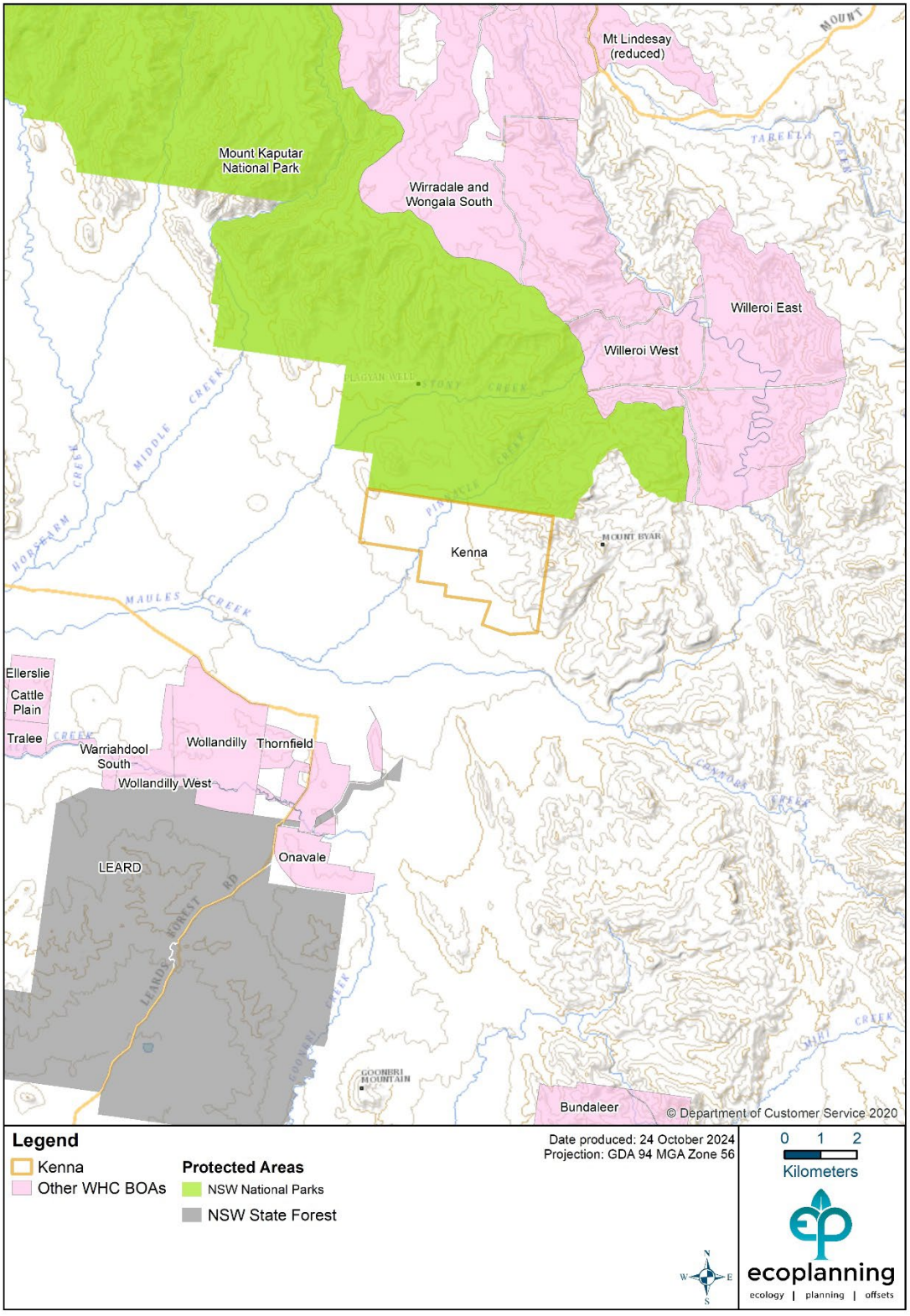


Figure 1-2: Location of the Kenna BOA.

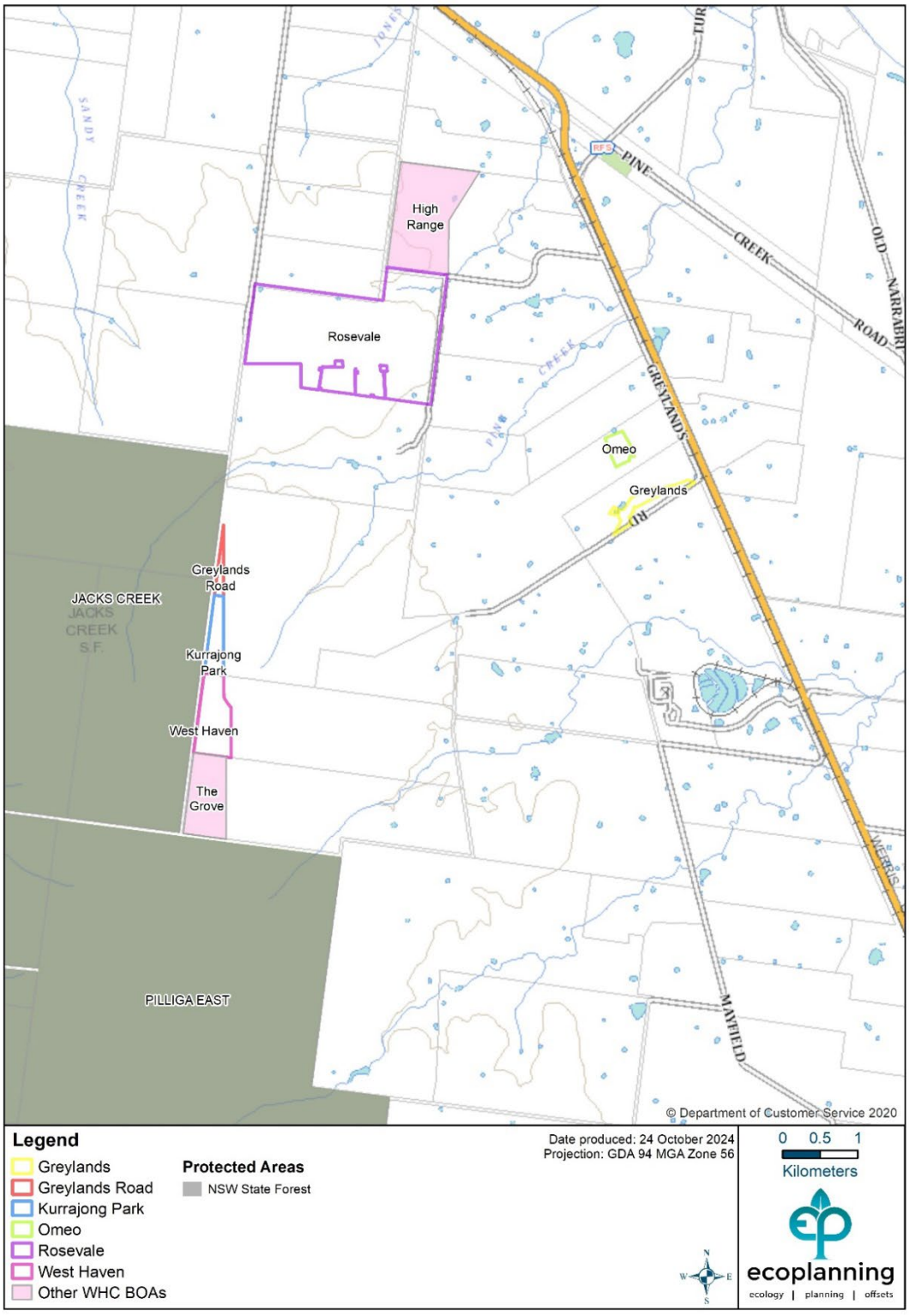


Figure 1-3: Location of the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs.

1.2 SCOPE AND OBJECTIVES

The purpose of this OMP is to provide a consolidated plan for the management of the NCM BOA shown in **Figure 1-2** and **Figure 1-3**, in accordance with all relevant approval requirements outlined in **Table 1-1** and summarised in **Section 2.** This objectives of this OMP are to provide WHC direction to:

- Identify the land that will be required to be managed in accordance with this OMP;
- Outline the actions for managing biodiversity within the BOA;
- Identify and address approvals and legislative requirements relevant to biodiversity management of the BOA;
- Provide a management framework that will lead to an improvement in the condition of biodiversity across the BOA;
- Identify and minimise the impacts of key threats to biodiversity; and
- Outline the monitoring, performance evaluation and reporting processes to be implemented by WHC personnel.

Upon its approval, this OMP will be appended to complement the Narrabri Mine Stage 3 Biodiversity Management Plan (WHC 2023a), which is an onsite specific document, compared to this OMP, which outlines management of the Narrabri BOA that are external to NCM and integrates the requirements of various securement documents, following the registration on title of Conservation Agreements between 2019 and 2021.

1.3 STRUCTURE OF THE OFFSET MANAGEMENT PLAN

The structure of this plan is as follows:

Section 2 Requirements for the Offset Management Plan

Section 3 Description of the Existing Environment Relevant to the BOA

Section 4 Description of the BOS and Securement

Section 5 Description of the Management Actions to be undertaken within the BOA, including Potential Risks and Contingency Measures

Section 6 Description of Reporting and Review Requirements

The following are appended to this OMP:

Appendix A Narrabri Coal Mine relevant State and Commonwealth approval requirements

Appendix B Key Biometric Annual Performance Criteria for relevant Keith Classes

1.4 CONSULTATION

The stakeholders outlined in **Table 1-3** will be formally consulted with in the preparation of OMP as per relevant Major Project Approvals, which is to be finalised following approval from CDCCEEW (formerly the Commonwealth Department of Agriculture, Water and the Environment [DAWE]) after approval of the Narrabri Stage 2 RBOS by NSW DPHI (formerly DPE) and consultation with NSW DCCEEW (formerly Office of Environment and Heritage).

Where relevant, amendments have been made following consultation with the Biodiversity, Conservation and Science Group (BCS) of the NSW DCCEEW including incorporating feedback on other WHC OMPs to ensure consistency between documents.

Table 1-3: Stakeholders to be consulted in preparation of this OMP.

Stakeholder
NSW DPHI
CDCCEEW
Biodiversity, Conservation and Science Group (BCS) within NSW DCCEEW

1.5 RESPONSIBILITIES

WHC is responsible for managing, monitoring, implementing and reviewing the management activities specific to the BOA covered by this OMP. **Table 1-4** outlines the key positions and contractors involved with implementing the offset management activities in this OMP (at the time of writing), as well as the emergency contact details responsible for managing biodiversity in accordance with this OMP.

Incident and Emergency Response

As per Induction and Biodiversity Training (Section 6.5); workers (staff and contractors) must notify WHC of all hazards and incidents as soon as practicable inclusive of whether a safety or health, pollution, material harm or potential for material harm to the environment including if emergency response is required. Initial incident details will be collected and reported to WHC required to make a preliminary report, i.e. Reported Date and Time, Event Date and Time, Event Summary, What Action has been or will be undertaken, and Exact Location (Property).

Where emergency response is required for life threatening situations or for material harm to the environment, workers are to enact and be aware of where Whitehaven Biodiversity Emergency Response Cards (Emergency Call Phone are located with WHC Biodiversity weather stations) including contacting Emergency Services on 000 or 112 or text 106 and then advise Whitehaven Biodiversity when safe to do so.

If the incident is determined to be notifiable under this OMP (irrespective of whether emergency services have been contacted on 000), WHC must contact the following authorities as relevant:

1. CDCCEEW to report a perceived breach of national environment law at environment.compliance@dcceew.gov.au or 1800 110 395
2. Environment Protection Authority Environment Line – 131 555
3. Public Health Units – 1300 066 055
4. Safework NSW – 131 050

5. Local Government
    a. Gunnedah Shire Council – (02) 6740 2100
    b. Narrabri Shire Council i. ii. Business hours – (02) 6799 6866 After hours emergency – 0429 911 111
6. Fire and Rescue NSW – 1300 729 579 (Sydney)
7. NSW Department of Planning and Environment – 1300 420 596
8. Resource Regulator – 1300 814 609

Table 1-4: Details of all parties responsible for management, monitoring and implementing the management activities associated with the Narrabri BOA.

NCM Offset Areas Key Contact / Emergency Contact				
Attention: Whitehaven Group Superintendent - Biodiversity biodiversity@whitehavencoal.com.au and 0488 407 000				
Area	Organisation*	Position*	Status*	Responsibilities*
WHC Biodiversity Offset Areas	WHC	Group Manager/ General Manager	Employee	Obtain and provide adequate resources for the Group Superintendent - Biodiversity to implement the OMP.
	WHC	Group Superintendent - Biodiversity	Employee	To authorise this OMP and undertake associated compliance and reporting requirements. Implement the overall biodiversity strategy on the offset areas; coordinate and supervise biodiversity management and monitoring activities on the offset areas. Initiate review of this OMP.
	WHC	Biodiversity Specialist & Field Officers	Employee	Support the Group Superintendent - Biodiversity and supervise biodiversity management and monitoring activities on the offset areas.
	Pest Management Consultant/ Contractor	Scientists & Field Technicians	Contractors	Undertake biodiversity management activities as directed by the Group Superintendent – Biodiversity and Biodiversity Specialist /Field Officers for feral and pest animal monitoring and management/control.
	Land Management & Weed Spraying Contactor	Field Operators & Technicians	Contractors	Undertake biodiversity management activities as directed by the Group Superintendent – Biodiversity and Biodiversity Specialist /Field Officers for weed spraying, habitat augmentation, threatened species, revegetation ground preparation and other minor earthworks and waste/infrastructure removal plus tree planting and maintenance activities.
	Fire & Ecological Burn Contractor	Fire Fighters & Controlled Burn Practitioners	Contractors	Undertake biodiversity management activities as directed by the Group Superintendent - Biodiversity and Biodiversity Specialist/Field Officers for fire management planning, hazard reduction management and ecological burn implementation.
	Ecological Consultant	Ecologists	Contractors	Undertake monitoring as directed by the Group Superintendent - Biodiversity and Biodiversity Specialist/Field Officers for threatened species and ecological community assessment and flora/fauna surveys.

* Role/responsibilities can vary over time by Whitehaven based on ongoing performance, compliance and commercial aspects that change as required.

1.6 RELATIONSHIP WITH OTHER MANAGEMENT PLANS

Rehabilitation Management Plans and Strategies

As outlined in **Section 0,** this OMP only addresses the external land-based components of the Narrabri BOS and as such complements the description and implementation of the Narrabri Mine Rehabilitation Management Plan (WHC 2023b) and the description and implementation of the Rehabilitation Area Offset to be documented in the NCM Rehabilitation Strategy.

Revised Biodiversity Offset Strategy

The Revised Biodiversity Offset Strategy (RBOS) for NCM Stage 1 and 2 (AMBS, 2024a) updates the original BOS (ELA 2014a and revised version ELA 2019). To prepare and register Conservation Agreements (CAs) for the Narrabri BOA, the BCT required WHC to undertake detailed cadastral surveys and utilise contemporary vegetation mapping. The cadastral survey was undertaken by registered surveyors and involved redefining the cadastral boundary to a very high accuracy, resulting in variations to the previous extent of the BOAs. In addition, the BCT required the use of the NSW Plant Community Type (PCT) vegetation mapping classification system. As a result, the original NCM BOS vegetation mapping (undertaken by Ecotone 2009 using an older classification system) was updated for the preparation of the CAs. These updates necessitated the revision of the NCM BOS (EcoLogical 2014; revised 2019), with the NCM RBOS (AMBS 2024a; APPENDIX C:). This OMP outlines the management within the BOA as described in the RBOS.

2 REQUIREMENTS FOR THE OFFSET MANAGEMENT PLAN

While this OMP has been prepared for EPBC approval 2009/5003, this OMP also addresses the requirements of the State (NSW) approval SSD-10269 for NCM. Each section of this OMP addresses the conditions of these approval documents as outlined in **Table 2-1**. Detailed compliance tables for NCM, under these instruments, are also included in **Table 2-2**, **Table 2-3** and **Table 2-4**.

Table 2-1: Approval document conditions addressed within each section of this OMP.

OMP Section Cross Referenced to applicable condition of Approval documents	SSD-10269	EPBC 2009/5003
Responsibilities Section 1.5	N/A	14aii 14bii
Figures in Section 1	N/A	14c 14d
BOS Section 4	B45 and B46	2
Management of Biodiversity Offset Areas Section 5	N/A	14ai 14bi
Biodiversity Offset Area Establishment Section 5.3	B42fi, B42fii B42fv & B42fx	14a& 14b
Seed Management Section 5.3.5	B42fvi	14a& 14b
Revegetation Section 5.5	B42ev	14a& 14b
Ecological Thinning Section 5.6	N/A	14a & 14b
Habitat Augmentation Section 5.7	B42ev & B42fiii	14a& 14b
Management of Heritage Values Section 5.8	B42fiv	14a& 14b
Weed Management Section 5.9	B42fvii	14a& 14b
Pest Animal Management Section 5.10	B42fviii	14a& 14b
Erosion Control Section 5.11	B42fix	14a& 14b
Agricultural Management Section 5.12	N/A	14a& 14b
Bushfire Management Section 5.13	B42fxi	14a& 14b
Threatened Flora Management Section 5.14	B42eiii	14a& 14b

OMP Section Cross Referenced to applicable condition of Approval documents	SSD-10269	EPBC 2009/5003
Vegetation and Habitat Monitoring Section 5.15	B42g	N/A
Fauna Monitoring Section 5.16	B42g	N/A
Performance and Completion Criteria Section 5.17	B42g	N/A
Potential Risks and Contingency Measures Section 5.18	B42g	N/A

S = Schedule of Major Project Approval; C = Condition Number within relevant Schedule (if applicable)

Table 2-2: Approval Decision EPBC 2009/5003 Requirements

Condition Number	Requirement	Relevant OMP Section
2	*In order to mitigate impacts on EPBC Act listed threatened species and communities, by 30 June 2021, the person taking the action must:*	Section 4.1 addresses the Biodiversity Offset Strategy and minimum area requirements. Figure 1-2 and Figure 1-3 Also addressed in NCM RBOS (APPENDIX C:)
	(a) secure at least 933 hectares of offset on the "Kenna" property, comprising the area enclosed by the yellow line labelled 'Proposed Offset' shown in Annexure 2 under a legal conservation mechanism that has been agreed to in writing by the Department, and,	
	(b) secure at least 422 hectares of offset on-site, comprising the areas enclosed by a yellow line labelled 'On-site Offset Area (2019)' shown in Annexure 3, under a legal conservation mechanism that has been agreed to in writing by the Department. *Evidence of compliance with this condition must be provided to the Department within 30 days of finalising the legal conservation mechanism.* *The approval holder must report on progress meeting the requirements of a) and b) in each annual compliance report required under condition 8 and as otherwise requested by the Department.*	

Condition Number	Requirement	Relevant OMP Section
14	*In order to mitigate impacts on EPBC Act listed threatened species and communities, the person taking the action must:* *(a) Develop and implement an active monitoring and management plan for the property mentioned in 2(a) for a period of 20 years to enhance White Box Grassy Woodland on the site as it provides habitat for the EPBC listed Superb parrot. The active management plan must include:* *i. Management actions, including but not limited to, rehabilitation and restoration measures, pest management, fencing, weed control, fire management, sediment and erosion control, exclusion of livestock and restrictions of access.* *ii. Details of who is responsible for monitoring, reviewing and implementing the plan.* *(b) Develop and implement an active monitoring and management plan for the site mentioned in (2b) for a period of 20 years to enhance Red Ironbark-Brown Bloodwood Shrubby Woodland which provides habitat for EPBC listed Bertya opponens and for the White Box Grassy Woodland which provides habitat for the EPBC listed Superb Parrot. The active management plan must include:* *i. Management actions, including but not limited to, land rehabilitation and restoration measures, pest management, fencing, weed control, fire management, sediment and erosion control, exclusion of livestock and restrictions of access.* *ii. Details of who is responsible for monitoring, reviewing and implementing the plan.*	Develop an active monitoring and management plan (14a & 14b): Section 5 outlines the monitoring and management plan of properties mentioned in 2(a) and 2(b) which will be implemented over a 20-year period. Rehabilitation and restoration measures (14a[i] and 14b[i]): Section 5.5 provides details on the revegetation program within the BOA, as well as revegetation works completed Pest management (14a[i] and 14b[i]): Section 5.10 provides details of the pest monitoring and management program, as well as control methods for specific pest species. Fencing (14a[i] and 14b[i]): Section 5.3.1 details the establishment of tracks and fences within the BOA and provides details on monitoring and maintenance. Weed control (14a[i] and 14b[i]): Section 5.9 provides details on the weed management program within the BOA, including seasonal weed assessment programs. Fire management (14a[i] and 14b[i]): Section 5.13 details bushfire management within the BOA, including describing the annual ecological burn program. Erosion control (14a[i] and 14b[i]): Section 5.11 provides details on erosion management and annual inspections within the BOA. Exclusion of livestock and restriction of access ((14a[i] and 14b[i]): Section 5.12 details exclusion of livestock within the BOA. Restriction of access via fencing and inspections is detailed in Section 5.3. In addition, Section 3.4 details the previous land use history of the site and specifies when destocking occurred. Other monitoring and management actions include: Seed Management: Section 5.4 Ecological Thinning: Section 5.6 Habitat Augmentation: Section 5.7 Heritage Management: Section 5.8 Threatened flora management: Section 5.14 Flora monitoring: Section 5.15 Fauna monitoring: Section 5.16 Performance and completion criteria: Section 5.17 Potential risks and contingency measures: Section 5.18 Responsible persons (14a[ii] and 14b[ii]): Section 1.5 and Table 1-4 details the persons responsible for implementation of the OMP, including management and monitoring activities.

Condition Number	Requirement	Relevant OMP Section
	(c) Clearly define boundaries of the property mentioned in 2(a), through maps and textual descriptions as well as an accompanying Shapefile. *(d) Clearly define boundaries of the 422 hectare property mentioned in 2(b), through maps and textual descriptions as well as an accompanying Shapefile.*	Section 1.1 details the properties within the BOA. Also see Figure 1-2 and Figure 1-3.
	The final Biodiversity Offset Strategy must be submitted to the Minister for approval by 31 December 2014. The approved strategy must be implemented.	See final NCM RBOS (APPENDIX C:).

Table 2-3: SSD-10269 (Narrabri Underground Mine Stage 3 Extension Project

Condition	Requirement	Section
Stage 2 Biodiversity Offset Strategy		
B42e	*Describe the measures to be implemented within the approved disturbance areas to:* *(iii) provide for the reasonable and feasible salvage, transplanting and/or propagation of any threatened flora found during pre-clearance surveys, in accordance with the Guidelines for the Translocation of Threatened Plants in Australia Third Edition (Commander et al., 2018); and* *(v) re-establish habitat for threatened species*	5.5, 5.7 & 5.14
B42f	*Describe the measures to be implemented on the site to:* *(i) minimise impacts to threatened ecological communities listed under the BC Act and EPBC Act, and contribute to conservation strategies for these communities;* *(ii) minimise impacts on fauna habitat resources such as hunting and foraging areas, habitat trees, fallen timber and hollow-bearing trees;* *(iii) introduce naturally scarce fauna habitat features such as nest boxes and salvaged tree hollows and promote the use of these introduced habitat features by threatened fauna species;* *(iv) manage any potential conflicts with Aboriginal heritage values; and* *(v) protect vegetation and fauna habitat outside of the approved disturbance areas;* *(vi) manage the collection and propagation of seed from the local area;* *(vii) control weeds, including measures to avoid and mitigate the spread of noxious weeds;* *(viii) control feral pests with consideration of actions identified in relevant threat abatement plans;* *(ix) control erosion;* *(x) control access to vegetated or revegetated areas; and* *(xi) manage bushfire hazards;*	5.3, 5.3.5, 5.7, 5.8, 5.9, 5.10, 5.11 & 5.13
B42g	*Include a seasonally-based program to monitor and report on the effectiveness of the above measures, progress against the detailed performance indicators and completion criteria required under conditions of this consent, and identify improvements that could be implemented to improve biodiversity outcomes.*	5.15, 5.16, 5.17, 5.18
B45	*The Applicant must implement the approved Biodiversity Offset Strategy prepared under development consent 08_0144 for Stage 2 of the Narrabri Mine throughout the life of the development, subject to the following:*	4.1

Condition	Requirement	Section
Stage 2 Biodiversity Offset Strategy		
	(a) with the approval of the Planning Secretary (following consultation with BCS), the Strategy may be incorporated into the Biodiversity Management Plan required under condition B42; *(b) with the approval of the Planning Secretary (following consultation with BCS), the Strategy may be amended; and* *(c) in recognition of the Applicant's decision to forego its right to disturb 14.1 ha of the Stage 2 disturbance footprint (the 'impact reduction area') the Strategy's requirement for the Applicant to conduct mine site rehabilitation over 2,832.79 ha and to secure this area under a long-term security mechanism is reduced by 36.66 ha to 2,796.13 ha* ***Note:** The Stage 2 Biodiversity Offset Strategy, Rehabilitation Strategy and Rehabilitation Management Plan need to be substantially integrated to ensure biodiversity objectives are achieved through rehabilitation of the site.*	
B46	*The Applicant must make suitable arrangements to provide appropriate long-term security for the offset areas required by the Biodiversity Offset Strategy within 3 years of commencing development under this consent, or other date agreed by the Secretary, to the satisfaction of the Planning Secretary.*	4.2

Table 2-4: Soon to be surrendered Major Project 08_0144 Requirements

Condition	Requirement	Section
SCHEDULE 5: REHABILITATION AND OFFSETS		
Biodiversity Offset Strategy		
6	*The proponent shall provide a suitable biodiversity offset strategy to compensate for the impacts of Stages 1 and 2 of the project. The offset strategy must:* *(a) be prepared in consultation with BCS;*	1.4 and 4.1
	(b) be submitted to the Secretary for approval by 31 December 2010, or as otherwise agreed by the Secretary;	Addressed in NCM RBOS (APPENDIX C:)
	(c) provide a detailed assessment of offset proposal/s involving the property/ies (agreed to by BCS) adjoining Mt Kaputar National Park to confirm the ability of either of these property/ies to meet "like for like or better" and "maintain or improve" conservation outcomes;	Addressed in NCM RBOS (APPENDIX C:)
	(d) include and assess proposals to offset impacts to the Inland Grey Box EEC, Bertya opponens, and foraging habitat for the Superb Parrot;	Addressed in NCM RBOS (APPENDIX C:)
	(e) include proposals on offsetting both direct and indirect impacts (i.e. edge effects) of the project; and	Addressed in NCM RBOS (APPENDIX C:)
	(f) determine the best overall combination of lands to provide a suitable offset.	Addressed in NCM RBOS (APPENDIX C:)
7	*The Proponent shall make suitable arrangements to provide appropriate long-term security for the offset by 31 December 2011, or other date agreed by the Secretary, to the satisfaction of the Secretary.*	4.2

2.1 RELEVANT ENVIRONMENTAL MANAGEMENT PLAN GUIDELINES

This OMP was prepared in consideration of the *Environmental Management Plan Guidelines* (Cth DCCEEW, 2024). The relevant environmental management plan guidelines are presented in **Table 2-5.**

Table 2-5: Environmental Management Plan Guidelines

Guideline	Relevant OMP Section
GENERAL PRINCIPLES FOR THE PREPARATION OF AN ENVIRONMENTAL MANAGEMENT PLAN	
Key principles	
An environmental management plan should:	
• *be balanced, objective and concise*	Throughout this OMP
• *state any limitations that apply, or should apply, to the use of the information in the environmental management plan*	None
• *identify any matter in relation to which there is a significant lack of relevant information or a significant degree of uncertainty*	None
• *include adaptive management strategies for managing uncertainty*	Section 5.18
• *be written in a way that is easily understood by other parties*	Throughout this OMP.
• *clearly present how conclusions about risks have been reached*	Section 5.18 and Appendix C
• *ensure that the person taking the action takes full responsibility for the content and commitments contained in the plan.*	Section 1.5 Declaration of Accuracy (Page ii)
Including commitments in management plans	
• *All commitments must be specific and auditable with measurable outcomes and clear timeframes.*	Throughout this OMP
• *To ensure readability, write clearly and avoid long sentences with complex clauses.*	
• *Always use the terms 'will' and 'must', rather than 'should' or 'may' when committing to carry out management actions.*	
• *Avoid use of ambiguous terminology such as 'where possible', 'as required', 'to the greatest extent possible'. If it is necessary to include ambiguous terminology, it should be explained and examples given.*	
• *Clearly explain any technical terms or acronyms used, and/or define them in a glossary.*	
It is also important that commitments or statements within the management plan are consistent with other relevant management plans or conditions of approval.	
Cross-referencing	
Where the plan refers to material in other documents, it should include cross-references that are clear, complete and that specify the document version and date. Use tables, diagrams and maps where their inclusion would provide a better understanding and implementation of the management plan. Link all tables, diagrams and maps into the text through cross-referencing.	Throughout this OMP and Section 7.
CONTENT OF THE ENVIRONMENTAL MANAGEMENT PLAN	
Cover page and declaration of accuracy	
Cover page detailing: • *EPBC number* • *project name* • *proponent /approval holder and ACN or ABN* • *the proposed/approved action* • *location of the action*	Cover Page

Guideline	Relevant OMP Section
• *date of preparation of the environmental management plan* • *person accepting responsibility for the environmental management plan – signed declaration (see below).*	Document History Table (p. i). Declaration of Accuracy (Page ii)
Document version control	
The document version control should be a simple system that ensures that details of all key changes to the document over time are properly recorded. Identified changes should include details of timings, persons responsible and reasons for changes.	Document History Table (Page i)
Table of contents	
Table of contents page detailing: • *all section headings and page numbers* • *all figures, tables, plans and maps (should be numbered)* • *all appendixes (with meaningful titles, including for sub-appendixes if any). If the appendixes contain a collation of data, include summary of the contents.*	Table of Contents (Page ii – vi).
Executive summary or introduction	
The executive summary should note the key elements of the project, the purpose of the document, the main potential impacts and the primary strategies planned to address these impacts.	Executive Summary (Page 1)
Conditions of approval reference table	
When an environmental management plan is prepared after the project has been approved under the EPBC Act, the management plan should include a table detailing the information noted below: • *The EPBC Act approval condition requirements the plan is intended to address. These are best presented broken down into each of the individual actions that the conditions require.* • *The section and page numbers which address the approval conditions.* • *A summary of the key commitments relating to each of the approval conditions.*	Section 2
Project description	
The environmental management plan should provide a description of the project as this provides context for the plan. The location of all project actions should be described and a map showing their location provided. Basic information on the environment at these locations should also be included as this helps provide the environmental context to which the environmental management plan applies. The plan should include a description of the activities that will be undertaken as part of the project including project details relevant to any approval conditions and with potential impacts on matters protected under the EPBC Act. The plan should distinguish between construction and operational activities, if relevant. A schedule of intended commencement and completion dates should be provided. Projects undertaken in stages should identify each stage in the schedule. Contingency schedules can also be included along with examples of events that could result in the use of the contingency schedules.	Section 1
Objectives	
The environmental outcomes of the plan should be defined. These should be tailored to the environmental issues outlined in the plan.	Section 6
Environmental management roles and responsibilities	
Once an action is approved, the approval holder is responsible for complying with the conditions of approval, including the commitments made in environmental management plans. The plan should define the roles and responsibilities of personnel in charge of the environmental management of the project. The roles and responsibilities of each relevant position should be documented, including the responsibilities of subcontractors. The names of the responsible personnel do not need to be included. Identification of the position titles, roles and responsibilities is sufficient. If the roles and responsibilities are expected to change over time the long-term variations should also be documented.	Section 1.5
Reporting	

Guideline	Relevant OMP Section
An environmental management plan will usually require reporting arrangements for two purposes. Reporting arrangements assist with effective implementation and with external reporting. External reports may include reports on environmental incidences to the regulator, reports to stakeholders, reports to inform reviews of the plan and reports to meet the reporting requirements of the conditions of approval.	Section 1.5 and Section 6
The description of reporting requirements should include:	
• *a list of required reports including where appropriate monitoring, environmental incidents, non-compliance, corrective action and auditing*	
• *a description of the standard report content*	
• *the schedule or triggers for preparing a report*	
• *who the report is provided to*	
• *document control procedures.*	
Reporting commitments should also be consistent with any reporting to us required by the conditions of approval.	
Environmental Training	
All people involved with the project should receive relevant environmental training to ensure they understand their responsibilities when implementing the environmental management plan. People to be trained include those at the site/s of all project activities and operations, including contractors, subcontractors and visitors. The training should be tailored to the role of the individual in the project.	Section 6.5
The environmental management plan should describe the training to be implemented and could include:	
• *site inductions*	
• *identification of key points of environmental value and any relevant matters of national environmental significance*	
• *understanding the requirements of the environmental management plan and the individual's role*	
• *environmental incident emergency response procedures*	
• *site environmental controls*	
• *an outline of the potential consequences of not meeting their environmental responsibilities.*	
Records of all training conducted should be maintained and include:	
• *the person receiving the training*	
• *the date the training was received*	
• *the name of the person conducting the training*	
• *a summary of the training.*	
Emergency contacts and procedures	
The environmental management plan should identify the key emergency contacts responsible for managing environmental emergencies associated with the project and their contact details. These personnel should have the power to stop and direct works so that they can manage emergencies effectively. In addition, the plan should establish procedures for managing environmental emergencies and ensure that those procedures are implemented and maintained.	Section 1.5
Potential environmental impacts and risks	
Threats to matters protected under the EPBC Act	Section 1.6
The environmental management plan should summarise all the identified threats to matters protected under Part 3 of the EPBC Act in the management plan. The matters protected by the EPBC Act include:	Section 4
• *the 9 matters of national environmental significance (listed in Appendix A)*	Section 5.18
• *the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).*	APPENDIX B:
The plan should refer to relevant information provided in the EPBC Act assessment documentation, such as an environmental impact statement or preliminary documentation. If the project has already been approved, the plan should detail all new information relevant to the conditions placed on the approval. The key sensitivities of the environmental values potentially impacted by the action should be identified.	
Potential impacts	

Guideline	Relevant OMP Section
The potential impacts section of the plan should focus on identifying, locating and quantifying the potential impacts (direct and indirect) of the project on the matters protected by the EPBC Act. It should discuss: • *the relevant impacts of the project* • *the nature and extent of the potential short-term and long-term effects* • *any uncertainties regarding the predicted impacts.* *This may include a summary of any relevant information previously provided in assessment documentation, such as an environmental impact statement or preliminary documentation.* *Impacts from relevant stages of the action (for example, pre-construction, construction and operation) should be delineated in this section and should reflect the relevant conditions of approval. It may be necessary to divide the potential impacts into subsections reflecting the stages of the project.* *Risk assessment* *Once the potential impacts of the proposal are clearly identified a risk assessment should be undertaken for each potential impact. This means that the likelihood and consequences of each potential impact need to be estimated. An example of a methodology for risk assessment is at Evaluating risk.* *The function of the risk assessment is not to repeat or supersede the original assessment of a project or its conditions of approval. Rather it is to ensure that these risks are effectively translated into actual mitigation and management actions. Impacts with higher risk ratings usually require more management actions and controls. This minimises the likelihood of the risk occurring and reduces the consequences to acceptable levels.*	
Environmental management measures	
The environmental management plan should clearly state how the potential impacts of the proposal will be managed and this information usually forms the bulk of the content of the plan. For each potential impact, the plan should address: • *environmental management activities, controls and performance targets* • *environmental management maps and diagrams* • *monitoring programs with trigger values for corrective actions* • *corrective actions and non-compliance reporting* • *environmental schedules* *These topics are described in more detail below. It is helpful if management plans present the information on these topics for one potential impact at a time. This ensures that all the management measures for each potential impact are in the same section of the document and easy to locate.*	Section 5
Environmental management activities, controls and performance targets *The environmental management plan should describe all the environmental management activities and control measures that will be implemented to avoid or minimise environmental impacts. The description of each measure should also specify the timeframes for implementation and the performance targets or outcomes to be achieved. The timing of measures is often best presented in a timetable. Performance targets and outcomes should be quantitative and auditable.*	Section 5
Environmental management maps and diagrams *Environmental management maps and diagrams are useful visual tools that aid in environmental management activities. Maps can provide useful spatial information about areas that require environmental management. Diagrams can illustrate the design of environmental control measures and the flow of environmental management procedures. For example, a map could be used to show:* • *environmentally sensitive areas on or near a project site* • *vegetation that requires protection* • *buffer zones or 'no-go zones'* • *monitoring locations.*	Figures throughout the OMP.
Environmental monitoring *The environmental management plan should specify how the effectiveness of environmental management measures will be monitored. It should include the methodology, frequency and duration of monitoring activities. It should also include trigger values or conditions under which corrective actions are*	Section 5.15 and 5.16

Guideline	Relevant OMP Section
taken. The plan should also specify if, and when, follow up action is required and how monitoring records will be maintained.	
Corrective actions *The environmental management plan should include procedures for addressing:* • *monitoring results which exceed the trigger values for corrective action* • *potential corrective actions* • *reporting non-compliance with approval conditions to the relevant authority* • *environmental incidents and emergencies.*	Section 5.18 Section 6
The plan should also identify who is responsible for implementing the above procedures. Auditable systems should be developed for recording the implementation of these procedures and their outcomes.	Section 1.5
Audit and review	
Environmental auditing *The environmental management plan should include the schedule or triggers for auditing the implementation and effectiveness of the plan. It should address both internal and external audit requirements including who is responsible for undertaking the audits and reporting the results.*	Section 6.4
Environmental management plan review *The environmental management plan should specify the schedule or triggers for reviews of the plan. A review should assess whether the plan is achieving its objectives and the requirements of any relevant approval conditions. A review should take into account environmental monitoring records, corrective actions and the results of any audits. The plan should also identify who will be responsible for undertaking the review. During the review process, any reasons for varying the environmental management plan should be documented.*	Section 6.3
Review of an environmental management plan would typically be undertaken: • *following significant environmental incidents* • *when there is a need to improve performance in an area of environmental impact* • *periodically for actions undertaken over long timeframes such as one, two or five years.*	Section 6.3
However, if the person taking the action wishes to carry out any activity other than in accordance with the approved management plan specified in the approval conditions, the person taking the action is usually required to submit to us for the Minister's written approval a revised management plan. In these cases, the varied activity should not commence until the Minister has approved the varied management plan in writing. As a guiding principle, the Minister will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time.	Section 6.3
Glossary	
This should include any acronyms, all terms which are open to different interpretations or terms which are not in common use. Terms which are defined in the approval conditions should retain the same meaning as that used in the conditions.	Page vii
EVALUATING RISK	
The following section sets out a qualitative risk assessment methodology that can be applied to the environmental risks associated with a wide range of projects. It is provided as an example of one approach to risk assessment and the Department does not require that this particular approach be used when preparing an environmental management plan. Further guidance on evaluating and managing risk can be found in AS ISO 31000:2018 Risk management – Guidelines (Standards Australia 2018).	Section 5.18 and APPENDIX B:
Likelihood and consequence	
Each environmental risk should be given a rating in terms of likelihood and consequence using the criteria in the table 1 and table 2 below. These ratings are then combined using the risk rating table to generate a risk rating of low, medium, high or severe.	APPENDIX B:

Guideline	Relevant OMP Section

Table 1 Likelihood

Qualitative measure of likelihood	***How likely is it that this event/issue will occur after control strategies have been put in place***
Highly likely	*Is expected to occur in most circumstances*
Likely	*Will probably occur during the life of the project*
Possible	*Might occur during the life of the project*
Unlikely	*Could occur but considered unlikely or doubtful*
Rare	*May occur in exceptional circumstances*

Table 2 Consequences

Qualitative measure of consequences	***What will be the consequence/result if this issue does occur rating***
Minor	*Minor incident of environmental damage that can be reversed*
Moderate	*Isolated but substantial instances of environmental damage that could be reversed with intensive efforts*
High	*Substantial instances of environmental damage that could be reversed with intensive efforts*
Major	*Major loss of environmental amenity and real danger of continuing*
Critical	*Severe widespread loss of environmental amenity and irrecoverable environmental damage*

Risk rating

You should give each of your risks a likelihood rating and a consequence rating. Using the rating table below you can determine whether your risk is low, medium, high or severe.

APPENDIX B:

The risk rating generated using the above table can be used as a guide to the amount of time and resources that will be required to manage each risk. Risks with 'low' risk ratings will usually require significantly less management than 'medium', 'high' and 'severe' risks.

This is usually reflected in the environmental management plan where issues with higher risk ratings require more detailed information regarding:

- *the description of the risk*
- *the measures and commitments to minimise and manage the risk*
- *the performance objectives and monitoring programs*
- *trigger values for additional action, review and reporting.*

Table 3 Risk Rating

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

FORMAT OF SUBMISSIONS

General

Each page of the environmental management plan should include the name of the project, the date of the environmental management plan and sequential page numbering. An environmental management plan can be submitted via standard post or electronically. Submissions should be titled 'Environmental Management Plan' with the project name and EPBC approval number.

Header and Footer of each page

Guideline	Relevant OMP Section
General requirements for maps, plans and sections	
All maps and sections should conform to the following standards.	Figures throughout the OMP.
• *Scale – an appropriate standard metric scale should be chosen to best represent the information required (for example 1:25 000, 1:10 000 and 1:5000).*	
• *Datum – plans and cross sections should refer to Australian Height Datum.*	
• *Title Block – plans should have a title block in the lower right-hand corner of the sheet with the following information:* – *EPBC number and project name* – *title and number of the plan* – *author* – *scale* – *date* – *source and date of data*	
• *Legend – plans should have a clear and comprehensive legend to identify the symbols and colours used.*	
• *Maps, plans, figures, images and sections should also:* – *use metric measurements throughout* – *show a graphic bar scale* – *show any local grid lines and standards* – *have a north point or orientation of sections* – *include a key.*	
Maps may also be submitted in ESRI Shapefiles containing '.shp', '.shx' and '.dbf' files.	

3 EXISTING ENVIRONMENT RELEVANT TO THE OFFSET AREAS

This section describes the existing environment relevant to the BOA. This section summarises the geography, prevailing climatic conditions; geology, topography and hydrology; land use history; threatened species and ecological communities; and introduced flora and fauna. It also provides a summary of NCM including the key biodiversity values for each relevant strategy such as vegetation community descriptions and mapping.

3.1 GEOGRAPHY

The Narrabri BOA comprises the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs, which are six geographically grouped properties in close proximity to NCM; and the Kenna BOA. All seven properties within the entire Narrabri BOA occur within the Narrabri Shire Council local government area (LGA) as shown on **Figure 3-1** and **Figure 3-2**.

The Kenna BOA is bordered by Mount Kaputar National Park, which is situated along its northern boundary (**Figure 3-1**). Jacks Creek State Forest is situated on the western boundary of West Haven, Kurrajong Park and Greylands Road BOAs (**Figure 3-2**).

The Kenna BOA occurs within both the Liverpool Plains sub-region of the Brigalow Belt South Interim Biogeographic Regionalisation for Australia (IBRA) region and the Peel sub-region of the Nandewar IBRA region (DoEE, 2012) (**Figure 3-3**). The Greylands and Omeo BOA occur wholly within the Liverpool Plains sub-region of the Brigalow Belt South IBRA region (**Figure 3-4**). The Greylands Road, Kurrajong Park and West Haven BOAs occur wholly within the Pilliga IBRA sub-region of the Brigalow Belt South IBRA region. The Rosevale BOA occurs partially within both the Liverpool Plains and Pilliga sub-regions of the Brigalow Belt South IBRA region (**Figure 3-4**).

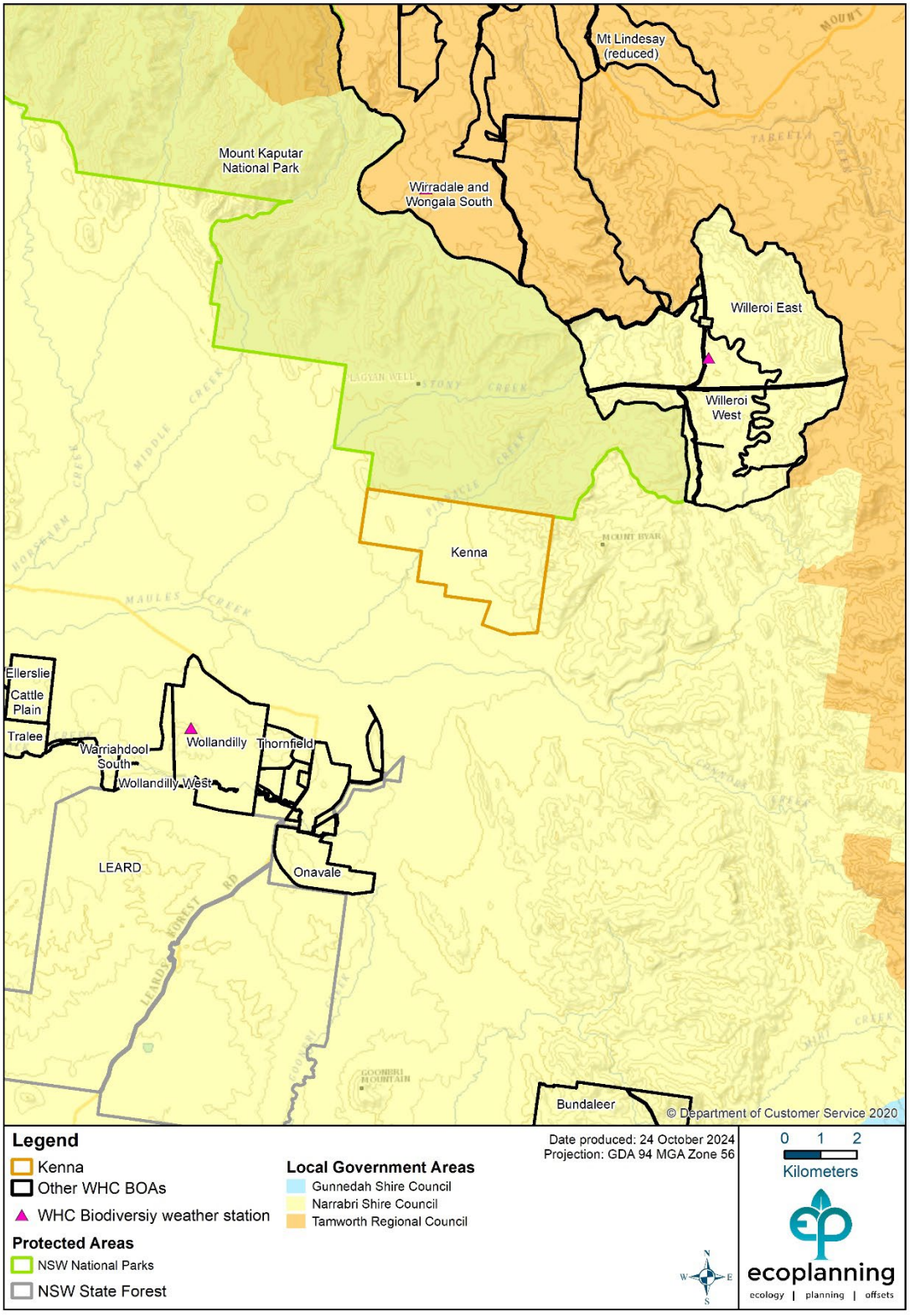


Figure 3-1: Location of the Kenna BOA in relation to National Parks, State Forests Protected Areas, LGAs and WHC weather stations.

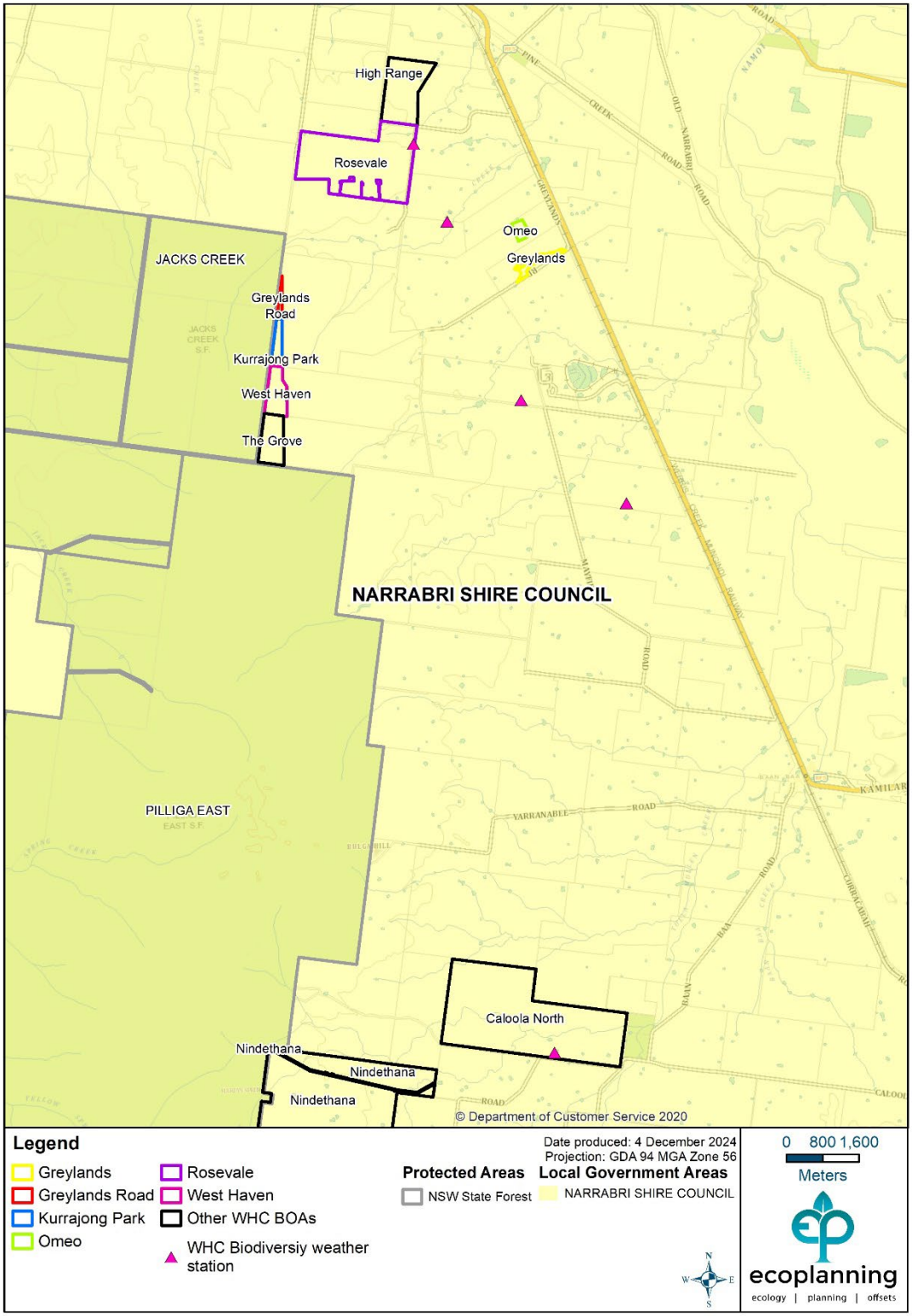


Figure 3-2: **Location of the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOA in relation to National Parks, State Forests Protected Areas, LGAs and WHC weather stations..**

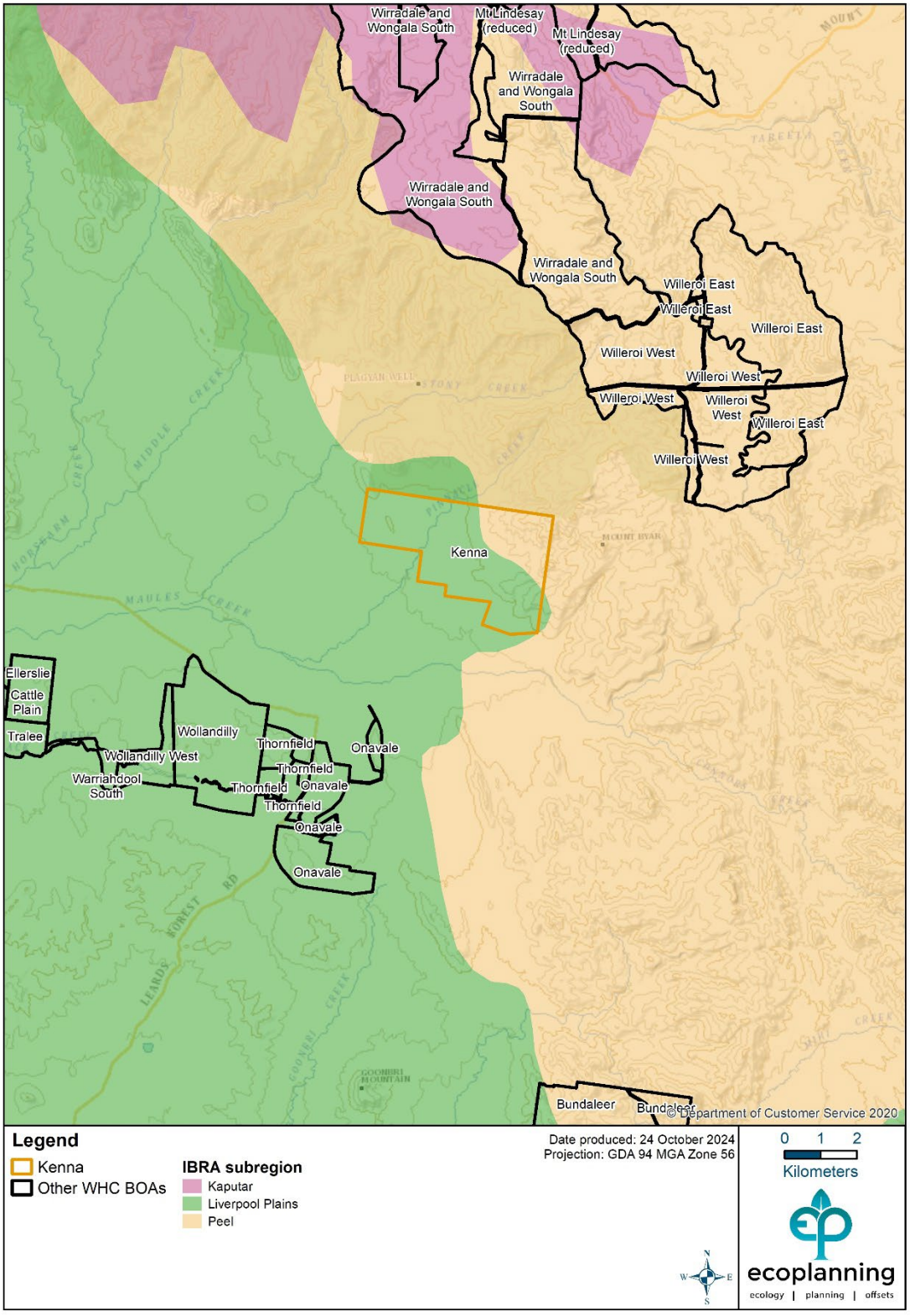


Figure 3-3: IBRA sub-regions of the Kenna BOA.

