NSW GOVERNMENT | Transport for NSW

Woolgoolga to Ballina
Pacific Highway Upgrade

Biodiversity Offset Package

September 2021

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Front cover images – (clockwise from top left)

Offset Site 44 - Paperbark Swamp Forest	View towards Offset Sites 28 and 51 and nearby Glenugie Peak from Site 25
Koala - Bagotville	
Offset Site 44 - Paperbark Swamp Forest	Quassia ‘Moonee Creek’ on Site 25

About this release

Title	Woolgoolga to Ballina Pacific Highway Upgrade–Biodiversity Offset Package

Approval and authorisation		Sign	Effective date
Prepared by	Kylie Wells & Matthew Stephens		12/12/17
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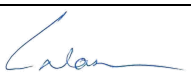
Approved by	Lindsay Nash		19/10/2021

Document status	Date
Final for approval	30/09/2021

Version	Date	Revision Description
Draft	07/11/2017	Draft version 1
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Final Draft	13/12/2017	Draft for internal review
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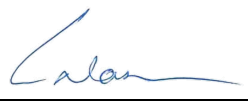
Final	30/09/2021	For agency approval

Declaration of accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulation 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed



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Organisation (please print)

Transport for NSW

Date 19/10/2021

Contents

Acronyms

BioBanking	Biodiversity Banking and Offsets Scheme, NSW
BC Act	*Biodiversity Conservation Act 2016*, NSW
BCT	Biodiversity Conservation Trust, NSW
BMF	Biodiversity Mitigation Framework
BOS	Biodiversity Offset Strategy
BOSR	Threatened Biodiversity Offset Status Report
BVT	Biometric Vegetation type
CEMP	Construction Environmental Management Plan
Class A	Arterial road standard
Class M	Motorway standard
DAWE	Department of Agriculture, Water and the Environment, Australia
DEC	Department of Environment and Conservation, NSW
DECC	Department of Environment and Climate Change, NSW (formerly DEC)
DECCW	Department of Environment, Climate Change and Water, NSW (formerly DECC)
DoE	Department of Environment, Australia
DoEE	Department of Energy and Environment, Australia
DP&E	Department of Planning and Environment NSW
DPI (Fisheries)	Department of Primary Industries (Fisheries), NSW
DPIE	Department of Planning, Industry and Environment, NSW
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EOI	Expression of Interest
EPA	Environment Protection Authority, NSW
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
FCNSW	Forestry Corporation of NSW
FM Act	*Fisheries Management Act 1994*, NSW
Forestry Act	*Forestry Act 2012*, NSW
HQS	Habitat Quality Scores under EPBC Act environmental offsets policy
IUCN	International Union for the Conservation of Nature
MNES	Matter of National Environmental Significance
MCoA	State and / or Commonwealth Minister's Conditions of Approval
NPWS	National Parks and Wildlife Service NSW

OEH	Office of Environment and Heritage, NSW
Project	Woolgoolga to Ballina Pacific Highway Upgrade
RMS	Roads and Maritime Services, NSW
SPIR	Project's Submission/Preferred Infrastructure Report
SSI	State Significant Infrastructure under the NSW *Planning and Assessment Act* 1979, NSW
TEC	Threatened Ecological Community
TfNSW	Transport for New South Wales
TSC Act	*Threatened Species Conservation Act* 1995, NSW
TSMP	Threatened Species Management Plan
Upgrade	Woolgoolga to Ballina Pacific Highway Upgrade
W2B	Woolgoolga to Ballina Pacific Highway Upgrade

1 Introduction

1.1 Background

The Woolgoolga to Ballina project is Australia's largest regional infrastructure project and will duplicate about 155 kilometres of highway to four-lane divided road. The project starts around six kilometres north of Woolgoolga and ends around six kilometres south of Ballina. Key features of the upgrade include:

- Duplication of 155 kilometres of the Pacific Highway to a motorway standard (Class M) or arterial road (Class A) highway with two lanes in each direction that can be upgraded to three lanes each way, if required in the future;
- 'Grade-separated' (or split level) interchanges at Range Road, Glenugie, Tyndale, Maclean, Yamba/Harwood, Woombah (Iluka Road), Woodburn, Broadwater and Wardell;
- Bypasses of South Grafton, Ulmarra, Woodburn, Broadwater and Wardell;
- More than 100 bridges over rivers, creeks and floodplains, including major bridges crossing the Clarence and Richmond Rivers;
- Bridges over and under the highway to maintain access to local roads that cross the highway;
- Access roads to maintain connections to existing local roads and properties;
- Structures designed to encourage fauna over and under the upgraded highway where it crosses key fauna habitat or wildlife corridors;
- Rest areas located at about 50 kilometre intervals at Pine Brush (Tucabia) and north of Mororo Road; and
- A heavy vehicle checking station near Halfway Creek.