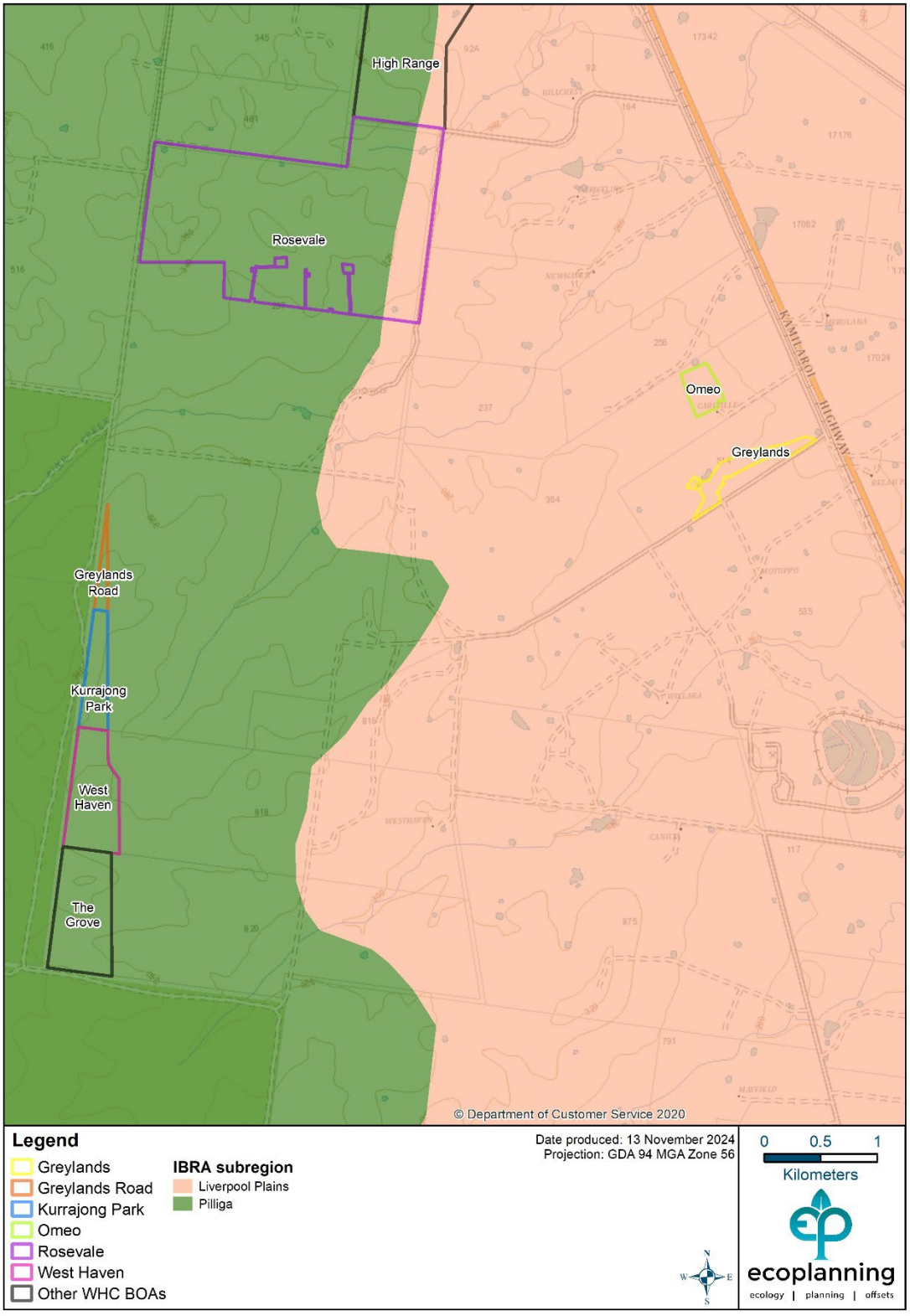


Figure 3-4: IBRA sub-regions of the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOA.

3.2 CLIMATIC INFORMATION

The most central public meteorological station to the BOA is the Gunnedah Airport Automatic Weather Stations (AWS) and Pool sites (BOM 2020). Summer maximum temperatures in Gunnedah reach an average of 34.7°C (daily) and a minimum of 18.6°C (nightly) during January. Winter minimums are experienced in July with an average maximum of 17.4°C and an average minimum of 1.9°C. The average rainfall is 544.9 mm per year with the maximum received in December (82.3 mm) and the minimum in April (21.5 mm). However, recent years have seen extreme conditions. 2019 being the peak of the drought and driest year in 140 years of records for Gunnedah (Pool) with only 237mm of rain recorded, followed by three years with above average rainfall experienced peaking in 2021 with 990mm of rain.

WHC weather stations are located across the BOAs (shown in **Figure 3-1** and **Figure 3-2**) to record more localised weather conditions for reporting purposes (Advitech, 2023). One weather station is located within the Kenna property and another proximate to Rosevale. Records from the Kenna weather station show a maximum monthly average temperature was 35°C in December 2023. Minimum monthly average temperature was 5°C in May 2023. Annual temperature ranges were 0°C to 41°C in 2023. The total annual rainfall in 2023 was 454mm with the maximum in March (130 mm) and minimum in May (0 mm). The Rosevale weather station recorded a maximum monthly average temperature as 34°C in December 2023. Minimum monthly average temperature was 2°C in May 2023. Annual temperature ranges were -5°C to 39°C in 2023. The total annual rainfall in 2023 was 400 mm with the maximum in March (114 mm) and minimum in May (1 mm).

3.3 GEOLOGY, TOPOGRAPHY AND HYDROLOGY

The Kenna BOA is predominately mapped as Liverpool Alluvial Plains Mitchell Landscape with a minor occurrence of Tamworth-Keepit Slopes and Plains (Mitchell, 2002) (**Figure 3-5**). The geology of Liverpool Alluvial Plains is generally described as Quaternary alluvial plains and outwash fans derived from Tertiary basal, Permian and Triassic quartz sandstones with minor basalt caps (Mitchell, 2002). The geology of the Tamworth-Keepit Slopes and Plains Mitchell Landscape comprises Silurian-Devonian chert, slate, phyllite, tuff, schist and Carboniferous conglomerate, sandstone, mudstone, andesite and small areas of limestonefolded and faulted sedimentary and metamorphic rocks with minor interbedded volcanics.

The Greylands Road, Kurrajong Park, Rosevale and West Haven BOAs are situated within the Bugaldie Uplands Mitchell Landscapes (Mitchell, 2002) (**Figure 3-6**). The geology of the Bugaldie Uplands Mitchell Landscape consists of stepped stony ridges on Jurassic quartz sandstone with some conglomerate, shale and occasional interbedded basaltic volcanic rocks (Mitchell, 2002). The Rosevale, Omeo and Greylands BOA are situated within the Cubbo Uplands Mitchell Landscapes (Mitchell, 2002) (**Figure 3-6**). The geology of the Cubbo Uplands Mitchell Landscape comprises Pilliga horizontal Jurassic quartz sandstones, limited shales, Tertiary basalt caps and plugs, plus the sediments derived from these rocks.

The Greater Soil Group (GSG) and Australian Soil Classification (ASC) (DPE, 2020a, 2020b) have mapped the soils within the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs as Lithosols, Solodic Soils, Grey Brown and Red Clays (GSG) and Rudosols and Tenosols, Sodosols, Vertosols (ASC). The Kenna BOA is mapped as containing Non-Calcic Brown Soils, Solodic Soils, Lithosols, Grey Brown and Red Clays (GSG) and Chromosols, Sodosols, Rudosol and Tenosol, Vertosols (ASC). The topography of the Narrabri BOA is variable with the minimum and maximum elevations within each property ranging from 263 m to 448 m for the BOA.

The entirety of the Narrabri BOA is within the Namoi River Catchment (Murray Darling Basin Authority [MDBA], 2024). There are a number of named watercourses within the Kenna BOA including Pinnacle Creek which flows into Maules Creek (Willeroi), which in turn flows on the floodplain of the Namoi River (DPIE, 2024) (**Figure 3-5**). Only minor first and/or second order watercourses are mapped within the

Rosevale, West Haven and Greylands BOA. No watercourses are mapped within the Greylands Road, Kurrajong Park or Omeo BOAs (**Figure 3-6**).

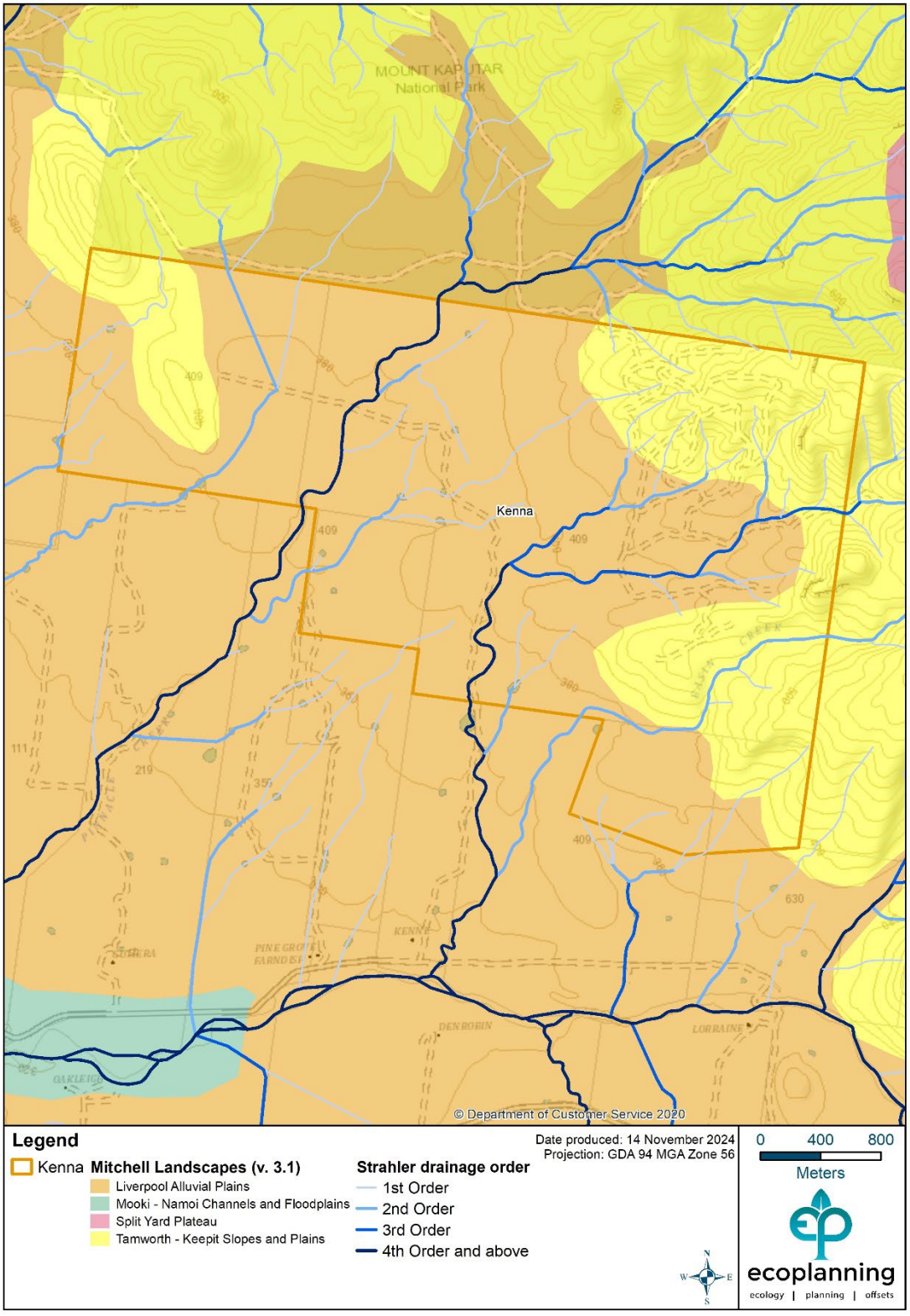


Figure 3-5: Mitchell landscapes and watercourses within and surrounding the Kenna BOA.

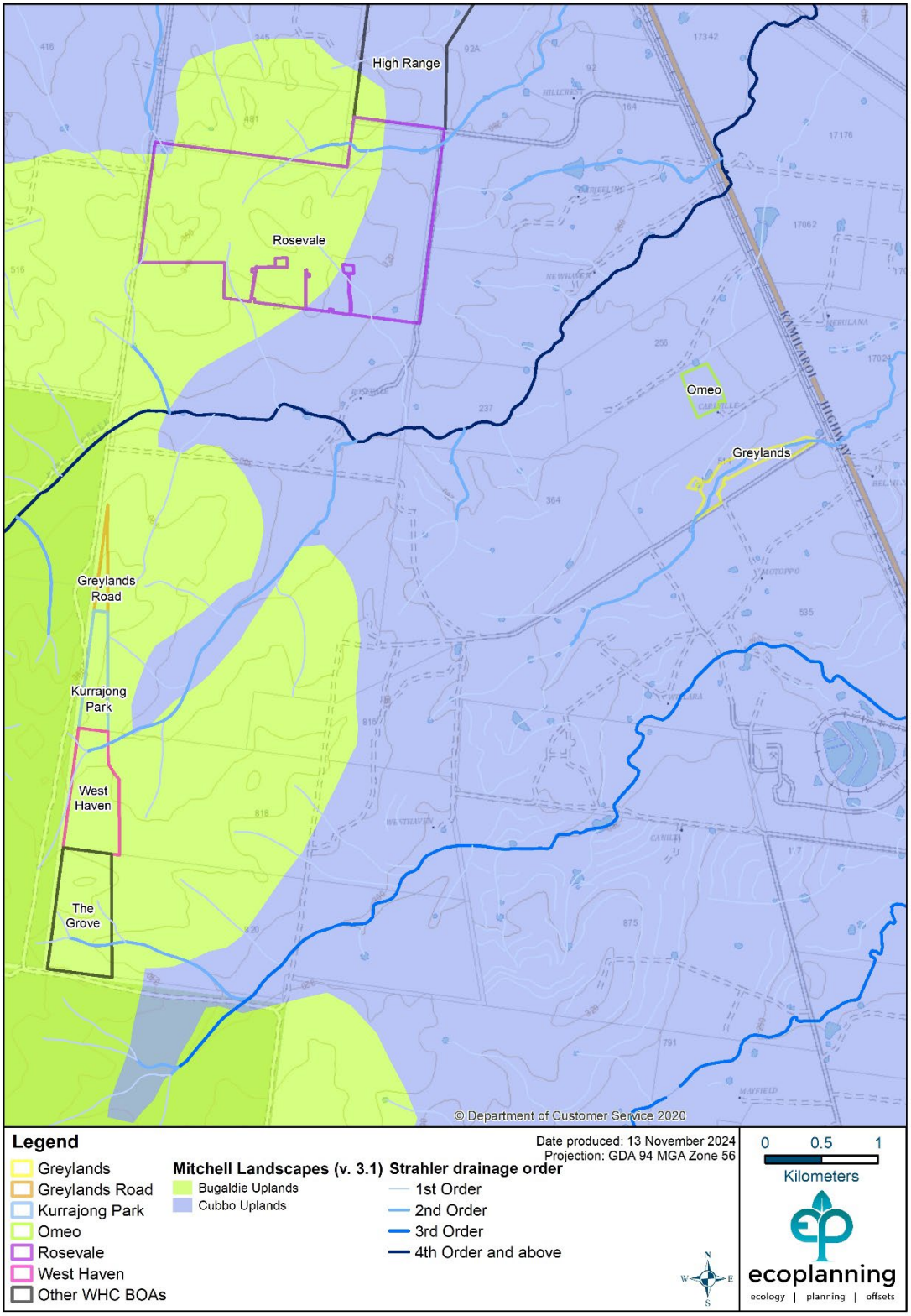


Figure 3-6: Mitchell landscapes and watercourses within and surrounding the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs.

3.4 PREVIOUS LAND USE HISTORY

Despite the geographic spread of the entire Narrabri BOA; each individual BOA has a similar history of agricultural management over much of the 20th century but with localised variances in intensity and extent of the disturbance to the natural ecosystems and habitat. A summary of the previous land use history is as follows:

- The previous agricultural management across the Kenna BOA was predominantly grazing and cultivation as evidenced by the large extent of exotic, low diversity and derived native grasslands. However historical clearing was limited in the steeper eastern and north-western areas of extant vegetation (remnant to regenerating semi-cleared native vegetation) with the overall resilience being moderate to high given proximity to the large remnant vegetation within the adjacent Mount Kaputar National Park. Biodiversity management commenced in 2014 with the Kenna BOA permanently destocked in 2016.

- The Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOAs ranged from extensive to minimal agricultural management including grazing and logging with areas of intensive cultivation/cropping evidenced by localised high weed abundance. The extent of historical clearing within these BOAs was greatest in the east (closest to the Kamilaroi Highway) but the majority of the properties adjoining the Pilliga Scrub/Forest region show high flora and fauna diversity in the well vegetated areas (mostly remnant with some regenerating semi-cleared native vegetation) with high resilience given its proximity to the very large remnant vegetation within the adjacent Jacks Creek State Forest (apart of the broader Pilliga Scrub/Forest region). Biodiversity management commenced in 2014 with the offset properties being permanently destocked between 2008 and 2016.

3.5 INTRODUCED FLORA AND FAUNA

At the commencement of Biodiversity Management (between 2010 and 2016); weed species had high occurrences in localised areas within the BOA due to the previous agricultural history as described above. Since that time, through routine weed management; most priority weed species recorded during seasonal weed assessments (Ecoplanning, 2021a, 2020b, 2020c,and by Ecotone (2009) have declined with the remaining key weeds shown below in **Table 3-1**.

Table 3-1: Occurrence of weed species within the BOA.

Species Name	Common Name	Priority Weed status for North West Region (LLS 2017)	Weed Threat Category	BOA
Bryophyllum delagoense	Mother of Millions	Regional Priority Weed – widely distributed in region and asset protection is the regional objective	HTE, KTP	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
Lycium ferocissimum	African Boxthorn	Regional Recommended Measure. Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. Land managers reduce impacts from the plant on priority assets.	WoNS	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
Opuntia stricta	Prickly Pear	Priority Weed - Prohibition on dealings	WoNS, KTP	Kenna
Rosa rubiginosa	Sweet Briar	Regional Priority Weed – widely distributed in region and asset protection is the regional objective	KTP	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven

Species Name	Common Name	Priority Weed status for North West Region (LLS 2017)	Weed Threat Category	BOA
Xanthium occidentale	Noogoora Burr	General Biosecurity Duty. All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	HTE	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
Xanthium spinosum	Bathurst Burr	General Biosecurity Duty. All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	HTE	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven

*KTP = Key Threatening Process, WoNS = Weeds of National Significance, HTE = Hight Threat Exotic.

Similarly, at the commencement of biodiversity management in 2016, certain pest animals were widespread across the BOA given their previous extended agricultural history. However, since that time, through routine pest animal management; most species have declined in detection on all offset properties while others species appear only in discrete areas (**Table 3-2**) as collated from data collected during baseline assessments, annual fauna monitoring and from quarterly pest animal management reports (AMBS, 2023).

Table 3-2: Occurrence of Priority Pest animals at the BOA.

Pest animals	Area of Occurrence (properties)
Feral Pig (*Sus scrofa*)	Has been detected on all offset properties or is expected to occur on all offset properties
Feral Goat (*Capra hircus*)	Kenna
European Red Fox (*Vulpes vulpes*)	Has been detected on all offset properties or is expected to occur on all offset properties
European Rabbit (*Oryctolagus cuniculus*)	Has been detected on all offset properties or is expected to occur on all offset properties
Feral Cat (*Felis catus*)	Has been detected on all offset properties or is expected to occur on all offset properties

3.6 THREATENED ECOLOGICAL COMMUNITIES, FLORA AND FAUNA

Threatened Ecological Communities

Two threatened ecological communities (TECs) have been mapped within the BOA (**Table 3-3**).

One threatened ecological community (TEC) has been identified in the Kenna BOA. In some condition states PCT 1383-White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregion' is consistent with the 'White Box-Yellow Box-Blakely's Red Gum grassy woodland' listed as critically endangered under the BC Act and under the EPBC Act. Currently 477.40 ha of this PCT meets the definition of the CEEC (**Figure 3-7**).

One threatened Ecological Community has been identified in the Omeo BOA: 'Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions' listed as an Endangered Ecological Community (EEC) under the BC Act; and 'Grey

Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia' listed as Endangered Ecological Community (EEC) under the EPBC Act. This occurs within areas of PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion. Currently 9.28 ha of this PCT meets the definition of the EEC (**Figure 3-8**).

Further details on these TECs, including vegetation descriptions and photos, can be found within the Revised Biodiversity Offset Strategy (RBOS) for NCM Stage 1 and 2 (AMBS, 2024a; **APPENDIX C:**).

Table 3-3: Threatened Ecological Communities within the BOA.

Ecological Community	Threatened Status		Area (ha)	
	BC Act	EPBC Act	Kenna BOA	Omeo BOA
Box-Gum Woodland	CEEC	CEEC	477.50	-
Inland Grey Box Woodland	EEC	EEC	-	9.28

Threatened Flora

Three threatened flora species have been recorded within the BOA (Ecoplanning, 2021b) (**Table 3-4**, **Figure 3-9** and **Figure 3-10**), with a further two species predicted to occur based on Conservation Agreements (**Table 3-4**).

Table 3-4: Recorded and Predicted Threatened Flora of the BOA.

Scientific Name	Common Name	Threatened Status		BOA	Likelihood
		BC Act	EPBC Act		
Tylophora linearis	-	V	E	Greylands, Kenna, Rosevale, Omeo, West Haven	Occurs
Bertya opponens	Coolabah Bertya	V	V	Rosevale, Kurrajong Park, West Haven	Occurs
Pomaderris queenslandica	Scant Pomaderris	E	-	Rosevale, Greylands	Occurs
Thesium australe	Austral Toadflax	V	V	Kenna	Potential habitat (listed in VCA0486)
Cadellia pentastylis	Ooline	V	V	Kenna	Potential habitat (listed in VCA0486)

E=Endangered, V=Vulnerable

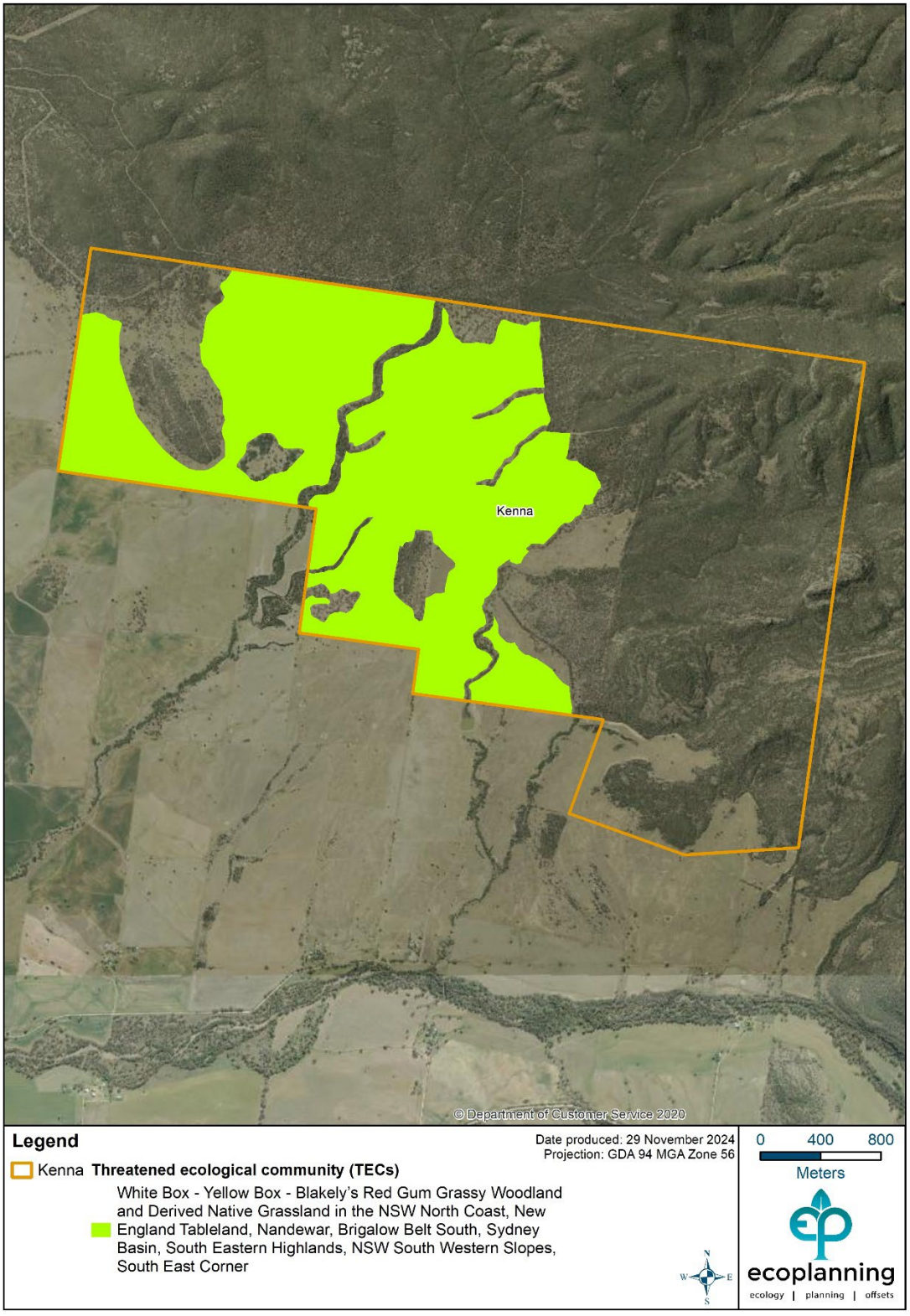


Figure 3-7: Threatened ecological communities occurring within the Kenna BOA.

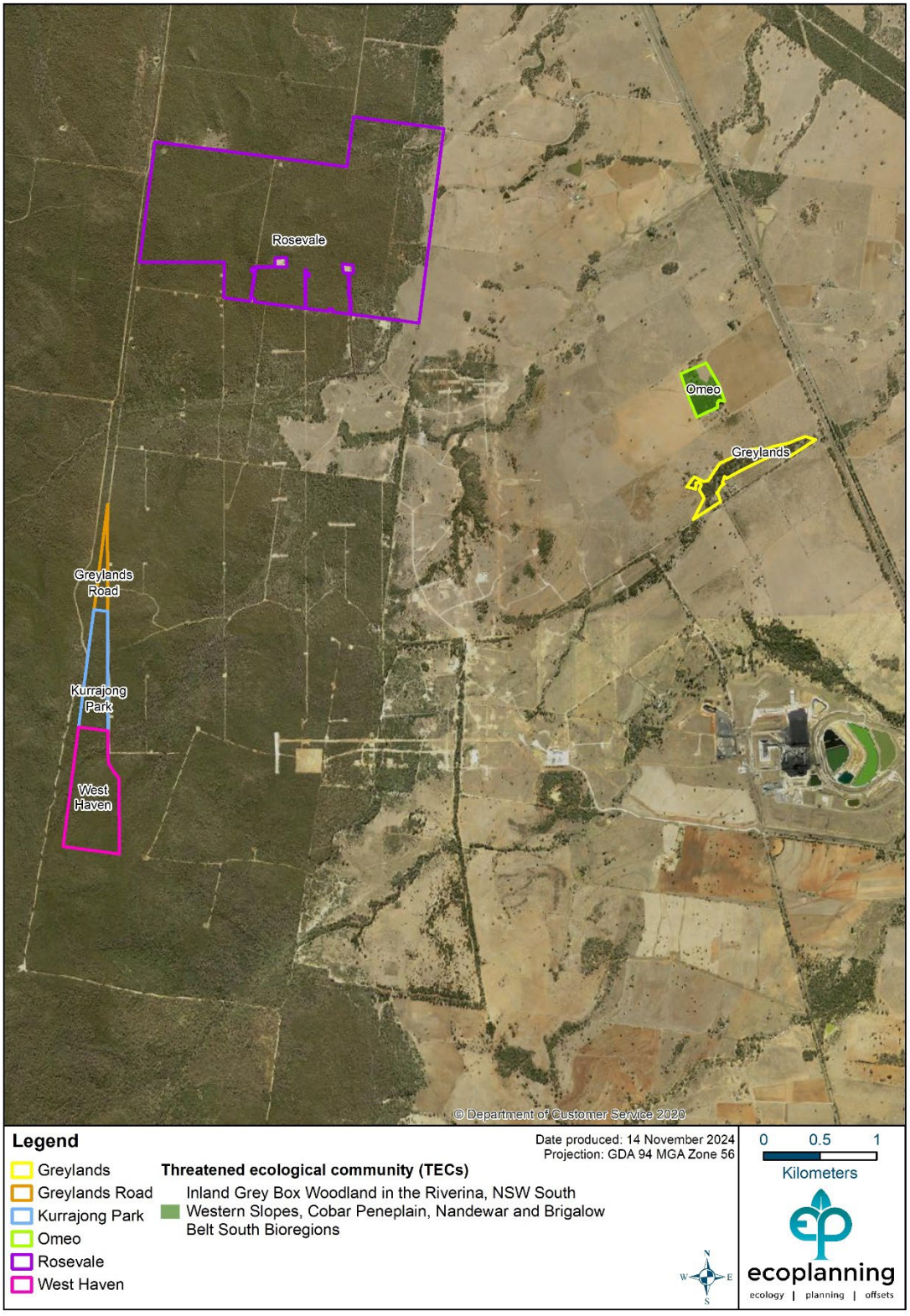


Figure 3-8: Threatened ecological communities occurring within the Omeo BOA.

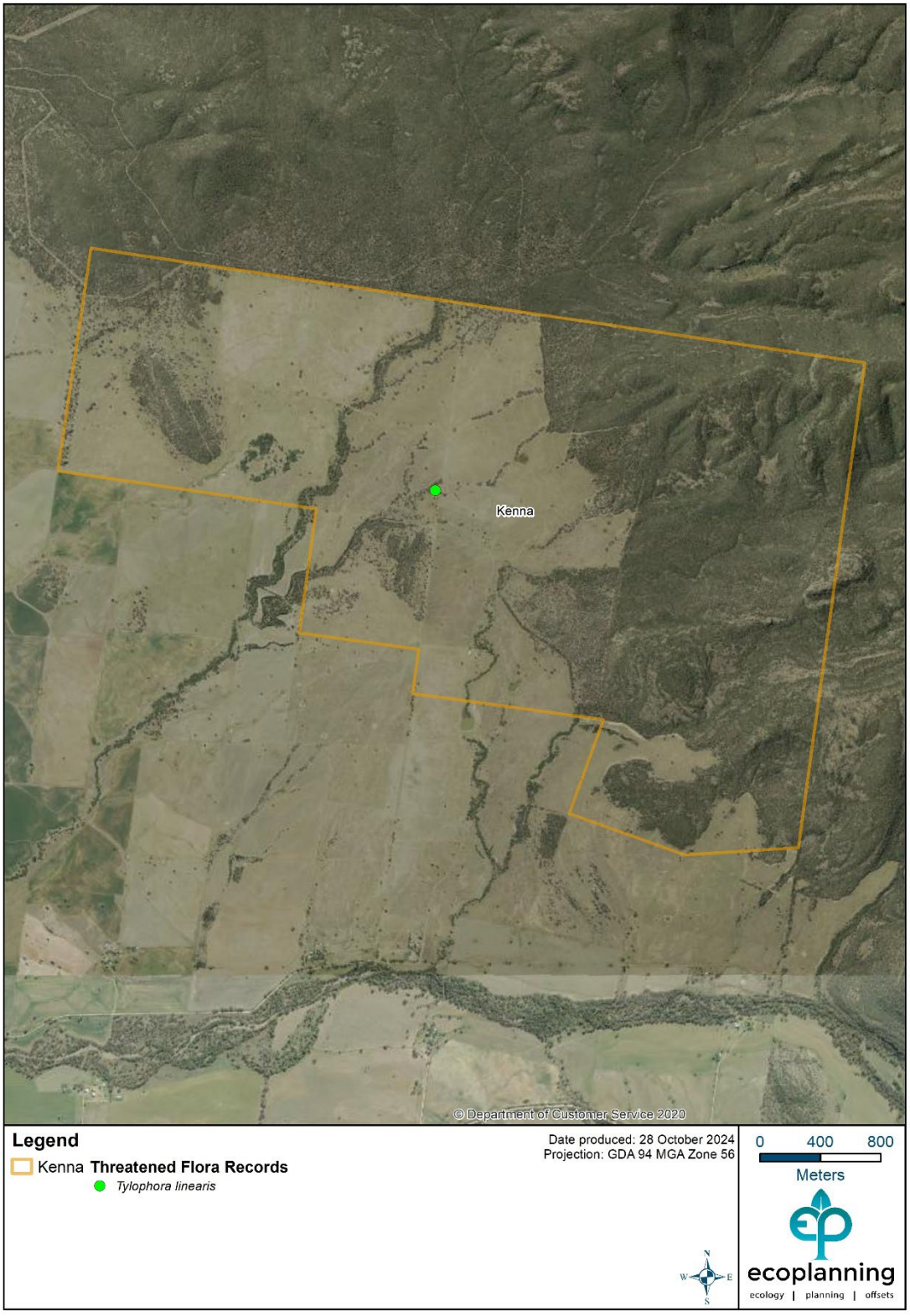


Figure 3-9: Threatened flora species occurring within the Kenna BOA.

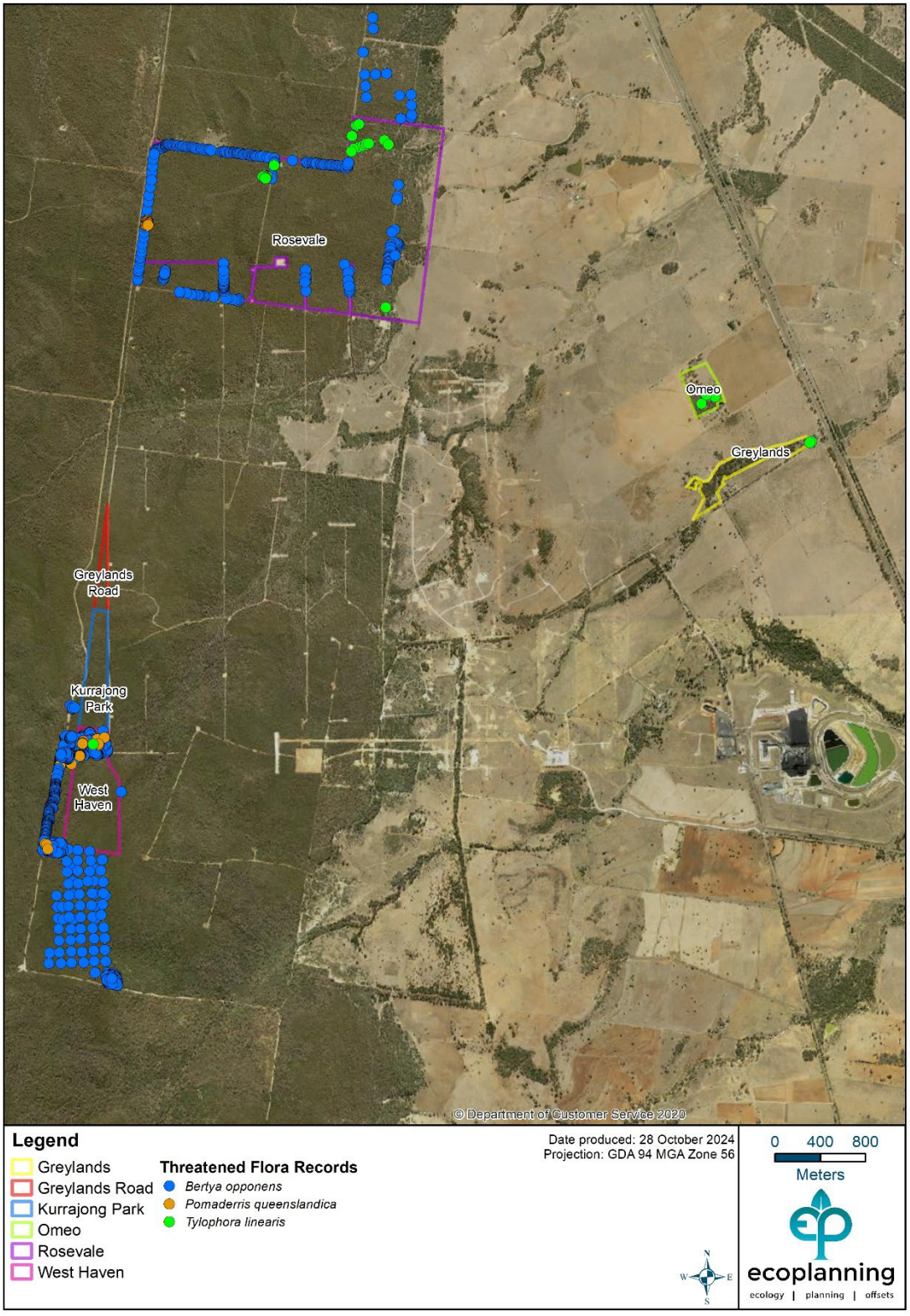


Figure 3-10: Threatened flora species occurring within the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs.

Threatened Fauna

All threatened fauna recorded or predicted to occur within the BOA is shown below in **Table 3-5**. Recorded or predicted threatened fauna records for the BOA is based on a search of BioNet Atlas (DPIE, 2021b) records within 10km radius of the BOA. Recorded fauna also includes those species recorded during 2020 – 2023 (AMBS, 2024b).

Table 3-5: Recorded and Predicted Threatened Fauna of the BOA.

Scientific Name	Common Name	Status		Habitat Requirements	Kenna	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
		BC Act	EPBC Act			
Birds						
Ardeotis australis	Australian Bustard	E	-	Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams.	-	P
Artamus cyanopterus	Dusky Woodswallow	V	-	Inhabits dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland	Yes	P
Calyptorhynchus lathami	Glossy Black-cockatoo	E	E	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	-	P
Certhionyx variegatus	Pied Honeyeater	V	-	Inhabits wattle shrub, primarily Mulga (*Acacia aneura*), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (*Eremophila* spp.); also from mistletoes and various other shrubs (e.g. *Grevillea* spp.); also eats saltbush fruit, berries, seed, flowers and insects.	P	-
Chthonicola sagittata	Speckled Warbler	V	-	Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.	Yes	Yes
Circus assimilis	Spotted Harrier	V	-	Occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Yes	-

Scientific Name	Common Name	Status		Habitat Requirements	Kenna	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
		BC Act	EPBC Act			
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; fallen timber is an important habitat component for foraging.	Yes	Yes
Daphoenositta chrysoptera	Varied Sittella	V	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Yes	Yes
Falco subniger	Black Falcon	V	-	Highly mobile, no specific habitat described	P	-
Glossopsitta pusilla	Little Lorikeet	V	-	Forages primarily in the canopy of open Eucalypt forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Yes	Yes
Grantiella picta	Painted Honeyeater	V	V	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests.	-	P
Hirundapus caudacutus	White-throated Needletail	-	V	Migratory	-	Yes
Lathamus discolor	Swift Parrot	E	E	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	-	P
Lophoictinia isura	Square-tailed Kite	V	-	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	P	-
Melanodryas cucullata	Hooded Robin (south-eastern form)	V	-	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Yes	P

Scientific Name	Common Name	Status		Habitat Requirements	Kenna	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
		BC Act	EPBC Act			
Melithreptus gularis	Black-chinned Honeyeater (eastern species)	V	-	Upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (Eucalyptus sideroxylon), White Box (E. albens), Inland Grey Box (E. microcarpa), Yellow Box (E. melliodora), Blakely's Red Gum (E. blakelyi) and Forest Red Gum (E. tereticornis). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	-	P
Neophema pulchella	Turquoise Parrot	V	-	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts.	Yes	P
Ninox connivens	Barking Owl	V	-	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland.	P	P
Petroica boodang	Scarlet Robin	V	-	Occupies open forests and woodlands from the coast to the inland slopes. Some dispersing birds may appear in autumn or winter on the eastern fringe of the inland plains.	Yes	-
Polytelis swainsonii	Superb Parrot	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	-	P
Pomatostomus temporalis	Grey-crowned Babbler	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	Yes	Yes
Stagonopleura guttata	Diamond Firetail	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.	Yes	P
Tyto novaehollandiae	Masked Owl	V	-	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Yes	P
Mammals						
Cercartetus nanus	Eastern Pygmy-possum	V	-	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest.	-	P
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features.	Yes	-

Scientific Name	Common Name	Status		Habitat Requirements	Kenna	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
		BC Act	EPBC Act			
Chalinolobus picatus	Little Pied Bat	V	-	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings.	Yes	P
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops are used as den sites.	-	P
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Found on the south-east coast and ranges of Australia. Prefers moist habitats, with trees taller than 20 m.	Yes	-
Macropus dorsalis	Black-striped Wallaby	E	-	Preferred habitat is characterised by dense woody or shrubby vegetation within three metres of the ground. This dense vegetation must occur near a more open, grassy area to provide suitable feeding habitat.	-	Yes
Miniopterus orianae oceanensis	Eastern Bentwing-bat	V	-	Caves used as primary roosting habitat	Yes	Yes
Mormopterus eleryi	Hairy-nosed Freetail Bat	E	-	Habit knowledge limited. Evidence suggests it uses hollows and tree fissures for roosting sites (DPIE 2021c)	Yes	-
Nyctophilus corbeni	South-eastern Long-eared Bat	V	V	Variety of vegetation types, including mallee, bulloke Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	P	P
Petaurus norfolcensis	Squirrel Glider	V	-	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas.	-	P
Phascolarctos cinereus	Koala	E	E	Inhabit eucalypt woodlands and forests.	P	P
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	V	-	Tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Yes	P
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	The species is found mainly in the gullies and river systems that drain the Great Dividing Range. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m.	Yes	-

Scientific Name	Common Name	Status		Habitat Requirements	Kenna	Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven
		BC Act	EPBC Act			
Vespadelus baverstocki	Inland Forest Bat	V	-	The habitat requirements of this species are poorly known but it has been recorded from a variety of woodland formations, including Mallee, Mulga and River Red Gum. Most records are from drier woodland habitats with riparian areas inhabited by the Little Forest Bat. However, other habitats may be used for foraging and/or drinking.	-	P
Vespadelus troughtoni	Eastern Cave Bat	V	-	Cave-roosting species usually found in dry open forest and woodland, near cliffs or rocky overhangs	Yes	P
Reptiles						
Hoplocephalus bitorquatus	Pale-headed Snake	V	-	Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas.	P	P

P=Potential, Yes=recorded or observed

4 BIODIVERSITY OFFSET STRATEGY (BOS) AND SECUREMENT

4.1 NCM BOS

The original NSW Approval for Stages 1 and 2 of the NCM included two conditions, condition 6 and 7 of Schedule 5 of PA 08_0144, regarding the preparation and implementation of a BOS. Approval of Stage 3 of the NCM (SSD-10269) will result in the surrender of NSW Approval PA 08_0144. Therefore, requirements for the Stage 1 and 2 Biodiversity Offset Strategy will transfer to SSD-10269 Conditions B45 and B46.

A summary of the minimum requirements within the various NSW and Commonwealth approvals for land-based offsetting needing to be met in the NCM BOS are:

- Property adjoining Mount Kaputar National Park meet 'like for like or better' requirements and 'maintain or improve' conservation outcomes. (NSW approval PA 08_0144 [Schedule 5 Condition 6c] referred to within SSD-10269 Condition B45);
- Offset the impacts to Inland Grey Box EEC, *Bertya opponens* and Superb Parrot foraging habitat (NSW approval PA 08_0144 [Schedule 5 Condition 6d] referred to within SSD-10269 Condition B45);
- The overall BOS is required to cover an area of 2,832.79 ha (but if Stage 2 disturbance footprint foregoes 14.1 ha then this can be reduced to 2,796.13 ha) (SSD-10269 [Condition B45c]).
    - The requirement for 2,832.79 ha will be met with the inclusion of 1,173.04 ha of vegetation in an area in the development footprint which may be subject to subsidence referred to within the RBOS (AMBS 2024a; APPENDIX C:) as the 'Rehabilitation Area Offset'. This is documented in the NCM Rehabilitation Management Plan (WHC 2023b).
- Enhance at least 933 hectares of offset on the Kenna property, which contains White Box Grassy Woodland habitat for the Superb Parrot, (EPBC Approval 2009/5003 Condition 2a and 14a).
- At least 422 hectares of offset on the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven properties of Red Ironbark – Brown Bloodwood Shrubby Woodland, which is habitat for *Bertya opponens* and the Superb Parrot (EPBC Approval 2009/5003 Condition 2b and 14b).

To meet these BOS approval requirements for the minimum area requirements of SSD-10269 Condition B45 and EPBC Approval 2009/5003 Condition 2(a/b) and 14(a/b); the NCM RBOS (AMBS 2024a; APPENDIX C:) outlines how the secured Narrabri BOAs exceed the minimum areas required as summarised in **Table 4-1**. In addition, the RBOS consists of Property adjoining Mount Kaputar National Park that meets 'like for like or better' requirements and 'maintains or improves' conservation outcomes (NSW Approval PA 08_0144 Condition 6c) The RBOS also confirms offsets to the impacts to Inland Grey Box EEC, *Bertya opponens* and Superb Parrot foraging habitat (NSW Approval PA 08_0144 Condition 6d).

Table 4-1: Summary of requirements of NSW Project Approval SSD-10269 and EPBC Approval 2009/5003 and how they have been met.

Biodiversity Offset Strategy Criteria (SSD-10269 and/or EPBC 2009/5003)	Required Quantum for Biodiversity Offset Strategy (ha)	Quantum in Revised Biodiversity Offset Strategy (ha)	Difference (Revised BOS – Required BOS) (ha)
Enhance at least 933 hectares of offset on the Kenna property, which contains White Box Grassy Woodland habitat for the Superb Parrot ((EPBC Approval 2009/5003 Condition 2a and 14a)	933	1,244.16	+ 311.16
At least 422 hectares of offset on the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven properties of Red Ironbark – Brown Bloodwood Shrubby Woodland, which is habitat for *Bertya opponens* and the Superb Parrot (EPBC Approval 2009/5003 Condition 2b and 14b)	422	1,442.63 (*Bertya opponens*) 1,944.38 (Superb Parrot)	+ 1,020.36 +1,522.38+
The overall BOS is required to cover an area of 2,832.79 ha (but if Stage 2 disturbance footprint foregoes 14.1 ha then this can be reduced to 2,796.13 ha) (NSW Approval SSD-10269 Condition B45c)	2,832.79 (or reduced by 36.66 to 2,796.13)	2,842.14 (or 2,805.48 if reduced)	+ 9.35

4.2 OFFSET SECUREMENT

The initial component of the NCM BOS was secured under Part 4 Division 12 of the NSW National Parks and Wildlife Act 1974. DPE NSW and Commonwealth DCCEEW were notified on 21 July 2021 that compliance had been achieved with EPBC Approval 2009/5003 Condition 2b (Condition 2a previously notified on 10 March 2020) and now SSD 10269 Condition B45 (DPE previously notified against the to be surrendered PA 08_0144 Schedule 5 Condition 7). With PA 08_0144 to be surrendered, going forward the Stage 2 Biodiversity Offset Strategy will be conditioned by SSD 10269 Condition B45 and B46, with NCM to make suitable arrangements to provide appropriate long-term security within 3 years of commencing development or following completion of longwall mining (if this date is agreed to the satisfaction of the Planning Secretary). This took the form of Conservation Agreement/s with the BCT, where considered to be the appropriate long-term security over the "future" offset area.

To meet compliance with securement of the NCM BOS; WHC made application for the Kenna BOA on 23 June 2017 and for the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven offset properties on 7 May 2018 for Conservation Agreements. Between 27 June 2019 and 16 July 2021, the NSW Biodiversity Conservation Trust (BCT) advised that the following Conservation Agreements were registered on title of the following relevant Lots and Deposited Plans for each BOA:

- Kenna (CA0060) – Lot 73 DP 754924, Part Lot 94 DP 754924, Part Lot 95 DP 754924, Lot 111 DP 754924, Lot 112 DP 754924, Lot 113 DP 754924, Part Lot 602 DP 854685, Lot 3 DP1210577 and Part Lot 2 DP1210578
- Greylands (VC00528) – Part Lot 841 DP1134385;
- Omeo (VC00495) – Part Lot 83 DP757124;
- Rosevale (VC00529) – Part Lot 63 DP757114 and Part Lot 1 DP1210797;
- Greylands Road (VC00496)– Part Lot 65 DP757114 and Part Lot 1 DP1210797;
- Kurrajong Park (VC00530) – Part Lot DP811171; and
- West Haven (VC00531) – Part Lot 67 DP757104.

The securement of these properties as Conservation Areas meets Condition 7 of Schedule 5 of the original PA 08_0144 (surrendered to SDD 1026) to provide appropriate long-term security for the offset areas.

4.3 VEGETATION COMMUNITIES AND CONDITION

The NCM RBOS (AMBS 2024a; APPENDIX C:) vegetation communities of the Narrabri BOA are listed in **Table 4-2** and shown on **Figure 4-1** to **Figure 4-4**. A total of 430.39 ha of native vegetation is preserved in the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOAs, and 1,244.06 ha in the Kenna BOA.

Table 4-2: Vegetation Communities in the offset area.

PCT ID	Plant Community Type (PCT)	TEC Status	Keith Class	Keith Formation	Condition	Area (ha)
Kenna BOA						
78	River Red Gum riparian tall woodland / open forest wetland in the Nandewar and Brigalow Belt South Bioregions	Not a TEC	Inland Riverine Forests	Forested Wetlands	Moderate & Poor	35.10
885	Heathy shrublands on rocky outcrops of the western slopes	Not a TEC	Northern Montane Heaths	Heathlands	Good	17.96
1313	White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Not a TEC	Western Slopes Dry Sclerophyll Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Good, Moderate & Poor	703.11
1314	White Cypress Pine - Silver-leaved Ironbark – Tumbledown Red Gum shrubby open forest of the Nandewar and Brigalow Belt South Bioregions	Not a TEC	Western Slopes Dry Sclerophyll Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Good	10.49
1383	White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	White Box Yellow Box Blakely's Red Gum Woodland CEEC	Western Slopes Grassy Woodlands	Grassy Woodlands	Good, Moderate, Poor and DNG	477.50
Total area of Kenna BOA						**1,244.16**
Greylands BOA						
88	Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Not a TEC	Pilliga Outwash Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Moderate	10.06
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Not a TEC	Floodplain Transition Woodlands	Grassy Woodlands	Moderate	2.32
619	Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion	Not a TEC	Western Slopes Grasslands	Grasslands	DNG	2.59

PCT ID	Plant Community Type (PCT)	TEC Status	Keith Class	Keith Formation	Condition	Area (ha)
	Assisted natural revegetation to PCT 88/101					
Total Native Vegetation						**14.97**
Dam						0.12
Total area of Greylands BOA						**15.09**
Greylands Road BOA						
406	White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Not a TEC	Western Slopes Dry Sclerophyll Forest	Dry Sclerophyll Forests (Shrubby sub-formation)	Good	5.62
Tracks						0.05
Total area of Greylands Road BOA						**5.67**
Omeo BOA						
81	Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland EEC	Floodplain Transition Woodlands	Grassy Woodlands	Good	9.28
619	Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion Replanted to establish PCT 81	Not a TEC	Western Slopes Grasslands	Grasslands	Moderate	1.56
Total area of Omeo BOA						**10.84**
Rosevale BOA						
401	Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region	Not a TEC	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Good	1.91
404	Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Not a TEC	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Good & Moderate	250.54
406	White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Not a TEC	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Good & Moderate	54.47
409	Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion	Not a TEC	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Good	3.01
435	White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion	Not a TEC	North-west Slopes Dry Sclerophyll Woodlands	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Moderate	2.33

PCT ID	Plant Community Type (PCT)	TEC Status	Keith Class	Keith Formation	Condition	Area (ha)
619	Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion Replanted to establish PCT 404 or natural regeneration.	Not a TEC	Western Slopes Grasslands	Grasslands	DNG	24.21
Dam						0.59
Total area of Rosevale BOA						**337.06**
Kurrajong Park BOA						
404	Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Not a TEC	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Good	18.28
406	White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Not a TEC	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Good	1.72
Total area of Kurrajong Park BOA						**20.00**
West Haven BOA						
141	Broombush - wattle very tall shrubland of the Pilliga to Goonoo regions, Brigalow Belt South Bioregion	Not a TEC	Pilliga Outwash Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Good	1.87
404	Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Not a TEC	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	Good	40.66
Total area of Kurrajong Park BOA						**42.53**

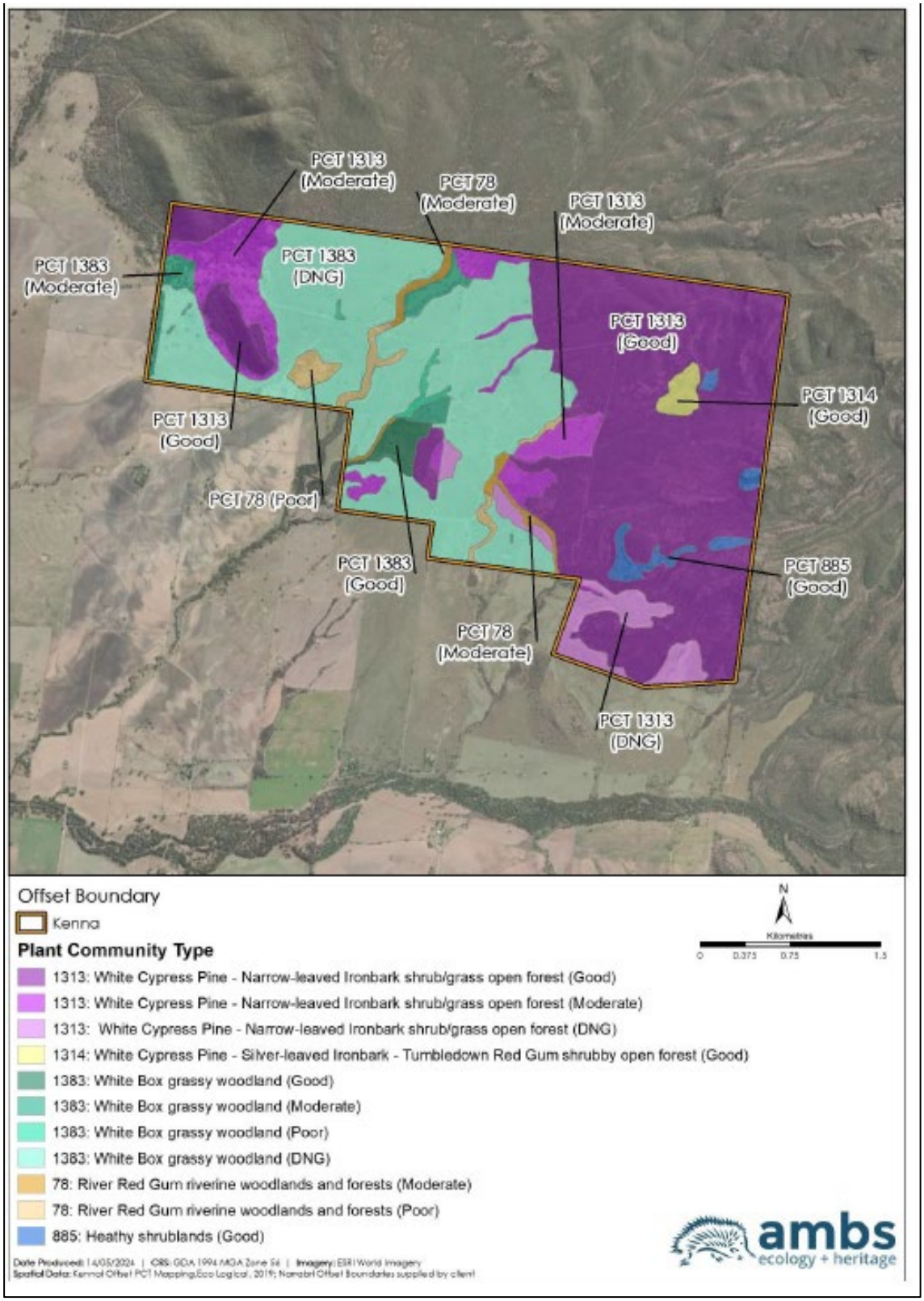


Figure 4-1: Vegetation Communities – Kenna BOA (AMBS 2024a).

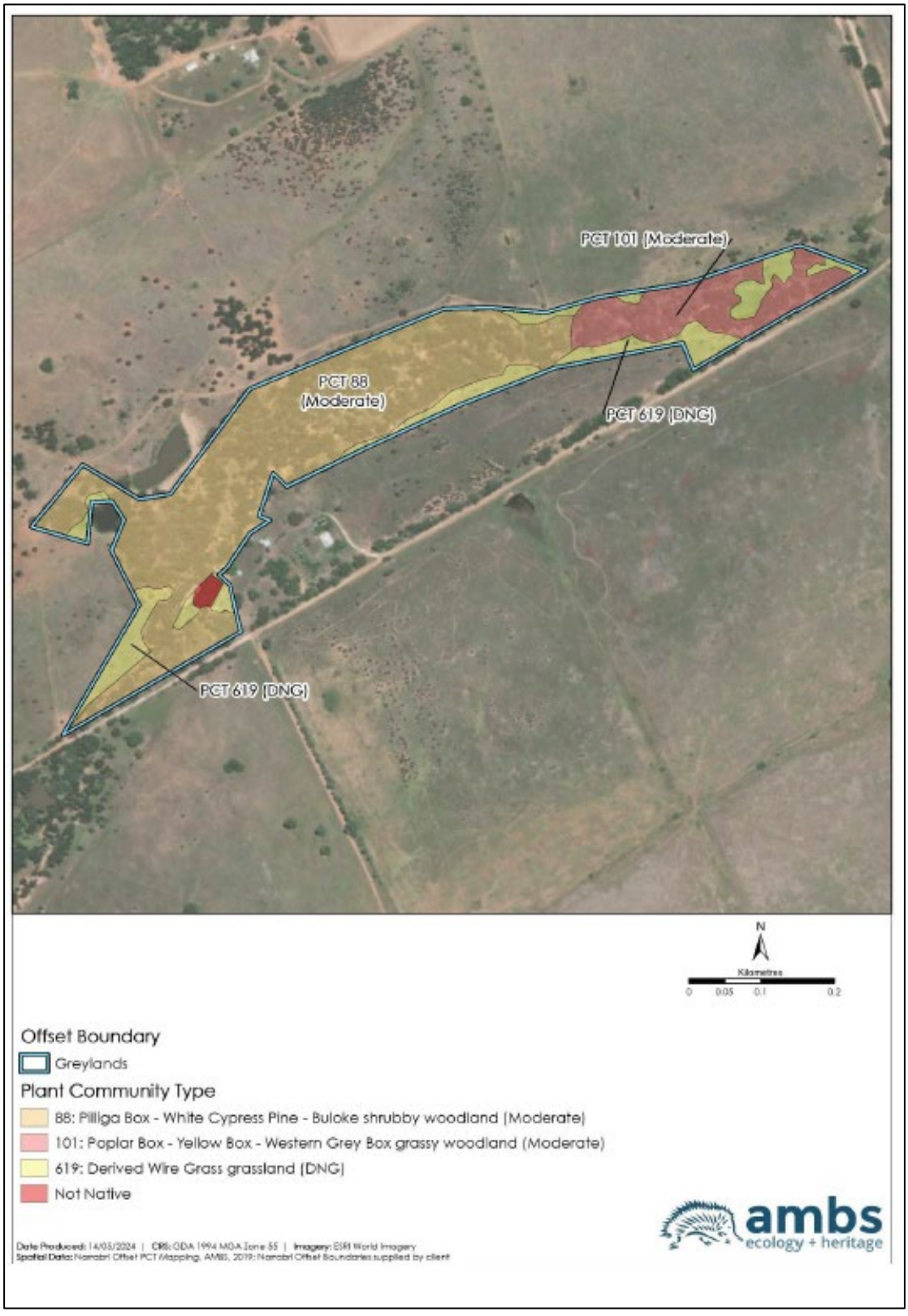


Figure 4-2: Vegetation Communities – Greylands BOA (AMBS 2024a).

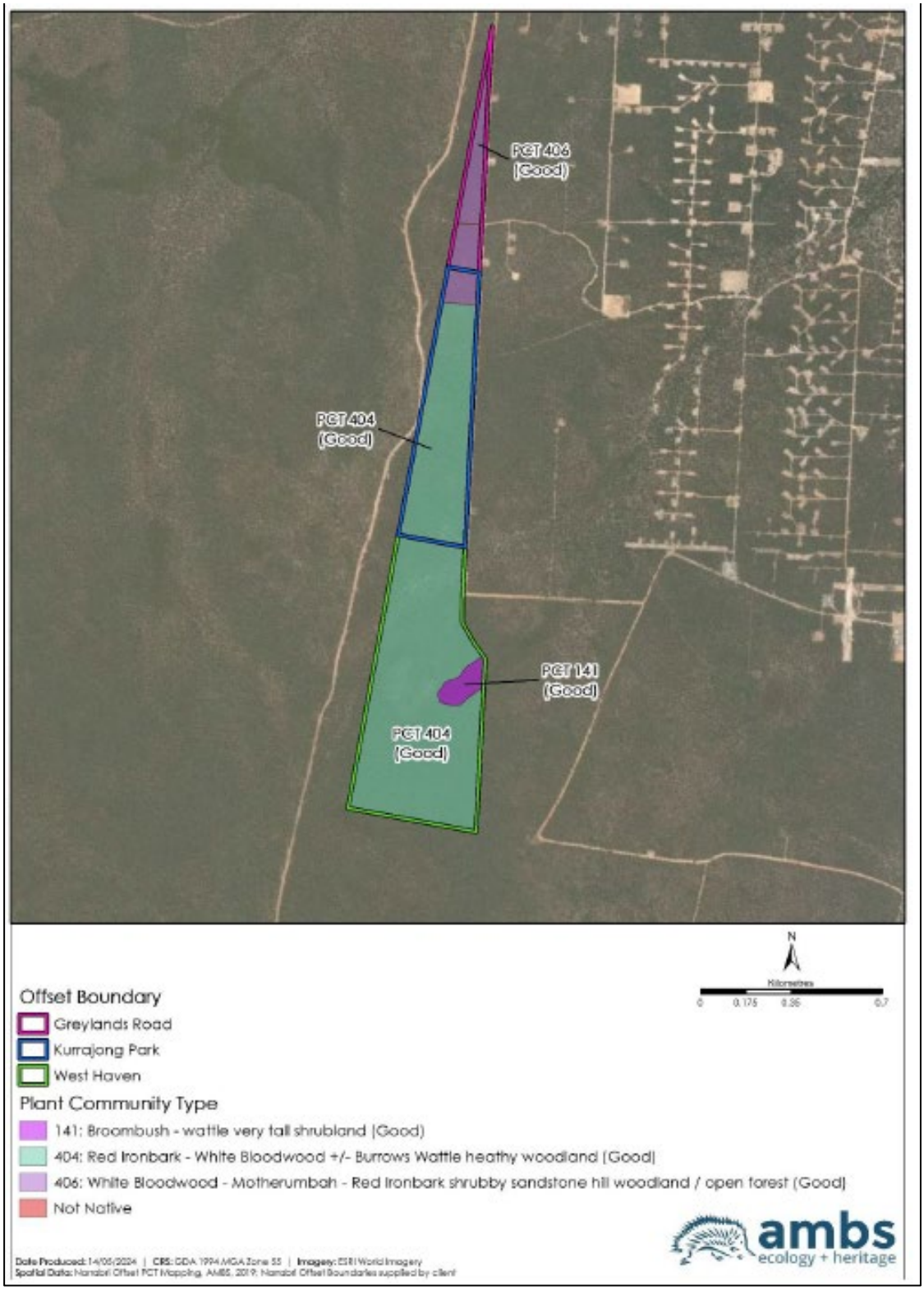


Figure 4-3: Vegetation Communities – Greylands Road, Kurrajong Park and West Haven BOA (AMBS 2024a).

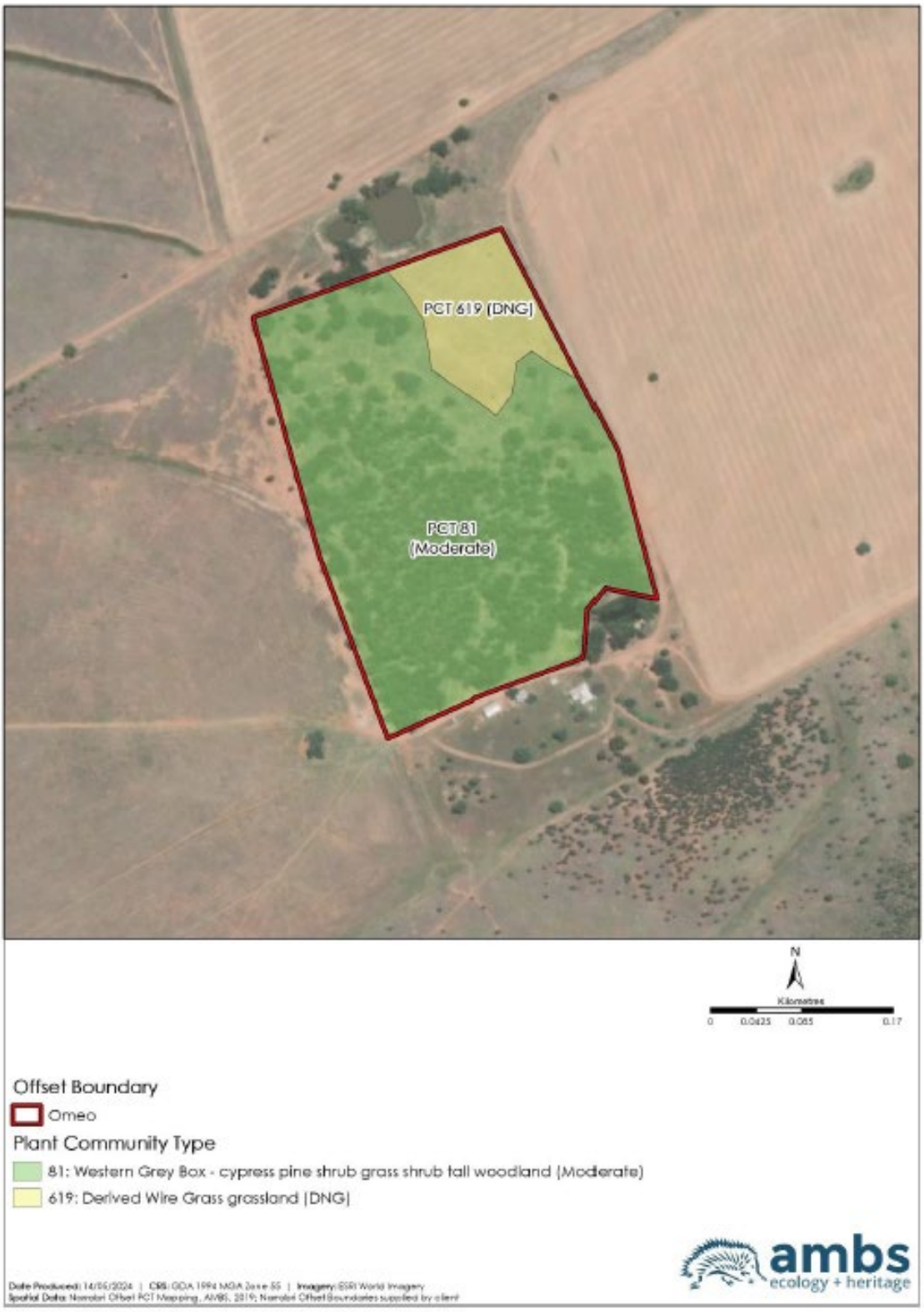


Figure 4-4: Vegetation Communities – Omeo BOA (AMBS 2024a).

5 MANAGEMENT OF THE BIODIVERSITY OFFSET AREAS

This section describes the management and monitoring measures to be implemented in the BOA, specifically the active monitoring and management for Kenna (formerly Offsite BOA), and Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven (formerly Onsite BOA) properties. as per Condition 14 of EPBC 2009/5003 approval requirements (**Table 2-2**).

The management regime in the offset areas will be adaptive over time to achieve the ecological management objectives. The management plan for the BOA is effective for a 20-year period as per Condition 14 of EPBC 2009/5003 approval requirements (**Table 2-2**), with Year 0 being the year that management commenced (or when the property was permanently destocked). Within the BOA, management is considered to have commenced in 2016 (Year 0) for all properties, with the first full year of management (Year 1) being 2017.

5.1 ECOLOGICAL MANAGEMENT OBJECTIVES

The ecological management objectives specific to the BOA are shown below in **Table 5-1**.

Table 5-1: Ecological Management Objectives specific to the BOA

Mine BOS	Ecological Management Objectives
NCM BOS	• protect and enhance existing Box-Gum Woodland CEEC (woodland form) • restore self-sustaining woodland within existing areas of Box-Gum Woodland CEEC (derived native grassland) • protect and enhance existing woodland and forest habitat for Superb Parrot • protect and enhance existing woodland and forest habitat for *Bertya opponens* • restore self-sustaining woodland and/or forest within derived native grasslands and 'non-native/Cleared' areas to provide habitat for the above listed threatened species listed under the EPBC Act

5.2 IMPLEMENTATION SCHEDULE

The following **Table 5-2** summarises the management actions described and the frequency/timing of when those actions are to occur.

Table 5-2: OMP Implementation Schedule

Section	Management Action	Frequency and/or Timing
5.3.1	Tracks and Fences	Biannual/as required
5.3.2	Other Offset Infrastructure	Biannual
5.3.3	Signage and Inspections	Biannual/as required
5.3.4	Long Term Security	Complete
5.3.5	Biodiversity Offset Area Divestment	When required
5.4	Seed Management	Seasonal, based on life cycle stage and development of native plants
5.5	Revegetation	As required, and based on annual assessment results
5.6	Ecological Thinning	As required, and based on annual assessment results
5.7	Habitat Augmentation	As required, and based on habitat needs assessment results
5.8	Heritage Management	Annual
5.9	Weed Management	As required, and based on seasonal assessment results and/or from other opportunistic observations
5.10	Pest Animal Management	As required, and based on seasonal assessment results and/or from other opportunistic observations

Section	Management Action	Frequency and/or Timing
5.11	Erosion Management	As required, and based on annual assessment results
5.12	Agriculture Management	As required
5.13	Bushfire Management	Annual/as required (dependent on seasonal conditions)
5.14	Threatened Flora Management	Seasonal (dependent on seasonal conditions)
5.15	Flora Monitoring	Annual
5.16	Fauna Monitoring	Annual and biennial
5.17	Performance and Completion Criteria	Annual
5.18	Potential Risks and Contingency Measures	As required

5.3 BIODIVERSITY OFFSET AREA ESTABLISHMENT

This section outlines WHC's approach to the demarcation of BOA boundaries for controlling access (including the use of signage) and provision for the long-term security of the offset areas (including provision of conservation bonds) in accordance with the Project and EPBC Act Approvals (**Section 2**).

5.3.1 Tracks and Fences

Tracks and fence lines are to be located on or adjacent to the actual BOA boundary wherever practicable. The use of existing fences will be maximised in the first instance as the BOA boundary, to reduce additional disturbance. This will secure the BOA by minimising the likelihood of inadvertent grazing, unauthorised disturbance, or unauthorised access into the BOA. Wherever practical, new fencing will prioritise the use of plain wire fencing (minimising the use of barbed wire). Redundant internal fencing within the BOA will be progressively removed overtime.

New tracks and fences will be located, as required (e.g., for access tracks, fence maintenance or replacement), in consideration of biodiversity (such as threatened species) and heritage constraints. Due diligence inspections will be undertaken prior to any disturbance, and new tracks and fences will be constructed in consideration of Conservation Agreements which for tracks and permanent fences limits total clearing to 6 m total width. Neighbours who don't pose a risk of unauthorised access or stock incursion (such as National Parks or similar estate and/or other BOAs) who border the BOA boundaries will be consulted over the need for boundary fencing and if agreed, the boundary fencing will be removed to minimise future impact to native species (Umwelt, 2017).

Ongoing monitoring and site inspections undertaken by WHC will note any damage or disrepair of fences and undertake maintenance/repair as required. If in instances where barbed-wire fencing is being used and is found to be restrictive or damaging to fauna, ecologically-friendly alternatives will be investigated.

5.3.2 Other Offset Infrastructure

Existing infrastructure (such as electricity transmission lines, windmills/water bores and pipes, homesteads and sheds) wholly or partly within the BOA will be retained and managed as required by the relevant owners and/or managers/licensees. Any existing infrastructure no longer required will be progressively removed overtime, and any hazardous materials or contaminated lands remediated as required.

Existing farm dams within the BOA will be assessed for habitat and if not required for management or habitat; will be filled in. The filled in farm dams will be revegetated to minimise soil erosion.

New infrastructure will be located, as required, in consideration of biodiversity (such as threatened species) and heritage constraints, and due diligence inspections will be undertaken prior to any disturbance.

5.3.3 Signage and Inspections

Signage will be installed on gates and/or other access points into the BOA that identifies the property/domain name as a 'Biodiversity Offset Area', and that authorised access only is allowed.

Routine (6 monthly) inspections will assess fencing, gates, access tracks and signage for maintenance issues and disturbance factors (including fire, unauthorised access and evidence of waste), limited by health and safety considerations, resources, accessibility, weather and/or ground conditions. Maintenance of all access tracks, fences and gates will be undertaken as required.

5.3.4 Long Term Security

Various WHC BOS have been secured in perpetuity by an appropriate legal mechanism as set out in **Table 5-3**. Now that securement is complete for the other WHC BOSs and Offset properties, WHC will re-engage with NPWS who have previously shown interest in BOAs being transferred to National Park Estate including Kenna (to Mount Kaputar National Park).

Table 5-3: Long-term security provisions for the BOA.

Long-term Security Provision	BOA	Legally Binding Conservation Covenant	Registered
Entering into a conservation agreement or agreements pursuant to section 69B of the National Parks and Wildlife Act 1974, recording the obligations assumed by the Proponent under the conditions of this approval in relation to these offset areas, and registering the agreement(s) pursuant to section 69F of the National Parks and Wildlife Act 1974; or A tenure of higher conservation status such as a National Park, or Nature Reserve, under the National Parks and Wildlife Act 1974.	Kenna	VCA0486	27/09/2021
	Omeo	VC00495	16/07/2021
	Greylands Road	VC00496	09/07/2021
	Greylands	VC00528	09/07/2021
	Rosevale	VC00529	09/07/2021
	Kurrajong Park	VC00530	26/06/2021
	West Haven	VC00531	09/07/2021

5.3.5 Biodiversity Offset Area Divestment

The long term securement for the Narrabri BOA will be for the ownership to be divested at an appropriate time in the future to another organisation best placed for in perpetuity management of lands for biodiversity conservation and restoration. One such divestment option that has been considered in the Approvals is the transfer to national park estate managed by NSW National Parks and Wildlife Service (NPWS). In a letter dated 16 August 2017, NPWS advised WHC of its interest in the transfer and reservation of BOA properties, subject to payment of an in perpetuity management fee and based on a certain standard of biodiversity and property condition (i.e. fencing and fire trials constructed, advanced revegetation, infrastructure/waste removed and hazardous/contaminated material remediated). At the time, transfer negotiations were to be deferred until after securement had been achieved for WHCs other BOAs. Now that WHC has secured all BOAs being registered on title; WHC will reengage with NPWS regarding transfer to national park estate of those BOA in respect of which NPWS has previously shown interest in, and/or to discuss if NPWS would now have interest in Narrabri BOA. WHC contacted NPWS (Executive Director, Park Operations Inland) in July 2024 following up on NPWS previous consideration of proposed offset transfers to National Park Estate; with NPWS responding in August 2024 confirming a new contact point within NPWS and following handover/background, will be back in contact with WHC in due course.

WHC will seek endorsement from NSW DPHI, NSW DCCEEW and CDCCEEW when a transfer agreement is executed with NPWS, and this OMP will be revised accordingly. For any offset areas not transferred to conservation reserve estate for in perpetuity management by NPWS, WHC will continue to be responsible for the ongoing management in accordance with this OMP until another appropriate

organisation best placed for in perpetuity management of lands for biodiversity conservation and restoration is identified (and suitable arrangements are made with that organisation for transfer of such responsibilities).

5.4 SEED MANAGEMENT

WHC coordinates routine seed assessment programs designed to identify, on a seasonal basis, the life cycle and development stages of native plants across a range of the BOA to determine the best strategy in order to collect seeds for future revegetation programs. The format of the seed assessments ensures that timely and prioritised seed collection is implemented, and that reporting includes spatial information required by seed collection contractors to undertake the required works. Seed collection will be based on seed assessment results and from other opportunistic observations, but the assessment, collection and propagation will only be undertaken as required depending on the revegetation needs.

Seed collection, management, propagation, storage and record-keeping will be undertaken in consideration of Greening Australia (various dates) Florabank Guidelines (http://www.florabank.org.au) and Conservation Agreement limitations and permissions. Currently accepted best practice, as described in Rawlings et al. (2010) for local provenance seed collection includes:

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

For seed collection undertaken on site; records will include the species, quantities, dates and locations (in consideration of Florabank Guideline 4) and be reported.

5.5 REVEGETATION

The objective of the revegetation program is to increase the area, quality and connectivity of native vegetation and habitats, focusing on assisted natural regeneration. Active revegetation methods include direct seeding or seedling planting with consideration given to Conservation Agreement conditions. The revegetation program was prepared following the principles outlined within *Florabank Guidelines* (Greening Australia, various dates) and *A Guide to Managing Box Gum Grassy Woodlands* (Rawlings *et al.,* 2010).

WHC will undertake annual revegetation assessments to identify across the BOA where natural regeneration is not occurring, as well as any underperforming previous revegetation areas to determine what and where any active revegetation or maintenance revegetation is required for the upcoming season of the annual revegetation program.

Annual revegetation assessments will consider key species required to match the mapped or adjoining suitable PCT vegetation communities as well as any natural or physical constraints to revegetation of individual paddocks across the BOA. The information from the annual revegetation assessments will be used to place seed and hiko seedling orders for the required quantity of tree, shrub and ground cover species. Orders will be placed in advance to allow sufficient time for additional seed collection (if required, **Section 5.3.5**) and for seedling germination/propagation to occur in time for the upcoming annual revegetation program. Flora species indicatively used in areas under active revegetation (**Table 5-4**) include a variety of grasses, shrubs and trees to create a structurally diverse habitat (including species associated for Box-Gum Woodland CEEC; and habitat for the Regent Honeyeater and Koala).

The annual revegetation program timing is to occur during periods of desirable seasonal conditions (times of opportunistic high soil moisture and moderate diurnal temperature variation).

Ground truthing and mapping of proposed revegetation paddocks will determine what preparation and maintenance works are required for individual revegetation paddocks. Ground preparation methods that can be implemented (where required) include weed control, grass competition maintenance, soil disturbance (i.e., augering, mounding, ripping, harrowing or ploughing) as well as consideration of other ancillary items (i.e. tree guards) that are required to optimise revegetation success and growth/development of seedlings and seeding areas. Post planting inspections will be undertaken progressively to survey performance/quality, methods and results to date including a final end of season survival count of the previous annual revegetation program. All these processes and steps allow progressive learning and adaptive management to be implemented as part of future revegetation programs (**Plate 1**).

Table 5-4: Indicative Revegetation Species List of Key PCTs within the BOA.

Common Name	Scientific Name	Common Name	Scientific Name
Trees		Grasses	
Western Rosewood	*Alectryon oleifolius*	Kangaroo Grass	*Themeda triandra*
Red Ash	*Alphitonia excelsa*	Wallaby Grass	*Rytidosperma spp.*
Rough-barked Apple	*Angophora floribunda*	Plains Grass	*Austrostipa aristiglumis*
Whitewood	*Atalaya hemiglauca*	Barbed Wire Grass	*Cymbopogon refractus*
Kurrajong	*Brachychiton populneus*	Slender Bamboo Grass	*Austrostipa verticillata*
#White Cypress Pine	*Callitris glaucophylla*	Slender Rats Tail Grass	*Sporobolus creber*
#Belah	*Casuarina cristata*	Tall Oats Grass	*Themeda avenacea*
*#White Box	*Eucalyptus albens*	Silky Browntop	*Eulalia aurea*
#Apple Box	*Eucalyptus bridgesiana*	Shrubs and Sub-shrubs	
*#Blakely's Red Gum	*Eucalyptus blakelyi*	Western Silver Wattle	*Acacia decora*
#Narrow-leaved Ironbark	*Eucalyptus crebra*	Sticky Wallaby Bush	*Beyeria viscosa*
#River Red Gum	*Eucalyptus cunninghamiana*	Sticky Hop-Bush	*Dodonaea viscosa ssp. angustifolia*
Tumbledown Red Gum	*Eucalyptus dealbata*	Wilga	*Geijera parviflora*
Dwyers Red Gum	*Eucalyptus dwyeri*	Black Tea-tree	*Melaleuca bracteata*
Silver-top Stringybark	*Eucalyptus laevopinea*	Forbs	
Red Stringybark	*Eucalyptus macrorhyncha*	Yellow Burr-daisy	*Calotis spp.*
#Silver-leaved Ironbark	*Eucalyptus melanophloia*	*Common Everlasting*	*Chrysocephalum apiculatum*
*#Yellow Box	*Eucalyptus melliodora*	Ruby Saltbush	*Enchylaena tomentosa*
#Western Grey Box	*Eucalyptus microcarpa*	Winter Apple	*Eremophila debilis*
Pilliga Box	*Eucalyptus pilligaensis*	Narrawa Burr	*Solanum cinereum*
Poplar Box	*Eucalyptus populnea*	Fuzz Weed	*Vittadinia spp.*
Manna Gum	*Eucalyptus viminalis*	Blue Bells	*Wahlenbergia spp.*

* Species associated with the Box-Gum Woodland CEEC to create structurally diverse habitat (as per the NSW Final Determination and Commonwealth Listing Advice for these communities). # Species associated with habitat for the Regent Honeyeater, Swift Parrot and Corben's Long-eared Bat.


Plate 1: Active Revegetation within Kenna BOA.

5.5.1 Revegetation Works Completed

Revegetation works have been undertaken across the BOA as outlined in **Table 5-5**, **Figure 5-1** and **Figure 5-2**. The restoration commitments outlined below include areas of active revegetation and natural regeneration.

Table 5-5: Extent of revegetation works undertaken across the BOAs.

BOA	Restoration Commitment (ha) and relevant Approval	Total restoration completed to date	Extent Active Reveg (ha)	Extent Natural Regen (ha)	Area (ha) of new and/or maintenance plantings						
					2017	2018	2019	2020	2021	2022	2023
Kenna	483 (VCA0486)	538.3	619.4	81.1	49	102	89	143	97	27	31
Rosevale and Omeo	28.3 (VC00495, VC00528 and VC00529)	24	10	14	0	0	0	0	0	10	14

A total of 607.3 ha of restoration works have been undertaken across the BOAs to date. Active revegetation extents (shown in **Table 5-5**) were quantified based on the actual extent of primary revegetation undertaken across the BOA. Differences between areas committed to in the relevant Approvals and the actual extent of active revegetation is identified through Annual Revegetation Assessments. Assessments to date have found that some areas originally committed to, were not suitable for revegetation due to; increased natural regeneration; unsuitably steep or rocky ground; the presence of remnant riparian or paddock trees; identification of heritage sites; identification of threatened flora species (and the erection of enclosures); and the presence of fence lines and access tracks.

Primary revegetation is materially complete for Kenna BOA. Annual Revegetation Assessments undertaken by Ecoplanning in July 2021 and 2022 have informed the FY22 Reveg Order Report (Ecoplanning, 2021c) and the draft FY23 Reveg Order Report (Ecoplanning, 2022), with the completion of primary revegetation for Kenna BOA achieved in 2023. Primary revegetation on Rosevale and Omeo BOAs is scheduled to be completed by 2025.

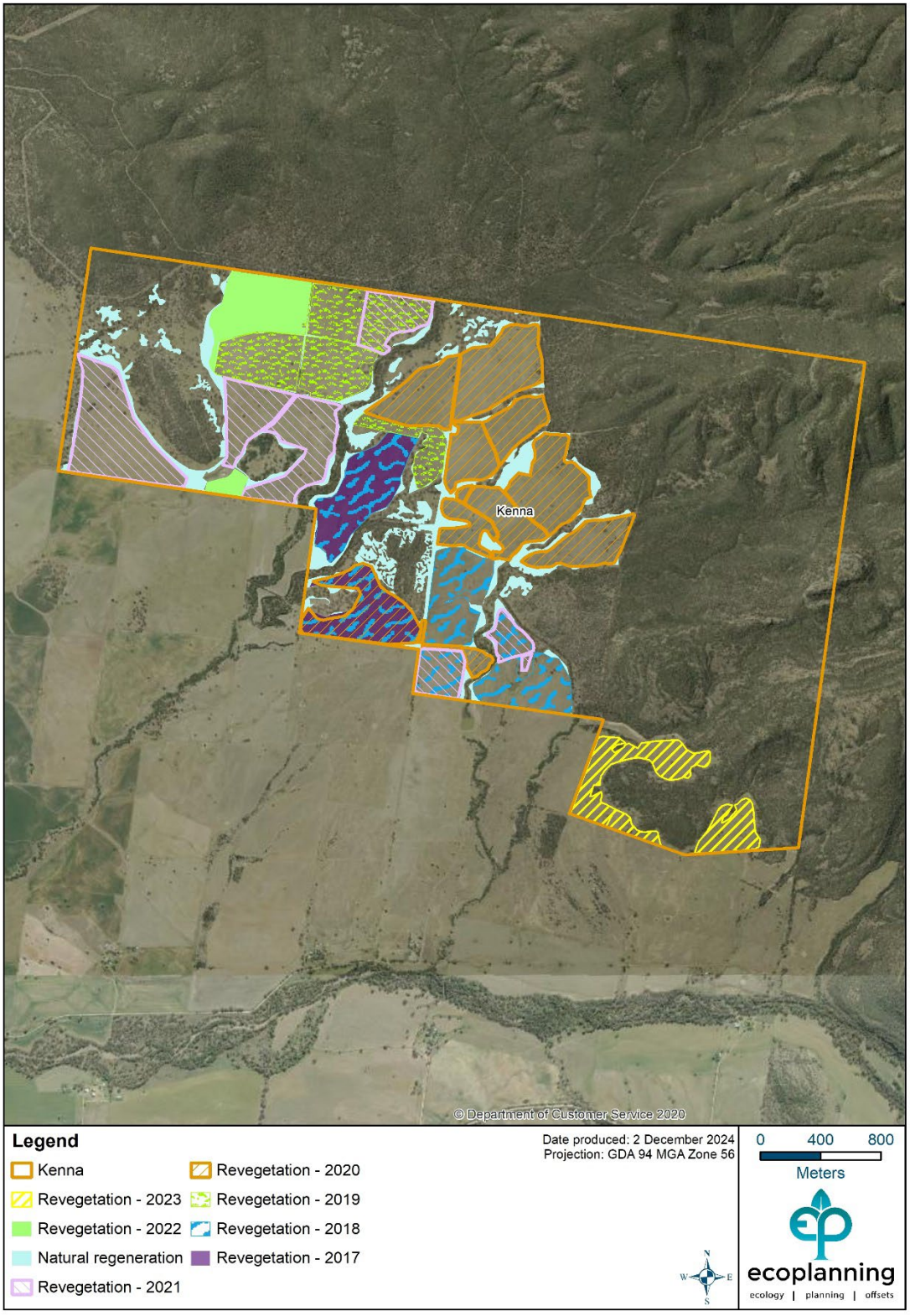


Figure 5-1: Revegetation undertaken across Kenna BOA.

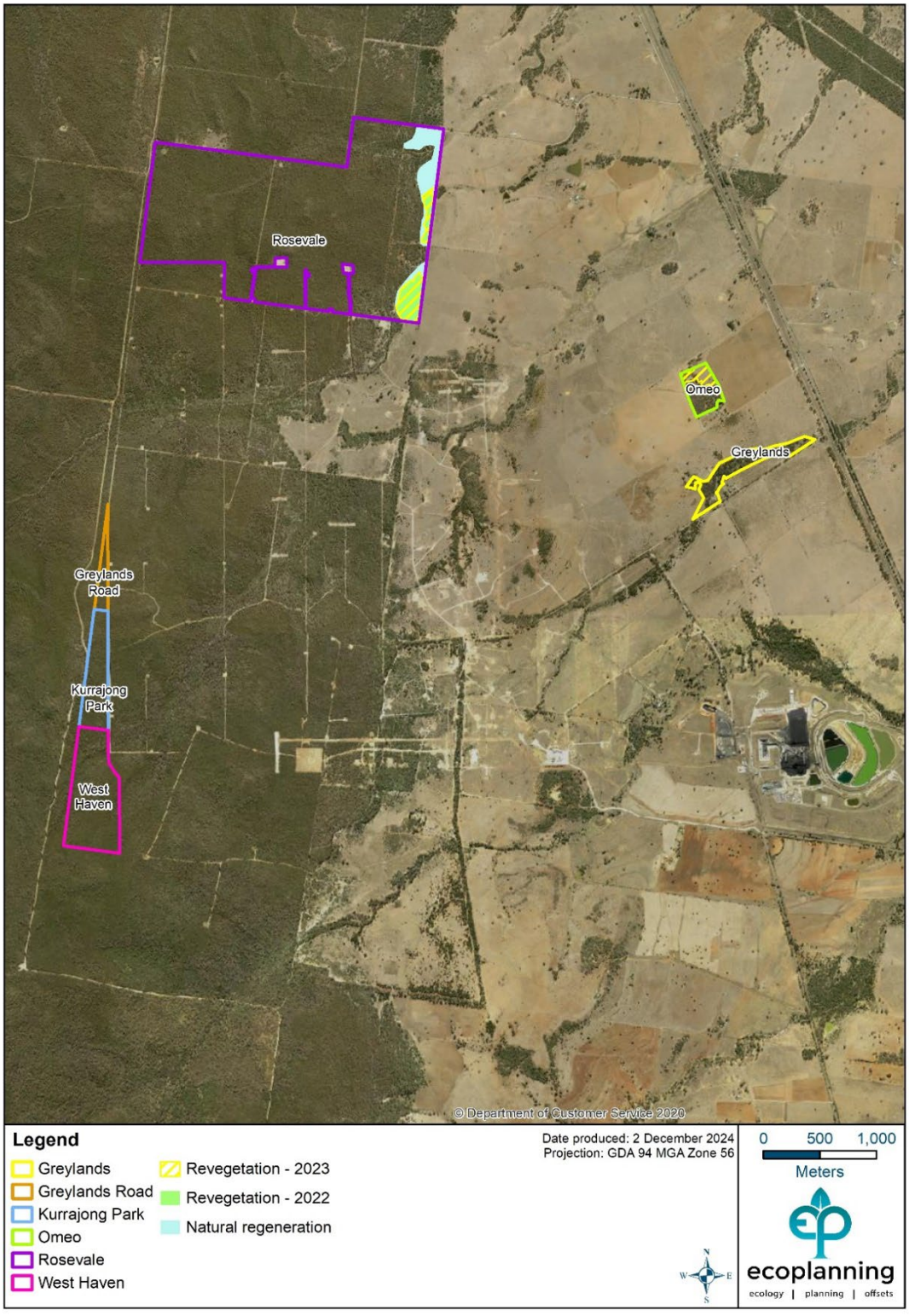


Figure 5-2: Revegetation undertaken across Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs.

5.6 ECOLOGICAL THINNING

Ecological thinning will only be considered in habitats identified as having dense regrowth, in particular *Callitris* species. WHC will undertake ecological thinning assessments to identify areas across the BOA where dense regrowth is impacting on flora and fauna habitat condition or is adverse to natural regeneration/ecological restoration. Initial stages of the ecological thinning assessment concludes that ecological thinning of *Callitris* could not be justified at this point in time without further assessment. If further assessment determines that ecological thinning is required; it will be staged, reflective of existing flora and fauna habitat condition (in consideration of Conservation Agreement conditions).

5.7 HABITAT AUGMENTATION

Habitat augmentation (using salvaged resources or nest boxes) will be undertaken in accordance with Approval conditions and in habitats identified as having low habitat resources. Whitehaven will undertake habitat needs assessments to identify across the BOA where habitat resources are scarce, to determine the extent of habitat augmentation required. Habitat augmentation will be staged, reflective of existing fauna habitat condition and will utilise available salvaged resources such as coarse woody debris, rocky debris and artificial hollows (including nest boxes – the number and type determined by the habitat needs assessment based on signs of use and suitable dimensions required for species and data collected from clearing areas on mine sites) in consideration of Conservation Agreement conditions.

Where nest boxes are to be installed; they will be made from high quality and durable materials that provide for a long lifespan and of designs that are targeted for hollow-dependent threatened species known to occur in the locality of the offset site such as woodland birds, arboreal mammals and microbats.

A targeted monitoring program is implemented for the BOA with habitat augmentation to survey their use in conjunction with other fauna methods (**Section 5.16**). Monitoring includes targeted camera surveys and external/internal observations of habitat augmentation structures to identify both their use and condition.

5.8 HERITAGE MANAGEMENT

Biodiversity management of heritage sites and values is consistent with the relevant baseline surveys and mine site specific Heritage Management Plans. There is not expected to be any conflict between biodiversity management works in the offset areas and any cultural and historical heritage values and sites by adopting the following measures:

- Any new BOA should have heritage due diligence assessments completed prior to commencing biodiversity management works that cause surface disturbance. In addition, biodiversity management works (such as fire break track maintenance, revegetation ground preparation or infrastructure/asset removal) cultural and historic heritage site locations will be reviewed to avoid being affected;
- Routinely maintain and update the Whitehaven Historical Heritage Register and Spatial Database (Whincop, 2021a) and the Whitehaven Cultural Heritage Register and Spatial Database (Whincop, 2021b);
- All relevant identified cultural and historic heritage sites within offset areas will be demarcated and fenced. To avoid inadvertent disturbance; heritage sites will have demarcation fencing installed and signs that identify the Whitehaven BOA property, type of heritage and site ID, and a Whitehaven contact number provided so that only authorised access can be permitted and all activities must be authorised;
- All relevant identified cultural and historic heritage sites will have an Annual Heritage Site and Fencing Inspection undertaken by appropriately qualified heritage specialists to ensure the

integrity of the fencing and site condition has not compromised and that heritage sites are appropriately managed;

- If any potential heritage sites, remains or artefacts are identified during biodiversity management; the work will immediately stop within the vicinity of the suspected area and appropriately qualified heritage specialists will be engaged and an assessment undertaken to determine what action and reporting is required. Offset areas will need to meet all statutory requirements under the NSW *National Parks and Wildlife Act* (NP&W Act) *1974* and NSW *Heritage Act 1977*.

5.9 WEED MANAGEMENT

WHC aim to promote natural regeneration by reducing weeds so that perennial exotic plant cover (PEPC) does not comprise of more than 20% of flora monitoring plots by implementing measures aiming to exclude priority weed species listed in the *North West Regional Strategic Weed Management Plan* 2017 – 2022 (NWRSWMP) (LLS, 2017). Priority weed species relevant to the BOA include Weeds of National Significance (WoNS), High Threat Exotics (HTE) and weeds identified within the BC Act and EPBC Act as a Key Threatening Process (KTP).

WHC will manage weeds in accordance with the *NSW Biosecurity Act 2015* that introduced the 'General Biosecurity Duty' (GBD) which requires all land managers and users to ensure as far as is reasonably practicable, that biosecurity risks are prevented, eliminated or minimised. In addition to WHC's GBD responsibility; weed management will be implemented aligned with the NWRSWMP (LLS, 2017) and weed control measures will be guided by published control measures (e.g., DPI, 2018a). The NWRSWMP introduces a risk management approach (based on the weed invasion curve stages of prevention, eradication, containment and asset protection) to prioritise weeds for management based on those weeds that are 'State Level Determined Priority Weeds for the North West Local Land Services Region' and additional 'Regional Priority Weeds'.

The spread and introduction of weeds can be prevented by the practice of weed hygiene measures. WHC will instruct contractor vehicles and equipment entering the offset area (via toolbox talks and other communications including key messages) to be clean and free from weeds and/or seeds. Access to the offset areas will also be controlled as described in **Section 5.3**.

Seasonal weed assessment programs are undertaken across the offset area to identify weed species, extent and condition of any infestations and the opportunity for control/management depending on seasonal conditions. The weed assessments ensure that timely and prioritised weed control is undertaken on a seasonal basis, with information provided directly to contractors to enable targeted weed control and efficient use of resources across the BOA.

A number of environmental and priority weeds are known to occur in the offset areas as listed in **Table 5-6**. Based on seasonal weed assessment results; weed control will target priority weeds and any other environmental weed present in the BOA. If new priority weed species are found, then this will be communicated with WHC mine sites and neighbouring properties/organisations (via toolbox talks and other communications including key messages) and will also be managed in accordance with this OMP.

The Department of Primary Industries *NSW WeedWise* Website will be consulted prior to weed control, for recommended techniques for the removal of priority weeds. Relevant methods for controlling priority weeds known to occur in the offset areas are summarised in **Table 5-6**.

Table 5-6: Example Control Methods of Priority Weeds across BOA.

Common Name	Scientific Name	Example Control Methods (DPI, 2018a)[2]
Mother of Millions	*Bryophyllum delagoense*	herbicide application
Paterson's Curse	*Echium plantagineum*	herbicide application
Coolatai Grass	*Hyparrhenia hirta*	physically remove, herbicide application
African Boxthorn	*Lycium ferocissimum*	physically remove, herbicide application
Prickly Pear	*Opuntia* sp.	physical removal, herbicide application
Tiger Pear	*Opuntia aurantiaca*	physical removal, herbicide application
Sweet Briar	*Rosa rubiginosa*	physical removal, herbicide application
Fireweed	*Senecio* spp.	herbicide application
Cockle Burr	*Xanthium occidentale*	physical removal, herbicide application
Bathurst Burr	*Xanthium spinosum*	physical removal, herbicide application

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

5.10 PEST ANIMAL MANAGEMENT

The overarching objective of the pest animal management program is to ensure that the impacts of pest animals to native species, existing vegetation and revegetation within offset area are minimised. The goal of pest animal management is to achieve an overall reduction in pest animal species and population sizes targeted by control measures implemented across the BOA (in consideration of potential drought conditions and seasonal trends).

WHC aims to apply an even and consistent pest animal management effort by routinely scheduling a rolling monitoring and control programs across the BOA. This standardised approach can also be supplemented with periodic targeted programs that focus on specific areas with high pest animal detection, or, on species which have increasing rates of detection. Both the overall management and targeted programs are planned using data collected from grid based motion detection camera monitoring program, pest animal observations and the results of previous control programs.

Pest animal management will focus on the pest animals recorded from the offset areas (**Table 3-2**). However, if new pest animals are found, those new pest animals will also be managed in accordance with this OMP.

Control measures will be implemented by Pest Control Contractor(s) and/or WHC personnel as required (**Table 5-7**). All personnel involved in pest animal control will be required to hold relevant and valid licences/permits, including any relevant chemical licences for pesticide use or a firearms licence for shooting. Pest animal control will be undertaken in consideration of the control recommendations outlined in the *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).

Table 5-7: Control Methods for Target Pest Animals.

Common Name	Scientific Name	Example Control Method	Relevant Documents[2]
Feral Pig	*Sus scrofa*	trapping/ground shooting; and/or ground baiting.	*Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs* (DotEE, 2017); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).

Common Name	Scientific Name	Example Control Method	Relevant Documents[2]
Feral Goat	*Capra hircus*	trapping/mustering; and/or ground shooting.	*Threat Abatement Plan for Competition and Land Degradation by Unmanaged Goats* (DEWHA, 2008a); and *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021).
European Red Fox	*Vulpes*	trapping; and/or ground baiting.	*Threat Abatement Plan for Predation by European Red Fox* (DEWHA, 2008b); *NSW Threat Abatement Plan for Predation by The Red Fox (Vulpes vulpes)* (OEH, 2011); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
European Rabbit	*Oryctolagus cuniculus*	warren ripping/fumigation; ground shooting; and/or ground baiting.	*Threat Abatement Plan for Competition and Land Degradation by Rabbits* (DotEE, 2016)*; PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Brown Hare	*Lepus capensis*	ground shooting.	*Integrated Hare Control* (Department of Environment and Primary Industries [VIC], 2015); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Feral Deer	*Cervus spp., Axis spp., or Dama spp.*	ground shooting.	*Feral Deer* (SEWPaC, 2011); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Feral Cat	*Felis catus*	trapping; and/or ground shooting.	*Threat Abatement Plan for Predation by Feral Cats* (DotE, 2015); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).
Wild Dog	*Canis familiaris*	ground baiting; and/or ground shooting.	*New South Wales Wild Dog Management Strategy 2017-2021* (DPI, 2017); *PestSmart Toolkit* (Centre for Invasive Species Solutions, 2021); and *Ecology and Management of Vertebrate Pests in NSW* (DPI, 2018b).

[1]*Local Land Services Act 2013*

[2]An alternative published method may be used as required.

5.11 EROSION MANAGEMENT

Erosion management is determined by annual inspection programs of known soil degradation (erosion and/or salinity) sites, unsealed tracks and associated drainage structures across the BOA to review appropriate erosion and sediment control measures required in accordance with the Blue Book (*Managing Urban Stormwater: Soils and Construction Volume 1* [Landcom, 2004]) and in consideration of Conservation Agreement conditions. Should annual inspection programs identify areas of unstable and active erosion or salinity, the soil erosion register will be updated including what (if any) active remediation works are required to be undertaken. Any erosion and sedimentation identified with tracks and associated drainage structures will be maintained through annual fire break track maintenance program.

5.12 AGRICULTURE MANAGEMENT

Agriculture/grazing has been excluded from the offset areas. Stray neighbouring stock will be removed as soon as practicable. Any proposed grazing for high threat weed infestations must be planned in consideration of Conservation Agreement conditions and aligned with the *Biodiversity Conservation Trust Livestock Grazing Guidelines* (BCT, 2021).

5.13 BUSHFIRE MANAGEMENT

WHC will annually quantify bushfire fuel loads and characterisation of the BOA to assess bushfire hazard of various offset properties prior to each bushfire season. The assessment will consider human, environment and infrastructure assets within and adjacent to offset areas to quantify an overall bushfire risk, then the feasibility of various hazard reduction methods are considered (for example but not limited

to fire exclusion, mechanical fuel reduction such as slashing or undertaking ecological burns) prior to determining annual treatment/actions for each offset property.

Offset properties with moderate to high overall bushfire risks will be prioritised as part of an annual ecological burn program and will be subject to conceptual and strategic fire planning and mapping. Once annual fire planning has identified paddocks feasible to undertake ecological burns, and a burn plan has been prepared, WHC will consult, where required, with relevant stakeholders such NSW Rural Fire Services (RFS), Councils and neighbours/local community as well as NSW Environmental Protection Authority (EPA Approval for Open Burning is required for ecological burns) and NSW BCT in consideration of Conservation Agreement conditions.

WHC will establish and maintain Access Tracks within the BOA and around the perimeter of the BOA that will serve a dual purpose to passively mitigate fire spreading within or outside of the offset property (where practicable) and containment for bushfires and active ecological burns (as required). Access Tracks will be periodically maintained as zero fuel barriers (preferably mineral earth barriers up to 6 m total width of clearing in accordance with Conservation Agreement Part 3 Tracks and Infrastructure and Part 4 Clearing and Earthwork Envelopes and as per WHCs obligations under VCA0486, VC00528, VC00496, VC00530, VC00495, VC00529, VC00531); acknowledging that between maintenance events some fuel accumulation will occur, not to NSW RFS Fire Trail Standards (November, 2023). Access Tracks will be inspected annually, prior to the fire season (RBS-2, Umwelt, 2017), and maintenance of Access Tracks to be prioritised as required by the inspection.

WHC will undertake an annual ecological burn program of paddocks/burn blocks identified through the above assessment, within the prioritised offset properties, using suitably experienced and capable professionals with adequate firefighting resources and training to safely and competently light and extinguish ecological burns. The location of ecological burns within grasslands (if previous revegetation present, will need to be sufficiently mature to avoided fire impacts) and existing remnant vegetation will be in consideration of Conservation Agreement and will align with fire intervals outlined by the Bush Fire Coordinating Committee (2008) summarised as:

- intervals for grassy woodlands of 8 to 40 years;
- grasslands 3 to 10 years; and
- dry sclerophyll forest shrub/grass sub-formation of 8 to 50 years.

Ecological burns will aim for low to moderate fire intensity burns, by aiming for cool-season burns, when conditions are suitable (generally autumn to spring) to establish a mosaic of different burn ages and fuel loads. In addition, other burn preparations will be undertaken to mitigate impacts to environmental assets (such as hollow bearing trees) and other constraints identified within mapped burn blocks.

In the event of a bushfire within or adjacent to the BOA; WHC will assist bushfire emergency services and neighbours (such RFS, NPWS and Forestry Corporation NSW) as much as practicable, including but not limited to coordinating access to the BOA as well as facilitating available water sources. The locations of previously undertaken ecological burns and historic burn scar mapping across the Kenna BOA are shown in **Figure 5-3**. WHC will add flora monitoring plots to previously burnt areas to monitor the restoration response and ecological burn treatment management (particularly for BGW).

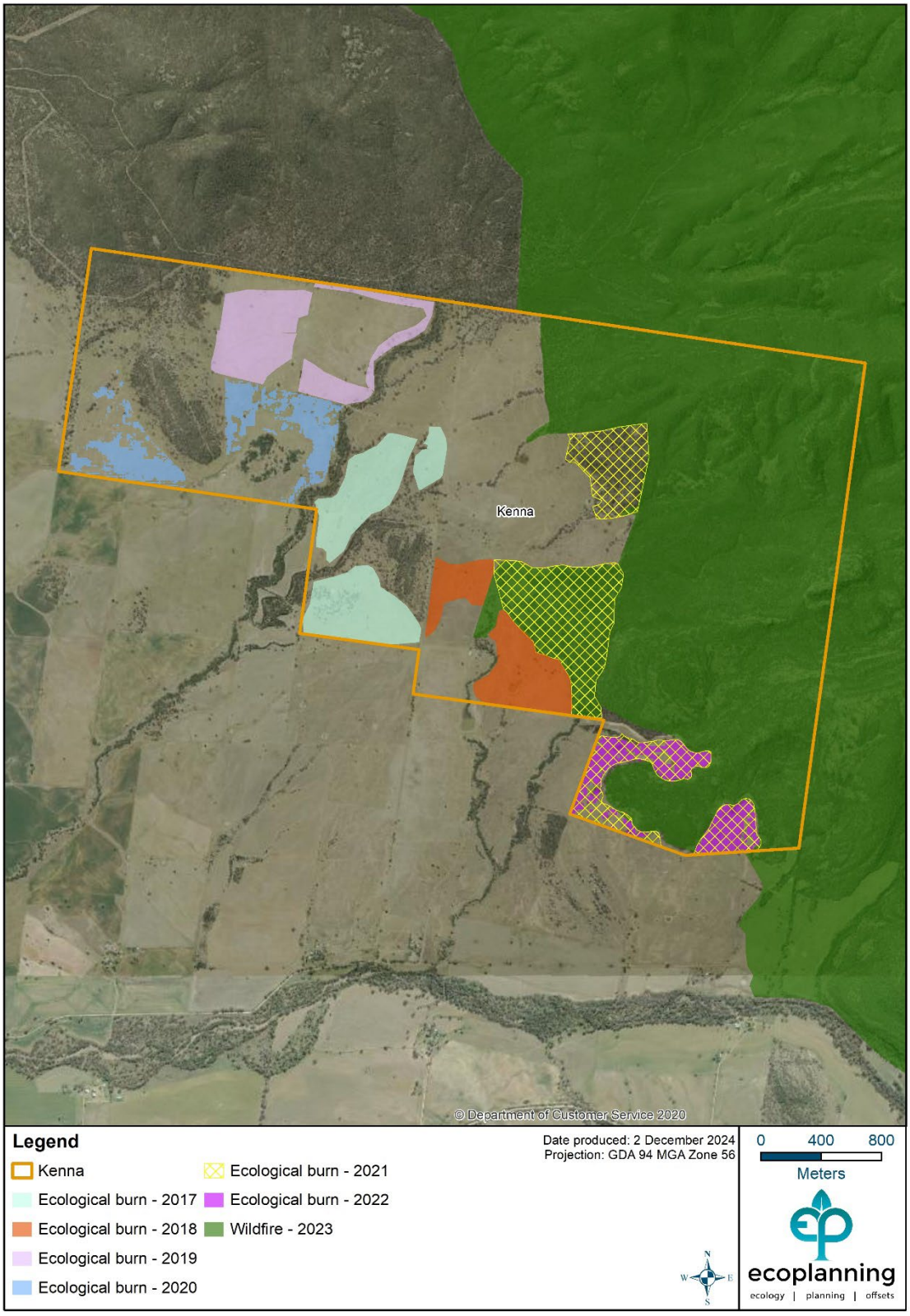


Figure 5-3: Ecological burns and burn scars within Kenna BOA.

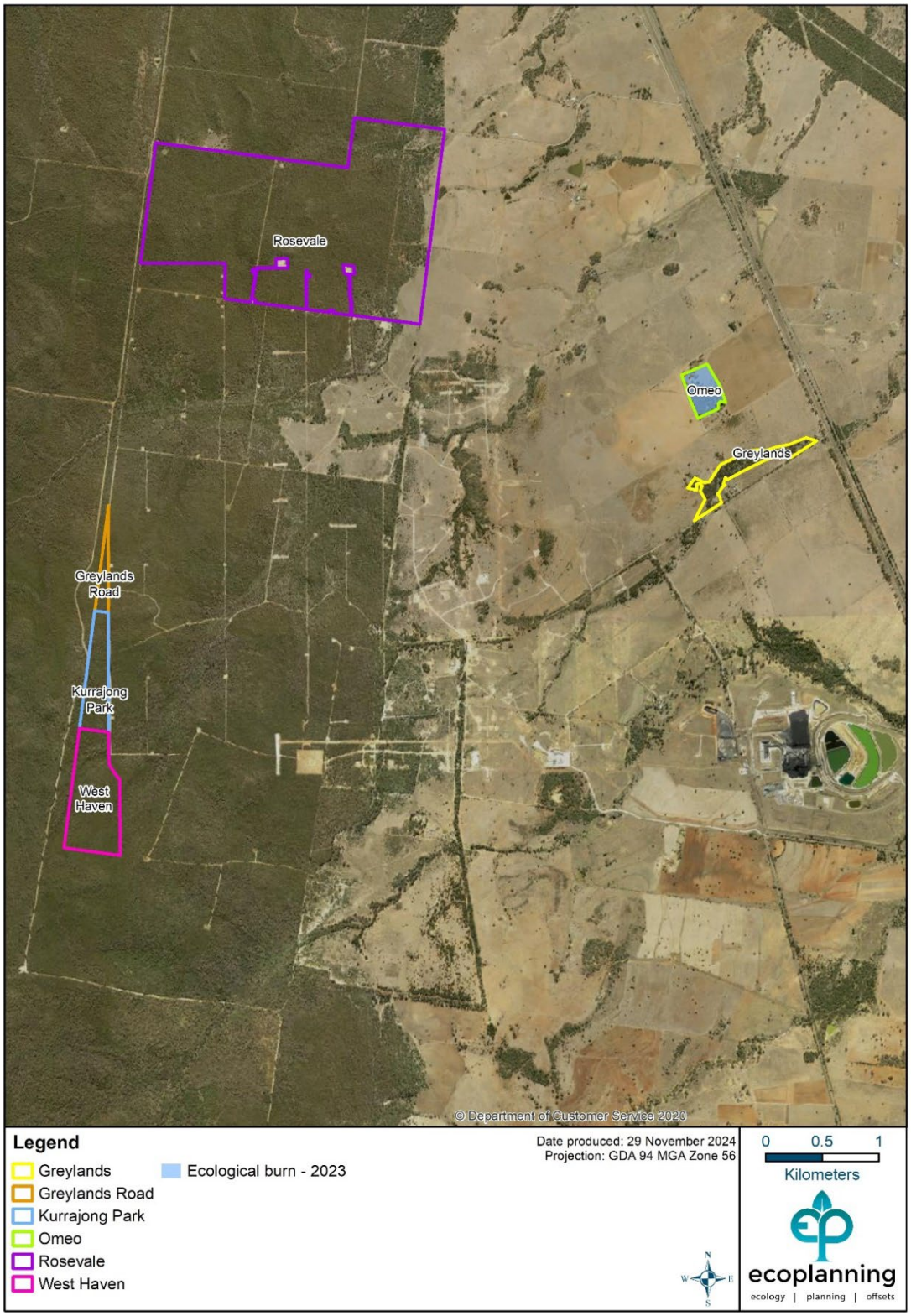


Figure 5-4: Ecological burns and burn scars within Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs.

5.14 THREATENED FLORA MANAGEMENT

A number of threatened flora species have been identified within the BOA and strategic areas outside of the BOA (**Table 5-8**). WHC will manage, protect and enhance habitat for threatened flora species within and adjacent to WHC mining operations and BOAs (Ecoplanning, 2021b). While the focus is to guide management of those threatened flora species which are known to occur within WHC owned land, general principles and actions are also outlined which will be implemented for any additional threatened flora species detected. Current and future management actions undertaken for the threatened flora species are broadly grouped as:

- Maintenance of Threatened Flora Database, Sighting Register and Spatial Data;
- Habitat Protection with Threatened Flora Fences and Signage;
- Threat abatement and habitat enhancement within the BOA;
- Undertake Translocations and Transplantations where propagative material is available; and
- Monitoring of Threatened Flora habitat and populations.

In summary, to avoid inadvertent disturbance of known populations, WHC maintains a threatened flora register and spatial database as well installs demarcation fencing and signage of known threatened flora sites within the BOA. Additionally, the management program includes routine inspections and monitoring of known threatened flora sites. The aim of the inspections and monitoring is to gain more knowledge of the threatened flora species, identify and respond to any identified threats, and identify potential reproductive material to support specific translocation programs for these species. Restoration and translocation strategies will continue to be developed for those threatened flora species identified across the BOA and Mine Sites. The long-term objectives of these restoration and translocation strategies are to directly support the conservation of the species by maintaining a self-sustaining, genetically diverse population of the species within the Offset properties which is capable of surviving in the long term. In the shorter term, actions will be undertaken to meet the requirements of any relevant Approvals, identify any propagative material and guide translocations which will either establish new populations or increase the resilience of existing populations.

Table 5-8: Threatened Flora Species per BOA.

Threatened Flora Species	BOA
Bertya opponens (Coolabah Bertya)	Rosevale, Kurrajong Park, West Haven
Pomaderris queenslandica (Scant Pomaderris)	Rosevale, Greylands
Tylophora linearis	Greylands, Kenna, Rosevale, Omeo, West Haven

5.15 FLORA MONITORING

Purpose

Annual flora monitoring will be undertaken by qualified ecologists to gather floristic data that can track changes in vegetation and habitat values within the BOA and report on the effectiveness of management actions and progress made against annual performance and final completion criteria (**Section 5.17**). Flora monitoring will be on an annual basis in spring, when the highest diversity of plants is expected to be present (Rawlings *et al.,* 2010).

Monitoring Design

Relevant ecological indicators outlined in **Table 5-9**, based on a modified BioBanking Assessment Methodology (BBAM) (OEH 2014) are monitored annually at treatment plots (within the BOA) and compared to control plot and reference site data (both outside the BOA) over time.

All monitoring plots (treatment, control and reference) are 0.1 ha (20 x 50 m) inclusive of a 20 x 20 m floristic plot and 50 m transect (see **Figure 5-5**).

To determine whether the ecological management objectives are being achieved, the flora monitoring program aims to collect data that can answer four ecological questions:

1) Do Vegetation Zones (VZs) meet completion criteria?
2) Do treatment plots meet annual performance criteria?
3) Are treatment plots trending towards completion criteria and/or reference state?
4) To what extent are management actions within a vegetation zone effective?

The annual reporting requirements for flora monitoring results are outlined in **Section 6.2**.

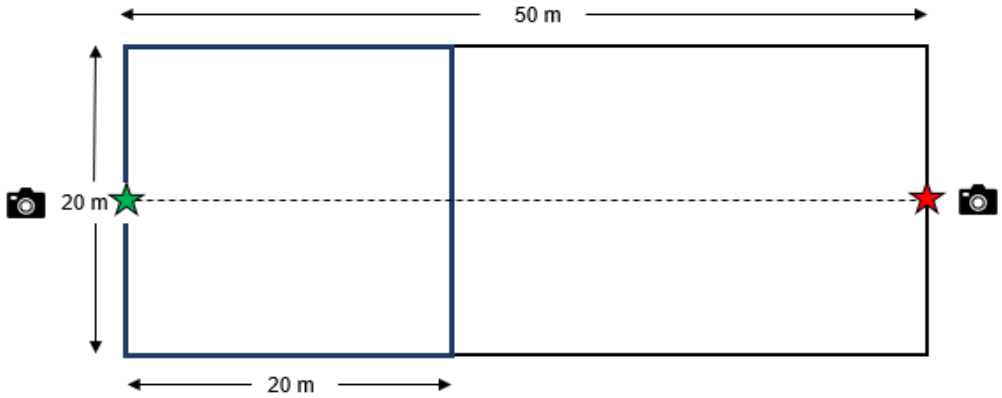


Figure 5-5: 20m x 50m monitoring plot – green star represents start of transect.

Table 5-9: Flora monitoring attributes.

Monitoring attributes (Ecological indicators)		Assessment technique	BGW condition indicators	Threatened Fauna Habitat value indicators
Native plant species richness (NPS)		Count utilising a species list recorded within 20 x 20m sub-plot (estimate % cover and abundance of each species)	✓	
Native over storey cover (NOS)		10 points along a 50 m transect	✓[1]	✓
Native mid-storey cover (NMS)		10 points along a 50 m transect	✓	
Native ground cover (grasses) (NGCG)		50 points along a 50 m transect	✓	
Native ground cover (shrubs) (NGCS)		50 points along a 50 m transect	✓	
Native ground cover (other) (NGCO)		50 points along a 50 m transect	✓	
Exotic plant cover (EPC) (calculated as % of total ground and mid-storey cover)	mid-storey cover	10 points along a 50 m transect	✓	
	ground cover	50 points along a 50 m transect		
Number of standing trees (dead and alive) with hollows (NTH)		Count within 20 x 50 m plot	✓	✓
Proportion of over-storey species occurring as regeneration (OR)		Observation within 20 x 50 m plot (compared to number of native overstorey species occurring within 50 m radius of plot)	✓	
Total length of fallen logs (FL)		Measured within 20 x 50 m plot	✓	✓
Exotic plant species richness		Count utilising a species list recorded within 20 x 20m sub-plot (estimate % cover and abundance of each species)		
Perennial exotic plant cover (PEPC)		% foliage cover recorded within 20 m x 20 mm sub-plot	✓	
Photo points		2 transect photos per plot, taken at chest height from start and end picket	✓	
Opportunistic observations		Record observations of: natural regeneration of disturbed areas, threatened species, fire events, weeds, pest animals, visitor impact, rubbish, other field notes	✓	✓

[1]Indicator of water stress

The BOA is mapped and stratified into Vegetation Zones (VZs) (shown in **Figure 5-6** and **Figure 5-7**) which define areas having the same annual performance criteria, final completion criteria and exposure to the BOA adaptive management actions. VZs within the BOA are defined based on:

1) Vegetation Class (Keith 2004) (known herein as Keith Class), and
2) Broad condition state (Good, Semi-cleared, DNG/Cleared)

Treatment plots are established in the largest VZs, where the majority of WHC management actions occur, and are replicated based on Biobanking Assessment Method (BBAM) area threshold

recommendations (OEH 2014). The number of treatment plots within each BOA is shown in **Table 5-10.** The location of treatment plots is displayed in **Figure 5-6** and **Figure 5-7**.

Table 5-10: Number of flora monitoring plots per BOA.

BOA	Area (ha)	No. VZs to be monitored	No. treatment plots
Kenna	1,177.10	5	28
Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven	404.54	2	11

Control plots are used to monitor the effectiveness of BOA management actions and are located outside the BOA in DNG and/or semi-cleared areas, within the same Keith Class and IBRA region as the treatment plots to which they are compared. Control plots are situated on land representing a 'business as usual' land management scenario (BCT 2021), where no WHC biodiversity management occurs. Where it is not possible to establish control plots in the same IBRA and Keith Class as treatment plots, control plots within the adjoining IBRA will be used. The comparison of treatment and control plot data aims to account for changes that occur due to background environmental change and indicate whether WHC management actions are effective within each VZ.

Reference plots are located within a 'reference site' outside of the BOA, representing high-quality remnants of Keith Classes monitored within the BOA. The monitoring of reference sites provides local benchmark data for aspirational 100-year targets, achievable beyond WHCs period of management. The comparison of VZ data (with relatively short management history) to the appropriate reference site, is to show that under WHC management VZ restoration is trending towards reference site condition. This gives confidence that it will continue to trend towards reference condition after achievement of completion criteria and the WHC management period ends.

Control and reference sites are to have a minimum of three plots to allow for statistically robust data analysis. Treatment and control plots are permanently marked with star pickets at the start and end of the 50 m transect and at the four corners of the 20 m x 20 m floristic plot. Reference plots will not be permanently marked as they are within public land. The location of the start and end of the 50 m transect have been recorded using a GPS. **Figure 5-8** shows the location of the control and reference sites surveyed in parallel with the treatment plots as part of Spring Flora Monitoring.

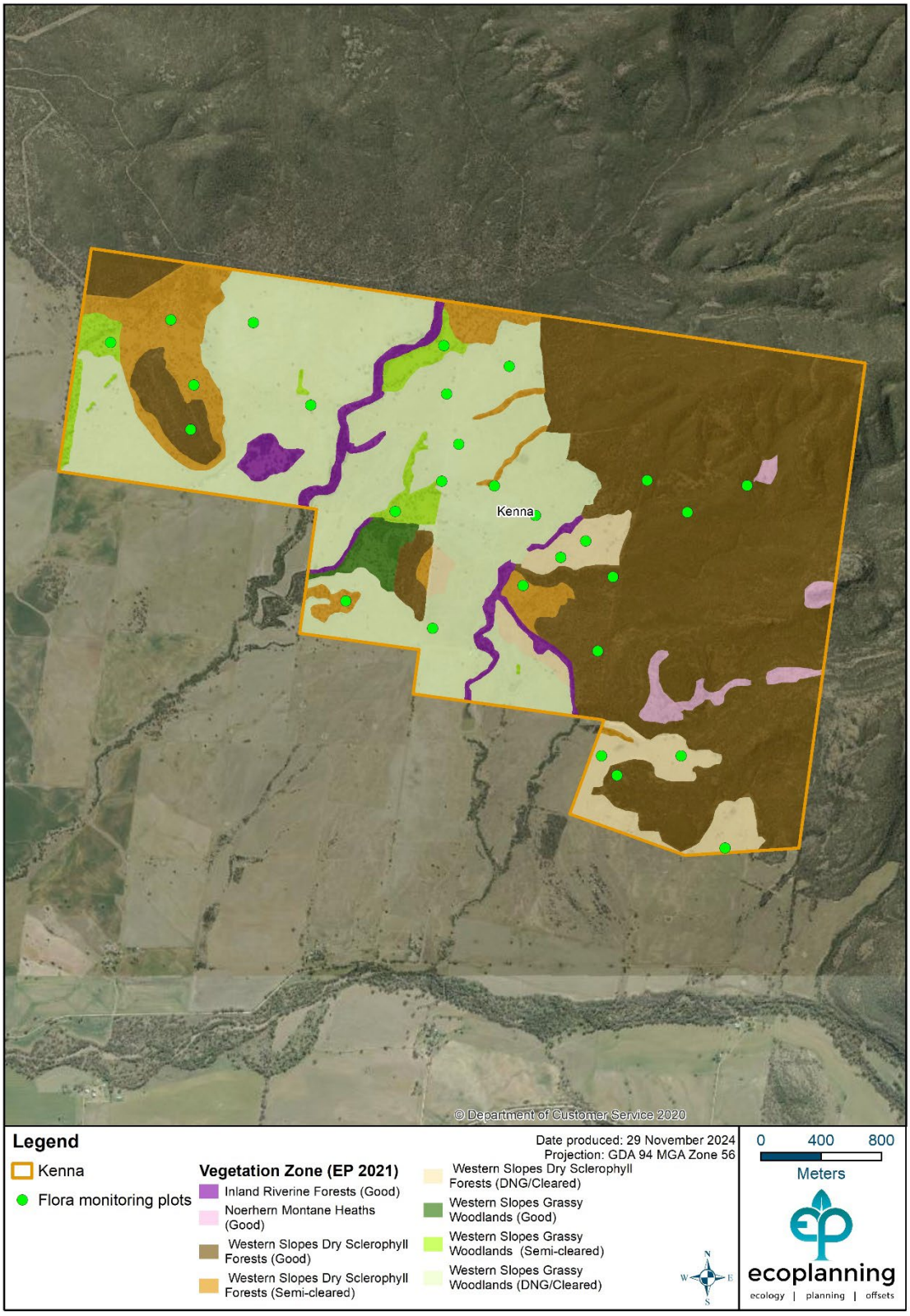


Figure 5-6: Vegetation zones and monitoring plot locations within Kenna BOA.

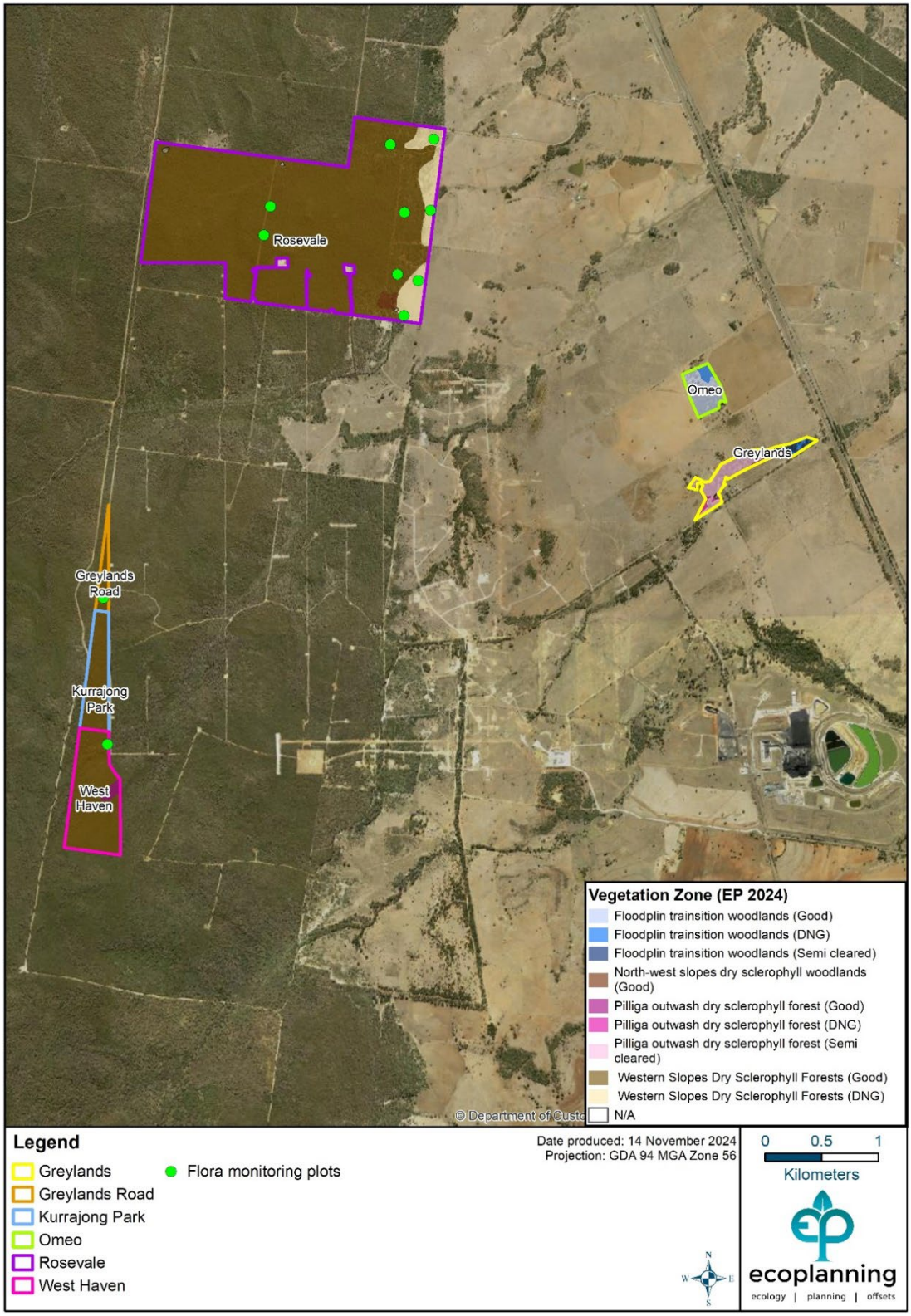


Figure 5-7: Vegetation zones and monitoring plot locations within the Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs.

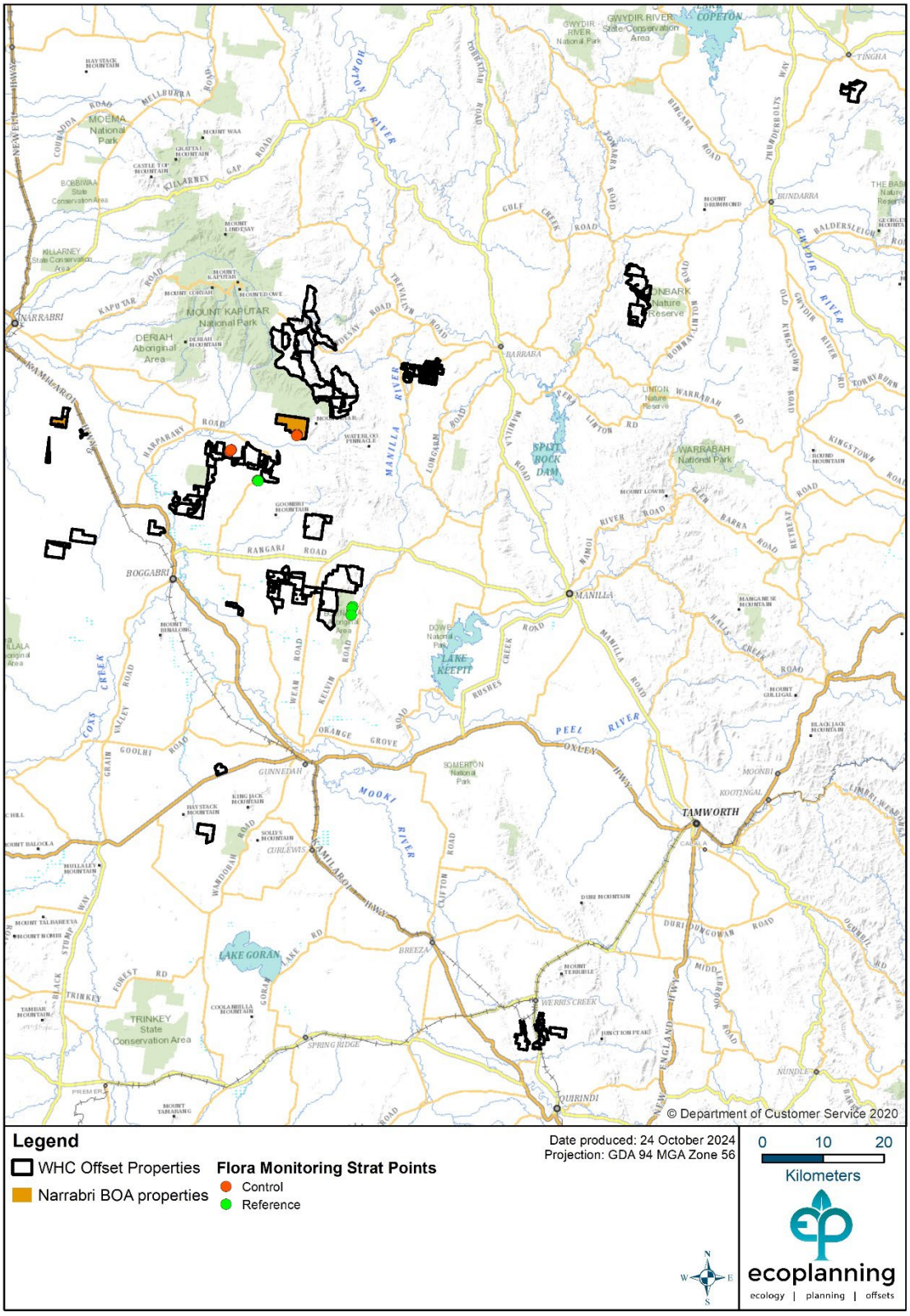


Figure 5-8: Location of control and reference plots associated with the Narrabri BOA.

Data recording and storage

WHC utilises an online/electronic application as the Flora Monitoring Database and Reporting tool. The online application is a custom-designed application, accessible in the field via a tablet or smart phone which is used to electronically record floristic and habitat biometric data. Once the data is uploaded from the field it is stored and visible via a web-based login. The biometric data is stored in the electronic database and can be downloaded as Excel spreadsheets.

5.16 FAUNA MONITORING

A 5-year review of the data collected from the Maules Creek and Willeroi Offset Annual Fauna Monitoring Programs surveyed between 2015 and 2019 (AMBS 2020a) indicated that while general trends in species richness and abundance over time were detected by the current survey methodologies and survey effort, the variance in the data set was extremely high and no meaningful statistical analysis linking changes in species richness and abundance to specific variables was possible. A further review was undertaken for all fauna monitoring methodologies and survey designs used across all WHC BOAs (AMBS 2020b) that identified the existing methods were somewhat effective at detecting fauna species richness and abundance, however there were aspects of each monitoring design and methodology that were contributing to high levels of variance in the data set. The previous monitoring design was struggling to deal with the spatial challenges associated with the large area of BOAs required to be monitored by WHC and the associated variables that were generated as a result of the large area. While the methods would continue to generate indicative species richness and abundance data sets, the data sets would not be sufficiently robust to link changes with specific variables including the management actions currently being undertaken by WHC.

Given the challenges faced by the monitoring projects managed by WHC and the strong desire of WHC to generate statistically robust data on the response of fauna assemblages to biodiversity management strategies; a series of structural modifications to the monitoring programs were implemented. The modifications to survey design and methods were selected after undertaking a thorough review of peer reviewed literature and consulting academic and industry experts in the fields of fauna that were being targeted. The modifications aimed to increase the likelihood that informative data on the influence of biodiversity management actions would be collected. The recommended modifications focused on adjustments to the timing of surveys, the number of survey sites, the number of replicates undertaken at each site, the area focused on by the surveys, and the methodology of the surveys. Specific modifications included:

- Changing the frequency of sampling for some monitoring components from annual to biennial, with the purpose of pooling resources for other structural survey modifications such as increasing the number of survey sites and increasing the number of replicates at each site;
- Designing sites to target specific fauna groups rather than having generic sites focusing on all fauna groups.
- Using the focus on target groups to select appropriate seasons for each survey (i.e. bird surveys conducted early spring independent of microbat surveys which are conducted in summer)
- Selecting sites that better sampled revegetation and non-revegetation treatments
- Targeting surveys on spatially explicit focus areas representative of the broader habitat variability of the BOA but likely to show detectable responses to biodiversity management actions that are influencing fauna response while maximising the chance of revealing total BOA species richness.

Annual monitoring of fauna has therefore been divided into a series of targeted programs focusing on specific fauna guilds. The surveys are primarily designed to detect changes in species richness and

abundance over the duration of the management of each property by WHC. In addition to this overall aim, the monitoring program will attempt to evaluate guild and species level responses to revegetation programs, habitat augmentation and pest animal management. The ecological management objectives relevant to the purpose of fauna monitoring are:

- Protect and enhance existing woodland and forest habitat for Regent Honeyeater and Swift Parrot
- Protect and enhance existing woodland and forest habitat for Corben's Long-eared Bat
- Protect and enhance existing woodland and forest habitat for Superb Parrot
- Restore self-sustaining woodland and/or forest within derived native grasslands and 'non-native/Cleared' areas to provide habitat for the threatened species listed under the BC Act and EPBC Act

Each survey method will target spatially explicit focus areas. The focus areas were designed to incorporate a matrix of remnant woodland, naturally regenerating woodland and revegetated woodland. As such, properly stratified survey designs should allow for a robust evaluation of fauna assemblage responses to revegetation program by comparing detection to other, non-revegetated habitats. The focus areas are different sizes and in different locations for each fauna guild. The location of all fauna monitoring sites for each BOA are shown in **Figure 5-9** and **Figure 5-10**.

5.16.1 Diurnal Bird Surveys

Diurnal bird surveys will be undertaken within target focus areas with the surveys conducted late winter into spring. Each bird survey focus area has been divided into grid areas, with one bird survey site placed within each grid. Bird surveys will be undertaken using a fixed time/area rapid survey design with survey site boundaries defined by having fixed start and end points. Counts of birds will be made for "in plot", "outside plot, same habitat", and "outside plot, different habitat". Survey effort will vary across a biennial schedule. In year one, all sites will be surveyed up to five times and in year two, sites will be surveyed twice. Surveys will be spread between morning and afternoon survey windows, and if possible, on non-consecutive days.

5.16.2 Microbat Surveys

Microbat assemblages will be monitored using a combination of echolocation recorders and harp traps. Echolocation surveys will target focus areas with each microbat focus area divided into a standardised grid appropriate for each focus area. One echolocation recorder will be placed within each grid and units deployed to start recording 30 minutes before last light and will stop recording 2 hours after last light. Survey effort will vary across a biennial schedule. Most sites will be surveyed once every two years while a selection of sites will be sampled annually to act as a control.

5.16.3 Pitfall and Funnel Trap Surveys

Ground dwelling fauna will be monitored using grids of pitfall traps and funnel traps. Pitfall and funnel trap surveys will be conducted biennially within target focus areas. Pitfall trap arrays will be deployed at each focus area with sites paired between remnant woodland areas and revegetated areas. Revegetated areas will further be paired between augmented habitats and non-augmented habitats. Each pitfall trap array will consist of pitfall traps and funnel traps. Pitfall traps will be plastic buckets with lids dug into the ground. Each bucket will be joined by a drift fence. When the sites are open, the lid will be perched above the bucket to provide shade. Funnel traps will be covered with reflective shields or vegetation to ensure trapped fauna can thermally equilibrate. Trap girds, when open, will be checked in the morning and evening. Sites have been selected to evaluate the response of fauna to revegetation and habitat augmentation through the provision of coarse woody debris and rocks.

5.16.4 Motion Detection Camera Survey

A network of motion detection camera sites have been established across the BOA for the purpose of native and pest animal monitoring (**Figure 5-9** and **Figure 5-10**). Site selection was designed on an area grid to maximise the even spread of cameras across the entire area of the BOA with a portion of the motion detection cameras to specifically inform pest animal management (**Section 5.9**). The remaining cameras will be activated annually to target native vertebrate fauna. Motion detection camera survey data will be analysed for the following purposes:

1. Native Fauna – Cameras will be used to detect other native species that don't already have targeted survey methods for and will aim to identify longer-term trends in native animal species richness;

2. Pest Animals - Separate to the monitoring for pest animal management, data will be analysed to identify longer-term trends in pest animal occupancy and identify interaction with native fauna trends.

Cameras activated annually will use bait stations comprising of an enclosed PVC pipe on a small star picket with the other cameras to focus on animal activity points.

Separate to the permanent motion detection camera surveys; WHC habitat augmentation installation areas will be monitored using cameras as follows:

1. Nest Boxes – the results of annual ground-based inspections and 5 yearly direct inspections (either climbing or pole cameras to look inside boxes) will inform where and what boxes are to be targeted with seasonally based camera surveys;

2. Coarse Woody & Rock Debris piles – Annual ground-based inspections will inform where and what piles are to be targeted with seasonally based camera surveys.

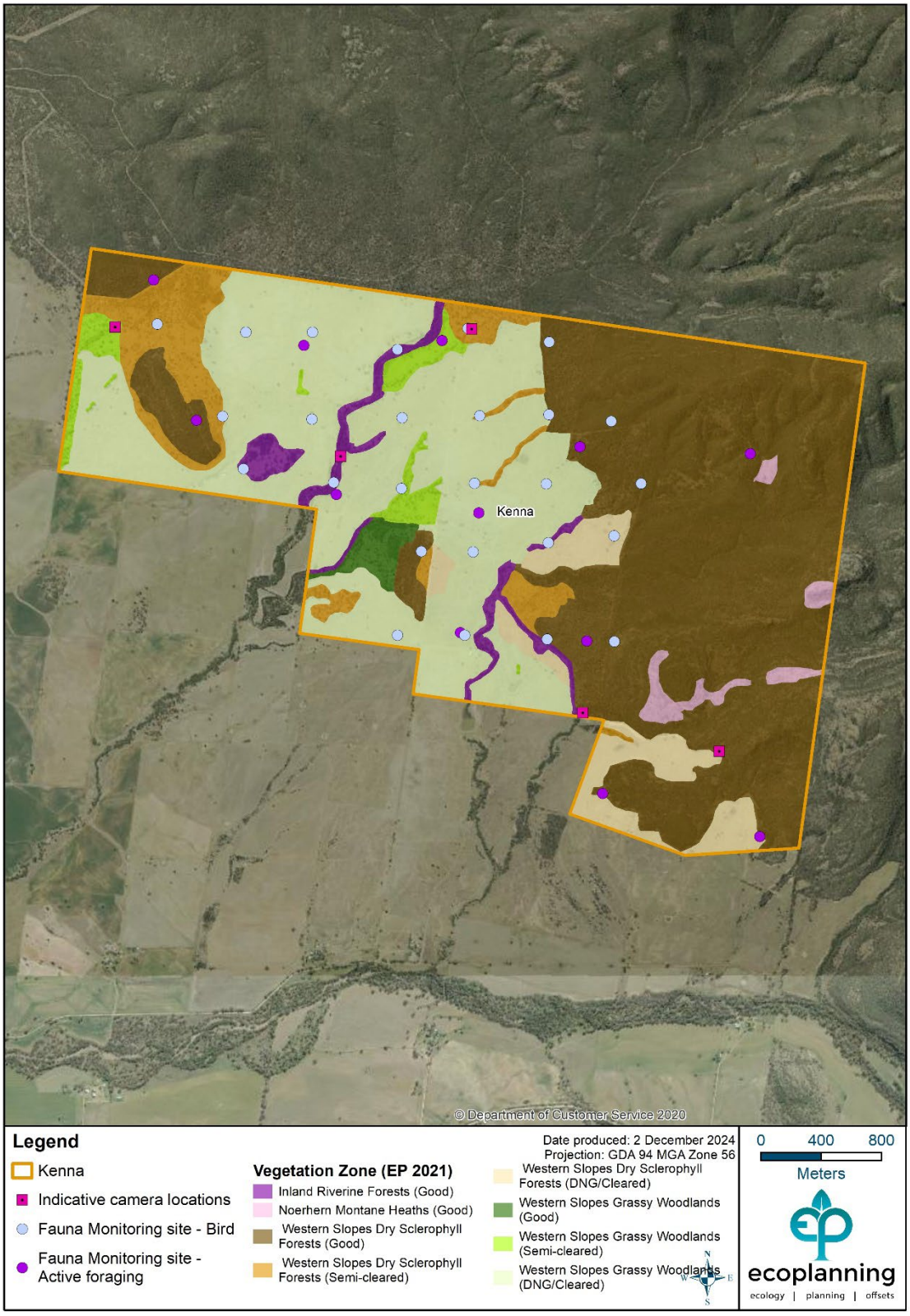


Figure 5-9: Vegetation zones and indicative camera locations within Kenna BOA.

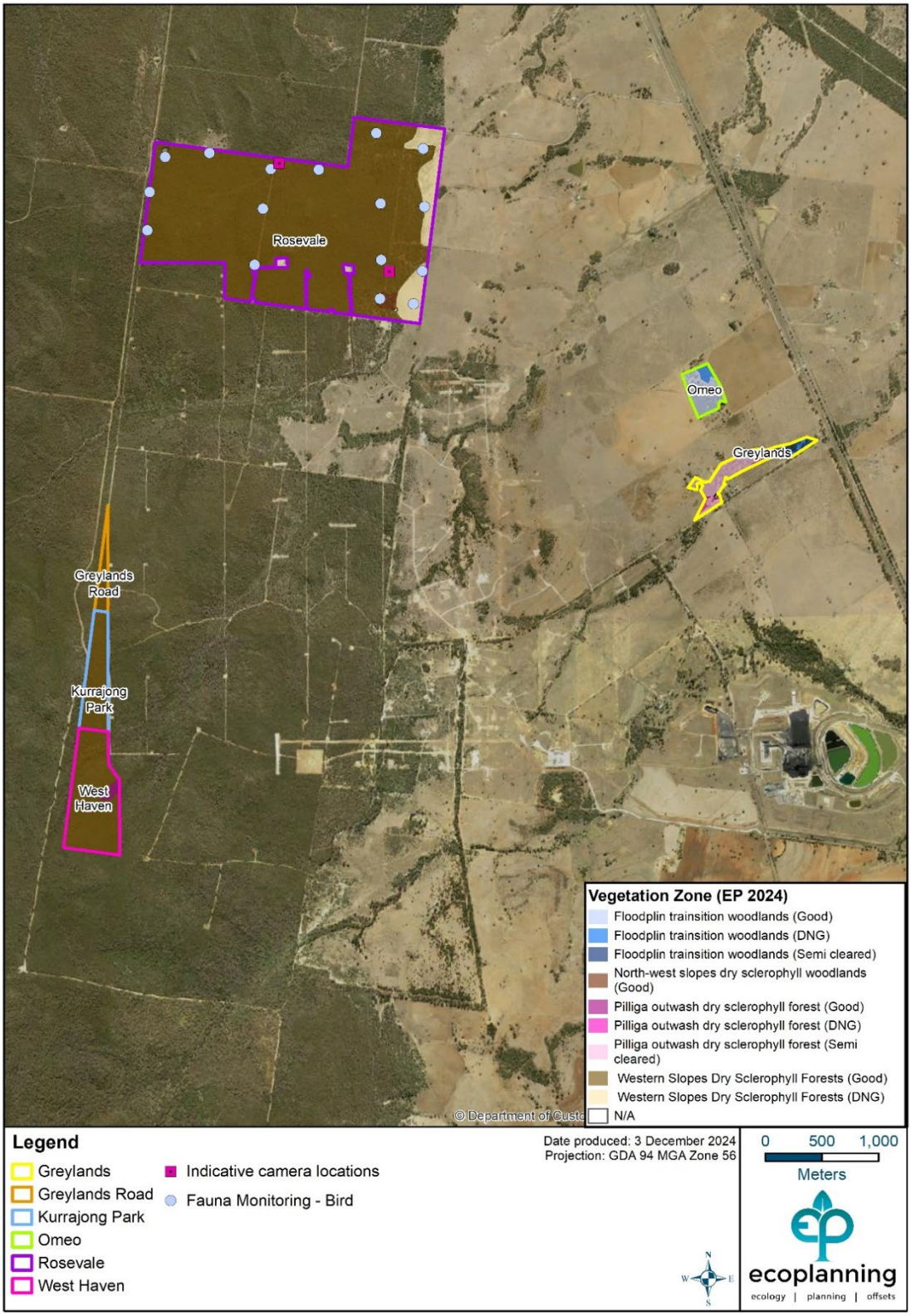


Figure 5-10: Vegetation zones and indicative camera locations within Greylands, Greylands Road, Kurrajong Park, Omeo, Rosevale and West Haven BOAs.

5.16.5 Winter Bird Survey

The ongoing monitoring for the Regent Honeyeater and Swift Parrot will be undertaken between May and August, coinciding with the likely flowering period for winter-flowering Eucalypts, such as White Box across the BOA. The monitoring program is designed to detect and confirm presence (or absence) of Regent Honeyeater and Swift Parrot in targeted areas with flowering resources to identify the use over time.

The monitoring program is summarised as follows:

1. Trigger point for survey - Starting May each year, relevant personnel will report on any observed presence of Winter flowering eucalypts. This will provide a trigger to initiate the scoping survey. If no trigger is provided, scoping survey to be initiated by the last week in July.
2. Scoping survey - Ecologists traverse the study area noting indicators for survey, such as, flowering eucalypts and/or congregations of nectar feeding birds. Linear, well-connected patches will also be noted. Flower intensity score and patch quality to be used to inform subsequent surveys.
3. Field survey - Ecologists to traverse the study area and conduct bird surveys at previously identified sites (as in the Scoping survey above). Survey effort will be guided by the intensity score at a site. At each site, flowering intensity scores are to be recorded, and all bird species (sighted or heard) are to be recorded. A total survey effort cannot be prescribed because this is ultimately dependant on flowering intensity in any one year. However, to meet Commonwealth survey guidelines for targeted surveys (DEWHA 2010), there will be a minimum of 20 hours of bird surveys across 8 days targeted to sampling winter flowering species across all Whitehaven offset areas.

The selection of survey locations for the field survey will prioritise high blossom areas within or adjoining known preferred habitat areas (such as high quality riparian areas although riparian Casuarina species and presence of Mistletoe are essentially a summer resource); presence of positively correlated species and absence of negatively correlated species like despotic/aggressive honeyeater species; and consider previous sighting records as well as the existing mapped and potential habitat areas for these species (**Section 4.3**). The existing Winter Bird Survey timing overlaps with the commencement of Regent Honeyeater breeding season; as well as overlapping with the Diurnal Bird Surveys (**Section 5.16.1**), replicating the high survey effort within or adjoining known preferred habitat areas during the breeding season. This will further extend the probability to detect this species.

The application of the above method targeted to the location of and timing for winter flowering trees will enable increased survey effort for nectivorous birds during the optimum seasonal conditions, increasing the chance of detection for rare species like Regent Honeyeater and Swift Parrot.

5.17 PERFORMANCE AND COMPLETION CRITERIA

Using SMART principles (outlined below), WHC have defined site-specific final completion and annual performance criteria. These criteria provide quantified metrics to measure (within the BOA) the trajectory toward all relevant ecological management objectives i.e.:

- The restoration of BGW CEEC within existing BGW DNG,
- The restoration of woodland and/or forest within DNG and non-native/Cleared areas,

- The protection and enhancement of existing BGW (woodland form),
- The protection and enhancement of existing woodland and forest habitat for threatened species

SMART principles as outlined in Section 2.1.3 of the RBS-2 (Umwelt 2017) are as follows:

- **S**pecific – specific outcomes relevant to biodiversity matters (i.e., specific biometric attributes);
- **M**easurable – include quantifiable performance measures that can be compared over time (i.e., specific numeric and temporal values for the biometric attributes);
- **A**chievable – realistic goals that can be compared to baseline information (i.e., linked to NSW state-wide benchmark data);
- **R**elevant – outcomes are directly relevant to the biodiversity matter (i.e., biometric attributes directly influenced by management to measure condition either for protection/maintenance or improvement/restoration over time)
- **T**imely – includes specific timeframes for the completion of the outcome (i.e., timeframes align with Approval based required management periods).

Performance criteria are interim yearly targets for assessing the performance of WHC Biodiversity management activities at plots, while completion criteria are the desired targets to be attained across a VZ, then maintained (at or above the desired target) averaged across five years. Once achieved; completion criteria indicate that management has been successful at obtaining the desired result towards woodland ecological restoration and annual monitoring can cease / be reduced, in consultation with the BCT. WHC can revise the management descriptions/actions to reflect the lower intensity management required until the end date of the relevant approval has been reached.

Performance and completion criteria have been defined for selected monitoring attributes (shown in **Table 5-11**) that best assess the trajectory toward ecological management objectives over a 20-year period. The monitoring attributes below have been selected as they can directly measure the outcome of biodiversity management being implemented towards restorations of the relevant PCT vegetation/endangered ecological communities and are also suitable as surrogates for monitoring improvements over time to woodland and forest habitat quality for key fauna threatened species (such as Regent Honeyeater, *S*wift Parrot and Corben's Long-eared Bat as per relevant Approvals).

Table 5-11: Performance and completion criteria for selected monitoring attributes

Monitoring attribute/ Ecological Indicators	Management Objectives	Performance criteria	Completion criteria
Native plant species richness (NPS)	Protect and enhance existing Box-Gum Woodland CEEC (woodland form). Restore self-sustaining woodland within existing areas of Box-Gum Woodland CEEC (derived native grassland). Restore self-sustaining woodland and/or forest within derived native grasslands and 'non-native/Cleared' areas to provide habitat for the	Native species diversity trending towards benchmark range for the relevant Keith Class (**APPENDIX A:**)	Native species diversity at or above benchmark value for the relevant Keith Class (**Table 5-12**)
Native over storey cover (NOS)		Native overstorey cover trending towards benchmark range for the relevant Keith Class (**APPENDIX A:**)	Native overstorey cover within benchmark range for the relevant Keith Class (**Table 5-12**)
Native mid-storey cover (NMS)		Native mid-storey cover trending towards benchmark range for the relevant Keith Class (**APPENDIX A:**)	Native mid-storey cover within benchmark range for the relevant Keith Class (**Table 5-12**)
Native ground cover (grasses) (NGCG)		Native grass groundcover trending towards benchmark range for the relevant Keith Class (**APPENDIX A:**)	Native groundcover grass cover within benchmark range for the relevant Keith Class (**Table 5-12**)

Perennial exotic plant cover (PEPC)	listed threatened species listed under the EPBC Act.	An overall decrease in weed cover compared to the previous year.	Perennial weed cover is less than 20% on average across plots

The benchmark ranges for key biometrics NPS, NOS, NMS and NGCG are sourced from the *BioMetric Vegetation Condition Benchmarks* (OEH, 2017) (**Table 5-12**). These benchmarks are relevant as these were in place at the time of the original Approval and therefore are compatible with the baseline data, subsequent monitoring data, and data collected by WHC in other company-owned offset areas which is based on BBAM (OEH, 2014). These benchmarks have an upper and lower threshold value.

Table 5-12: Key biometric completion criteria values for Keith Classes within the BOA.

Keith Class	Relevant PCTs	Completion criteria (based on BVT benchmark values [OEH, 2017])			
		NPS	NOS	NMS	NGCG
Western Slopes Grassy Woodlands	1383	23	6-25	0-5	30-40
Western Slopes Dry Sclerophyll Forests	401, 404, 406, 409, 1313, 1314	30	25-40	6-25	20-30

Annual performance criteria in **APPENDIX A:** are calculated by back-extrapolating lower and upper threshold completion criteria over 20 years to Year 1. Analysis of annual performance data aims to track progress towards the vegetation management objectives and allows for timely intervention with remedial action. Plots that fall below upper or lower threshold annual performance criteria will trigger a review of contingency measures as outlined in **Section 5.18**.

Existing monitoring attributes collected (as per **Table 5-9**) will provide data to determine whether EPBC conformance completion criteria have been met for BGW plots within the BOA. **Table 5-13** outlines the three EPBC conditions required to be met, the data assessment method used to determine the status of that EPBC condition and the completion criteria value.

Table 5-13: EPBC conformance condition, data assessment method and completion criteria.

EPBC Condition	Data assessment method	Completion criteria
Plots record a predominantly native understorey	Assessed by comparing perennial native cover % (recorded with NPS as indicated in **Table 5-9**) and PEPC	Plots record perennial native cover % > PEPC
Plots record 12 or more native ground cover species (excluding grasses)	Assessed using floristic plot data (recorded as part of NPS as indicated in **Table 5-9**)	Plots record >11 native ground cover species (excluding grasses)
Plots record at least one important ground cover species (TSSC, 2006)	Assessed using floristic plot data (recorded as part of NPS as indicated in **Table 5-9**)	Plots record at least one important ground cover species (TSSC, 2006)

5.18 POTENTIAL RISKS AND CONTINGENCY MEASURES

5.18.1 Contingency Measures

The following Biodiversity Trigger, Action, Response Plan (TARP), has been aligned to the performance and completion criteria outlined in **Section 5.17**. The TARP shown in **Table 5-14** provides trigger points for contingency measures (corrective actions) to be implemented if the flora monitoring program outlined in **Section 5.15** identifies that performance criteria outlined in **Section 5.17** are not being met. Contingency measures may not be limited to those listed.

Table 5-14: WHC Biodiversity Trigger, Action, Response Plan (TARP).

Aspect	Trigger	Action/Response
Recruiting canopy species	Recruiting canopy species do not meet completion criteria across Good, or Semi-cleared VZs after 10 years following offset establishment	Review factors leading to below benchmark performance. Evaluate whether additional management (i.e., targeted removal of weeds, pest animal control, thinning, burning and/or supplementary planting of seedlings) is required.
	Recruiting canopy species do not meet completion criteria across DNG/Cleared VZs after 15 years following offset establishment	Review factors leading to below benchmark performance. Evaluate whether additional management (i.e. targeted removal of weeds, pest animal control, thinning, burning and/or supplementary planting of seedlings) is required.
EPBC conformance	BGW treatment plots do not meet completion criteria after 10 years following offset establishment	Review factors leading to below benchmark performance. Evaluate whether additional management (i.e., targeted removal of non-characteristic species and weeds, following supplementary planting with seedlings and/or seed) is required. Consider additional monitoring to examine the establishment of seedlings and seed.
Native species richness (NPS)	1st TIER - Offset treatment plots are below 80% annual performance benchmark following offset establishment	Review factors leading to below benchmark performance. Evaluate whether supplementary planting of appropriate seedlings or seeding is required.
	2nd TIER - Offset treatment plots are below 100% annual performance benchmark value but above 80% annual performance benchmark following offset establishment	Determine whether NPS is increasing or decreasing. If decreasing, investigate factors leading to decrease and monitor for further change.
Native overstorey cover (NOS)	1st TIER - Offset treatment plots are below lower annual performance criteria following offset establishment	For revegetation younger than five years - no action required, continue to monitor. For revegetation older than five years – Review factors leading to below benchmark performance. For revegetation older than five years – Evaluate whether supplementary planting of appropriate seedlings is required.
	2nd TIER - Offset treatment plots are above upper annual performance criteria following offset establishment	Review factors leading to above benchmark performance such as BVT/PCT assigned to the treatment plot and/or VZ. If shown to be an increasing trajectory overtime, evaluate whether additional management is required.
Native mid-storey cover (NMS)	1st TIER - Offset treatment plots are below lower annual performance benchmark following offset establishment	Review factors leading to below benchmark performance. Evaluate whether supplementary planting of appropriate seedlings is required.
	2nd TIER - Offset treatment plots are above upper annual performance benchmark following offset establishment	Review factors leading to above benchmark performance such as BVT/PCT assigned to the treatment site and/or VZ. Evaluate whether additional management is required.
Native groundcover – Grass (NGCG)	1st TIER - Offset treatment plots are below lower annual performance benchmark following offset establishment	Review factors leading to below benchmark performance. If shown to be an increasing trajectory overtime, evaluate whether additional management (i.e., supplementary seeding or weed control) is required.

Aspect	Trigger	Action/Response
	2nd TIER - Offset treatment plots are above upper annual performance benchmark following offset establishment	Review factors leading to above benchmark performance such as BVT/PCT assigned to the treatment site and/or VZ. Evaluate whether additional management (i.e., burning) is required.
Perennial exotic plant cover (PEPC)	1st TIER - All offset treatment plots across a VZ show an increase in PEPC	Review factors leading to increase in perennial weed cover. Identify the location of weed infestations and review additional management (i.e. the need for control measures such as broad-acre spraying, spot-spraying, slashing, hand-removal or controlled burns).
	2nd TIER - Offset treatment plots record PEPC above 20%	Review factors leading to high perennial weed cover. Identify the location of weed infestations and review additional management (i.e. the need for control measures such as broad-acre spraying, spot-spraying, slashing, hand-removal or controlled burns).

6 REPORTING AND REVIEW

In accordance with the various NSW Project/State Significant Development Approvals and EPBC Approvals, this OMP will be effective for the period of effect of each relevant approval. The OMP may be revised from time to time in accordance with those approvals; however once approved, the WHC OMP will be published on each of relevant WHC Mine webpages within one month.

A summary of WHC OMP reporting requirements is provided in **Table 6-1**: .

Table 6-1: Biodiversity Management Reporting frequencies.

Aspect	Section	Frequency/Timing
Seed Management	5.4	Annual
Revegetation	5.5	Annual
Ecological Thinning	5.6	Annual
Habitat Augmentation	5.7	Annual
Heritage Management	5.8	Annual
Weed Management	5.9	Annual
Pest Animal Management	5.10	Annual
Erosion Management	5.11	Annual
Agriculture Management	5.12	Annual
Bushfire Management	5.13	Annual
Threatened Flora Management	5.14	Quarterly
Flora Monitoring	5.15	Annual
Fauna Monitoring	5.16	Annual/Biennial
Performance and Completion Criteria	5.17	Annual
Risks and Contingency Measures	5.18	As required

6.1 REPORTING SURVEY DATA

WHC will ensure that survey data will be recorded so as to conform to data standards notified from time to time by CDCCEEW in accordance with EPBC Approval conditions. If requested by the CDCCEEW, WHC will provide all species and ecological survey data and related survey information from ecological surveys undertaken for the relevant Matters of National Environmental Significance. This survey data will be provided within 30 business days of request, or in a timeframe agreed to in writing by CDCCEEW.

WHC will maintain accurate records substantiating all activities and outcomes associated with or relevant to EPBC Approvals, including measures taken to implement the OMP, and make them available upon request to the CDCCEEW.

6.2 REPORTING REQUIREMENTS

The reporting processes outlined in **Table 6-2** will be undertaken on the management and monitoring programs of the BOA.

Table 6-2: Reporting Requirements Specific to the BOA described within the NCM BOS.

Reporting Requirement	Due Date
BCT Conservation Agreement and Biobanking Annual Reporting	31 March
NSW Project/State Significant Development Approval Review Reporting (also for relevant Commonwealth EPBC Approvals)	31 March
Commonwealth EPBC Approval Annual Compliance Reporting	30 July

6.2.1 BCT Conservation Agreement and Biobanking Annual Reporting

To meet the requirements of Conservation Agreements (VCA0486, VC00495, VC00496, VC00528, VC00529, VC00530 and VC00531 plus CA0060); WHC is to submit annual reports to the BCT that includes:

- Reporting Template against conditions of the Agreements; and
- Summary of annual Flora Monitoring (including Photo monitoring and Flora Monitoring data).

These Conservation Agreement reports for the NCM BOS must be submitted by the end of March annually.

6.2.2 NSW Project/State Significant Development Approval Annual Review Reporting

Each WHC Mine is required by their relevant Project/State Significant Development Approvals (NCM SSD-10269) to submit an Annual Review Report by the end of March annually (or an agreed alternate time) also for relevant Commonwealth EPBC Approvals. Each Annual Review Report outlines the environmental performance of the relevant WHC Mine over the previous calendar year including a detailed summary of their respective BOS and a summary of biodiversity management implemented during that period including:

- the progress of management activities undertaken in the offset areas;
- the outcome of those management activities;
- any need for improved management; and
- activities to undertake such improved management.

6.2.3 Commonwealth EPBC Approval Annual Compliance Reporting

A report pertaining to the annual compliance will be published on the relevant WHC Mine webpages each year (after the anniversary date of commencement for each respective Mine) in accordance the following EPBC Approvals and their respective end of reporting period and submission deadlines:

- NCM 2009/5003 - end of reporting period is 30 April and submission deadline is 30 July; and

Non-compliance with any of the conditions will be reported to CDCCEEW at the same time as the compliance report is published.

Both the BCT and Annual Review Reporting will be the processes by which WHC report to CDCCEEW the progress of management activities undertaken in the relevant BOA and the outcome of those activities, including identifying any need for improved management and activities to undertake such improvement in accordance with relevant conditions of the respective EPBC Approvals.

6.3 REVIEW AND REVISION OF THE BIODIVERSITY OFFSET MANAGEMENT PLAN

This OMP will be effective for the period of approval and will be reviewed and revised from time to time in accordance with the relevant NSW and Commonwealth Approvals. An overview of the Commonwealth and NSW revision requirements are provided below.

Commonwealth Requirements

In accordance with relevant EPBC Approvals (NCM 2009/5003), if WHC wishes to carry out any activity otherwise than in accordance with this OMP then WHC will submit a revised OMP to CDCCEEW for the Minister's written approval. The varied activity shall not commence until the Minister has approved the revised plan in writing. The Minister will not approve a revised plan unless the revised plan would result in an equivalent or improved environmental outcome, therefore, should WHC submit a revised OMP for EPBC Act approval WHC will specify in its submission to the Commonwealth how the revised approved OMP meets this requirement.

NSW Requirements

In accordance with relevant Project/State Significant Development Approvals (NCM SSD-10269), the OMP will be reviewed, and revised if necessary to the satisfaction of the NSW Secretary of DPHI, within three months of:

- the submission of an annual review;
- the submission of an incident report;
- the submission of an audit report; or
- any modification to the conditions of the consent (unless the conditions require otherwise).

Further, WHC must comply with reasonable requirements of the Secretary of NSW DPHI in respect of the assessment of this OMP or the implementation of actions or measures under this OMP, including any reasonable request to amend this OMP.

6.4 BIODIVERSITY AUDIT

6.4.1 Commonwealth Audit

In accordance with relevant EPBC Approvals (NCM 2009/5003), upon the direction of the Commonwealth Minister, WHC will ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Commonwealth Minister. The independent auditor will be approved by the Commonwealth Minister prior to the commencement of the audit. Audit criteria will be agreed to by the Commonwealth Minister and the audit report will address the criteria to the satisfaction of the Commonwealth Minister.

6.4.2 NSW Audits

Independent Environmental Audit

In accordance with relevant Project/State Significant Development Approvals (NCM SSD-10269), an independent audit will be undertaken every 3 years, unless the Secretary directs otherwise. This Environmental Audit will be conducted by a suitably qualified, experienced and independent team of experts whose appointment was endorsed by the NSW Secretary of DPHI. The Independent Environmental Audit will assess the environmental performance of the relevant WHC Mine and its compliance to the conditions of the respective Project/State Significant Development Approvals including the relevant Biodiversity conditions and this OMP.

6.5 BIODIVERSITY TRAINING

Inductions for staff and contractors to the BOAs will be conducted to make them aware of the environmental issues relevant to WHC. Further targeted training (i.e. fire management) is to be undertaken appropriate to their role and responsibilities. Additional training relevant to this OMP will be undertaken for the Narrabri BOA for the management of impacts to biodiversity and records will be retained by WHC.

7 REFERENCES

Advitech (2023). Bio Monthly Weather Data.

AMBS Ecology & Heritage (AMBS) (2024a) Narrabri Coal Mine Stage 1 and 2 – Revised Biodiversity Offset Strategy (Draft for Submission. Dated December 2024).

AMBS Ecology & Heritage (AMBS) (2024b). Whitehaven Approved Offsets Threatened Species Database. Prepared for Whitehaven Coal Limited.

AMBS Ecology & Heritage (2023). *Fauna Monitoring of the Whitehaven Coal Biodiversity Offset Properties – July 2020 to June 2023*. Prepared for: Whitehaven Coal Limited.

AMBS (2020a) 5 – Year Review of the Annual Fauna Monitoring Program Data for the Maules Creek and Tarrawonga Biodiversity Offsets. Prepared by AMBS Ecology & Heritage for Whitehaven Coal Ltd.

AMBS (2020b) Whitehaven Coal Biodiversity Fauna Monitoring Methodology Review. Prepared by AMBS Ecology & Heritage for Whitehaven Coal Ltd.

Australian Government Department of the Environment (DotE) (2015). *Threat abatement plan for predation by feral cats.*

Australian Government Department of the Environment and Energy (DotEE) (2017). *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (Sus scrofa).*

Australian Government Department of the Environment and Energy (DotEE) (2016). *Threat Abatement Plan for Competition and Land Degradation by Rabbits.*

Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) (2011). *Feral Deer.*

Biodiversity Conservation Trust (BCT) (2021) *Livestock Grazing Guidelines.* Accessed at: file:///E:/Desktop/Marulan%20FFA/BCT%20livestock%20grazing%20guidelines_Feb%202022.pdf.

BOM (2020). *Climate statistics for Australian locations*. Accessed at: http://www.bom.gov.au/climate/averages/tables/cw_055202.shtml.

Bush Fire Coordinating Committee (2008). *Policy no. 1/2008 Bush Fire Risk Management Planning Guidelines for Bush Fire Management Committees.*

Commonwealth Department of the Environment & Energy (DoEE) (2012). Interim Biogeographic Regionalisation for Australia, Version 7. Available at: https://www.environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps

Department of Planning and Environment (DPE) (2020a). Great Soil Group (GSG) Soil Type map of NSW. Accessed at: https://datasets.seed.nsw.gov.au/dataset/great-soil-group-gsg-soil-type-map-of-nsw

Department of Planning and Environment (DPE) (2020b). Australian Soil Classification (ASC) soil type map of NSW. Accessed at https://datasets.seed.nsw.gov.au/dataset/australian-soil-classification-asc-soil-type-map-of-nsweaa10

Department of Planning, Industry and Environment (DPIE) (2024). Water Management (General) Regulation 2018 Hydro Line spatial data. Accessed at: https://www.industry.nsw.gov.au/water/licensing-trade/hydroline-spatial-data

Department of Environment and Primary Industries (VIC) (2015). *Integrated Hare Control.* Accessed at: https://agriculture.vic.gov.au/biosecurity/pest-animals/invasive-animal-management/integrated-hare-control.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008a) *Threat Abatement Plan for Competition and Land Degradation by Unmanaged Goats.*

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008b) *Threat Abatement Plan for Predation by European Red Fox.*

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2010). *Survey guidelines for Australia's threatened birds*.

Department of Primary Industries (DPI) (2018a). *New South Wales Invasive Species Plan 2018-2021*

Department of Primary Industries (DPI) (2018b). *Ecology and Management of Vertebrate Pests in NSW.*

Department of Primary Industries (DPI) (2017) *New South Wales Wild Dog Management Strategy 2017-2021.*

Eco Logical Australia (ELA) (2019). Narrabri Coal Mine Stage 1 and 2 Biodiversity Offset Strategy. Prepared for Whitehaven Coal Limited.

Eco Logical Australia (ELA) (2014a). Narrabri Coal Mine Stage 1 and 2 Biodiversity Offset Strategy. Prepared for Whitehaven Coal Limited.

Eco Logical Australia (ELA) (2014b). Kenna Biodiversity Offset Management Plan. Prepared for Narrabri Coal Operations Pty Ltd.

Eco Logical Australia (ELA) (2014c). *Narrabri Mine On-site Biodiversity Offset Management Plan*. Prepared for Narrabri Coal Operations Pty Ltd.

Ecoplanning (2021a). *Seasonal Weed Assessment Report – Q1 2021.* Prepared for Whitehaven Coal.

Ecoplanning (2021b). *Threatened Flora Project Plan – Whitehaven Coal*. Prepared for Whitehaven Coal.

Ecoplanning (2021c). 2022 Reveg Order Report – Whitehaven Coal Biodiversity Offset Areas. Prepared for Whitehaven Coal.

Ecoplanning (2020b). *Seasonal Weed Assessment Report – Q4 2020.* Prepared for Whitehaven Coal.

Ecoplanning (2020c). *Seasonal Weed Assessment Report – Q3 2020.* Prepared for Whitehaven Coal.

Ecoplanning (2022). FY23 Revegetation Order Report – Whitehaven Coal Biodiversity Offset Areas. Prepared for Whitehaven Coal.

Ecotone Ecological Consultants Pty Ltd (2009). *Narrabri Coal Project Flora and Fauna Impact Assessment. Specialist Consultant Studies Compendium Volume 2, Part 4 for Environmental Assessment* Prepared for R.W. Corkery and Co Pty Ltd. Waratah, NSW.

Environmental Resources Management (ERM) (2020). *Independent Environmental Audit 2019 – Narrabri Coal Mine.*

Florabank (1999). GUIDELINES KEEPING RECORDS ON NATIVE SEED 4.

Landcom (2004), *Managing Urban Stormwater: Soils and Construction Volume 1.*

Local Land Services (LLS) (2017). *North West Regional Strategic Weed Management Plan 2017-2022*. Local Land Services - North West.

NSW Office of Environment and Heritage (OEH) (2011). *NSW Threat Abatement Plan for Predation by The Red Fox (Vulpes vulpes).*

NSW Office of Environment and Heritage (OEH) (2014). BioBanking Assessment Methodology 2014, Office of Environment and Heritage, Sydney.

NSW Office of Environment and Heritage (OEH) (2017). *BioMetric Vegetation Condition Benchmarks*.

Murray-Darling Basin Authority (MDBA) (2024). Murray Darling Basin Boundary - Water Act 2007. Accessed at: https://data.gov.au/data/dataset/murray-darling-basin-boundary.

Mitchell 2002. Descriptions for NSW (Mitchell) Landscapes Version 2 (2002). Accessed at: https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-mitchell-landscapes-release-notes

PestSmart (Centre for Invasive Species Solutions) (2021). Management toolkits. Accessed at: https://pestsmart.org.au/.

Rawlings, K., Freudenberger, D., and Carr, D. (2010). *A guide to managing Box Gum Grassy Woodlands* Part 3. Department of the Environment, Water, Heritage and the Arts, Canberra, ACT.

SLR (2022). *Narrabri Coal Mine Rehabilitation Management Plan for Large Mines.*

Threatened Species Scientific Committee (TSSC) (2006). *White Box – Yellow Box – Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands listing advice and conservation advice.* Accessed at:https://www.dcceew.gov.au/sites/default/files/env/pages/dcad3aa6-2230-44cb-9a2f-5e1dca33db6b/files/box-gum.pdf.

Umwelt (2017). *Leard Forest Regional Biodiversity Strategy Stage 2 – Strategy Report*. Unpublished report for NSW Planning & Environment.

Whincop Archaeology (2021a). *Historical Heritage Management Plan.* Prepared for Whitehaven Coal Ltd

Whincop Archaeology (WHC) (2021b). *Aboriginal Archaeology and Cultural Heritage Management Plan.* Prepared for Whitehaven Coal Ltd

Whitehaven Coal (WHC) (2023a) Narrabri Coal Stage 3 – Biodiversity Management Plan.

Whitehaven Coal (WHC) (2023b) Narrabri Mine, Rehabilitation Management Plan

APPENDIX A: KEY BIOMETRIC ANNUAL PERFORMANCE CRITERIA FOR RELEVANT KEITH CLASSES

Table A-1: Annual performance criteria values for VZs of Western Slopes Grassy Woodlands (PCT 1383)

Biometric	Threshold - BVT benchmark	Annual performance criteria (Year since management commenced). Year 1 = 2017.																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NPS	Lower- 80% BVT	0.9	1.8	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0	12.9	13.8	14.7	15.6	16.6	17.5	18.4
	Upper- 100% BVT	1.2	2.3	3.5	4.6	5.8	6.9	8.1	9.2	10.4	11.5	12.7	13.8	15.0	16.1	17.3	18.4	19.6	20.7	21.9	23
NOS	Lower – Min. BVT	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6
	Upper – Max. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
NMS	Lower – Min. BVT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upper – Max. BVT	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.5	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5
NGCG	Lower – Min. BVT	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30
	Upper – Max. BVT	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40

Table A-2: Annual performance criteria values for VZs of Western Slopes Dry Sclerophyll Forests (PCTs 401, 404, 406, 409, 1313 and 1314).

Biometric	Threshold - BVT benchmark	Annual performance criteria (Year since management commenced). Year 1 = 2017																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NPS	Lower-80% BVT	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	13.2	14.4	15.6	16.8	18.0	19.2	20.4	21.6	22.8	24
	Upper-100% BVT	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30
NOS	Lower – Min. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
	Upper – Max. BVT	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40
NMS	Lower – Min. BVT	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6
	Upper – Max. BVT	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0	21.3	22.5	23.8	25
NGCG	Lower – Min. BVT	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20
	Upper – Max. BVT	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0	25.5	27.0	28.5	30

APPENDIX B: OFFSET RISK ASSESSMENT

Table B-1: Risk Assessment

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Substrate	Ground disturbance	C	4	L	• Ground preparation and soil disturbance for revegetation will only be undertaken where required in revegetation (Section 5.5) • Vehicle access will be restricted to designated tracks, except in the case of biodiversity management actions and inspections (Section 5.3); and • Establishment and maintenance of fire breaks around the perimeter of and within the offset areas only where practicable (Section 5.13);	D	4	L
Clearing	Incidental clearing and fragmentation	C	4	L	• Low level management interventions in existing woodland and forest to minimise clearing (Section 5); • Active revegetation will be undertaken to increase the area and connectivity of native vegetation (Section 5.5); and • Ecological thinning will be limited to areas of dense regrowth of *Callitris* spp. (Section 5.6).	D	4	L
Livestock	Grazing by cattle – ground disturbance, remove or destroy seeds, seedlings or plantings	C	2	H	• Agriculture/grazing has been excluded from the offset area (Section 5.12); • Inadvertent grazing from neighbouring stock will be removed as soon as practicable (Section 5.12).	D	3	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Introduced flora species (weeds)	Weed invasion – perennial and annual grasses, perennial herbs, annual and biennial herbs and woody weeds	C	2	H	• Whitehaven will instruct contractor vehicles and equipment entering the offset area to be clean and free from weeds and/or seeds reduce introduction and spread of weeds (Section 5.9); • Seasonal weed assessment programs will be used to identify weeds and implement timely and prioritised weed control; • Weed control will target priority weed species; • The cover and extent of exotic species will be monitored (Sections 5.9 and 5.15); and • An increase in perennial exotic plant cover will trigger management actions and a review of factors leading to increasing/high weed cover (Section 5.17).	D	3	L
Impacts from Animals (exotics and grazing native animals)	Grazing by feral pigs and goats	B	3	H	• Pest animal abundance is monitored across the offset area (Section 5.10); • Control measures are informed by monitoring results/presence of pest animals (Section 5.10).	B	5	L
	Rabbits and hares	B	3	H	• Pest animal abundance is monitored across the offset area (Section 5.10); • Control measures are informed by monitoring results/presence of pest animals (Section 5.10).	B	5	L
	Grazing native fauna species (e.g. kangaroos)	B	4	M	• Pest animal abundance is monitored across the offset area (Section 5.10); • Control measures are informed by monitoring results/presence of pest animals (Section 5.10).	B	5	L
	Feral foxes	B	3	H	• Pest animal abundance is monitored across the offset area (Section 5.10); • Control measures are informed by monitoring results/presence of pest animals (Section 5.10).	B	5	L
	Deer	C	4	L	• Pest animal abundance is monitored across the offset area (Section 5.10);	B	5	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
					• Control measures are informed by monitoring results/presence of pest animals (Section 5.10).			
	Feral Cat	B	4	M	• Pest animal abundance is monitored across the offset area (Section 5.10); • Control measures are informed by monitoring results/presence of pest animals (Section 5.10).	B	5	L
Fire	Uncontrolled bushfire	B	2	H	• Establishing and maintaining fire breaks around the perimeter of and within the offset areas (Section 5.13); • Fuel loads, bushfire risk and appropriate hazard reduction methods will be assessed annually; • Whitehaven will undertake an annual ecological burn program according to the annual assessment; • Controlled burns may be utilised as a contingency measure within the Trigger Action Response Plan according to annual flora performance criteria (Sections 5.13, 5.15 and 5.17).	D	3	L
Floristics	Poor understorey diversity	C	3	M	• Annual revegetation assessments will determine key species to be planted in order to create a structurally diverse habitat (Section 5.5); • Ecological monitoring (Section 5.15) will assess the diversity of understory species in defined control/treatment plots to determine required contingency measures (Section 5.18); • Supplementary planting of appropriate tubestock or seeding will be undertaken if the contingency measure is triggered (Section 5.18).	D	3	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
Native plant growth	Poor native plant growth/germination	C	3	M	• Annual revegetation assessments will determine key species to be planted in areas requiring active revegetation (Section 5.5); • Vegetation and habitat monitoring will be undertaken to track changes in vegetation and habitat in the offset areas in response to management measures (Section 5.15 and 5.16); • Supplementary planting of appropriate tubestock or seeding will be undertaken if the contingency measure is triggered (Section 5.18).	C	4	L
	Dense overstorey and midstorey revegetation	C	3	M	• Ecological monitoring (Section 5.15) will assess the density of overstorey and midstory vegetation in defined control/treatment plots to determine required contingency measures (Section 5.18); • Ecological thinning will be conducted in areas of dense regrowth of *Callitris* spp. where it has adverse impacts on habitat condition or restoration (Section 5.6).	C	4	L
	Dense grass cover	C	3	M	• Ecological monitoring (Section 5.15) will assess the density of grasses in defined control/treatment plots to determine required contingency measures (Section 5.18).	C	4	L
Fauna habitat	Lack of bush rocks	C	4	L	• Habitat needs assessment will be undertaken to determine the requirements for habitat augmentation (Section 5.7); • Habitat augmentation will use available salvaged resources such as rocky debris.	C	4	L
	Lack of fallen timber/hollow logs	C	4	L	• Habitat needs assessment will be undertaken to determine the requirements for habitat augmentation (Section 5.7); • Habitat augmentation will use available salvaged resources such as coarse woody debris and artificial hollows.	C	4	L
	Lack of structural diversity (including lack of tree hollows)	C	4	L	• Habitat needs assessment will be undertaken to determine the requirements for habitat augmentation (Section 5.7); • Nest box installation (where required) will use high quality, durable materials suited to hollow-dependent threatened species.	C	4	L

Risk Factor (Hazard)	Impact (Risk)	Before Management			Action/Control/Risk Mitigation Measure	After Management		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk Level
	Lack of suitable vegetation for foraging and/or roosting	C	4	L	• Habitat needs assessment will be undertaken to determine the requirements for habitat augmentation (Section 5.7); • Nest box installation (where required) will use high quality, durable materials suited to hollow-dependent threatened species.	C	4	L

APPENDIX C: NARRABRI COAL MINE STAGE 1 AND 2 – REVISED BIODIVERSITY OFFSET STRATEGY (AMBS 2024A)

Narrabri Coal Mine Stage 1 and 2 – Revised Biodiversity Offset Strategy

Prepared by AMBS Ecology & Heritage
for Whitehaven Coal Limited

Final Report

February 2025

AMBS Ecology & Heritage
www.ambs.com.au contact@ambs.com.au 02 9518 4489

Document Information

Citation:	AMBS Ecology & Heritage (2024) Narrabri Coal Mine Stage 1 and 2 – Revised Biodiversity Offset Strategy. Consultancy report to Whitehaven Coal Limited.
AMBS Ref:	19771
Versions:	Version 9: Final Report for submission issued 17 February 2025
Recipient:	Andrew Wright
Authors:	Belinda Pellow, Chris Jackson, Corey O'Brien, Lachlan Palmes
Approved by:	Belinda Pellow

Executive Summary

AMBS Ecology & Heritage Pty Ltd (AMBS) were commissioned by Whitehaven Coal Limited (WHC) on behalf of Narrabri Coal Operations Pty Ltd to prepare a revision to the Biodiversity Offset Strategy (RBOS) for Stages 1 and 2 of the Narrabri Coal Mine (NCM). The NCM Stage 1 and 2 was originally approved under NSW Project Approval 08_0144 in 2010 (latest modification November 2021 MOD7) and the Commonwealth EPBC Approval 2009/5003 in 2011 (latest variation 24 March 2021). In April 2022 the NCM Stage 3 Mine received NSW Approval SSD-10269 to supersede PA 08_0144. WHC established the Narrabri Biodiversity Offset Area (BOA) including Kenna (previously known as the Off-site BOA) and other various Biodiversity Offset Properties (BOPs) each known as Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven (previously collectively known as the On-site BOA).

To prepare and register Conservation Agreements (CAs) for the various BOPs, the NSW Biodiversity Conservation Trust (BCT) required WHC to undertake detailed cadastral surveys and utilise contemporary vegetation mapping. In addition, the BCT required the use of the NSW Plant Community Type (PCT) vegetation mapping classification system. As a result, the original NCM BOS vegetation mapping (undertaken by Ecotone 2009 using an older classification system) needed to be revised utilising quantitative biometrics to define vegetation assemblages for the application of the required PCT mapping. This RBOS outlines how the cadastral survey boundary changes as well as the contemporary PCT vegetation mapping reflected in the registered CAs still meet the requirements of Approvals for NSW SSD-10269 Condition B45 and EPBC Approval 2009/5003 Condition 2.

Overall, the RBOS meets the biodiversity value requirements as per the NCM Stage 1 and 2 Approvals (08_0144 and when it is surrendered to SSD-10269) relating to the extent of offset area “to enhance”, “like for like or better” and “maintain and improve” the habitat restoration (i.e. revegetation and habitat augmentation) for the *Bertya opponens*, Superb Parrot and White Box Grassy Woodland plus Inland Grey Box EEC. A number of vegetation community names have been updated as a result of the preparation of CAs and the application of the contemporary Plant Community Type (PCT) classification (DCCEEW 2024).

Two Threatened Ecological Communities (TEC) are present within the Narrabri RBOS and will result in no significant change to the area of TECs within the offsets. One TEC has been identified in the Kenna BOP. PCT 1383-White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregion’ is consistent with the ‘White Box-Yellow Box-Blakely’s Red Gum grassy woodland’ listed as critically endangered under the BC Act and under the EPBC Act. Currently 477.40ha of this PCT meets the definition of the CEEC. The other TEC has been identified in the Omeo BOP. ‘Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions’ listed as an Endangered Ecological Community (EEC) under the BC Act and ‘Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia’ listed as Endangered Ecological Community (EEC) under the EPBC Act occurs within areas of PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion. Currently 9.28 ha of this PCT meets the definition of the EEC.

A total of 373.61 ha of habitat for *Bertya opponens* is mapped in this RBOS within the Rosevale, Greylands Road, West Haven and Kurrajong Park BOPs and a further 1,069.02 ha in areas of these PCTs within the NCM rehabilitation area to be secured post mining once subsidence impacts have been ameliorated.

A total of 1,944.28 ha of habitat for the Superb Parrot is mapped in this RBOS within the Kenna, Greylands, Rosevale, Omeo, Greylands Road, West Haven and Kurrajong Park BOPs and the NCM rehabilitation area.

This RBOS does not alter or vary the intent of the original BOS to establish NCM Rehabilitation Area Offset affected by subsidence that has been transferred through to SSD-10269 Condition B45. While this RBOS addresses the external land-based components of the Narrabri RBOS; the description and implementation of the Rehabilitation Area Offset is to be documented in the NCM Rehabilitation Strategy to be submitted for approval within six months of the date of commencement of NCM Stage 3 Mine. The Rehabilitation Area Offset covers up to 1,167.54 ha of woodland vegetation that adjoins four of the adjacent BOPs as part of the overall NCM BOS area of 2,842.02 ha.

The RBOS covers an area of native vegetation of 1,244.06 ha from the Kenna BOP and 430.42 ha from the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs (Table 4.5) for a total of 1,674.48 ha. Furthermore, up to 1,167.54 ha of woodland vegetation that may be subject to subsidence impacts and mine site rehabilitation at NCM, adjoining four of the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs will be progressed following timing to be outlined in the NCM Rehabilitation Strategy, resulting in an overall NCM BOS of 2,842.02 ha (or could reduce to 2,805.36 if SSD-10269 Condition B45c is triggered).

This RBOS does not alter or vary exiting BOS commitments as described in NSW Project Approval PA 08_0144 and SSD-10269 and Commonwealth EPBC Approval 2009/5003. All commitments are maintained or exceeded (Table 5.1)

This RBOS consists of Property adjoining Mount Kaputar National Park that meets ‘like for like or better’ requirements and ‘maintains or improves’ conservation outcomes (NSW Approval PA 08_0144 Condition 6c).

This RBOS confirms offsets to the impacts to Inland Grey Box EEC, *Bertya opponens* and Superb Parrot foraging habitat (NSW Approval PA 08_0144 Condition 6d).

Contents

Tables

Figures

1 Introduction

1.1 Background

AMBS Ecology & Heritage Pty Ltd (AMBS) were commissioned by Whitehaven Coal Limited (WHC) to prepare a revision to the Biodiversity Offset Strategy (RBOS) for Stages 1 and 2 of the Narrabri Coal Mine (NCM). NCM is a joint venture ownership managed by Narrabri Coal Operations Pty Limited (NCO) on behalf of majority owner Narrabri Coal Pty Ltd (both are wholly owned subsidiaries of WHC). The NCM Stage 1 and 2 was originally approved under NSW Project Approval 08_0144 in 2010 (latest modification November 2021 MOD7) and the Commonwealth EPBC Approval 2009/5003 in 2011 (latest variation 24 March 2021). In April 2022, the NCM Stage 3 Mine received NSW Approval SSD-10269 to supersede PA 08_0144. These NCM Approvals outlined a Biodiversity Offset Strategy (BOS) to offset impacts to biodiversity and to meet these BOS Approval requirements; WHC established the Narrabri Biodiversity Offset Area (BOA) including Kenna (previously known as the Off-site BOA) and other various Biodiversity Offset Properties (BOPs) each known as Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven (previously collectively known as the On-site BOA).

The NCM Stage 1 and 2 BOS, (EcoLogical Australia, 2014) confirmed the ability of these properties to meet "like for like or better" and "maintain or improve" conservation outcomes. The BOS was updated in 2019 (EcoLogical Australia, 2019) outlining minor changes in the cadastral boundaries which resulted in a 9 hectare (ha) increase of the former On-site BOA from 422 ha to 431 ha.

To prepare and register Conservation Agreements (CAs) for the various BOPs, the NSW Biodiversity Conservation Trust (BCT) required WHC to undertake detailed cadastral surveys and utilise contemporary vegetation mapping. The cadastral survey was undertaken by registered surveyors and involved redefining the cadastral boundary to a very high accuracy, resulting in variations to the previous extent of the BOPs. In addition, the BCT required the use of the NSW Plant Community Type (PCT) vegetation mapping classification system. As a result, the original NCM BOS vegetation mapping (undertaken by Ecotone 2009 using an older classification system) needed to be revised utilising quantitative biometrics to define vegetation assemblages for the application of the required PCT mapping.

This RBOS outlines how the cadastral survey boundary changes as well as the contemporary PCT vegetation mapping reflected in the registered CAs still meet the requirements of Approvals NSW SSD-10269 Condition B45 and EPBC Approval 2009/5003 Condition 2.

1.2 Relevant approval conditions relating to this RBOS

1.2.1 NSW Approvals for the Narrabri Coal Mine (PA 08_0144 and SSD-10269)

The original NSW Approval for Stages 1 and 2 of the NCM included two conditions, condition 6 and 7 of Schedule 5 of PA 08_0144, regarding the preparation and implementation of a BOS.

Condition 6. *The Proponent shall provide a suitable biodiversity offset strategy to compensate for the impacts of Stages 1 and 2 of the project. This offset strategy must:*
(a) be prepared in consultation with BCS;
(b) be submitted to the Secretary for approval by 31 December 2010, or as otherwise agreed by the Secretary;
(c) provide a detailed assessment of offset proposal/s involving the property/ies (agreed to by BCS) adjoining Mt Kaputar National Park to confirm the ability of these property/ies to meet 'like for like or better' and 'maintain or improve' conservation outcomes;

(d) include and assess proposals to offset impacts to the Inland Grey Box EEC, Bertya opponens, and foraging habitat for the Superb Parrot;
(e) include proposals on offsetting both direct and indirect impacts (i.e. edge effects) of the project; and
(f) determine the best overall combination of lands to provide a suitable offset.

Condition 7. *The Proponent shall make suitable arrangements to provide appropriate long-term security for the offset areas by 31 December 2011, or other date agreed by the Secretary, to the satisfaction of the Secretary.*

Approval of Stage 3 of the NCM (SSD-10269) will result in the surrender of NSW Approval PA 08_0144. Therefore, requirements for the Stage 1 and 2 Biodiversity Offset Strategy will transfer to SSD-10269 Conditions B45 and B46 stating:

Condition B45. *The Applicant must implement the approved Biodiversity Offset Strategy prepared under development consent 08_0244 for Stage 2 of the Narrabri Mine through out the life of the development, subject to the following:*

(a) with the approval of the Planning Secretary (following consultation with BCS), the Strategy may be incorporated into the Biodiversity Management Plan required under condition B42;
(b) with the approval of the Planning Secretary (following consultation with BCS), the Strategy may be amended; and
(c) in recognition of the Applicant's decision to forego its right to disturb 14.1 ha of the Stage 2 disturbance footprint (the 'impact reduction area') the Strategy's requirement for the Application to conduct mine site rehabilitation over 2,832.79 ha and to secure this area under a long-term security mechanism is reduced by 36.66 ha to 2,796.13 ha.
Note: *The Stage 2 Biodiversity Offset Strategy, Rehabilitation Strategy and Rehabilitation Management Plan need to be substantially integrated to ensure biodiversity objectives are achieved through rehabilitation of the site.*

Condition B46. *The Applicant must make suitable arrangements to provide appropriate long-term security for the offset areas required by the Biodiversity Offset Strategy within 3 years of commencing development under this consent, or other date agreed by the Secretary, to the satisfaction of the Planning Secretary.*

A summary of the minimum requirements from the NCM NSW Approvals for land-based offsetting are:

- Property adjoining Mount Kaputar National Park meet 'like for like or better' requirements and 'maintain or improve' conservation outcomes.
- Offset the impacts to Inland Grey Box EEC, *Bertya opponens* and Superb Parrot foraging habitat.
- The overall BOS is required to cover an area of 2,832.79 ha (but if Stage 2 disturbance footprint foregoes 14.1 ha then this can be reduced to 2,796.13 ha).

The requirement for 2,832.79 ha will be met with the inclusion of 1,167.54 ha of vegetation in an area in the development footprint which may be subject to subsidence referred to as the Future Onsite Offsets in the BOS (Ecological 2014). Within the Approval for NCM Stage 3 Condition B45(c) (SSD-10269); the area is referred to as 'mine site rehabilitation'. For clarity, this RBOS will refer to the area that may be subject to subsidence, (previously known as the "Future Onsite Offsets") and to be included as part of the offset requirement, as the 'Rehabilitation Area Offset'.

1.2.2 Commonwealth Approval for the Narrabri Coal Mine (EPBC Approval 2009/5003)

The original Commonwealth Approval for Stages 1 and 2 of the NCM included Condition 2 of EPBC Approval 2009/5003 with the following requirements.

***Condition 2**. In order to mitigate impacts on EPBC Act listed threated species and communities, by 30 June 2021, the person taking the action must:*

a) secure at least 933 hectares of offset on the "Kenna" property, comprising the area enclosed by the yellow line labelled 'Proposed Offset' shown in Annexure 2 under a legal conservation mechanism that has been agreed to in writing by the Department, and.

b) secure at least 422 hectares of offset on-site, comprising the areas enclosed by a yellow line labelled 'On-site Offset Area (2019)' shown in Annexure 3, under a legal conservation mechanism that has been agreed to in writing by the Department.

Evidence of compliance with this condition must be provided to the Department within 30 days of finalising the legal conservation mechanism.

The approval holder must report on progress meeting the requirements of a) and b) in each annual compliance report required under condition 8 and as otherwise requested by the Department.

Condition 14: In order to mitigate impacts on EPBC Act listed threatened species and communities, the person taking the action must:

a) Develop and implement an active monitoring and management plan for the property mentioned in 2(a) [i.e. the property known as Kenna] *for a period of 20 years to enhance White Box Grassy Woodland on the site as it provides habitat for the EPBC listed Superb Parrot. The active management plan must include:*

i. Management actions, including but not limited to, rehabilitation and restoration measures, pest management, fencing, weed control, fire management, sediment and erosion control, exclusion of livestock and restrictions of access.

ii. Details of who is responsible for monitoring, reviewing and implementing the plan.

b) Develop and implement an active monitoring and management plan for the site mentioned in (2b) [i.e. the properties known as Rosevale, Greylands, Omeo, West Haven, Kurrajong Park collectively known as "On-site offset properties"] *for a period of 20 years to enhance Red Ironbark-Brown Bloodwood Shrubby Woodland which provides habitat for EPBC listed Bertya opponens and for the White Box Grassy Woodland which provides habitat for the EPBC listed Superb Parrot. The active management plan must include:*

i. Management actions, including but not limited to, land rehabilitation and restoration measures, pest management, fencing, weed control, fire management, sediment and erosion control, exclusion of livestock and restrictions of access.

ii. Details of who is responsible for monitoring, reviewing and implementing the plan.

A summary of the minimum requirements from the Commonwealth Approval for land-based offsetting that are relevant to this RBOS is:

- Enhance at least 933 hectares of offset on the Kenna property, which contains White Box Grassy Woodland habitat for the Superb Parrot, (EPBC Approval 2009/5003 Condition 2a and 14a).

- At least 422 hectares of offset on the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven properties of Red Ironbark – Brown Bloodwood Shrubby Woodland, which is habitat for *Bertya opponens* and the Superb Parrot (EPBC Approval 2009/5003 Condition 2b and 14b).

1.3 Offset securement

The Kenna BOP was secured as a Conservation Agreement VCA0486 on 1 October 2019 under Part 4 Division 12 of the NSW National Parks and Wildlife Act 1974 with the former NSW Department of Planning, Infrastructure and Environment (now NSW Department of Planning, Housing and Infrastructure [NSWDPHI]) and former Commonwealth Department of Environment and Energy (now Commonwealth Department of Climate Change, Energy, the Environment and Water [CDCCEEW]) notified on 25 October 2019.

The next six BOPs (Omeo VC00495, Greylands Road VC00496, Greylands VC00528, Rosevale VC00529, Kurrajong Park VC00530 and West Haven VC00531) were secured as Conservation Agreements between 26th June and 16th July 2021 under Part 4 Division 12 of the NSW National Parks and Wildlife Act 1974 with the former NSW Department of Planning and Environment (now NSWDPHI) and former Commonwealth Department of Agriculture, Water and Environment (now CDCCEEW) notified on 21 July 2021 that compliance had been achieved with EPBC Approval 2009/5003 Condition 2b (as Condition 2a previously compliant on 10 March 2020) and PA 08_0144 Schedule 5 Condition 7).

With PA 08_0144 to be surrendered, going forward the securement of the remaining component of the Stage 2 Biodiversity Offset Strategy, called the Rehabilitation Area Offset, will be guided by SSD 10269 Condition B46 currently designating that suitable arrangements to provide appropriate long-term security within 3 years of commencing development be made. However, if another date is agreed by the Secretary and to the satisfaction of the Planning Secretary then NCM will secure the Rehabilitation Area Offset as per timing to be outlined in the NCM Rehabilitation Strategy to allow for post mining rehabilitation and subsidence mitigation as well as for the Conservation Agreement process managed by NSW Biodiversity Conservation Trust (BCT).

The below listed Lots and Deposited Plans now have CAs registered on title for the following BOPs (excluding the Rehabilitation Area Offset):

- Kenna (CA0060) – Lot 73 DP 754924, Part Lot 94 DP 754924, Part Lot 95 DP 754924, Lot 111 DP 754924, Lot 112 DP 754924, Lot 113 DP 754924, Part Lot 602 DP 854685, Lot 3 DP1210577 and Part Lot 2 DP1210578
- Omeo (VC00495) – Part Lot 83 DP757124;
- Greylands Road (VC00496)– Part Lot 65 DP757114 and Part Lot 1 DP1210797;
- Greylands (VC00528) – Part Lot 841 DP1134385;
- Rosevale (VC00529) – Part Lot 63 DP757114 and Part Lot 1 DP1210797;
- Kurrajong Park (VC00530) – Part Lot DP811171; and
- West Haven (VC00531) – Part Lot 67 DP757104.

1.4 Scope and objectives

This RBOS outlines how the minor cadastral survey boundary changes as well as the contemporary PCT vegetation mapping reflected in the registered CAs still meet the requirements of Approvals for NSW SSD-10269 Condition B45 and EPBC Approval 2009/5003 Condition 2.

The scope of this project is to prepare a RBOS that updates the original BOS and its required biodiversity values, first described in PA 08_0144 and then transferred to SSD-10269 and EPBC Approval 2009/5003 for NCM.

The objectives are to:

- describe the NSW BOS requirements and associated offset areas;
- describe the proposed revisions to the NSW BOS;
- describe the way in which the Commonwealth offset requirements for threatened entities will be met; and
- describe how these NSW and Commonwealth offset biodiversity value requirements will be met by the RBOS.

1.5 Location of the study area

The study area is located on the north western slopes of New South Wales. The BOPs close to the NCM are approximately 19 km south east of Narrabri, and the Kenna BOP is located 55 km south east of Narrabri near to the locality of Maules Creek (Figure 1.1). The study area falls within the Narrabri Shire local government area in the Brigalow Belt South IBRA region and the Pilliga and Liverpool Plains subregions.

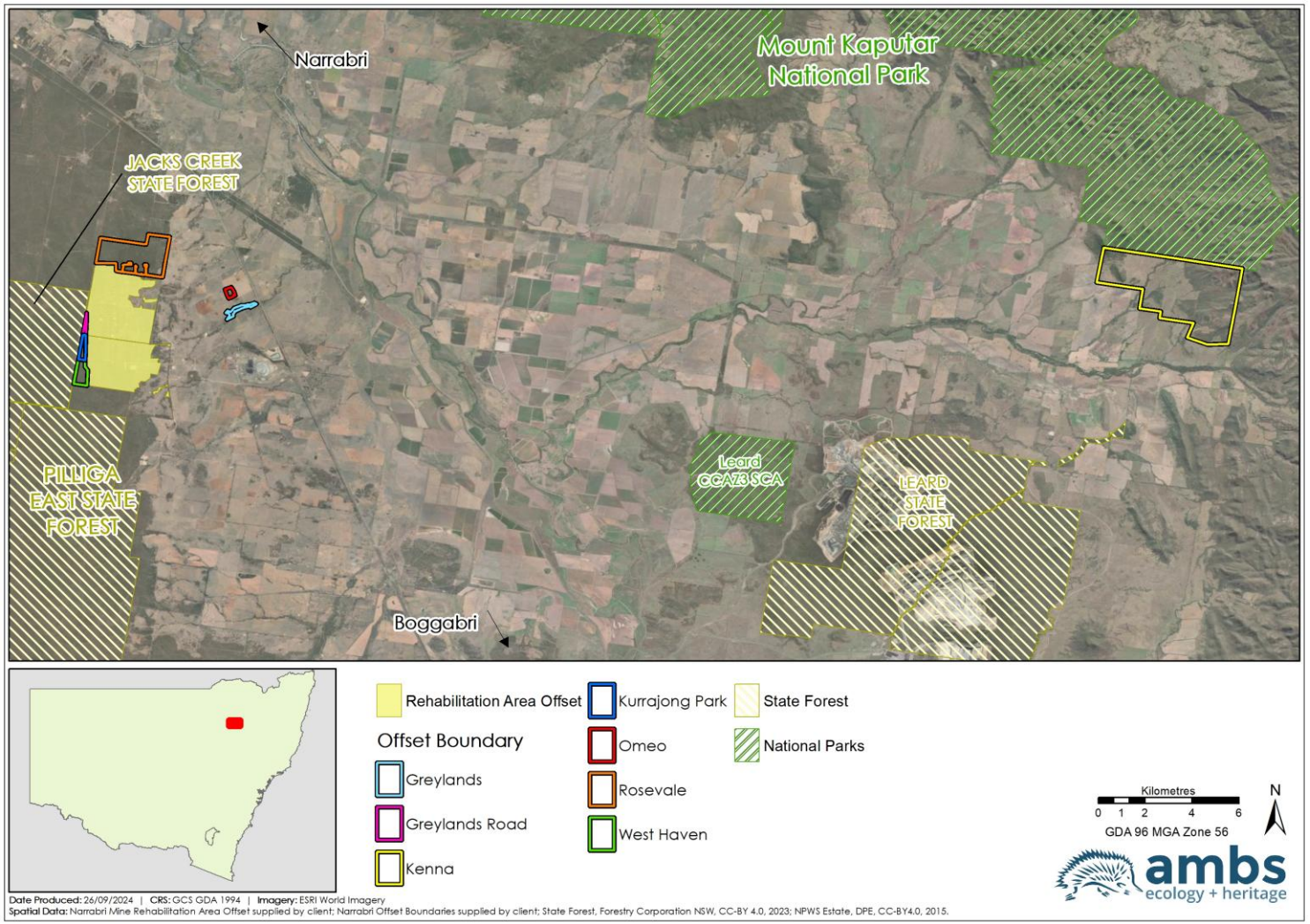


Figure 1.1 Location of the study area

2 Method

2.1 Plant Community Type mapping

A comparison between the BOS mapping and the RBOS mapping shows variation between the vegetation types mapped. The preparation of the RBOS is based on the information held within the CA prepared for each BOP. As part of the preparation of the CAs, the original vegetation types listed within the BOS had to be converted to contemporary vegetation communities.

Vegetation mapping prior to 2016 utilised the Biometric Vegetation Types [BVT]. To apply contemporary plant communities, PCTs, to areas assigned BVTs, the Biometric Vegetation Type Archives DPIE (2017) was consulted for a designated equivalent PCT. Confirmation of this best match was made be reviewing the candidate PCT description in the NSW BioNet Vegetation Classification application (DCCEEW 2024c). An exact match was not achieved for all BVTs. When this occurred, a best fit approach was used to designate a PCT to the BVT.

Allocation of PCTs to BVTs was undertaken on the Kenna BOP in 2019 for preparation of the CA (VCA0486) registered in 2019. During the CA preparation across 2018 and 2019; the PCT assignment was undertaken by the BCT in consultation with Whitehaven Coal Limited to align with the original BVT mapping described in the Kenna Off-site Biodiversity Offset Management Plan (Eco Logical Australia, 2014).

Confirmation of the applied PCT mapping, was undertaken on the Onsite BOPs by AMBS between August and September 2019. Data was collected at 16 assessment sites across the BOPs and compared to the selected PCT to confirm accuracy. A follow up investigation was then undertaken by the NSW Biodiversity Conservation Trust, in October 2019 to confirm the selected PCTs prior to formalisation of the relevant property CA agreements.

Section 3 of this report details the biodiversity values, including the PCTs, of each of the NCM BOPs based on the relevant CA and inquiry of the BioNet Atlas (DCCEEW 2024a) for recent records of threatened species. Table 4.1 in Section 4 of this report provides a comparative appraisal of the changes made to the vegetation mapping as a result of applying a PCT to BVT.

2.2 Threatened Ecological Community mapping

Threatened Ecological Communities (TECs) have been determined and mapped based on the following information sources

- Previous reports and CA agreements relating to each BOP.
- Lists of potential TEC as described in the BioNet Vegetation Classification (DCCEEW 2024a)
- NSW Final Determinations and Commonwealth Listing Advice documents relevant to the potential TEC.
- Comparison of site data, and field surveys (where they have been undertaken).

2.3 Threatened species mapping

Threatened species listed and mapped for each BOP is based on the following information sources.

- The Threatened Biodiversity Data Collection (DCCEEW 2024b).
- NSW BioNet Atlas (DCCEEW 2024a).
- Records from previous reports and CA agreements relating to each BOP (AMBS 2020a; NSW Land Registry Services 2019 and 2021 a – f).
- Recent records from AMBS surveys conducted within the BOPs (AMBS 2019a; 2020a-d, 2022; 2023a; 2023b).

Only threatened species recorded on each BOP or nearby to the BOP have been shown.

3 Overview of the Biodiversity Offset Properties

Prior to purchase for offsetting, the Kenna property was predominantly grazed and cultivated as evidenced by the extent of exotic, low diversity and derived native grasslands. Historic clearing was limited in the central flatter area and the steeper eastern and north-western areas with the overall resilience considered to be moderate to high given the BOP proximity to a large area of remnant vegetation within the adjacent Mount Kaputar National Park. Biodiversity management of the Kenna BOP commenced in 2014 with the property permanently destocked in 2016.

The Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs had minimal agricultural management such as light grazing and potentially logging. The more eastern extents of the BOPs show evidence of more intensive cultivation/cropping such as localised high weed abundance. The extent of historic clearing was limited to the east (closest to the Kamilaroi Highway) with the majority of the BOPs adjoining the Jacks Creek State Forest to the west showing high flora and fauna diversity in well vegetated areas. Biodiversity management of these BOPs commenced in 2014 with the properties being permanently destocked between 2008 and 2016.

3.1 Kenna

3.1.1 Vegetation

Five plant community types in a range of condition states were mapped across the Kenna BOP (EcoLogical Australia 2014). The PCTs are listed in Table 3.1, shown in Figure 3.1 and described below. Areas that were assigned to cleared land in the Kenna BOP (EcoLogical Australia 2014) have been re assigned to DNG forms of the PCTs determined as occurring in the BOP.

Table 3.1 Area and condition of plant community types on Kenna BOP

PCT ID	Plant Community Type (PCT)	Condition	Area (ha)
78	River Red Gum riparian tall woodland / open forest wetland in the Nandewar and Brigalow Belt South Bioregions	Moderate/Poor	35.10
885	Heathy shrublands on rocky outcrops of the western slopes	Good	17.96
1313	White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Good/Moderate/DNG	703.11
1314	White Cypress Pine - Silver-leaved Ironbark – Tumbledown Red Gum shrubby open forest of the Nandewar and Brigalow Belt South Bioregions	Good	10.49
1383	White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	Good/Moderate/Poor/DNG	477.40
Total			**1,244.06**

PCT 1383: White Box grassy woodland

PCT Name: White Box Grassy Woodland of the Nandewar and Brigalow Belt South Bioregions

Vegetation Class: Western Slopes Grassy Woodlands

EPBC Status: Critically endangered: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

BC Status: Critically endangered: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Description on the Property

Plant Community Type 1383 is likely to have been the dominant vegetation type across the study area although the majority has been cleared and is now present as derived grassland with the occasional *Eucalyptus albens* (White Box) scattered throughout. The most intact stand is present in the centre of the site. Although all areas have undergone past disturbance and were grazed up until 2016, the species diversity in this area is greater than in the areas of derived grassland with a number of herbs and forbs also present. Four condition types were assigned to this community; a near intact category (good) with all strata present, scattered trees with a native understorey, scattered trees with an exotic understorey and a derived grassland dominated by native species.

The canopy was dominated by *Eucalyptus albens* and *Callitris glaucophylla* (White Cypress Pine). *Eucalyptus crebra* (Narrow-leaved Ironbark) was also scattered throughout. A small number of areas occur within this community where regrowth of *Callitris glaucophylla* is denser, but the vegetation community is the same in terms of species composition and disturbance levels and consequently has been included in the good condition category. Small tree species within this community and scattered throughout grassland areas derived from this community include *Geijera parviflora* (Wilga) and *Brachychiton populneus* (Kurrajong). *Pimelea neo-anglica* (Poison Pimelea) is also present within this community.

The ground layer is dominated by native grasses including *Bothriochloa decipiens* (Pitted Bluegrass)*, Austrostipa scabra* (Rough Speargrass), *Eragrostis leptostachya* (Paddock Lovegrass), *Aristida* sp., *Sporobolus creber* (Rat's Tail Grass), *Chloris truncata* (Windmill Grass) and *Rytidosperma* sp. (Wallaby Grass) A variety of herbs and forbs are also present and include *Chrysocephalum apiculatum* (Common Everlasting), *Wurmbea dioica* (Early Nancy*)*, *Vittadinia cuneata* (Fuzzweed), *Cymbonotus lawsonianus* (Bears-ear) and *Oxalis perennans* (Yellow Wood Sorrel).

Within the study area, this PCT is equivalent to the Critically Endangered Ecological Community - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland under the BC and EPBC Acts.

PCT 1313: White Cypress Pine Narrow-leaved Ironbark shrub/grass open forest

PCT Name: White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion

Vegetation Class: Western Slopes Dry Sclerophyll Forest

EPBC Status: not listed

BC Status: not listed

Description on Property

White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest is the dominant vegetation type across the eastern part of the study area. This community is present on the rises and rocky hills / escarpments. All areas have undergone past logging and consequently some areas support dense *Callitris glaucophylla* (White Cypress Pine*)* regrowth. This community occurs as woodland, semi cleared areas with scattered trees and DNG.

This community dominates the east of the site on the steep slopes. A smaller stand is also present in the north western corner of the site. The dominant canopy species include White Cypress Pine, *Eucalyptus crebra* (Narrow-leaved Ironbark*). Eucalyptus albens* (White Box*)* is also present in this community within the central portion of the large stand of vegetation in the east of the site on the lower slopes and *Eucalyptus dealbata* (Tumbledown Red Gum) is also present in some parts of this community. A large number of old stumps from previously clearing present throughout this community. *Alphitonia excelsa* (Red Ash) is also present on the north-western parts of this community. Three condition types were assigned to this community; a near intact category with all strata present, scattered trees with a native understorey and a derived grassland dominated by native species.

Shrub species include *Beyeria viscosa* (Sticky Wallaby Bush) is dominant in most areas with *Olearia elliptica* (Sticky Daisy-Bush) also common throughout. Other less common shrubs include *Notelaea*

microcarpa (Native Olive), *Acacia cheelii* (Motherumbah), *Cassinia quinquefaria* (Cough Bush) (common in the north eastern part of this community), *Melichrus urceolatus* (Urn Heath), *Acacia triptera x cheelii* and *Pimelea neo-anglica* (Poison Pimelea*)* is also present within this community.

The ground layer is dominated by native species including *Austrostipa scabra* (Rough Speargrass*)*, Eragrostis spp. (Lovegrasses), *Aristida ramosa* (Purple Wiregrass), Enneapogon sp. (Nineawn Grass), *Cymbopogon refractus* (Barbed Wire Grass), *Rytidosperma* sp. (Wallaby Grass), *Panicum effusum* (Hairy Panic), *Desmodium brachypodum* (Large Tick-trefoil), *Cheilanthes sieberi* (Rockfern), *Dichondra repens* (Kidneyweed), *Gonocarpus elatus* (Raspwort), *Fimbristylis dichotoma* (Common Fringe Sedge) and *Dianella revoluta* (Blue Flax-lily).

The weed species *Opuntia stricta* is scattered within this community and *Medicago* and *Trifolium* species occur in the DNG areas.

PCT 1314: White Cypress Pine Silver-leaved Ironbark-Tumbledown Red Gum shrubby open forest

PCT Name: White Cypress Pine - Silver-leaved Ironbark - Tumbledown Red Gum shrubby open forest of the Nandewar and Brigalow Belt South Bioregions

Vegetation Class: Western Slopes Dry Sclerophyll Forest

EPBC Status: not listed

BC Status: not listed

Description on Property

White Cypress Pine - Silver-leaved Ironbark - Tumbledown Red Gum shrubby open forest is patchily distributed throughout areas of White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest primarily in the east of the site. This community was present on the rises and slopes / rocky hills. All areas had undergone past logging. Two condition types were assigned to this community; a near intact category with all strata present and scattered trees with a native understorey.

The dominant canopy species include *Callitris glaucophylla* (White Cypress Pine) and *Eucalyptus melanophloia* (Silver-leaved Ironbark). *Eucalyptus dealbata* (Tumbledown Red Gum) is also present in some parts of this community. A large number of old stumps from previous clearing are present throughout this community.

Beyeria viscosa (Sticky Wallaby Bush) is the dominant shrub species within this community. Other shrubs include *Acacia* spp. and *Indigofera adesmiifolia* (Tick Indigo*)*.

The ground layer is dominated by native species and there are large areas of bare ground, rock and litter (up to 85 %). Native species present in the ground layer include *Austrostipa scabra* (Rough Speargrass*)*, Eragrostis spp. (Lovegrasses) *Aristida ramosa* (Purple Wiregrass), *Enneapogon* sp. (Nineawn Grass), *Cymbopogon refractus* (Barbed Wire Grass), *Desmodium brachypodum* (Large

Tick-trefoil), *Cheilanthes distans* (Bristly Cloak Fern), *Dichondra* sp. (Kidneyweed), *Lomandra filiformis* (Wattle Mattrush) and *Stackhousia* sp. The orchid *Pterostylis* sp. was also recorded within this community.

Exotic species present in more disrobed locations include *Trifolium arvense*, *Medicago* sp., *Hypochaeris radicata* and *Opuntia stricta.*

PCT 78: River Red Gum riverine woodlands and forests

PCT Name: River Red Gum riverine woodlands and forests in the Nandewar and Brigalow Belt South Bioregions

Vegetation Class: Inland Riverine Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

This vegetation type is present in two forms. Along Maules Creek the vegetation is an alluvial woodland characteristic of the Regional Vegetation Community (RVC) 73 (River Red Gum riverine woodlands and forests, Darling Riverine Plains, Brigalow Belt South and Nandewar) with a tall, denser canopy. Along the smaller drainage lines across the site, the vegetation was highly disturbed and more characteristic of Bracteate Honey Myrtle riparian shrubland Brigalow Belt South with a dense small tree layer and scattered Eucalypts.

Canopy species present in this area include *Eucalyptus camaldulensis* (River Red Gum), *Casuarina cunninghamiana* (River Oak*)* and *Angophora floribunda* (Rough-barked Apple). The small tree / shrub layer was dominated by *Acacia* sp. and *Melaleuca bracteata* (Black Tea-tree) with *Brachychiton populneus* (Kurrajong) also present.

The ground layer was a mixture of native and exotic species dominated by *Austrostipa verticillata* (Slender Bamboo Grass) and the exotic species *Cerastium glomeratum* (Mouse-ear Chickweed). Other groundcover species present include *Microlaena stipoides* (Weeping Grass) and *Dichondra*

repens (Kidneyweed). Dense infestations of the exotic *Araujia sericifera* (Moth Vine) are also present in this area.

Common weed species include *Cerastium glomeratum, Hypochaeris radicata, Sida rhombifolia, Medicago* sp. and *Bidens pilosa.*

PCT 885 Heathy shrublands

PCT Name: Heathy shrublands on rocky outcrops of the western slopes

Vegetation Class: Northern Montane Heaths

EPBC Status: not listed

BC Status: not listed

Description on Property

This vegetation type was present on the rocky outcrops above a waterfall amongst areas of White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest and White Cypress Pine - Silver-leaved Ironbark - Tumbledown Red Gum shrubby open forest. It had a shrubland structure with emergent small trees. This community is in good condition with the majority of species recorded being native.

Scattered *Eucalyptus dealbata* (Tumbledown Red Gum) and *Callitris glaucophylla* (White Cypress Pine) were present with Tumbledown Red Gum exhibiting a mallee-like form. A dense stand of *Micromyrtus sessilis* with the occasional *Cryptandra propinqua* and *Pimelea neo-anglica* (Poison Pimelea*)* were present in the shrub strata.

The ground layer supports large areas of mosses and lichens and a diversity of groundcover species including herbs, forbs and grasses sparsely spread across the rocks. Ground layer species included *Cymbopogon refractus* (Barbed Wire Grass), *Aristida* sp., *Austrostipa* sp., *Cheilanthes sieberi* (Rockfern), *Gonocarpus elatus* (Raspwort), *Geranium* sp., *Dichondra repens* (Kidneyweed), *Galium gaudichaudii* (Rough Bedstraw), *Wurmbea dioica* (Early Nancy), *Crassula* sp., *Pterostylis* sp., *Enneapogon* sp. (Nineawn Grass) and *Poa sieberiana* (Snow Grass).

Weed species present included, *Opuntia* sp. (Prickly Pear) was recorded within this community in low numbers as was *Hypochaeris radicata* (Flatweed).

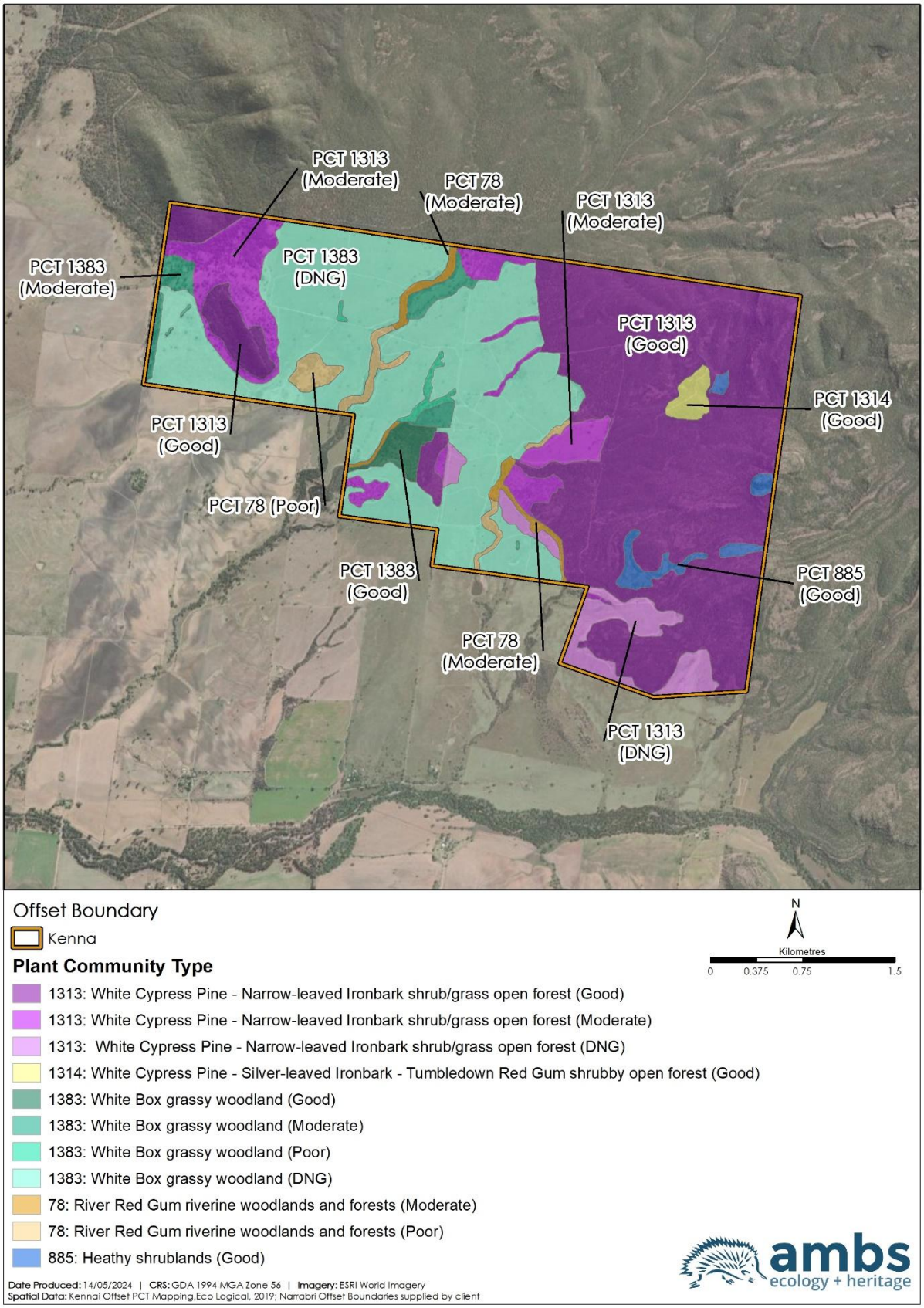


Figure 3.1 Map of the Plant Community Types on the Kenna BOP

3.1.2 Threatened Ecological Communities

One threatened ecological community (TEC) has been recorded in the Conservation Area of the Kenna BOA (Table 3.2; Figure 4.1). PCT 1383-White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregion' is consistent with the 'White Box-Yellow Box-Blakely's Red Gum grassy woodland' listed as critically endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act) and under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Table 3.2 Threatened ecological communities present in the Kenna BOA

Listed under the BC Act	Listed under the EPBC Act	Kenna Area (ha)
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (CEEC)	White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands (CEEC)	477.40
Total		**477.40**

3.1.3 Threatened plants

The Kenna BOP provides habitat for two threatened flora species *Dichanthium setosum* and *Tylophora linearis* (Figure 3.3).

3.1.4 Fauna habitat

A range of fauna habitat has been identified in PCTs across the Kenna BOP (Table 3.3).

Table 3.3 Fauna habitat types identified within the Kenna BOP (Whitehaven 2019).

Plant Community Type	Habitat Values
1383: White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	Scattered trees Hollow bearing trees Woody debris Tall grassland
1313: White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Hollow-bearing trees Woody debris Rocky outcrops Shrubby and grassy formations Abundant leaf litter
1314: White Cypress Pine - Silver-leaved Ironbark - Tumbledown Red Gum shrubby open forest of the Nandewar and Brigalow Belt South Bioregions	Scattered trees Hollow-bearing trees Woody debris Rocky outcrops Shrubby and grassy formations Abundant leaf litter
78: River Red Gum riverine woodlands and forests in the Nandewar and Brigalow Belt South Bioregions	Dense shrubs Hollow bearing trees
885: Heathy shrublands on rocky outcrops of the western slopes	Dense shrubs Rocky outcrops Water pools Waterfalls

The Conservation Area of the Kenna BOP contains 8.4 km of direct connectivity with the Mount Kaputar National Park along the northern and eastern boundaries of the property and reduces the distance to the south to remnant riparian bushland along Maules Creek (1.0 km at the closest

point), other Conservation Area/Biodiversity Offset Areas (Onavale 3.7 km at the closest point) and further south to the Leard State Forest (4.3 km at the closest point).

3.1.5 Threatened fauna

Fourteen threatened species have been recorded on the Kenna BOP (Table 3.4; Figure 3.2). Superb Parrots have not been detected within 10 km of the Kenna BOA, but suitable foraging habitat exists within the property.

Table 3.4 Threatened fauna species that have been recorded on Kenna BOP

Common Species Name	Scientific Species Name	BC Act Listing	EPBC Act Listing
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	V
Diamond Firetail	*Stagonopleura guttata*	V	V
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-
Eastern Cave Bat	*Vespadelus troughtoni*	-	-
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-
Hooded Robin (south-eastern form)	*Melanodryas cucullata*	V	-
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V
Little Lorikeet	*Glossopsitta pusilla*	V	-
Little Pied Bat	*Chalinolobus picatus*	V	-
Speckled Warbler	*Chthonicola sagittata*	V	-
Spotted Harrier	*Circus assimilis*	V	-
Turquoise Parrot	*Neophema pulchella*	V	-
Varied Sittella	*Daphoenositta chrysoptera*	V	-
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-

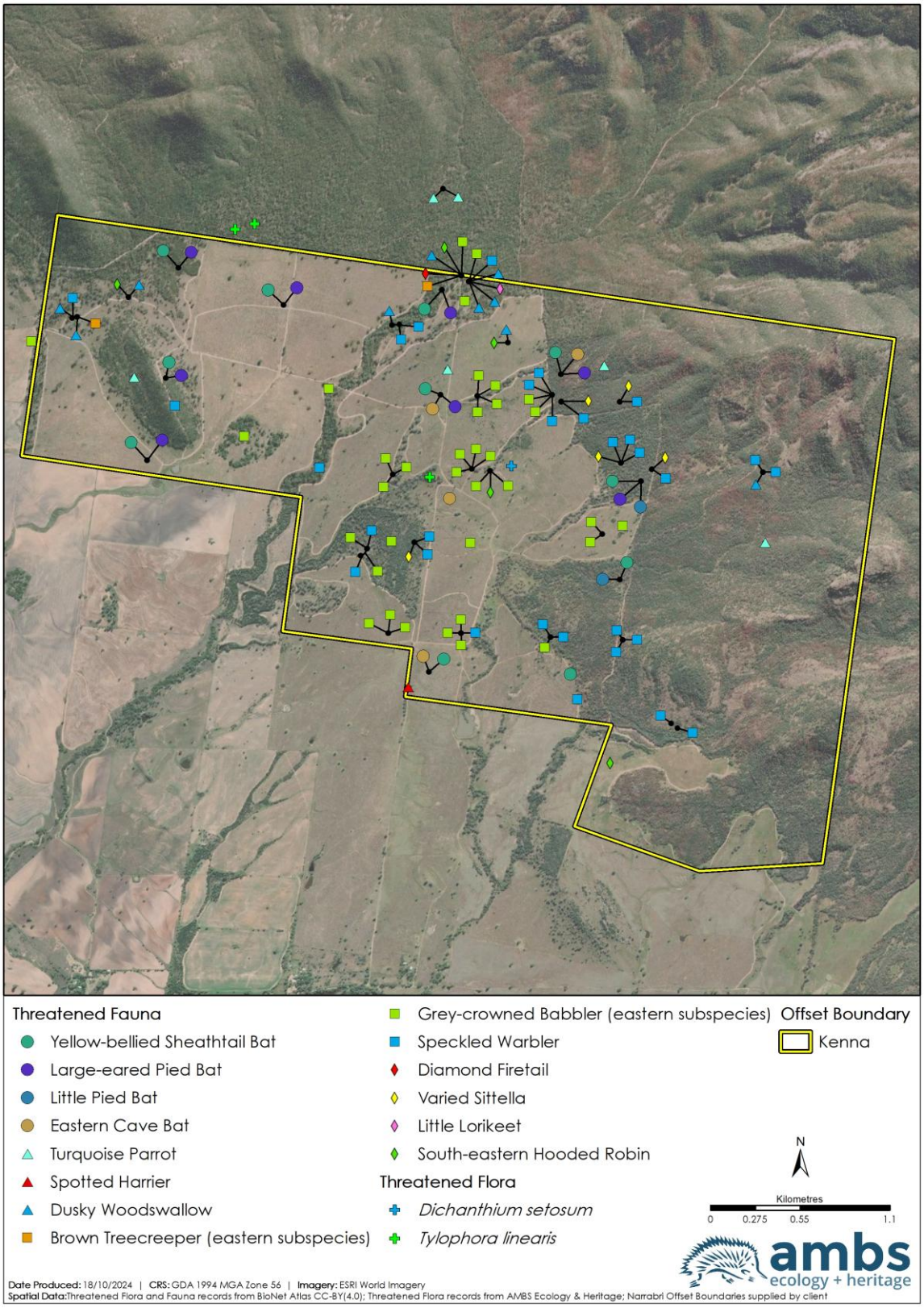


Figure 3.2 Location of Threatened species within the Kenna BOP

3.2 Greylands

3.2.1 Vegetation

Three plant community types were described and mapped across the Greylands BOP. The PCTs are listed in Table 3.5, shown in Figure 3.3 and described below.

Table 3.5 Area and condition of plant community types on Greylands BOA

PCT ID	Plant Community Type (PCT)	Condition	Area (ha)
88	Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Moderate	10.06
101	Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Moderate	2.32
619	Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion Assisted natural revegetation to PCT 88/101	DNG	2.59
Total Native Vegetation			**14.97**
Dam			0.12
Total			**15.09**

PCT 88: Pilliga Box - White Cypress Pine - Buloke shrubby woodland

PCT Name: Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion

Vegetation Class: Pilliga Outwash Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOP, PCT 88 occurs as a semi cleared woodland with small patches of regrowth.

Is a woodland dominated by *Eucalyptus pilligaensis* (Pilliga Box), often in association with *Callitris glaucophylla* (White Cypress Pine). Common shrub species in this community include *Eremophila mitchellii* (Budda), *Geijera parviflora* (Wilga), *Myoporum montanum* (Western Boobialla), *Acacia deanei* (Dean's Wattle), *Maireana microphylla* (Small-leaf bluebush) and *Dodonaea viscosa* (Sticky Hop Bush). Regrowth patches may include dense stands of *Callitris glaucophylla* (White Cypress Pine) or *Acacia deanei* (Dean's Wattle).

The ground layer is sparse, with common grasses including *Aristida ramosa* (Purple Wiregrass), *Aristida jerichoensis* (Jericho Wiregrass), *Austrostipa scabra* (Speargrass), *Enteropogon acicularis* (Curly Windmill Grass) and *Rytidosperma bipartitum* (Wallaby Grass). Common forbs include Corrugated Sida (*Sida corrugata*), *Boerhavia dominii* (Tarvine), *Brunoniella australis* (Blue Trumpet), *Glycine clandestina* and *Rostellularia adscendens*.

PCT 101 Poplar Box - Yellow Box - Western Grey Box grassy woodland

PCT Name: Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion

Vegetation Class: Floodplain Transition Woodlands

EPBC Status: In its current condition state this PCT does not meet the requirements to be listed as a TEC.

BC Status: In its current condition state this PCT does not meet the requirements to be listed as a TEC.

Description on Property

Within the BOA, PCT 101 occurs as a semi cleared woodland grading into PCT 88 to the west.

PCT 101 is a tall woodland dominated by *Eucalyptus populnea* (Poplar Box) in association with *Eucalyptus microcarpa* (Western Grey Box) and *Casuarina cristata* (Belah). Shrubs are typically sparse but may be denser in areas of canopy disturbance and adjacent to cleared areas. Common shrub species include *Geijera parviflora* (Wilga), *Notelaea microcarpa* (Native Olive), *Capparis mitchellii* (Wild Orange) and *Maireana microphylla* (Bluebush).

The ground layer is often dense and is dominated by a diverse range of grass and forb species. Common grass species include *Aristida personata* (Purple Wire Grass), *Aristida ramosa* (Purple Wire Grass), *Austrostipa scabra* (Speargrass), *Bothriochloa decipiens* (Redleg Grass) and *Enteropogon acicularis*. Forb species include *Einadia nutans* (Climbing Saltbush), *Calotis lappulacea* (Burr Daisy), *Sida corrugata* (Corrugated Sida), *Vittadinia cuneata* (Fuzzweed), *Vittadinia muelleri*, *Rumex brownii* (Dock) and *Rostellularia adscendens*.

PCT 619: Derived Wire Grass grassland

PCT Name: Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion

Vegetation Class: Western Slopes Grassland (Derived)

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOA, PCT 619 is most likely derived from cleared vegetation communities such as PCT 88 and PCT 101 that still occur nearby in various condition states.

A canopy layer does not occur, but *Eucalyptus* species are regenerating in some locations. Where it occurs, the shrub layer is sparse and may include species such as *Geijera parviflora* (Wilga), *Maireana microphylla* (Small-leaf Bluebush) and *Dodonaea viscosa* (Sticky Hop Bush).

The ground layer is typically dominated by grass species such as *Aristida personata* (Purple Wire Grass), *Aristida vagans* (Threeawn Speargrass) and *Aristida ramosa* (Purple Wire Grass). Other grass species include *Rytidosperma bipartitum* (Wallaby Grass), *Rytidosperma racemosum* (Wallaby Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Cymbopogon refractus* (Barbed-wire Grass), *Enteropogon acicularis* and *Bothriochloa macra* (Redleg Grass). Typical forbs include *Boerhavia dominii* (Tarvine)*, Rumex brownii* (Swamp Dock)*, Tribulus micrococcus* (Spineless Caltrop)*, Erodium crinitum* (Blue Stalkbill)*, Alternanthera denticulata, Geranium solanderi var. solanderi, Dichondra repens* (Kidney Weed), *Oxalis perennans, Solanum esuriale, Wahlenbergia communis* (Tufted Bluebell)*, Portulaca oleracea* (Pigweed).

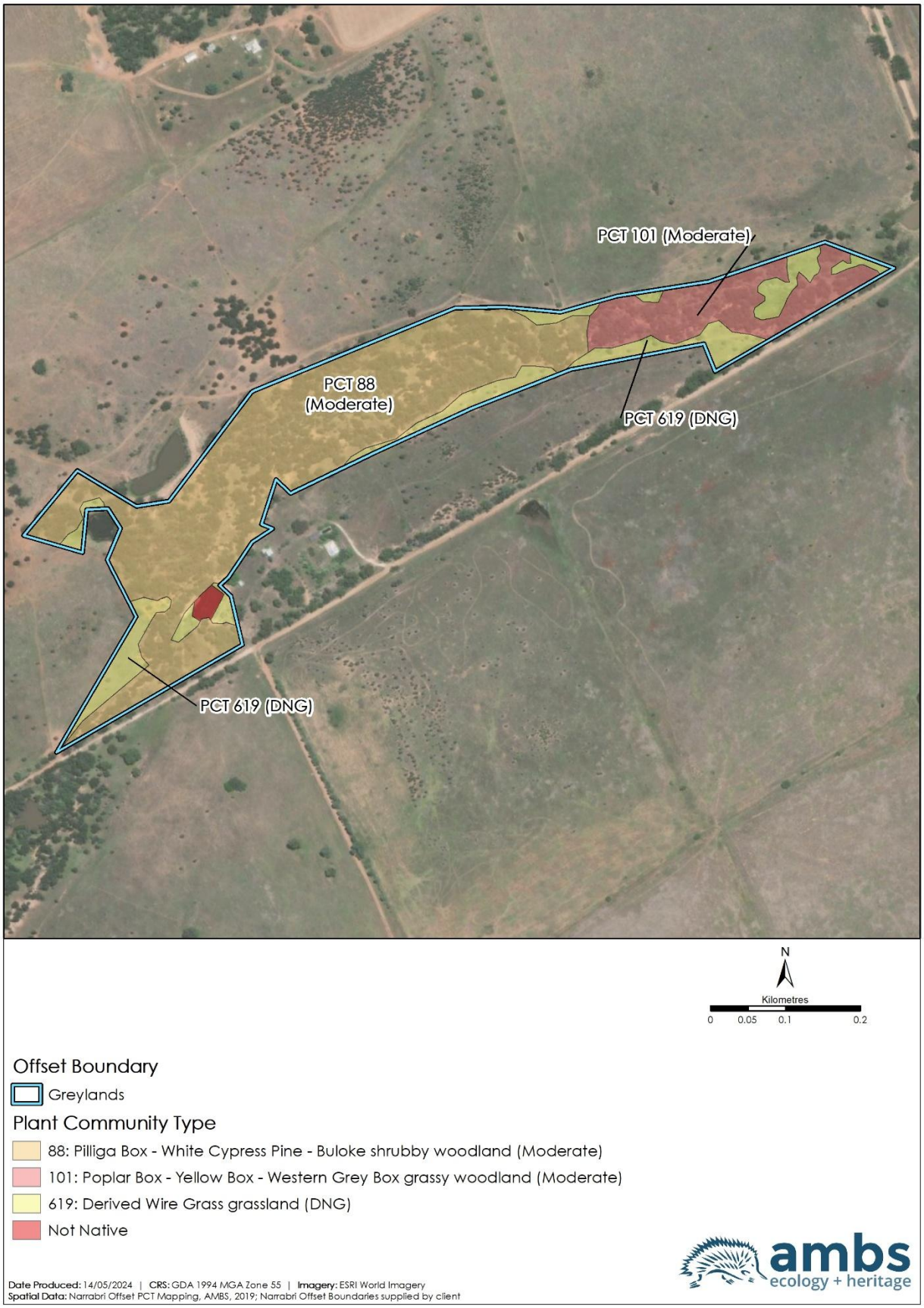


Figure 3.3 Map of the Plant Community Types on the Greylands BOA

3.2.2 Threatened Ecological Communities

No vegetation in a condition to qualify as a Threatened Ecological Communities (TEC) has been recorded within the Greylands BOA.

3.2.3 Threatened plants

The Greylands BOP provides habitat for one threatened plant species recorded on the site, *Pomaderris queenslandica* (Scant Pomaderris) (Figure 3.4).

3.2.4 Fauna habitat

A range of fauna habitat has been identified in PCTs across the Greylands BOP (Table 3.6).

Table 3.6 Fauna habitat types identified within the Greylands BOP

Plant Community Type	Habitat Values
88: Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Scattered trees Hollow bearing trees Foraging resources
101: Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Hollow-bearing trees Woody debris Foraging and roosting resources

The Greylands BOP is a remnant patch of vegetation associated with an unnamed ephemeral drainage line running from south west to north east. Whilst this connectivity is degraded in many areas to derived native grasslands with scattered trees, the drainage line connects a road reserve in the north east to Jacks Creek State Forest in the west.

3.2.5 Threatened fauna

Three threatened fauna species have been recorded on the Greylands BOP (Table 3.7, Figure 3.4). There are records of the Superb Parrot within 10 km and there is potential foraging habitat on the property.

Table 3.7 Threatened fauna species recorded on the Greylands Conservation Area

Common Name	Scientific Name	BC Act Listing*	EPBC Act Listing*
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-
White-throated Needletail	*Hirundapus caudacutus*	-	V
Yellow-bellied Sheathtail-Bat	*Saccolaimus flaviventris*	V	-

* V= Vulnerable, E= Endangered, CE= Critically Endangered

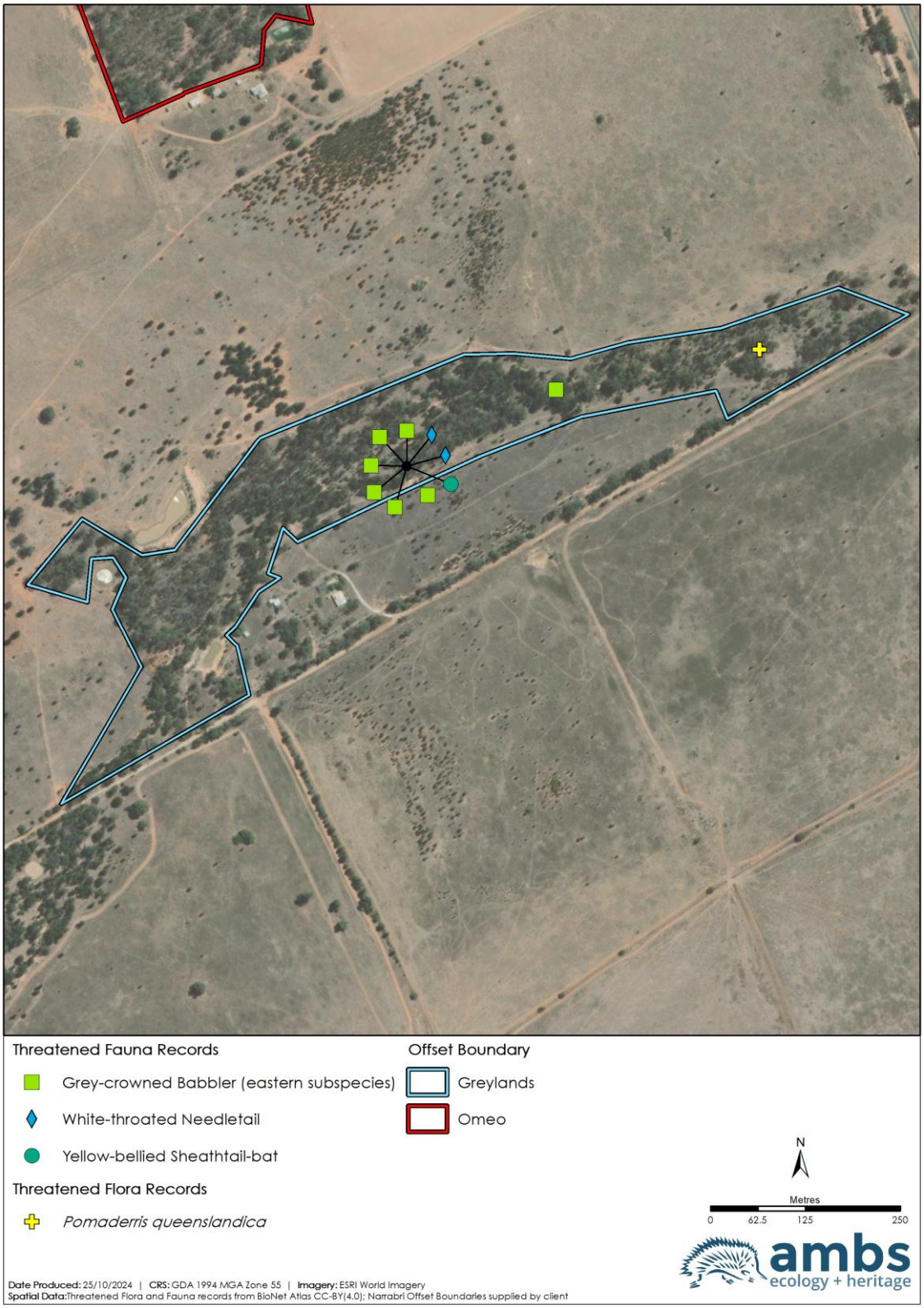


Figure 3.4 Location of threatened species recorded on the Greylands BOA

3.3 Greylands Road

3.3.1 Vegetation

One plant community type was described and mapped across the Greylands Road BOP. The PCT is listed in Table 3.8, shown in Figure 3.5 and described below.

Table 3.8 Area and condition of plant community types on Greylands Road BOA

PCT ID	Plant Community Type (PCT)	Condition	Greylands Road Area (ha)
406	White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Good	5.62
Total Native Vegetation			5.62
Tracks			0.05
Total			**5.67**

PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest

PCT Name: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests

Vegetation Class: Western Slopes Dry Sclerophyll Forest

EPBC Status: not listed

BC Status: not listed

Description on Property

PCT 406 is the dominant vegetation type across the Greylands Road BOA. This community typically occurs on rocky rises in the eastern Pilliga region. On the northern end of the area PCT 406 intergrades with the surrounding PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests. Across the BOA, this community occurs in a relatively intact (moderate to good) condition.

The community is a mid to tall, shrubby woodland with a canopy dominated by *Eucalyptus fibrosa* (Red Ironbark) often in association with *Corymbia trachyphloia* (White Bloodwood). This community is characterised by a small tree layer dominated by *Acacia cheelii* (Motherumbah). *Eucalyptus dwyeri* (Dwyer's Red Gum) and *Alphitonia excelsa* (Red Ash) may also be present.

The shrub layer is typically dense and dominated by a diverse range of tall shrubs, including *Philotheca difformis* (Small-leaf Wax-flower), *Philotheca salsolifolia, Philotheca ciliata*, *Phebalium squamulosum* (Scaly Phebalium) and *Calytrix tetragona* (Common Fringe Myrtle). The vulnerable shrub *Bertya opponens* (Coolabah Bertya) may be dominant in some areas. A sparse low shrub layer is often present and includes *Homoranthus flavescens* and *Melichrus urceolatus* (Urn Heath).

The ground layer is variable and may be sparse or mid to dense in places. Common grass species include *Cleistochloa rigida, Thyridolepis mitchelliana* (Mulga Mitchell Grass) and *Aristida ramosa* (Purple Wiregrass). The sedges *Lepidosperma laterale* and *Schoenus kennyi* are often present. The ground layer may also include a range of forb species such as *Goodenia rotundifolia*, *Stypandra glauca* (Nodding Blue Lily) and *Chloanthes parviflora.*

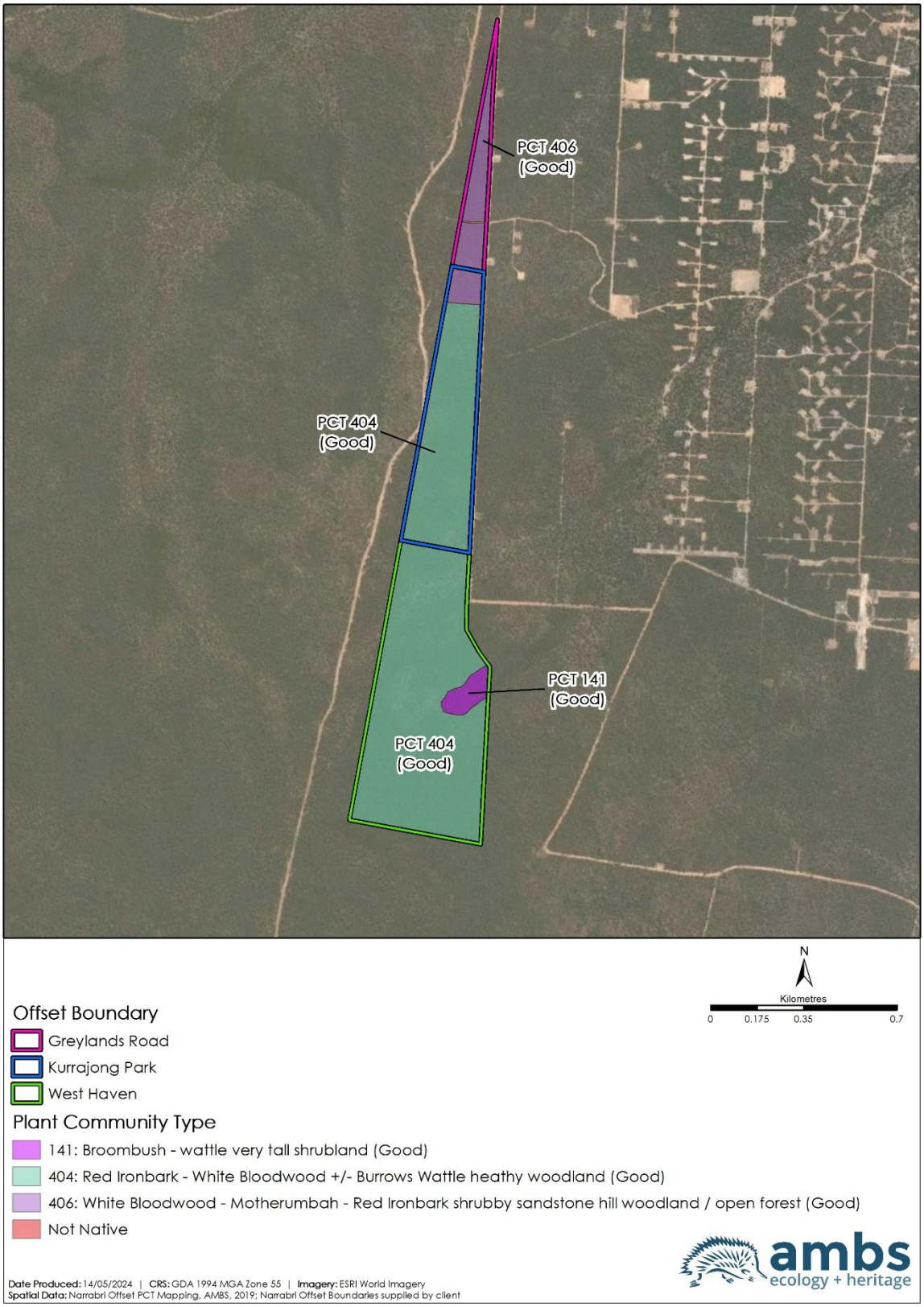


Figure 3.5 Map of the Plant Community Types on the Greylands Road BOA

3.3.2 Threatened Ecological Communities

No Threatened Ecological Communities (TECs) have been recorded in the Greylands Road BOA.

3.3.3 Threatened plants

No threatened plant species has been recorded on the Greylands Road BOP. *Bertya opponens* (Coolabah Bertya) has been recorded nearby (Figure 3.9).

3.3.4 Fauna habitat

Fauna habitat is provided in PCT 406 for a range of fauna species, given the presence rock outcrops, small caves, as well as hollow bearing trees and coarse woody debris.

The Greylands Road BOP is imbedded in vegetation adjacent to the Jacks Creek State Forest which provides good connectivity to the west into the Pilliga National Park and south to the Pilliga Nature Reserve.

3.3.5 Threatened fauna

Five threatened species have been recorded on or immediately adjacent to the Greylands Road BOP (Table 3.9; Figure 3.6). There are records of the Superb Parrot within 10 km and there is potential foraging habitat on the property.

Table 3.9 Threatened fauna species recorded on or adjacent to the Greylands Road BOP

Common Name	Scientific Name	BC Act Listing*	EPBC Act Listing*
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-
Speckled Warbler	*Chthonicola sagittata*	V	-
White-throated Needletail	*Hirundapus caudacutus*	-	V
Yellow-bellied Sheathtail-Bat	*Saccolaimus flaviventris*	V	-

* V= Vulnerable, E= Endangered, CE= Critically Endangered

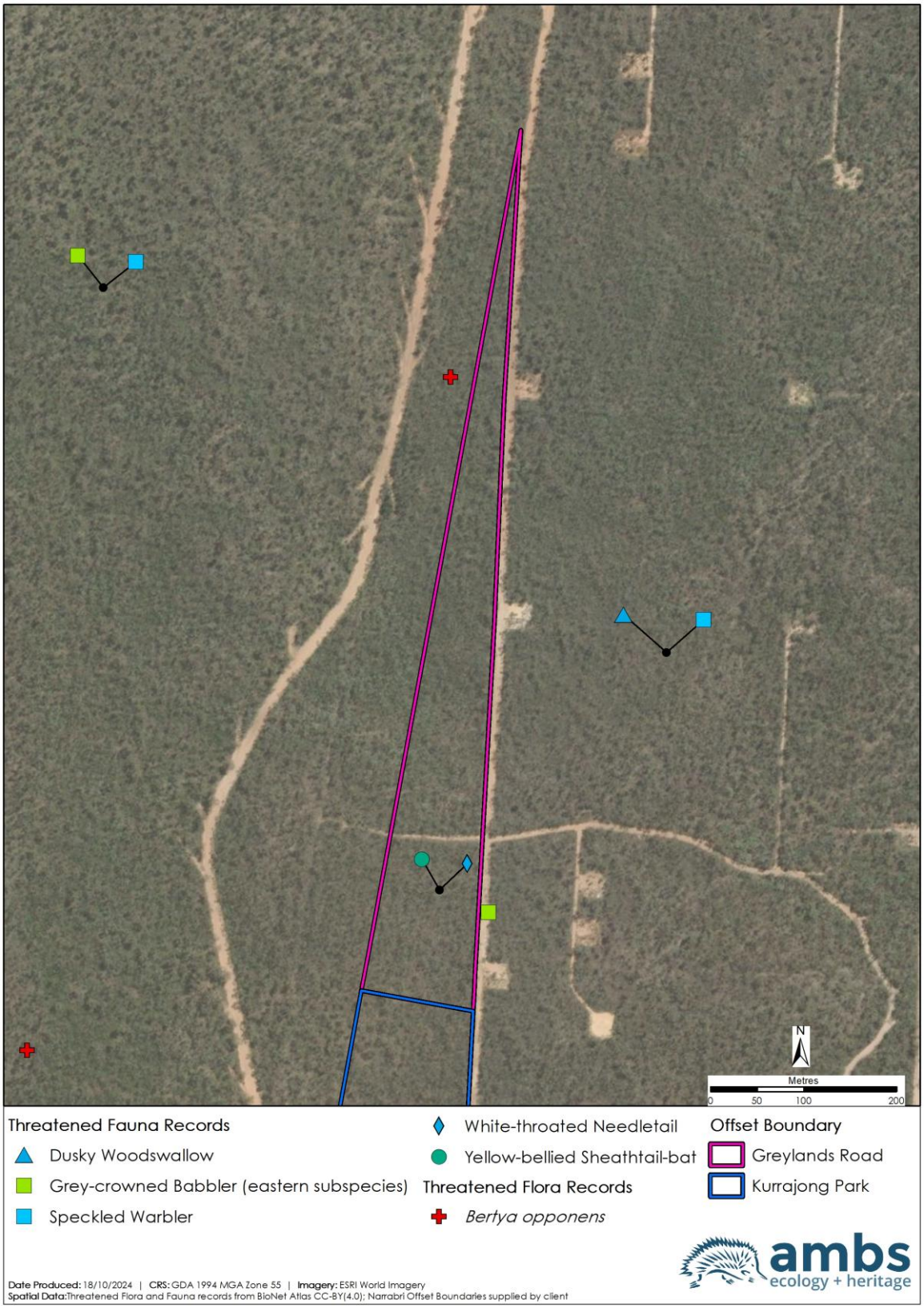


Figure 3.6 Location of threatened species recorded on or adjacent to the Greylands Road BOA

3.4 Omeo

3.4.1 Vegetation

Two plant community type was described and mapped across the Omeo BOP. The PCTs are listed in Table 3.10, shown in Figure 3.7 and described below.

Table 3.10 Area and condition of plant community types on Omeo BOA

PCT ID	Plant Community Type (PCT)	Condition	Omeo Area (ha)
81	Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Good	9.28
619	Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion (DNG) Replanted to establish PCT 81	Moderate	1.56
Total			**10.84**

PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland

PCT Name: Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion

Vegetation Class: Floodplain Transition Woodland

EPBC Status Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

BC Status: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions

Description on Property

PCT 81 is the dominant vegetation type within the Omeo BOA. Despite the woodland community lacking many old growth trees and adverse seasonal conditions at the time of assessment, the community was in moderate condition.

This community is a tall woodland dominated by *Eucalyptus microcarpa* (Western Grey Box) in association with *Eucalyptus pilligaensis* (Pilliga Box) with scattered *Callitris glaucophylla* (White Cypress Pine). The shrub layer is sparse with thicker patches in parts, with common species including *Geijera parviflora* (Wilga), *Eremophila mitchellii* (Budda), *Capparis mitchellii* (Native Orange) and *Maireana microphylla* (Small-leaf bluebush). The vines *Parsonsia eucalyptophylla* (Gargaloo) and *Marsdenia viridiflora* subsp. *viridiflora* (Native Pear) are also common.

The ground layer is mid to dense and dominated by grasses and forbs. Common grass species include *Austrostipa ramosissima* (Stout Bamboo Grass), *Austrostipa scabra* (Speargrass), *Aristida personata* (Purple Wire-grass) and *Enteropogon acicularis* (Windmill Grass). Common forb species include *Boerhavia dominii* (Tarvine), *Brunoniella australis* (Blue Trumpet), *Dichondra repens* (Kidney Weed) and *Sida corrugata* (Corrugated Sida).

Priority weeds *Opuntia stricta* (Common Prickly Pear), *Lycium ferocissimum* (African Boxthorn) and *Bryophyllum delagoense* (Mother of Millions) were also present.

PCT 619 Derived Wire Grass grassland

PCT Name: Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion.

Vegetation Class: Western Slopes Grassland

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the Omeo BOP PCT 619 occurs in a cleared area likely to have previously supported PCT 81.

A canopy layer does not occur, but *Eucalyptus* species are regenerating in some locations. If present the shrub layer is sparse and may include species such as *Geijera parviflora* (Wilga), *Maireana microphylla* (Small-leaf Bluebush) and *Dodonaea viscosa* (Sticky Hop Bush).

The ground layer is typically dominated by grass species such as *Aristida personata* (Purple Wire Grass), *Aristida vagans* (Threeawn Speargrass) and *Aristida ramosa* (Purple Wire Grass). Other grass species include *Rytidosperma bipartitum* (Wallaby Grass), *Rytidosperma racemosum* (Wallaby Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Cymbopogon refractus* (Barbed-wire Grass), *Enteropogon acicularis* and *Bothriochloa macra* (Redleg Grass). Typical forbs include *Boerhavia dominii* (Tarvine)*, Rumex brownii* (Swamp Dock)*, Tribulus micrococcus* (Spineless Caltrop)*, Erodium crinitum* (Blue Stalkbill)*, Alternanthera denticulata, Geranium solanderi* var. *solanderi, Dichondra repens* (Kidney Weed), *Oxalis perennans, Solanum esuriale, Wahlenbergia communis* (Tufted Bluebell)*, Portulaca oleracea* (Pigweed).

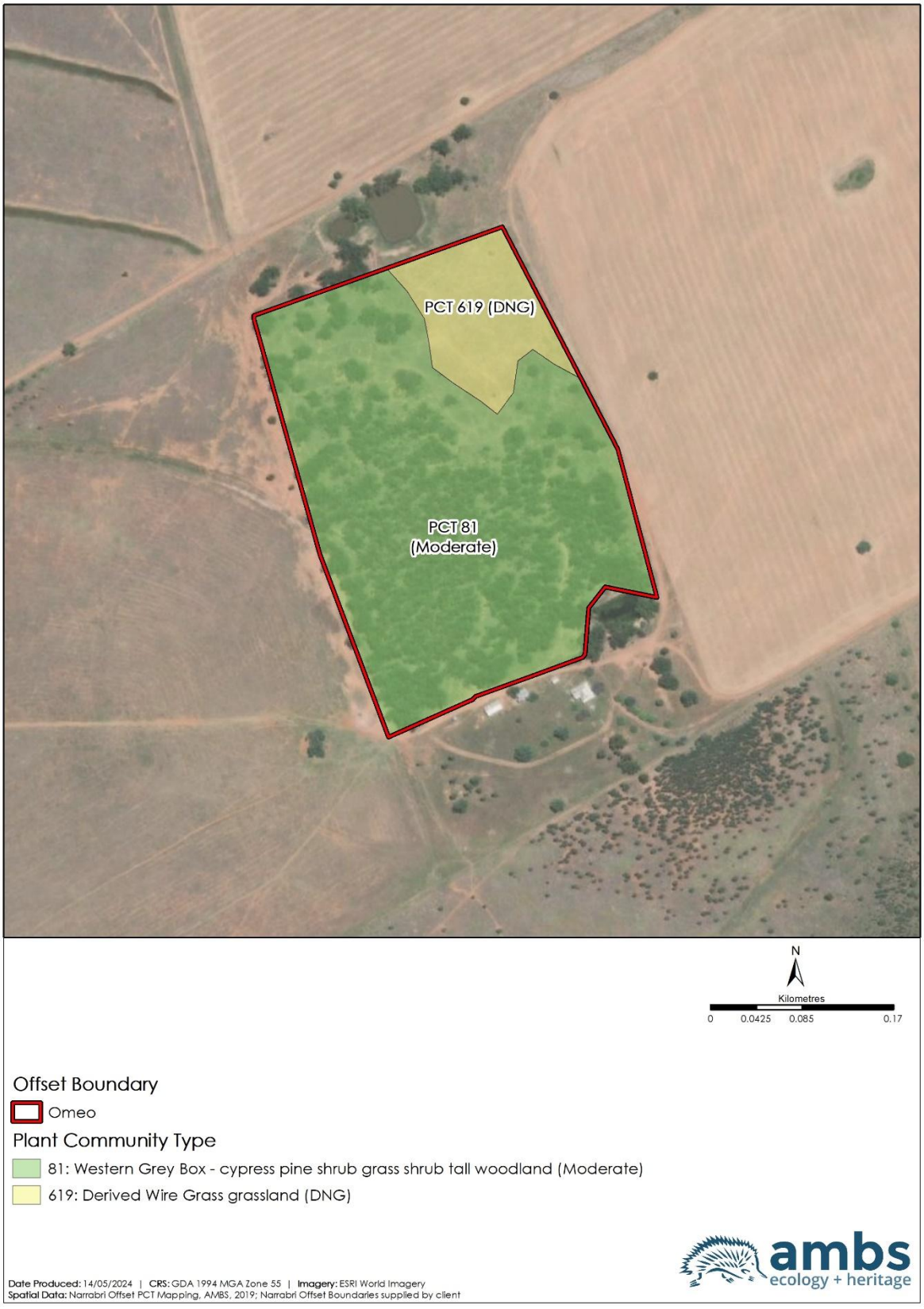


Figure 3.7 Map of the Plant Community Types on the Omeo BOA

3.4.2 Threatened Ecological Communities

One threatened Ecological Community has been identified in the Omeo BOP (Table 2.11; Figure 4.2). Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions' listed as an Endangered Ecological Community (EEC) under the BC Act and 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia' listed as Endangered Ecological Community (EEC) under the EPBC Act and occurs within areas of PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion.

Table 3.11 Threatened ecological communities present in the Omeo BOA

Listed under the BC Act	Listed under the EPBC Act	Omeo Area (ha)
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar, and Brigalow Belt South Bioregions (Endangered)	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Endangered)	9.28
Total		**9.28**

3.4.3 Threatened plants

One threatened plant species has been recorded on the Omeo BOP, *Tylophora linearis* (Figure 3.8).

3.4.4 Fauna habitat

Fauna roosting and foraging habitat is provided in PCT 81 for a range of fauna species, given the presence of hollow bearing trees, coarse woody debris and foraging resources.

3.4.5 Threatened fauna

Three threatened fauna species have been detected on the Omeo BOP (Table 3.12). There are records of the Superb Parrot within 10 km and there is potential foraging habitat on the property (Figure 3.8).

Table 3.12 Threatened fauna species recorded on the Omeo BOP

Common Name	Scientific Name	BC Act Listing*	EPBC Act Listing*
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-
Squirrel Glider	*Petaurus norfolcensis*	V	-
Yellow-bellied Sheathtail-Bat	*Saccolaimus flaviventris*	V	-

* V= Vulnerable, E= Endangered, CE= Critically Endangered

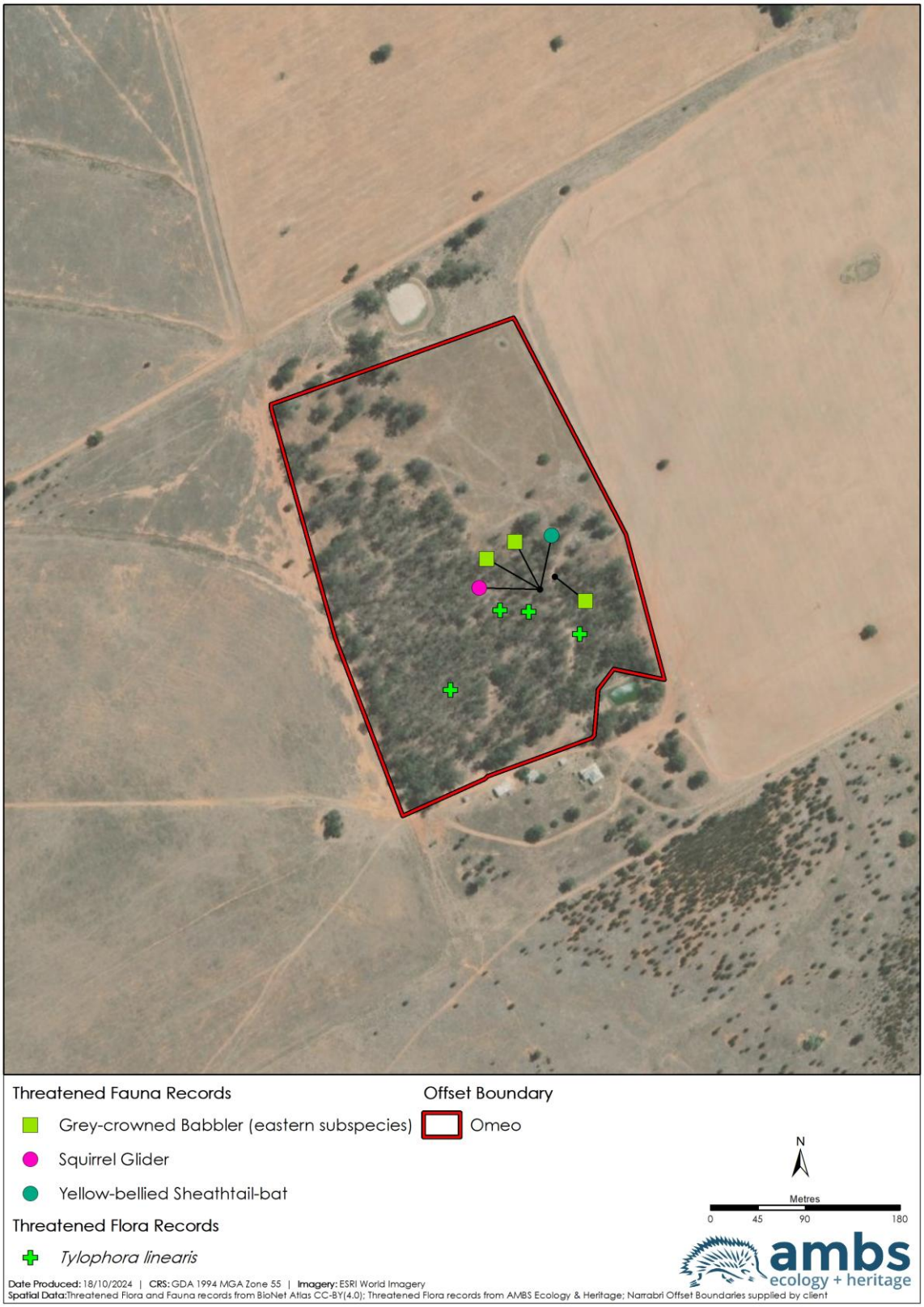


Figure 3.8 Location of threatened species on the Omeo BOA

3.5 Rosevale

3.5.1 Vegetation

Six plant community types were described and mapped across the Rosevale. The PCTs are listed in Table 3.13, shown in Figure 3.9 and described below.

Table 3.13 Area and condition of plant community types on Rosevale BOA

PCT ID	Plant Community Type (PCT)	Condition	Rosevale Area (ha)
401	Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region	Good	1.91
404	Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Good/Moderate	250.54
406	White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Good/Moderate	54.47
409	Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion	Good	3.01
435	White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion	Moderate	2.33
619	Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion Replanted to establish PCT 404 or natural regeneration	DNG	24.21
Total Native Vegetation			336.47
Dam			0.59
Total			**337.06**

PCT 401 Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland

PCT Name: Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOP PCT 401 occurs in a single patch in the south east section. Where it occurs within the study area, this community is in relatively intact (good) condition.

This community is a tall open forest or woodland with a canopy dominated by *Eucalyptus chloroclada* (Dirty Gum), *Angophora floribunda* (Rough-barked Apple) and *Callitris endlicheri* (Black Cypress Pine).

The shrub layer is sparse and includes *Calytrix tetragona* (Common Fringe Myrtle), *Philotheca ciliata* (Wax Flower), *Phebalium squamulosum* (Scaly Phebalium) and *Acacia gladiiformis* (Sword Wattle).

The ground layer is sparse to dense and is dominated by a range of grass and graminoid species, including *Lomandra multiflora* (Many-flowered Mat-rush), *Lomandra leucocephala* (Woolly Mat-rush*), Lomandra longifolia* (Spiny-headed mat-rush), *Gahnia aspera* (Rough Saw Sedge), *Aristida personata* (Purple Wire-grass)*, Austrostipa ramosissima* (Stout Bamboo Grass) and *Microlaena stipoides* subsp. *stipoides* (Weeping Grass). A range of forbs are also typically present, including *Chrysocephalum semipapposum* (Yellow Buttons), *Chrysocephalum apiculatum* (Yellow Buttons),

Pomax umbellata (Pomax) and *Calotis cuneifolia* (Purple Burr-daisy). *Cheilanthes sieberi* subsp. *sieberi* (Poison Rock Fern) is also commonly present in the ground layer.

PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland

PCT Name: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOA, PCT 404 is the dominant vegetation type. This community occurs on sandy soils and grades into PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests, which occur on associated rocky rises. This community is in relatively intact condition (moderate to good).

The community is a mid-high to tall, shrubby woodland with a canopy dominated by *Eucalyptus fibrosa* (Red Ironbark) and *Corymbia trachyphloia* (White Bloodwood). The canopy may also include *Eucalyptus dwyeri* (Dwyer's Red Gum), *Callitris glaucophylla* (White Cypress Pine) or *Callitris endlicheri* (Black Cypress Pine). A small tree layer dominated by *Acacia burrowii* (Burrow's Wattle) and *Allocasuarina diminuta* is often present. In some areas, *Acacia burrowii* may dominate in response to fire.

The shrub layer may be dense and contains a diverse range of species, including *Philotheca ciliata* (Wax Flower), *Phebalium squamulosum* (Scaly Phebalium), *Calytrix tetragona* (Common Fringe Myrtle) and *Harmogia densiflora*. The vulnerable shrub *Bertya opponens* (Coolabah Bertya), may

be dominant in some areas. A sparse low shrub layer is also often present and includes *Homoranthus flavescens* and *Melichrus urceolatus* (Urn Heath).

The ground layer is typically sparse but may be dense in patches and is commonly dominated by grasses including *Thyridolepis mitchelliana* (Mulga Mitchell Grass)*, Aristida ramosa* (Purple Wiregrass)*, Cleistochloa rigida* and sedges including *Schoenus kennyi* and *Gahnia aspera* (Rough Saw Sedge). Forb species commonly present include *Gonocarpus elatus, Goodenia rotundifolia, Pomax umbellata* (Pomax)*, Actinotus gibbonsii, Tricoryne elatior* (Yellow Autumn-lily) and *Chrysocephalum apiculatum* (Yellow Buttons).

PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest

PCT Name: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOA, PCT 406 typically occurs on rocky rises. PCT 406 intergrades with the surrounding PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests. Across the study area, this community occurs in a relatively intact (moderate to good) condition.

The community is a mid-high to tall shrubby woodland with a canopy dominated by *Eucalyptus fibrosa* (Red Ironbark) and *Corymbia trachyphloia* (White Bloodwood). This community is

characterised by a small tree layer dominated by *Acacia cheelii* (Motherumbah). *Eucalyptus dwyeri* (Dwyer's Red Gum) and *Alphitonia excelsa* (Red Ash) may also be present.

The shrub layer is typically dense and dominated by a diverse range of tall shrubs, including *Philotheca difformis* (Small-leaf Wax-flower), *Philotheca salsolifolia, Philotheca ciliata*, *Phebalium squamulosum* (Scaly Phebalium) and *Calytrix tetragona* (Common Fringe Myrtle). The vulnerable shrub *Bertya opponens* (Coolabah Bertya) may be dominant in some areas. A sparse low shrub layer is often present and includes *Homoranthus flavescens* and *Melichrus urceolatus* (Urn Heath).

The ground layer is variable and may be sparse or in mid to dense in places. Common grass species include *Cleistochloa rigida, Thyridolepis mitchelliana* (Mulga Mitchell Grass) and *Aristida ramosa* (Purple Wiregrass). The sedges *Lepidosperma laterale* and *Schoenus kennyi* are often present. The ground layer may also include a range of forb species such as *Goodenia rotundifolia*, *Stypandra glauca* (Nodding Blue Lily) and *Chloanthes parviflora*.

PCT 409 Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland

PCT Name: Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOP PCT 409 occurs in the south eastern corner where it grades into PCT 401. This community occurs as an intact woodland in good condition.

PCT 409 in a tall woodland dominated by *Eucalyptus chloroclada* (Dirty Gum) in association with *Corymbia trachyphloia* (White Bloodwood) and *Callitris glaucophylla* (White Cypress Pine). The small tree *Acacia cheelii* (Motherumbah) is also often present. The shrub layer is sparse to mid-dense and may include a diverse range of shrub species. Common shrubs include *Styphelia triflora* (Pink Five Corners), *Cassinia sifton* (Sifton Bush), *Acacia penninervis* (Mountain Hickory), *Melichrus urceolatus* (Urn Heath), *Boronia glabra* and *Homoranthus flavescens*. The cycad *Macrozamia glaucophylla* is often present.

The ground layer is typically sparse to very sparse and commonly includes grasses such as *Austrostipa scabra* (Speargrass), *Aristida personata* (Purple Wire Grass), *Aristida ramosa* (Purple Wire Grass) and *Microlaena stipoides* (Weeping Grass). Common forb species include *Chrysocephalum semipapposum* (Clustering Everlasting Daisy), *Xerochrysum bracteatum* (Golden Everlasting Daisy), *Glycine clandestina* and *Gonocarpus elatus*. The sedges *Gahnia aspera* Rough Saw-sedge) and *Schoenus ericetorum* are often present and may be dense in patches.

PCT 435 White Box - White Cypress Pine shrub grass hills woodland

PCT Name: White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion

Vegetation Class: North-west Slopes Dry Sclerophyll Woodlands

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOP PCT 435 occurs in a small patch in the south-east. This community is in relatively intact (moderate) condition. PCT 435 in the BOP does not meet the criteria to be listed as a TEC.

PCT 435 is a tall woodland dominated by *Eucalyptus albens* (White Box) often in association with *Callitris glaucophylla* (White Cypress Pine). *Brachychiton populneus* subsp. *populneus* (Kurrajong) is also often present in the canopy. The shrub layer is typically sparse and may include a range of species such as *Geijera parviflora* (Wilga), *Acacia implexa* (Hickory Wattle), *Dodonaea viscosa* (Sticky Hop Bush) and *Teucrium betchei*.

The ground layer is typically relatively dense and dominated by grasses, including *Aristida personata* (Purple Wire-grass), *Cymbopogon refractus* (Barbed-wire Grass), *Rytidosperma racemosum* (Wallaby Grass), *Austrostipa verticillata* (Slender Bamboo Grass) and *Austrostipa scabra* (Speargrass). Common forb species include *Calotis lappulacea* (Yellow Burr-daisy), *Einadia nutans* (Climbing Saltbush), *Wahlenbergia communis* (Tufted Bluebell), *Dianella longifolia* (Blue Flax-Lily), *Daucus glochidiatus* (Native Carrot), *Desmodium brachypodum* (Large Tick-trefoil) and *Desmodium varians* (Slender Tick-trefoil).

PCT 619 Derived Wire Grass grassland

PCT Name: Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion.

Vegetation Class: Western Slopes Grassland

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOP PCT 619 occurs in areas most likely derived from cleared woodland communities that still occur nearby in various condition states.

A canopy layer does not occur, but *Eucalyptus* species are regenerating in some locations such as the north east corner of the "Rosevale" section. If present, the shrub layer is sparse and may include species such as *Geijera parviflora* (Wilga), *Maireana microphylla* (Small-leaf Bluebush) and *Dodonaea viscosa* (Sticky Hop Bush).

The ground layer is typically dominated by grass species such as *Aristida personata* (Purple Wire Grass), *Aristida vagans* (Threeawn Speargrass) and *Aristida ramosa* (Purple Wire Grass). Other grass species include *Rytidosperma bipartitum* (Wallaby Grass), *Rytidosperma racemosum* (Wallaby Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Cymbopogon refractus* (Barbed-wire Grass), *Enteropogon acicularis* and *Bothriochloa macra* (Redleg Grass). Typical forbs include *Boerhavia dominii* (Tarvine)*, Rumex brownii* (Swamp Dock)*, Tribulus micrococcus* (Spineless Caltrop)*, Erodium crinitum* (Blue Stalkbill)*, Alternanthera denticulata, Geranium solanderi var. solanderi, Dichondra repens* (Kidney Weed), *Oxalis perennans, Solanum esuriale, Wahlenbergia communis* (Tufted Bluebell)*,* and *Portulaca oleracea* (Pigweed).

It is intended for the area mapped as PCT 619 to be revegetated and/or facilitate natural regeneration to be consistent with PCT 404. Canopy species characteristic of PCT 404 that have been included in revegetation efforts include *Eucalyptus fibrosa* (Red Ironbark), *Corymbia trachyphloia* subsp. *amphistomatica* (White Bloodwood) and *Callitris glaucophylla* (White Cypress Pine).

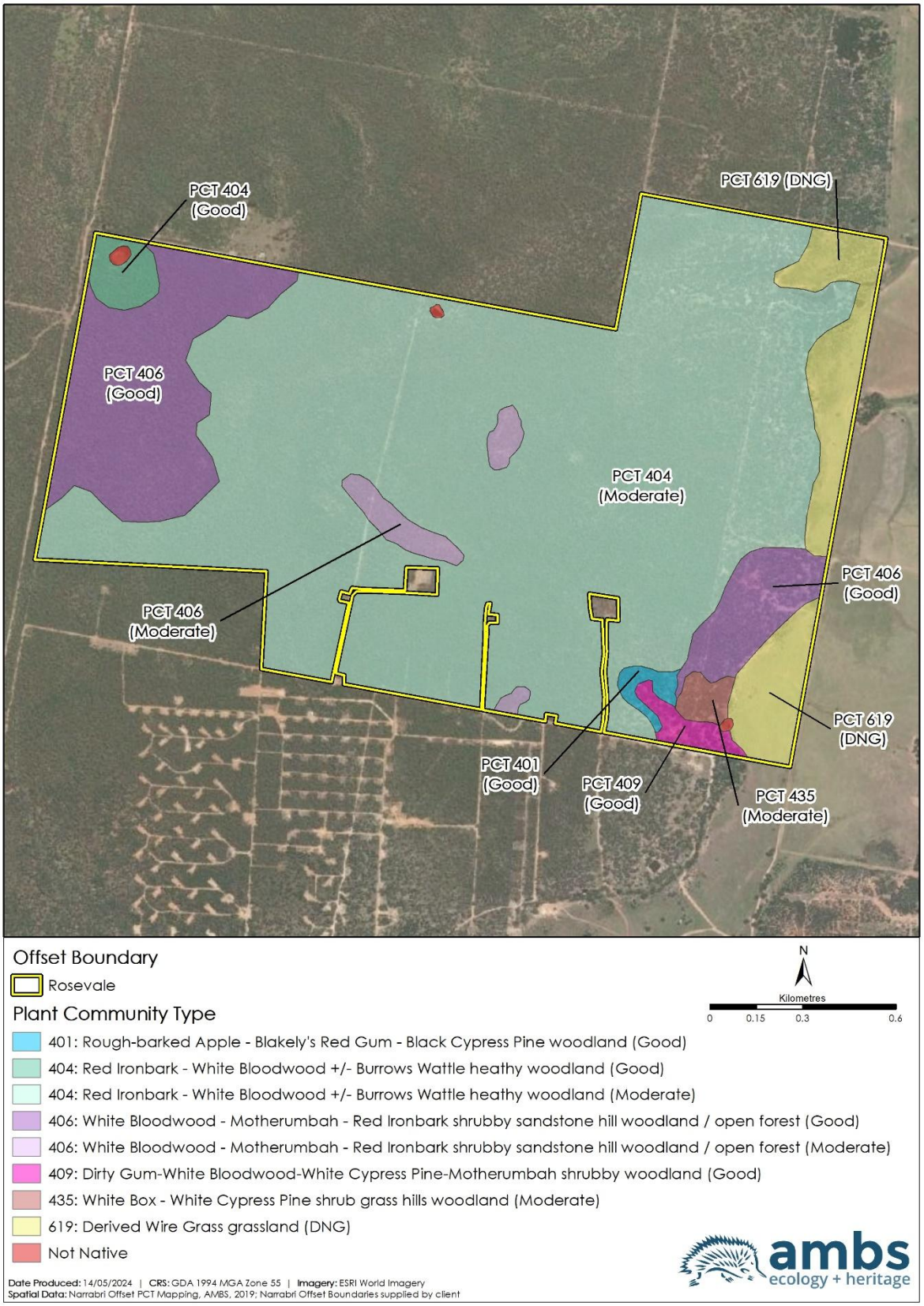


Figure 3.9 Map of the Plant Community Types on the Rosevale BOP

3.5.2 Threatened Ecological Communities

No Threatened Ecological Communities (TECs) have been designated to vegetation in the Rosevale BOP.

3.5.3 Threatened plants

Three threatened plant species have been recorded on the BOP, *Tylophora linearis*, *Bertya opponens* (Coolabah Bertya), and *Pomaderris queenslandica* (Scant Pomaderris) (Figure 3.10).

3.5.4 Fauna habitat

A range of fauna habitat has been identified in PCTs across the Rosevale BOP (Table 3.14)

Table 3.14 Fauna habitat types identified within the Rosevale BOP

Plant Community Type	Habitat Values
401: Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region	Hollow-bearing trees Woody debris
404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Hollow-bearing trees Woody debris
406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Rocky outcrops and small caves Hollow-bearing trees Woody debris
409: Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion	Hollow-bearing trees Woody debris
435: White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion	Hollow-bearing trees Woody debris

The Rosevale BOP is connected to the Jack Creek State Forest in the west. Jacks Creek State Forest is connected to the Pilliga National Park and Pilliga Nature Reserve.

3.5.5 Threatened fauna

Eight threatened species have been recorded on the Rosevale BOP (Table 3.15; Figure 3.1). There are records of the Superb Parrot within 10 kms of the property and areas of foraging habitat is present.

Table 3.15 Threatened fauna species recorded on the Rosevale BOP

Common Name	Scientific Name	BC Act Listing*	EPBC Act Listing*
Black-striped Wallaby	*Macropus dorsalis*	E	-
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V	V
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-
Little Lorikeet	*Glossopsitta pusilla*	V	-
Speckled Warbler	*Chthonicola sagittata*	V	-
Varied Sittella	*Daphoenositta chrysoptera*	V	-
White-throated Needletail	*Hirundapus caudacutus*	-	V
Yellow-bellied Sheathtail-Bat	*Saccolaimus flaviventris*	V	-

* V= Vulnerable, E= Endangered, CE= Critically Endangered

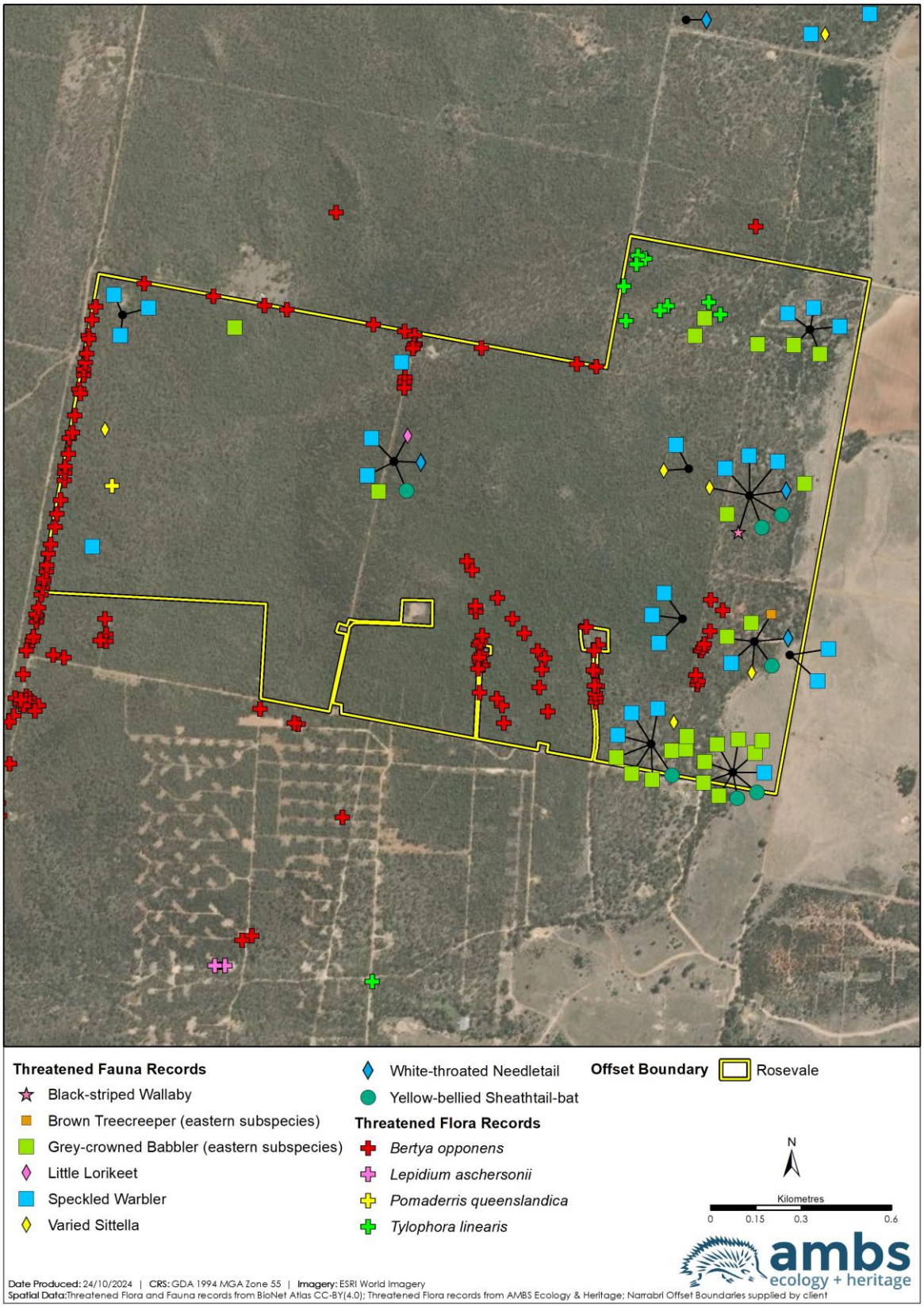


Figure 3.10 Location of Threatened species recorded on the Rosevale BOP

3.6 Kurrajong Park

3.6.1 Vegetation

Two plant community types were described and mapped across the Kurrajong Park BOP. The PCTs are listed in Table 3.16, shown in Figure 3.11 and described below.

Table 3.16 Area and condition of plant community types on Kurrajong Park BOP

PCT ID	Plant Community Type (PCT)	Condition	Kurrajong Park Area (ha)
404	Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Good	18.28
406	White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	Good	1.72
Total Native Vegetation			20

PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland

PCT Name: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOP PCT 404 is the dominant vegetation type. This community occurs on sandy soils and grades into PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests, which occur on associated rocky rises. This community is in relatively intact condition (moderate to good).

The community is a mid-high to tall, shrubby woodland with a canopy dominated by *Eucalyptus fibrosa* (Red Ironbark) and *Corymbia trachyphloia* (White Bloodwood). The canopy may also include *Eucalyptus dwyeri* (Dwyer's Red Gum), *Callitris glaucophylla* (White Cypress Pine) or *Callitris endlicheri* (Black Cypress Pine). A small tree layer dominated by *Acacia burrowii* (Burrow's Wattle) and *Allocasuarina diminuta* is often present. In some areas, *Acacia burrowii* may dominate in response to fire.

The shrub layer may be dense and contains a diverse range of species, including *Philotheca ciliata* (Wax Flower), *Phebalium squamulosum* (Scaly Phebalium), *Calytrix tetragona* (Common Fringe Myrtle) and *Harmogia densiflora*. The vulnerable shrub *Bertya opponens* (Coolabah Bertya), may be dominant in some areas. A sparse low shrub layer is also often present and includes *Homoranthus flavescens* and *Melichrus urceolatus* (Urn Heath).

The ground layer is typically sparse but may be dense in patches and is commonly dominated by grasses including *Thyridolepis mitchelliana* (Mulga Mitchell Grass), *Aristida ramosa* (Purple Wiregrass), *Cleistochloa rigida* and sedges including *Schoenus kennyi* and *Gahnia aspera* (Rough Saw Sedge). Forb species commonly present include *Gonocarpus elatus, Goodenia rotundifolia, Pomax umbellata* (Pomax), *Actinotus gibbonsii, Tricoryne elatior* (Yellow Autumn-lily) and *Chrysocephalum apiculatum* (Yellow Buttons).

PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest

PCT Name: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property

Within the BOP PCT 406 occurs in the north. This community typically occurs on rocky rises in the eastern Pilliga region. PCT 406 intergrades with the surrounding PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests. Across the study area, this community occurs in a relatively intact (moderate to good) condition.

The community is a mid-high to tall shrubby woodland with a canopy dominated by *Eucalyptus fibrosa* (Red Ironbark) and *Corymbia trachyphloia* (White Bloodwood). This community is characterised by a small tree layer dominated by *Acacia cheelii* (Motherumbah). *Eucalyptus dwyeri* (Dwyer's Red Gum) and *Alphitonia excelsa* (Red Ash) may also be present.

The shrub layer is typically dense and dominated by a diverse range of tall shrubs, including *Philotheca difformis* (Small-leaf Wax-flower), *Philotheca salsolifolia, Philotheca ciliata*, *Phebalium squamulosum* (Scaly Phebalium) and *Calytrix tetragona* (Common Fringe Myrtle). The vulnerable shrub *Bertya opponens* (Coolabah Bertya) may be dominant in some areas. A sparse low shrub layer is often present and includes *Homoranthus flavescens* and *Melichrus urceolatus* (Urn Heath).

The ground layer is variable and may be sparse or in mid to dense in places. Common grass species include *Cleistochloa rigida, Thyridolepis mitchelliana* (Mulga Mitchell Grass) and *Aristida ramosa* (Purple Wiregrass). The sedges *Lepidosperma laterale* and *Schoenus kennyi* are often present. The ground layer may also include a range of forb species such as *Goodenia rotundifolia*, *Stypandra glauca* (Nodding Blue Lily) and *Chloanthes parviflora*.

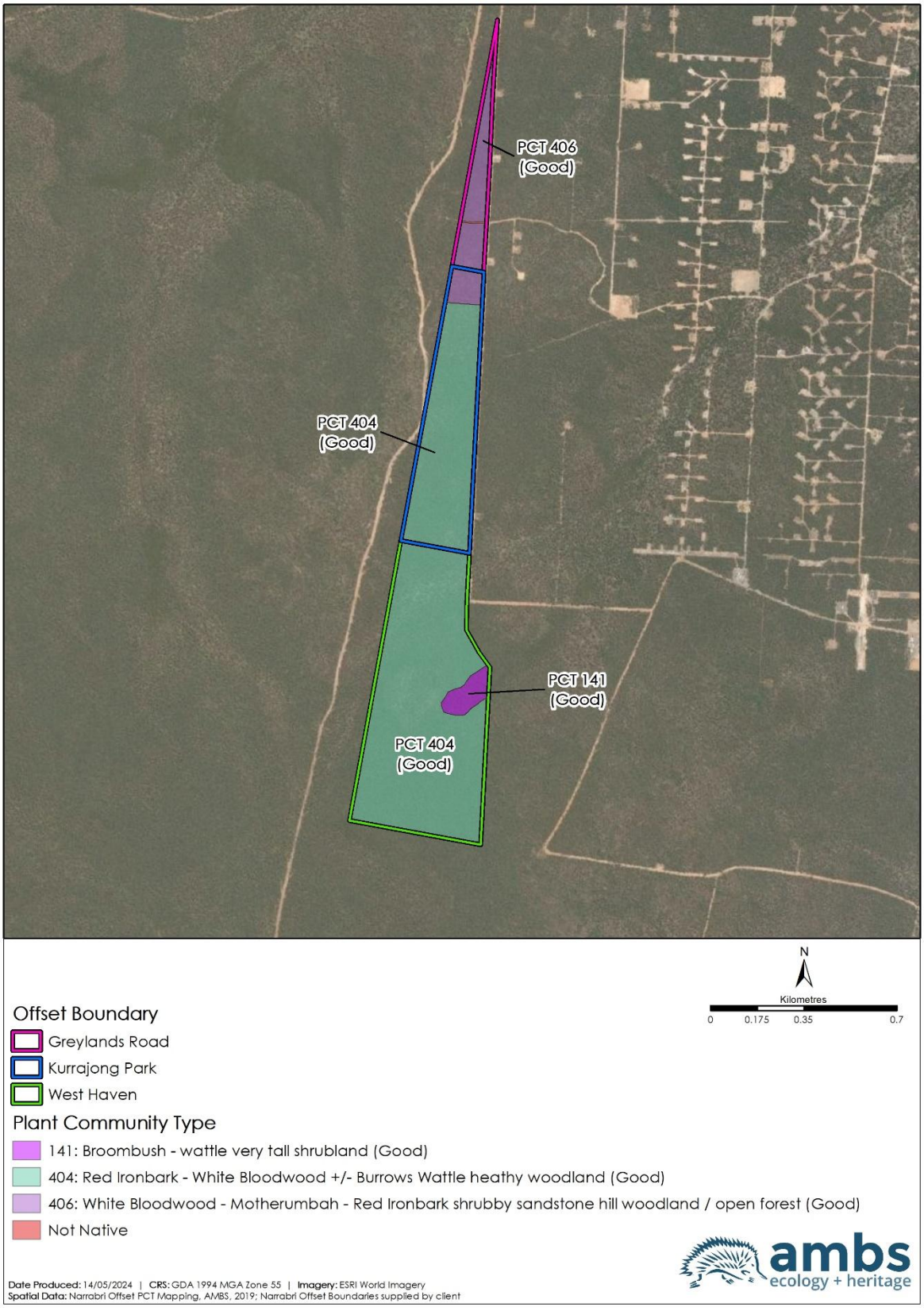


Figure 3.11 Map of the Plant Community Types on the Kurrajong Park BOP

3.6.2 Threatened Ecological Communities

No Threatened Ecological Communities (TECs) have been designated to vegetation in the Kurrajong Park BOP.

3.6.3 Threatened plants

One threatened flora species, *Bertya opponens* (Coolabah Bertya), has been recorded on the Kurrajong BOP (Figure 3.12).

3.6.4 Fauna habitat

A range of fauna habitat has been identified in PCTs across the Kurrajong BOP given the presence of hollow bearing trees, coarse woody debris, rock outcrops and small caves.

The Kurrajong Park BOP is imbedded in vegetation adjacent to the Jacks Creek State Forest which provides good connectivity to the west into the Pilliga National Park and south to the Pilliga Nature Reserve.

3.6.5 Threatened fauna

Three threatened species have been recorded on or immediately adjacent to the Kurrajong Park BOP (Table 3.17; Figure 3.12). There are records of the Superb Parrot within 10 km and there is potential foraging habitat on the property.

Table 3.17 Threatened fauna species recorded on or adjacent to the Kurrajong Park BOP

Common Name	Scientific Name	BC Act Listing*	EPBC Act Listing*
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-
Speckled Warbler	*Chthonicola sagittata*	V	-
White-throated Needletail	*Hirundapus caudacutus*	-	V

* V= Vulnerable, E= Endangered, CE= Critically Endangered

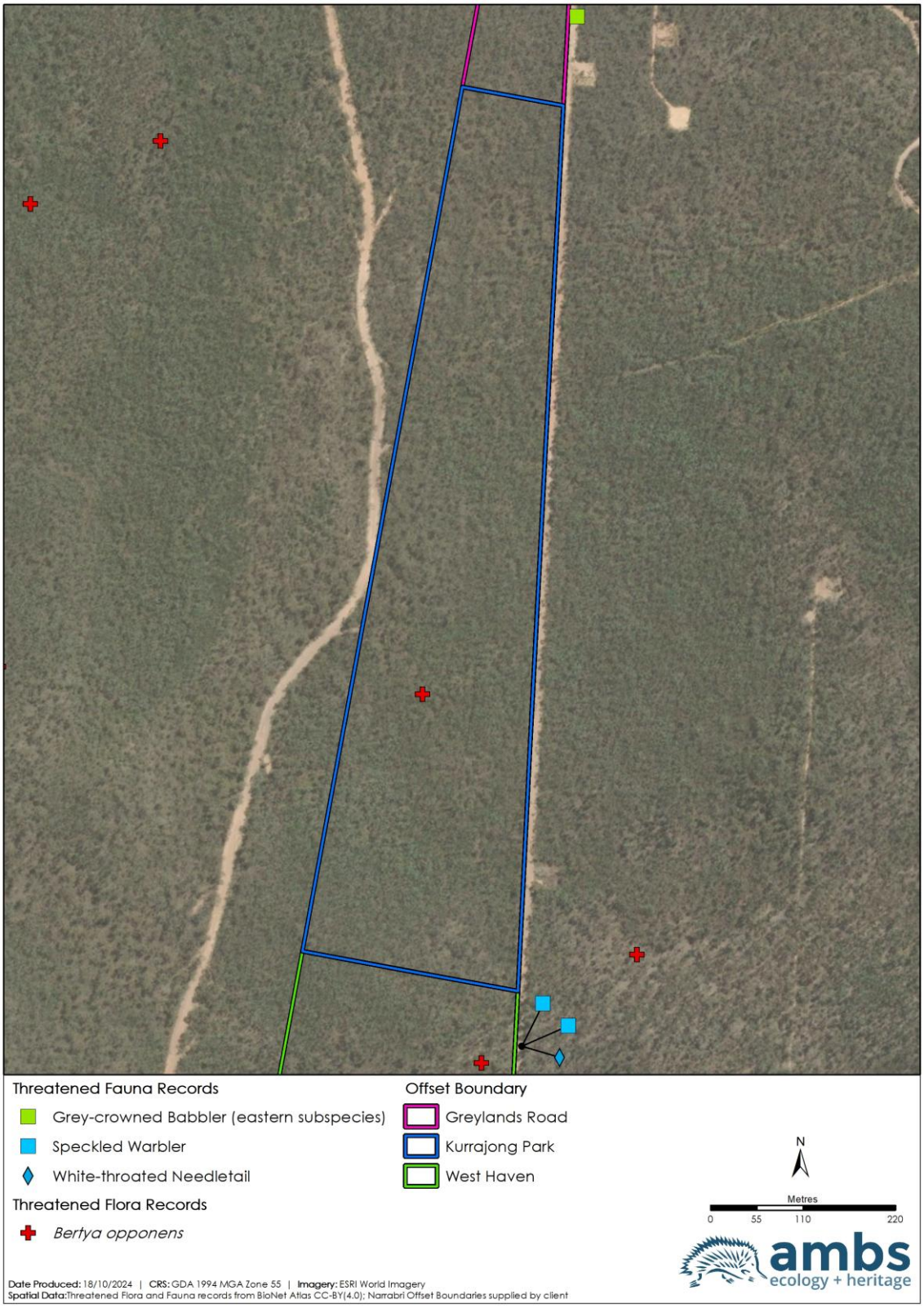


Figure 3.12 Location of threatened species recorded on or adjacent to the Kurrajong Park BOP

3.7 West Haven

3.7.1 Vegetation

Two plant community types were described and mapped across the West Haven BOP. The PCTs are listed in Table 3.18, shown in Figure 3.13 and described below.

Table 3.18 Area and condition of plant community types on West Haven BOP

PCT ID	Plant Community Type (PCT)	Condition	West Haven Area (ha)
141	Broombush - wattle very tall shrubland of the Pilliga to Goonoo regions, Brigalow Belt South Bioregion	Good	1.87
404	Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	Good	40.65
Total			**42.52**

PCT 141 Broombush - wattle very tall shrubland

PCT Name: Broombush - wattle very tall shrubland of the Pilliga to Goonoo regions, Brigalow Belt South Bioregion

Vegetation Class: Pilliga Outwash Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property
Within the West Haven BOP PCT 141 occurs in a single patch in the central east, this community is in relatively intact (good) condition.

This community is a tall shrubland, dominated by *Melaleuca uncinata* (Broombush), sometimes in association with *Acacia burrowii* (Burrow's Wattle). A sparse tree layer including *Eucalyptus fibrosa* (Red Ironbark) and *Corymbia trachyphloia* (White Bloodwood) may be present. A range of smaller shrubs also occur, including *Calytrix tetragona* (Common Fringe Myrtle), *Philotheca ciliata* (Wax Flower), *Phebalium squamulosum* (Scaly Phebalium) and Mint Bushes *Prostanthera ringens* (Gaping Mint-bush) and *Prostanthera granitica* (Granite Mintbush).

The ground layer is typically sparse and includes *Microlaena stipoides* subsp. *stipoides* (Weeping Grass), *Cheilanthes sieberi* subsp. *sieberi* (Poison Rock Fern), *Dianella revoluta* (Blue Flax-Lily) and *Goodenia rotundifolia*.

PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland

PCT Name: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests

Vegetation Class: Western Slopes Dry Sclerophyll Forests

EPBC Status: not listed

BC Status: not listed

Description on Property
Within the Biodiversity Offset Area, PCT 404 is the dominant vegetation type in West Haven. This community occurs on sandy soils and grades into PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests, which occur on associated rocky rises. This community is in relatively intact condition (moderate to good).

The community is a mid-high to tall, shrubby woodland with a canopy dominated by *Eucalyptus fibrosa* (Red Ironbark) and *Corymbia trachyphloia* (White Bloodwood). The canopy may also include *Eucalyptus dwyeri* (Dwyer's Red Gum), *Callitris glaucophylla* (White Cypress Pine) or *Callitris endlicheri* (Black Cypress Pine). A small tree layer dominated by *Acacia burrowii* (Burrow's Wattle) and *Allocasuarina diminuta* is often present. In some areas, *Acacia burrowii* may dominate in response to fire.

The shrub layer may be dense and contains a diverse range of species, including *Philotheca ciliata* (Wax Flower), *Phebalium squamulosum* (Scaly Phebalium), *Calytrix tetragona* (Common Fringe Myrtle) and *Harmogia densiflora*. The vulnerable shrub *Bertya opponens* (Coolabah Bertya), may be dominant in some areas. A sparse low shrub layer is also often present and includes *Homoranthus flavescens* and *Melichrus urceolatus* (Urn Heath).

The ground layer is typically sparse but may be dense in patches and is commonly dominated by grasses including *Thyridolepis mitchelliana* (Mulga Mitchell Grass), *Aristida ramosa* (Purple Wiregrass), *Cleistochloa rigida* and sedges including *Schoenus kennyi* and *Gahnia aspera* (Rough Saw Sedge). Forb species commonly present include *Gonocarpus elatus, Goodenia rotundifolia, Pomax umbellata* (Pomax), *Actinotus gibbonsii, Tricoryne elatior* (Yellow Autumn-lily) and *Chrysocephalum apiculatum* (Yellow Buttons).

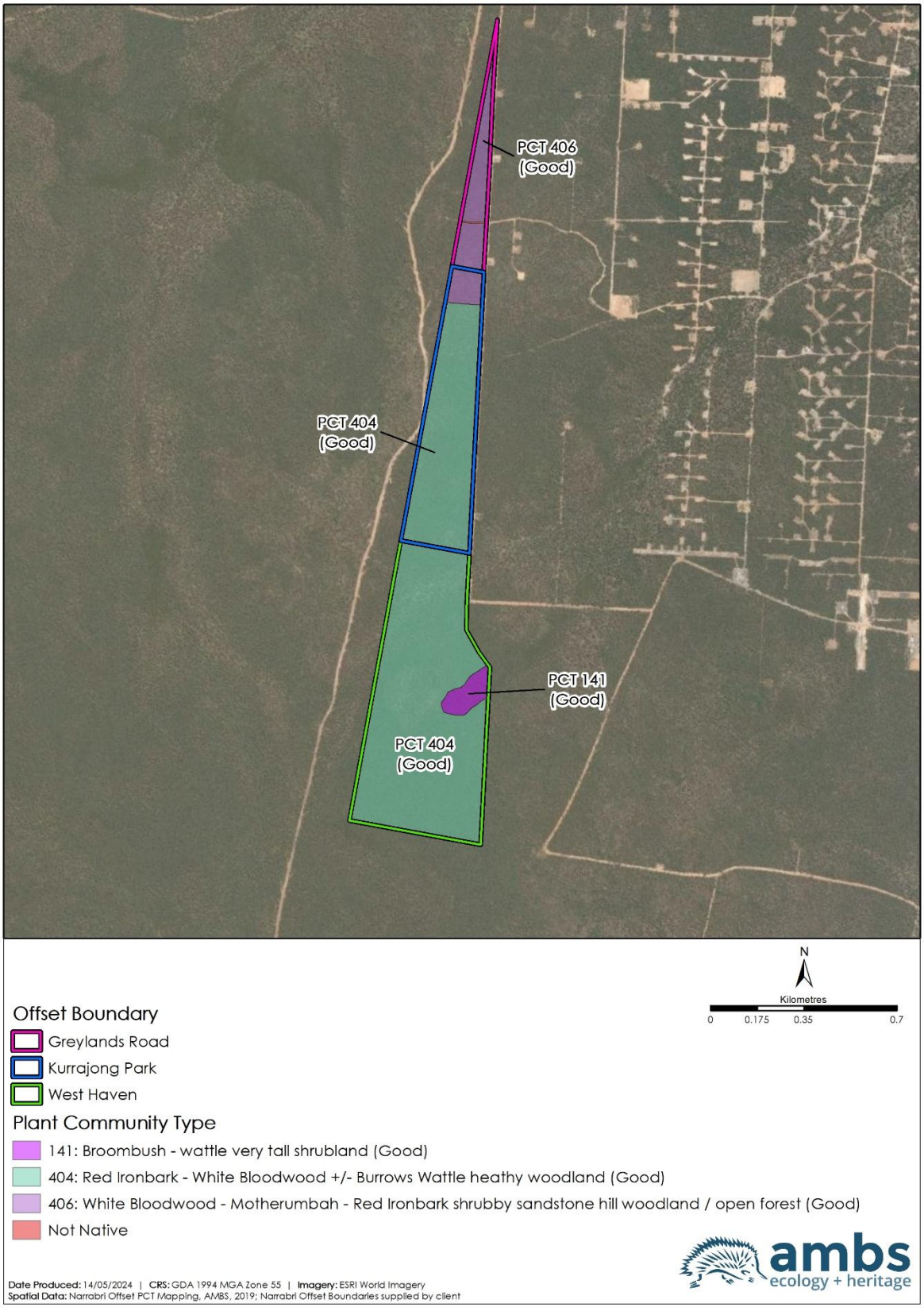


Figure 3.13 Map of the Plant Community Types on the West Haven BOP

3.7.2 Threatened Ecological Communities

No Threatened Ecological Communities (TECs) have been designated to vegetation in the West Haven BOP.

3.7.3 Threatened plants

Two threatened flora species have been recorded on the BOP, *Tylophora linearis* and *Bertya opponens* (Coolabah Bertya); with *Pomaderris queenslandica* (Scant Pomaderris) recorded nearby (Figure 3.14).

3.7.4 Fauna habitat

A range of fauna habitat has been identified in PCTs across the West Haven BOP given the presence of a dense shrub layer, hollow bearing trees, coarse woody debris, rock outcrops and small caves.

The West Haven BOP is imbedded in vegetation adjacent to the Jacks Creek State Forest which provides good connectivity to the west into the Pilliga National Park and south to the Pilliga Nature Reserve.

3.7.5 Threatened fauna

Three threatened species have been detected on or immediately adjacent to the Kurrajong Park BOP (Table 3.19; Figure 3.14). There are records of the Superb Parrot within 10 km and there is potential foraging habitat on the property.

Table 3.19 Threatened fauna species recorded on or adjacent to the West Haven BOP

Common Name	Scientific Name	BC Act Listing*	EPBC Act Listing*
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-
Speckled Warbler	*Chthonicola sagittata*	V	-
White-throated Needletail	*Hirundapus caudacutus*	-	V

* V= Vulnerable, E= Endangered, CE= Critically Endangered

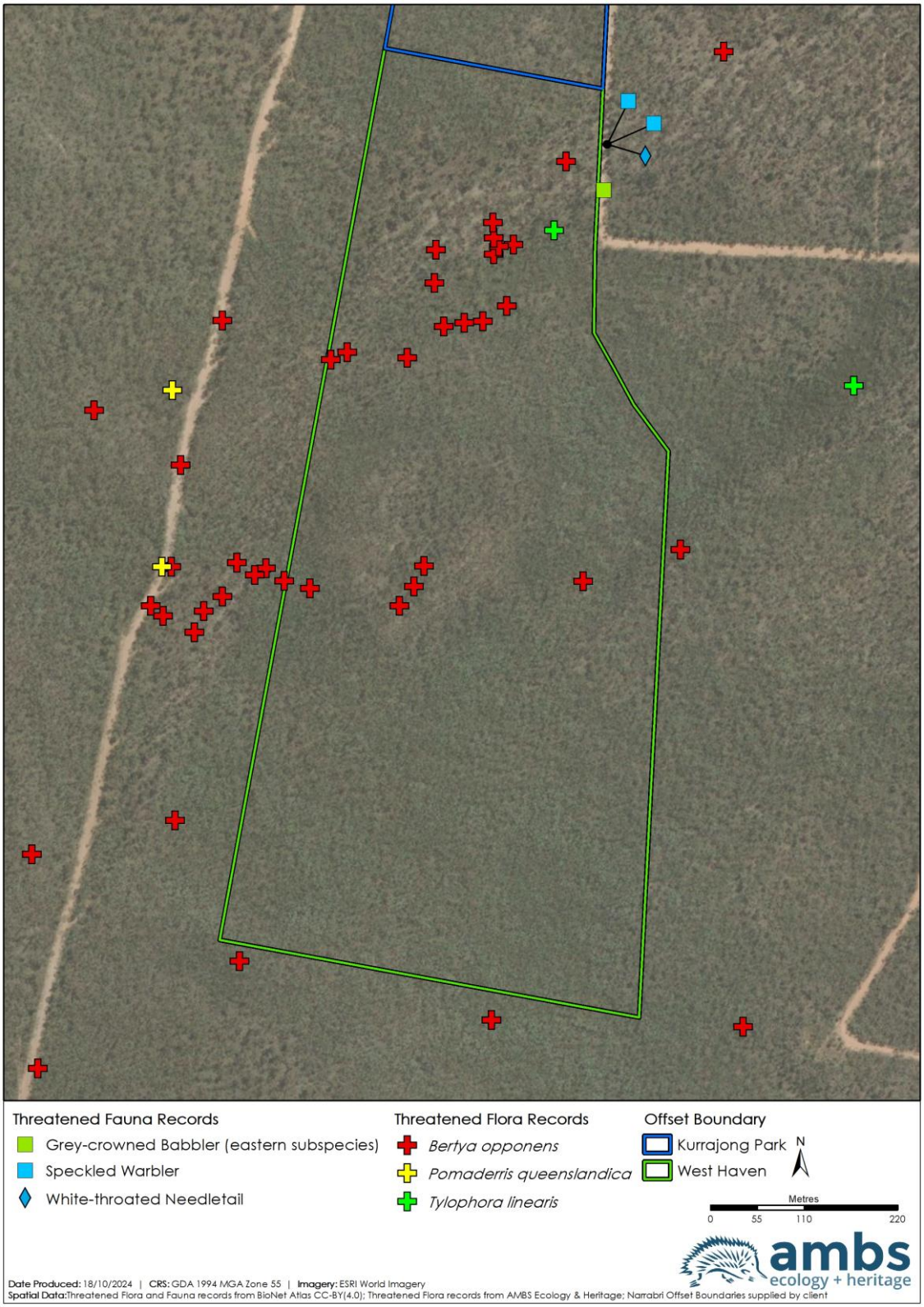


Figure 3.14 Location of threatened species recorded on or adjacent to the West Haven BOP

3.8 Description of Rehabilitation Area Offset

The Rehabilitation Area Offset covers up to 1,167.54 ha of woodland vegetation that may be subject to subsidence impacts (Figure 3.15) and mine site rehabilitation at NCM. This area adjoins four of the adjacent offset properties and is to be progressed following timing to be outlined in the NCM Rehabilitation Strategy, resulting in an overall NCM BOS of 2,842.02 ha (or reduces to 2,805.36 ha as per SSD-10269 Condition B45c). The vegetation mapped in this area has been equated to the following PCTs.

- Riparian Forest = PCT 101: Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion (8.63 ha).
- Inland Grey Box Woodland = PCT 81: Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion (89.89 ha).
- Brown Bloodwood Shrubby woodland = PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests; PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests; and PCT 409: Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region (1,069.02 ha).

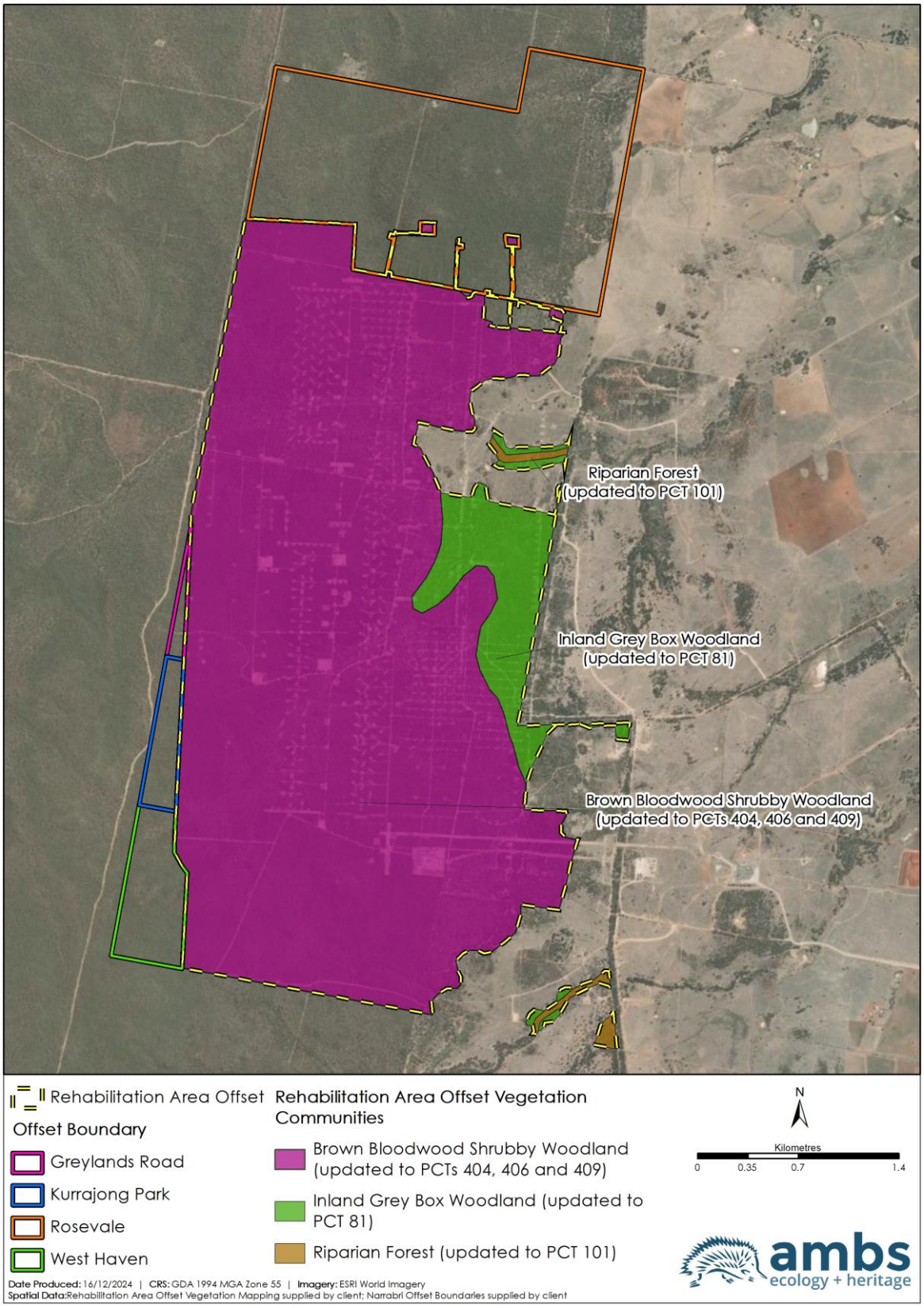


Figure 3.15 Location of the Mine Rehabilitation Area Offset

4 Summary of Findings

The following section provides a comparative summary of the proposed RBOS. NCM Stage 1 and 2 was originally approved under NSW Project Approval 08_0144 in 2010 (latest modification November 2021 MOD7) and the Commonwealth EPBC Approval 2009/5003 in 2011 (latest variation 24 March 2021). In April 2022 the NCM Stage 3 Mine received NSW Approval SSD-10269 to supersede PA 08_0144

4.1 Plant Community Types

Overall, the RBOS meets the biodiversity value requirements as per the NCM Stage 1 and 2 Approvals (08_0144 and when it is surrendered to SSD-10269 & EPBC 2009/5003) relating to the extent of offset area "to enhance", "like for like or better" and "maintain and improve" the habitat restoration (i.e. revegetation and habitat augmentation) for the *Bertya opponens*, Superb Parrot and White Box Grassy Woodland plus Inland Grey Box EEC. A number of vegetation community names have been updated as a result of the preparation of CAs and the application of the contemporary Plant Community Type (PCT) classification (DCCEEW 2024c). Table 4.1 provides a comparison of the vegetation community names used in the original BOS with the PCTs applied in this RBOS.

Please note that for the following community, *Red Ironbark - **Brown Bloodwood** shrubby woodland of the Brigalow Belt South Bioregion* described in the original BOS, *Corymbia trachyphloia* subsp. *amphistomatica* (Brown Bloodwood) is the same species referred to by the common name White Bloodwood and used in the following updated PCTs.

- PCT 404: Red Ironbark - **White Bloodwood** +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
- PCT 406: **White Bloodwood** - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
- PCT 409: Dirty (Baradine) Gum - **White Bloodwood** - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion

A total of 430.43 ha of native vegetation is preserved in the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs and 1,244.06 ha in the Kenna BOP.

Table 4.1 Comparison from original BOS to changes to Plant Community Names and area in hectares for each by BOP in the RBOS

Plant Community Name	Plant Community Name in Original BOS	Narrabri RBOS						
		Kenna (ha)	Greylands (ha)	Greylands Road (ha)	Omeo (ha)	Rosevale (ha)	Kurrajong Park (ha)	West Haven (ha)
PCT 78: River Red Gum riverine woodlands and forests in the Nandewar and Brigalow Belt South Bioregions	Same	35.10						
PCT 101: Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	New		2.32					
PCT 1313: White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Same	703.11						
PCT 1314: White Cypress Pine - Silver-leaved Ironbark - Tumbledown Red Gum shrubby open forest of the Nandewar and Brigalow Belt South Bioregions	Same	10.49						
PCT 1383: White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	Same	477.40						
PCT 141: Broombush - wattle very tall shrubland of the Pilliga to Goonoo regions, Brigalow Belt South Bioregion	New							1.87

Plant Community Name	Plant Community Name in Original BOS	Narrabri RBOS						
		Kenna (ha)	Greylands (ha)	Greylands Road (ha)	Omeo (ha)	Rosevale (ha)	Kurrajong Park (ha)	West Haven (ha)
PCT 401: Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region	New					1.91		
PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests	New					250.54	18.28	40.65
PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests	New			5.62		54.47	1.72	
PCT 409: Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion	New					3.01		
PCT 435: White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion	New					2.33		
PCT 619: Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion	Pilliga Box - Poplar Box- White Cypress Pine grassy open woodland on alluvial loams (DNG); White Box Grassy Woodland (DNG);		2.59		1.56	24.21		

Plant Community Name	Plant Community Name in Original BOS	Narrabri RBOS						
		Kenna (ha)	Greylands (ha)	Greylands Road (ha)	Omeo (ha)	Rosevale (ha)	Kurrajong Park (ha)	West Haven (ha)
PCT 81: Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	New				9.28			
PCT 88: Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Inland Grey Box Woodland		10.06					
PCT 885: Heathy shrublands on rocky outcrops of the western slopes	Same	17.96						
BVT: Inland Grey Box tall grassy woodland on clay soils in the Brigalow Belt South and Nandewar bioregions	Replaced with PCT 435					x		
BVT: Pilliga Box - Poplar Box- White Cypress Pine grassy open woodland on alluvial loams	Replaced with PCT435/81				x	x		
BVT: Red Ironbark - Brown Bloodwood shrubby woodland of the Brigalow Belt South Bioregion	Replaced with PCT 404/406/409			x		x	x	x
BVT: River Oak Riparian woodland of the Brigalow Belt South and Nandewar Bioregions	Replaced with PCT 88/101		x					
BVT: Rough-barked Apple riparian forb/grass open forest of the Nandewar Bioregion (Box Gum Woodland CEEC)	Replaced with PCT 88		x					
Total Native Vegetation		**1,244.06**	**14.97**	**5.62**	**10.84**	**336.47**	**20**	**42.52**

Plant Community Name	Plant Community Name in Original BOS	Narrabri RBOS						
		Kenna (ha)	Greylands (ha)	Greylands Road (ha)	Omeo (ha)	Rosevale (ha)	Kurrajong Park (ha)	West Haven (ha)
Not Native/Dam	-		0.12			0.59		
Not Native/Track	-			0.05				
Total Area of BOP		**1,244.06**	**15.09**	**5.67**	**10.84**	**337.06**	**20**	**42.52**

4.2 Threatened Ecological Communities

Overall, two Threatened Ecological Communities (TEC) are present within the Narrabri RBOS. One TEC has been identified in the Kenna BOP (Table 4.2, Figures 4.1). PCT 1383-White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregion' is consistent with the 'White Box-Yellow Box-Blakely's Red Gum grassy woodland' listed as critically endangered under the BC Act and under the EPBC Act. Currently 447.40 ha of this PCT meets the definition of the CEEC.

The other TEC has been identified in the Omeo BOP (Table 4.2; Figure 4.2). Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions' listed as an Endangered Ecological Community (EEC) under the BC Act and 'Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia' listed as Endangered Ecological Community (EEC) under the EPBC Act and occurs within areas of PCT 81 Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion. Currently 9.28 ha of this PCT meets the definition of the EEC.

The RBOS will result in no significant change to the area of TECs within the offsets (Table 4.2).

Table 4.2 Summary Table BOA previous and revised TEC areas

Threatened Ecological Community	Original BOS		Revised BOS	
	Kenna	Omeo	Kenna	Omeo
Grey Box Grassy Woodland EEC		10		9.28
White Box Yellow Box Blakely's Red Gum Woodland CEEC	476.91		477.40	
Total Threatened Ecological Community	**486.91**		**486.68**	

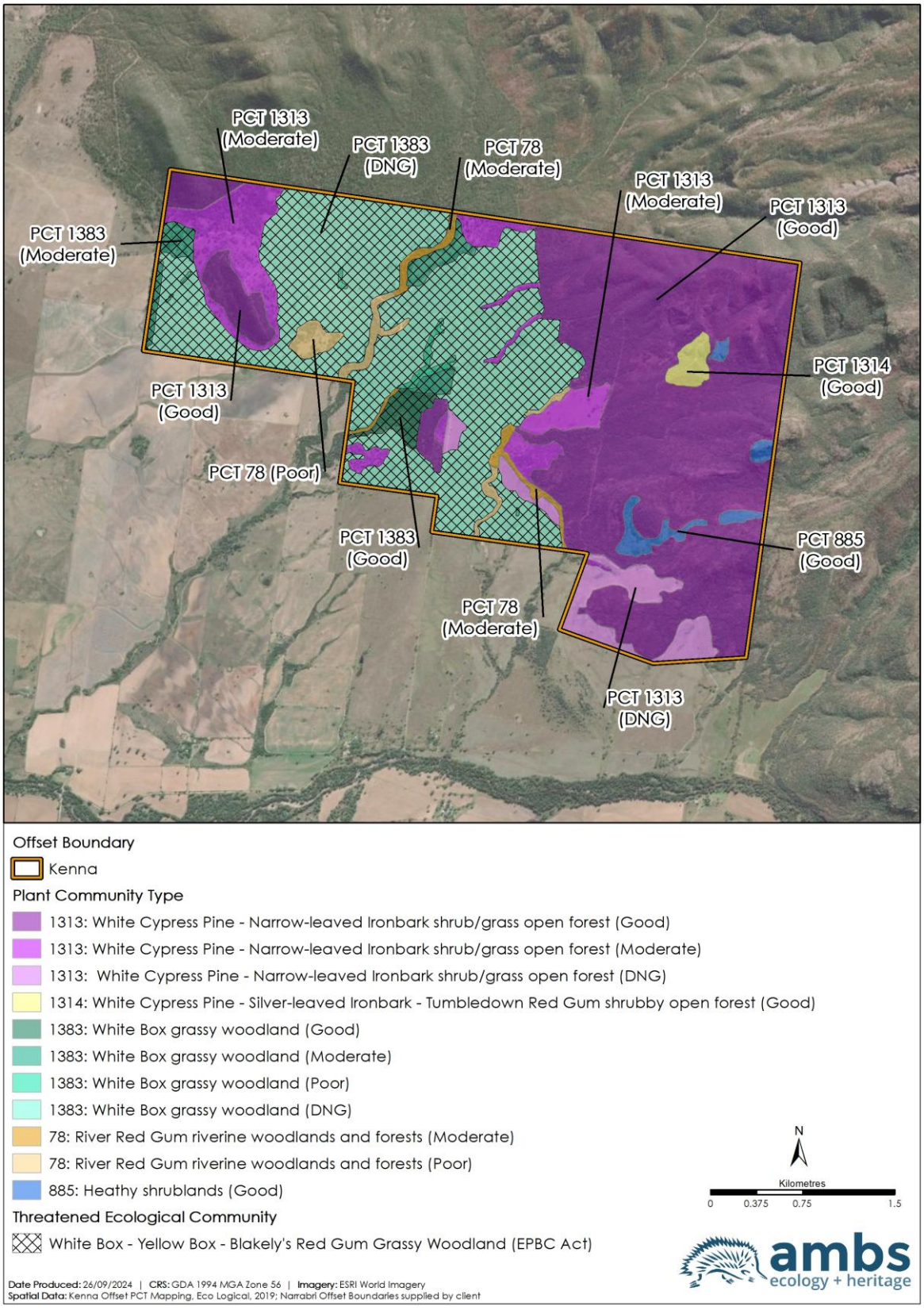


Figure 4.1 Map of Threatened Ecological communities on Kenna BOP

Figure 4.2 Map of Threatened Ecological communities on Omeo BOP

4.3 Threatened plants

Habitat for the threatened plant *Bertya opponens*, which is listed as Vulnerable under the BC and EPBC Acts, is required to be protected under the EPBC Act Approval 2009/5003 that forms a portion of the total 422 ha former on-site offset specifically within the Rosevale, Greylands Road and Kurrajong Park BOPs.

The original BOS package for *Bertya opponens* included the protection of nearly 380 ha of Red Ironbark – Brown Bloodwood shrubby woodland (not affected by any direct or indirect impacts of the project) and a further 297 ha of the same vegetation community occupied by *Bertya opponens* which is located within the 1,069.02 affected by subsidence. Contemporary mapping has designated two PCTs to this original vegetation community, PCT 404 Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests and PCT 406 White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests. The original area covered by Brown Bloodwood shrubby woodland also included PCT 409 Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion (3.01 ha on Rosevale), however this PCT is not listed as potential habitat for *Bertya opponens* and has been excluded from the Habitat for Bertya opponens in Table 4.3

A total of 373.61 ha of habitat for *Bertya opponens* is mapped in this RBOS within the Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs and a further 1,069.02 ha in areas of these PCTs effected by subsidence within the NCM rehabilitation area (Table 4.3; Figure 4.3).

Table 4.3 Habitat for *Bertya opponens* on the BOPs

BOP	Area in BOP (ha)	PCT
Rosevale	250.54	PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
Kurrajong Park	18.28	PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
Greylands Road	5.62	PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
Rosevale	54.47	PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
Kurrajong Park	1.72	PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
Rosevale	2.33	PCT 435: White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion
West Haven	40.65	PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
Subtotal	**373.61**	

BOP	Area in BOP (ha)	PCT
Within NCM rehabilitation subsidence affected area	1,069.02	PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests; PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests;
Total	**1,442.63**	

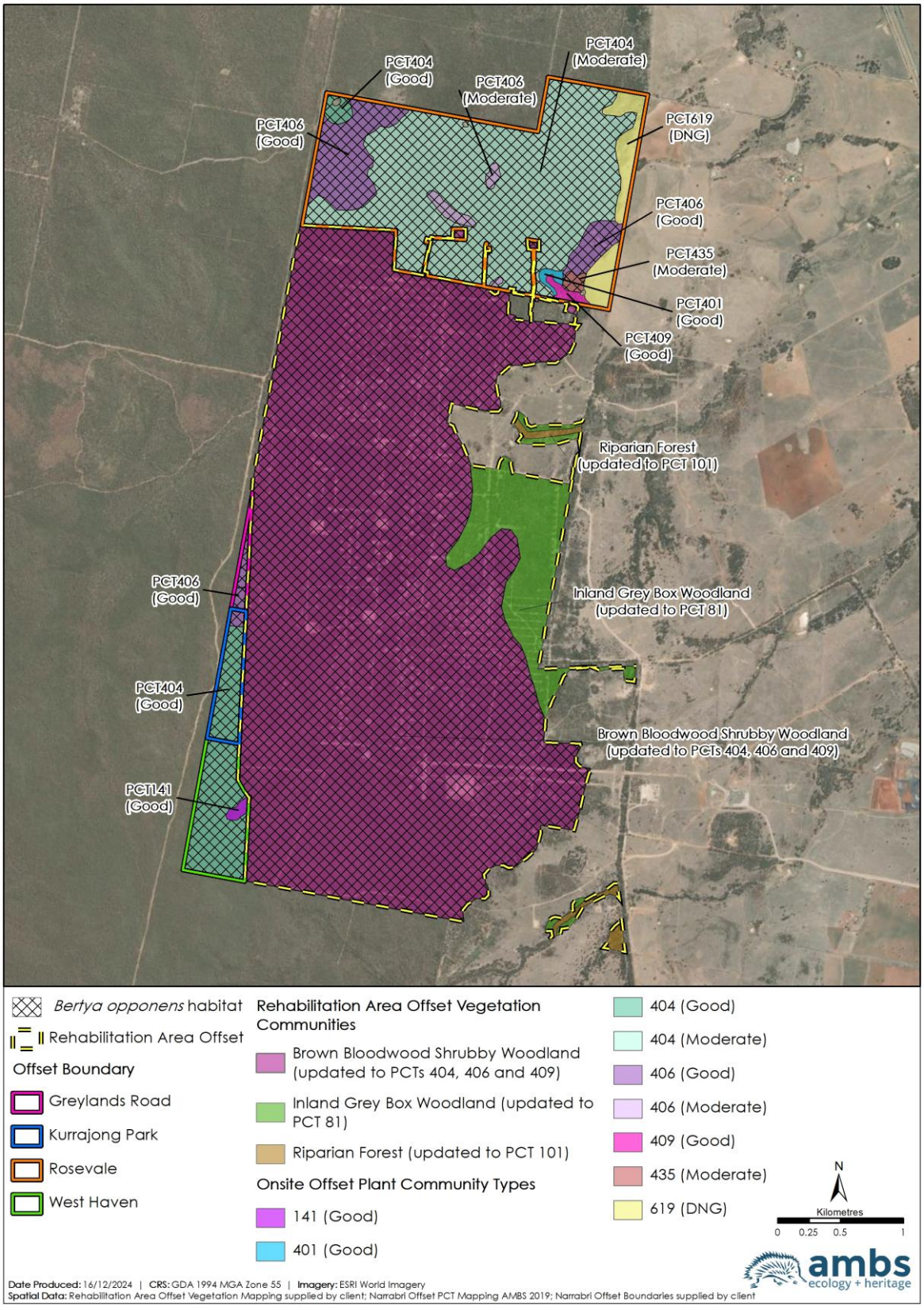


Figure 4.3 Location of *Bertya opponens* habitat in onsite BOPs and NCM rehabilitation area

4.4 Threatened fauna

The key focus of this RBOS in regard to threatened fauna is providing, rehabilitating and managing habitat for the Superb Parrot, specifically;

- White Box Grassy Woodland habitat for the Superb Parrot, located on the Kenna BOP, requires management and enhancement through the implementation of vegetation rehabilitation and restoration measures, pest management, fencing, weed control, fire management, sediment and erosion control, exclusion of livestock and restrictions of access, and,
- Red Ironbark – Brown Bloodwood Shrubby Woodland habitat on the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs requires management and enhancement through the implementation of vegetation rehabilitation and restoration measures, pest management, fencing, weed control, fire management, sediment and erosion control, exclusion of livestock and restrictions of access.

Areas of White Box Grassy Woodland on Kenna and Red Ironbark – Brown Bloodwood Shrubby Woodland on the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs providing habitat for the threatened species are listed in Table 4.4 and shown on Figures 4.4 and 4.5. WHC has revegetated 434.92 ha of White Box Grassy Woodland DNG in the Kenna BOP.

A total of 1,944.28 ha of habitat for the Superb Parrot is mapped in this RBOS within the Kenna, Greylands, Rosevale, Omeo, Greylands Road, West Haven and Kurrajong Park BOPs and the subsidence affected area.

Table 4.4 Habitat for the Superb Parrot on the BOPs

BOPs	Area in BOP	PCT
Kenna	477.40	1383: White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions
Greylands	2.32	PCT 101: Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion
Rosevale	1.91	PCT 401: Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region
Omeo	9.28	PCT 81: Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion
Greylands	10.06	PCT 88: Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion
Greylands Road	5.62	406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
Rosevale	250.54	404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
Rosevale	54.47	406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
Rosevale	3.01	409: Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion
Kurrajong Park	18.28	404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests

BOPs	Area in BOP	PCT
Kurrajong Park	1.72	406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests
West Haven	40.65	404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests
Subsidence effected area	1,069.02	PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests; and PCT 409: Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion
Total	**1,944.28**	

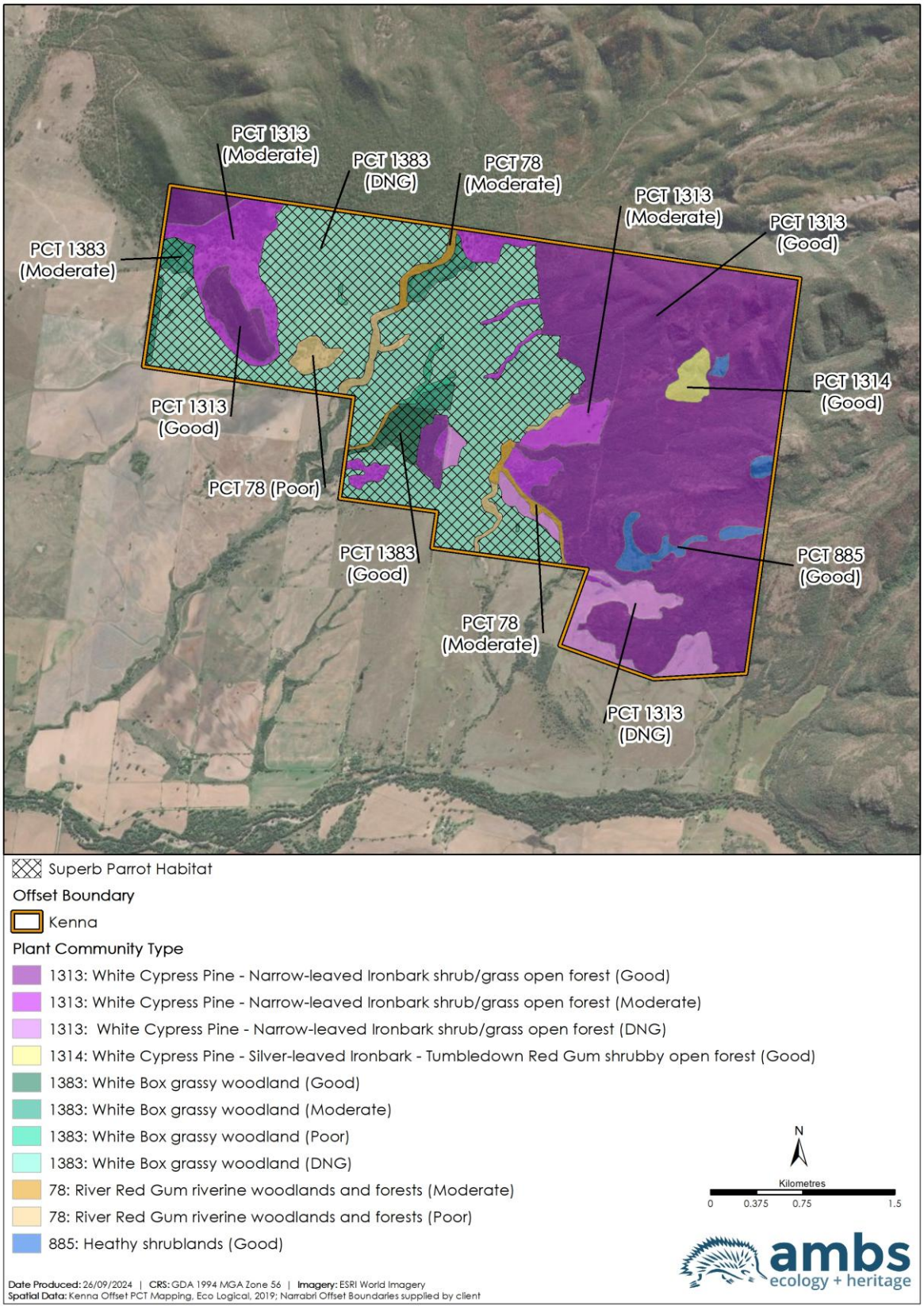


Figure 4.4 Location of Superb Parrot habitat in the Kenna BOP

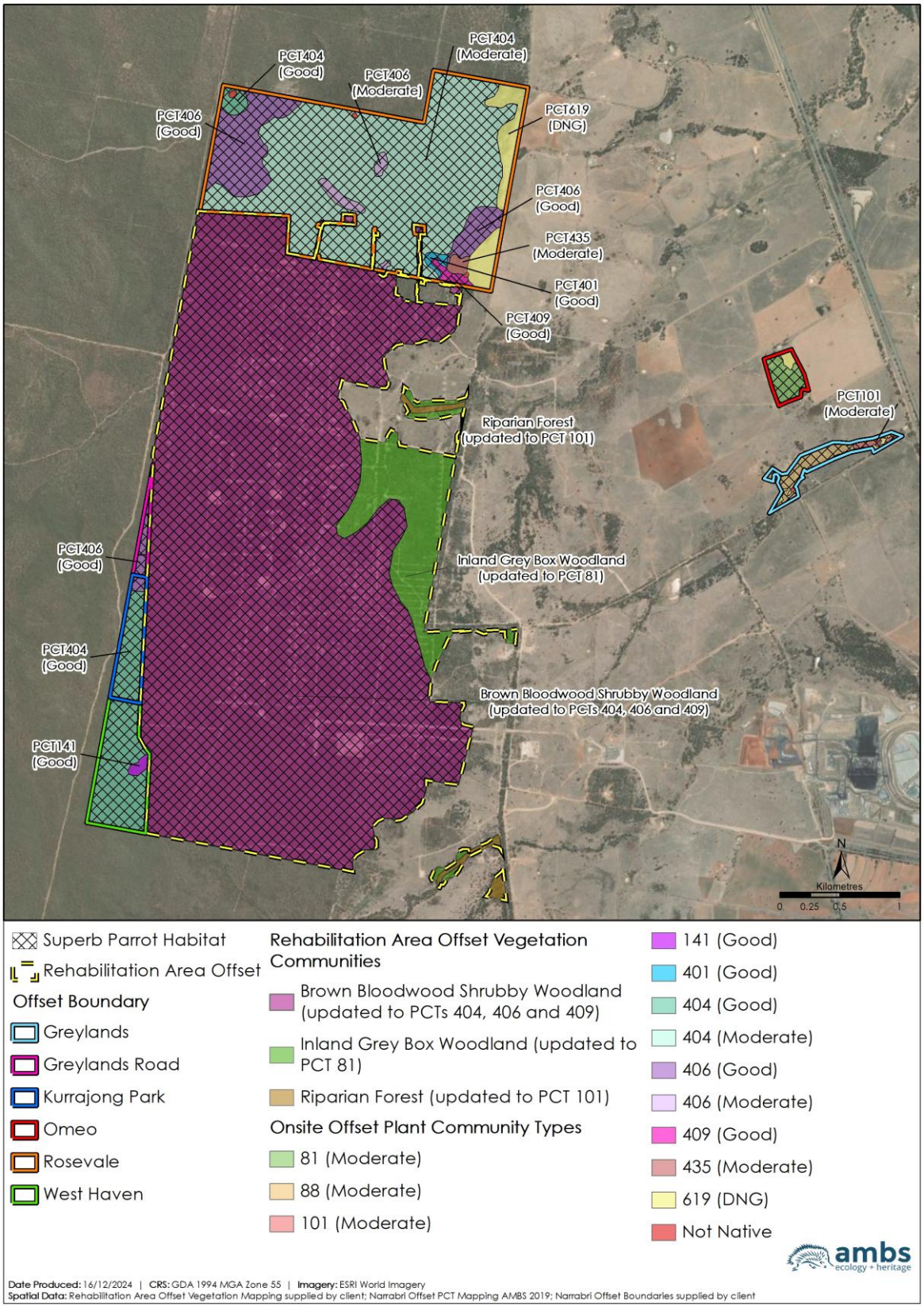


Figure 4.5 Location of Superb Parrot habitat in the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs

4.5 Rehabilitation Area as part of the approved BOS

This RBOS does not alter or vary the intent of the original BOS to establish a NCM Rehabilitation Area Offset affected by subsidence that has been transferred through to SSD-10269 Condition B45. While this RBOS addresses the external land-based components of the Narrabri RBOS; the description and implementation of the Rehabilitation Area Offset is to be documented in the NCM Rehabilitation Strategy. As described above in Section 3.8; the Rehabilitation Area Offset covers up to 1,167.54 ha of woodland vegetation that adjoins four of the adjacent BOPs as part of the overall NCM BOS area of 2,842.02 ha.

With PA 08_0144 to be surrendered, going forward the securement of the remaining component of the Stage 2 BOS, called the Rehabilitation Area Offset, will be guided by SSD-10269 Condition B46 currently designating that suitable arrangements to provide appropriate long-term security within 3 years of commencing development be made. However, if another date is agreed by the Secretary and to the satisfaction of the Planning Secretary then NCM will secure the Rehabilitation Area Offset with timing to be outlined in the NCM Rehabilitation Strategy to allow for post mining rehabilitation and subsidence mitigation as well as for the Conservation Agreement process managed by NSW BCT.

4.6 Required area of NCM RBOS

Approval SSD-10269 requires NCM to have a BOS with a minimum area of 2,832.79 ha (not considering if NCM decides to forego Stage 2 footprint 14.1 ha of disturbance, which could reduce the minimum BOS area by 36.66 ha to 2,796.13 ha under SSD-10269 Condition B45c).

The RBOS covers an area of native vegetation of 1,244.06 ha from the Kenna offset property and 430.42 ha from the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs (Table 4.5) a total of 1,674.48 ha. Furthermore, up to 1,167.54 ha of woodland vegetation that may be subject to subsidence impacts and mine site rehabilitation at NCM, adjoining four of the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs will be progressed following timing to be outlined in the NCM Rehabilitation Strategy, resulting in an overall NCM BOS of 2,842.02 ha (or reduces to 2,805.36 as per SSD-10269 Condition B45c).

Table 4.5 Required Areas of Native Vegetation covered by the RBOS

Plant Community Type described in this RBOS	Vegetation Type Required	Biodiversity Offset Property	Total Area in BOPs	NCM Rehabilitation Offset Area	Final Area
PCT 404: Red Ironbark - White Bloodwood +/- Burrows Wattle heathy woodland on sandy soil in the Pilliga forests; PCT 406: White Bloodwood - Motherumbah - Red Ironbark shrubby sandstone hill woodland / open forest mainly in east Pilliga forests; PCT 409: Dirty (Baradine) Gum - White Bloodwood - White Cypress Pine - Motherumbah shrubby woodland on sandy soils in the Pilliga Scrub and surrounding region, Brigalow Belt South Bioregion	Red Ironbark - Brown Bloodwood shrubby woodland of the Brigalow Belt South Bioregion	Rosevale, Greylands Road, Kurrajong Park and West Haven	374.29	1,069.02	1,443.31
PCT 1383: White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	At least 933 hectares of offset on the Kenna property, which contains White Box Grassy Woodland	Kenna	477.40	0	477.40
PCT 401: Rough-barked Apple - Blakely's Red Gum - Black Cypress Pine woodland on sandy flats, mainly in the Pilliga Scrub region	Other Native Vegetation	Rosevale	1.91	0	1.91
PCT 1313: White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion	Other Native Vegetation	Kenna	703.11	0	703.11
PCT 81: Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion;	Other Native Vegetation	Omeo	9.28	89.89	99.17
PCT 101: Poplar Box - Yellow Box - Western Grey Box grassy woodland on cracking clay soils mainly in the Liverpool Plains, Brigalow Belt South Bioregion	Other Native Vegetation	Greylands	2.32	8.63	10.95
PCT 435: White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion	Other Native Vegetation	Rosevale	2.33	0	2.33

Plant Community Type described in this RBOS	Vegetation Type Required	Biodiversity Offset Property	Total Area in BOPs	NCM Rehabilitation Offset Area	Final Area
PCT 141: Broombush - wattle very tall shrubland of the Pilliga to Goonoo regions, Brigalow Belt South Bioregion	Other Native Vegetation	West Haven	1.87	0	1.87
PCT 78: River Red Gum riverine woodlands and forests in the Nandewar and Brigalow Belt South Bioregions	Other Native Vegetation	Kenna	35.10	0	35.10
PCT 1314: White Cypress Pine - Silver-leaved Ironbark - Tumbledown Red Gum shrubby open forest of the Nandewar and Brigalow Belt South Bioregions	Other Native Vegetation	Kenna	10.49	0	10.49
PCT 885: Heathy shrublands on rocky outcrops of the western slopes	Other Native Vegetation	Kenna	17.96	0	17.96
PCT 88: Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion	Other Native Vegetation	Greylands	10.06	0	10.06
PCT 619: Derived Wire Grass grassland of the NSW Brigalow Belt South Bioregion and Nandewar Bioregion	Other Native Vegetation	Greylands, Omeo, Rosevale	28.36	0	28.36
Totals			**1,674.48**	**1,167.54**	**2,842.02**

5 Conclusion

This RBOS covers an area of native vegetation on the Kenna offset property of 1,244.06 ha and on the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven BOPs of 430.42ha. Furthermore, up to 1,167.54 ha of woodland vegetation that may be subject to subsidence impacts and mine site rehabilitation at NCM, adjoining four of the other BOPs will be progressed following timing to be outlined in the NCM Rehabilitation Strategy, resulting in an overall NCM BOS of 2,842.02 ha (or reduces to 2,805.36 ha as per SSD-10269 Condition B45c).

This RBOS does not alter or vary exiting BOS commitments as described in NSW Project Approval PA 08_0144 and SSD-10269 and Commonwealth EPBC Approval 2009/5003. All commitments are maintained or exceeded (Table 6.1)

This RBOS does not alter or vary the commitment as described in the original BOS (NSW Approval SSD-10269 Condition B45c) for a Rehabilitation Area as part of the Offset package. This RBOS only addresses the external land-based components of the NCM BOS; and as such the description and implementation of the Rehabilitation Area Offset (1,167.54 ha of native woodland vegetation) is to be outlined in the NCM Rehabilitation Strategy.

Table 5.1 Summary of requirements of NSW Project Approval SSD-10269 and EPBC Approval 2009/5003 and how they have been met

Biodiversity Offset Strategy Criteria (SSD-10269 and/or EPBC 2009/5003)	Required Quantum for Biodiversity Offset Strategy (ha)	Quantum in Revised Biodiversity Offset Strategy (ha)	Difference (Revised BOS – Required BOS) (ha)
Enhance at least 933 hectares of offset on the Kenna property, which contains White Box Grassy Woodland habitat for the Superb Parrot (EPBC Approval 2009/5003 Condition 2a and 14a)	933	1,244.06	311.06 +
At least 422 hectares of offset on the Greylands, Omeo, Rosevale, Greylands Road, Kurrajong Park and West Haven properties of Red Ironbark – Brown Bloodwood Shrubby Woodland, which is habitat for *Bertya opponens* and the Superb Parrot (EPBC Approval 2009/5003 Condition 2b and 14b)	422	1,442.63 *(Bertya opponens*) 1,944.28 (Superb Parrot)	1,020.63 + 1,522.28+
The overall BOS is required to cover an area of 2,832.79 ha (but if Stage 2 disturbance footprint foregoes 14.1 ha then this can be reduced to 2,796.13 ha) (NSW Approval SSD-10269 Condition B45c)	2,832.79 (or reduced by 36.66 to 2,796.13)	2,842.02 (or 2,805.36 if reduced)	9.23 +

The RBOS consists of Property adjoining Mount Kaputar National Park that meets 'like for like or better' requirements and 'maintains or improves' conservation outcomes (NSW Approval PA 08_0144 Condition 6c)

The RBOS confirms offsets to the impacts to Inland Grey Box EEC, *Bertya opponens* and Superb Parrot foraging habitat (NSW Approval PA 08_0144 Condition 6d).

Bibliography

AMBS (2019b). Bird Surveys in Whitehaven Offset Areas – Winter 2018. AMBS Ecology & Heritage

AMBS (2020a). Narrabri Mine Onsite Offset Biodiversity Constraints Due Diligence Report. Consultancy report to Whitehaven Coal Pty Ltd. AMBS Ecology & Heritage

AMBS (2020b). Bird Surveys in Whitehaven Offset Areas – Winter 2019 AMBS Ecology & Heritage

AMBS (2020c). 5 – Year Review of the Annual Fauna Monitoring Program Data for the Maules Creek and Tarrawonga Biodiversity Offsets. AMBS Ecology & Heritage

AMBS (2020d). - Habitat Needs Assessment for the Whitehaven Offset Properties; AMBS Ecology & Heritage

AMBS (2022). Koala Monitoring on the Whitehaven Coal Biodiversity Offset Areas 2020 - 2022 AMBS Ecology & Heritage

AMBS (2023a). Koala Monitoring on the Whitehaven Coal Biodiversity Offset Areas 2022 – 2023 AMBS Ecology & Heritage

AMBS (2023b). Fauna Monitoring of the Whitehaven Coal Biodiversity Offset Properties June 2020 to July 2023. Consultancy report to Whitehaven Coal Limited.

Commonwealth Threatened Species Scientific Committee (2006). White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Listing Advice, Australian Government. https://www.dcceew.gov.au/sites/default/files/env/pages/dcad3aa6-2230-44cb-9a2f-5e1dca33db6b/files/box-gum.pdf

Commonwealth Threatened Species Scientific Committee (2010). Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia, Listing Advice, Australian Government.

DAWE (2021). Narrabri Coal Mine, Stage 2 Longwall Project, Narrabri, NSW (EPBC 2009/5003), Australian Government. Department of Agriculture, Water and the Environment

DCCEEW (2024a). NSW BioNet Atlas, State Government of NSW, and Department of Planning, and Environment

DCCEEW (2024b). Threatened Biodiversity Data Collection. New South Wales Department of Planning, and Environment Website: http://www.bionet.nsw.gov.au/. [Accessed 2024].

DCCEEW (2024c). NSW BioNet Vegetation Classification https://vegetation.bionet.nsw.gov.au/

Department of Planning & Government, (2021). Narrabri Coal Project - Stage 2, Project Approval, Application Number 08_0144, NSW Government.

Department of Planning & Government (2022). Narrabri Underground Mine Stage 3 Extension Project, Application Number SSD-10269, NSW Government.

DPIE (2017). Biometric Vegetation Type Archives. NSW Department of Planning, Industry and Environment. [Accessed 2024] https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet/about-bionet-vegetation-classification/archived-biometric-datasets

EcoLogical Australia (2014). Narrabri Coal Mine Stage 1 and 2 Biodiversity Offset Strategy. Prepared for Whitehaven Coal Limited.

EcoLogical Australia (2019). Narrabri Coal Mine Stage 1 and 2, Biodiversity Offset Strategy – Draft Revision.

Ecotone (2009). Narrabri Coal Project Flora and Fauna Impact. Assessment. Specialist Consultant Studies Compendium Volume 2, Part 4 for Environmental Assessment. Ecological Consultants Pty Ltd. Prepared for R.W. Corkery and Co Pty Ltd. Warratah, NSW.

NSW DCCEEW (2024). White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the Brigalow Belt South NSW Government Office of Environment and Heritage. [Accessed 2024] https://www.environment.nsw.gov.au/threatenedspeciesapp/profileData.aspx?id=10837&cmaName=Brigalow+Belt+South

NSW Land Registry Services (2019). Conservation Agreement VCA0486, Kenna Biodiversity Offset Area. NSW Government.

NSW Land Registry Services (2021a). Conservation Agreement VCA0495, Omeo Biodiversity Offset Area. NSW Government.

NSW Land Registry Services (2021b). Conservation Agreement VCA0496, Greylands Road Biodiversity Offset Area. NSW Government.

NSW Land Registry Services (2021c). Conservation Agreement VCA0528, Greylands Biodiversity Offset Area. NSW Government.

NSW Land Registry Services (2021d). Conservation Agreement VCA0529, Rosevale Biodiversity Offset Area. NSW Government.

NSW Land Registry Services (2021e). Conservation Agreement VCA0530, Kurrajong Park Biodiversity Offset Area. NSW Government.

NSW Land Registry Services (2021f). Conservation Agreement VCA0531, West Haven Biodiversity Offset Area. NSW Government.

NSW Scientific Committee (2011). Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions - Final Determination, NSW Government. https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2011-2012/inland-grey-box-woodland-in-the-riverina-minor-amendment-determination

NSW Threatened Species Scientific Committee (2020). White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions Final Determination, NSW Government. https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2020/white-box-yellow-box-final-determination-ceec.pdf

OEH (2023). White Box - Yellow Box - Blakely's Red Gum Grassy Woodland Profile NSW Government Office of Environment and Heritage. [Accessed 2024] https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10837

Whitehaven (2019). Kenna Biodiversity Offset Conservation Area Agreement No CA0060

Whitehaven (2023). Biodiversity Offset Management Plan (DRAFT) for Willeroi, Kenna, Onsite, Biobank and Werris Offset Areas.