The Woolgoolga to Ballina Pacific Highway upgrade project was approved as State Significant Infrastructure under Part 5.1A of the NSW *Environmental Planning and Assessment Act 1979* by the NSW Minister for Planning on 24 June 2014. Approval was also granted under Part 9 of the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999* on 14 August 2014.

The State and Commonwealth Minster's Conditions of Approval (MCoA) required the development of three separate biodiversity offset related reports:

1. Biodiversity Offset Strategy (NSW MCoA D3, EPBC Act MCoA 15, 16 and 17) was approved by the Department of Planning and Environment on 6 January 2016 and by the Department of the Environment and Energy on 7 January 2016. While the project was approved to clear 931.7 ha (MCoA B1), the Biodiversity Offset Strategy predicted the project would impact a reduced area of 900.39 ha of native vegetation across 34 Biometric Vegetation Types. Based on the required 4:1 offset ratio, the indicative offset requirement was a minimum of 3602 ha.

2. Threatened Biodiversity Offset Status Report (BOSR) (NSW MCoA D4, EPBC Act MCoA 17) required offsets to be approved for seven Matters of National Environmental Significance (MNES) prior to construction impacting habitat for those species:
    - Coolgardie/Bagotville koala population;
    - Broadwater koala population;
    - Woombah/Iluka koala population;
    - Moonee Quassia;
    - Sandstone Rough-barked Apple;
    - Singleton Mint Bush; and
    - Lowland Rainforest in Sub-tropical Australia

    Update 2 of the BOSR was approved by the Department of Planning and Environment on 6 January 2016 and by the Department of the Environment and Energy on 7 January 2016 to cover Sections 1 and 2 and early stage works. Update 3 of the BOSR was approved by the Department of Planning and Environment on 30 June 2016 and the Department of Environment and Energy on 18 July 2016 to cover all other sections.

    In June 2017 an addendum to Update 3 of the BOSR was developed to add a new site for the Broadwater koala population. This was approved by the Department of Planning and Environment on 19 June 2017 and the Department of the Environment and Energy on 13 July 2017.
3. Biodiversity Offset Package (NSW MCoA D5, EPBC Act MCoA 15, 16 and 18) was required to be submitted within 24 months of approval of the Biodiversity Offset Strategy (6 January 2018). The Biodiversity Offset Package was submitted in December 2017 with the final review comments received in November 2018. The package was reviewed in line with comments received and updated impact data and resubmitted for approval in May 2020. The final review comments were received in April 2021. The Biodiversity Offset Package has been updated to address comments received and take account of the final M class clearing data (August 2021).

1.2 Purpose of this report

This report has been prepared to satisfy the requirements of the NSW MCoA D5 to prepare a Biodiversity Offset Package and the Commonwealth MCoA 15, 16 and 18. Table 1.1 summarises the relevant conditions of approval and references the sections of this report where each Condition element is addressed.

Table 1.1: Minister's Conditions of Approval and relevant sections of report.

State MCoA D5	Section of this report
The Applicant shall prepare and implement (following approval) a Biodiversity Offset Package, within twenty-four months of approval of the Biodiversity Offset Strategy, or as otherwise agreed by the Secretary. The package shall detail how the ecological values lost as a result of the SSI will be offset. The Biodiversity Offset Package shall be prepared in consultation with the EPA, DPI (Fisheries) and DoE, for the approval of the Secretary, and shall (unless otherwise agreed by the Secretary) include, but not necessarily be limited to:	

(a) the identification of the extent and types of habitat that would be lost or degraded as a result of the final design of the SSI;	Section 2
(b) the objectives and biodiversity outcomes to be achieved;	Section 1.3
(c) details of the final suite of the biodiversity offset measures selected and secured in accordance with the Biodiversity Offset Strategy including the identification of all offset sites, including, offset attributes, shapefiles, textual descriptions and maps that clearly define the location, boundaries of the offset areas;	Section 4
(d) an assessment demonstrating how the offset area(s) achieve the outcomes required by the Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy and user guide to the written satisfaction of DoE;	Section 4.4, Section 5 & Appendix D
(e) the management and monitoring requirements for compensatory habitat works and other biodiversity offset measures proposed to ensure the outcomes of the package are achieved, including: (i) the monitoring of the condition of species and ecological communities at offset locations; (ii) the methodology for the monitoring program(s), including the number and location of offset monitoring sites, and the sampling frequency at these sites; (iii) provisions for the annual reporting of the monitoring results for a set period of time as determined in consultation with the EPA, DPI (Fisheries) and DoE; and (iv) the monitoring and reporting on the effectiveness of these measures, and progress against the performance and completion criteria;	Section 4.6 & 4.7
(f) the results of targeted field surveys within the offset sites (undertaken at any ecologically appropriate time of the year) to assess and describe habitat suitability, presence/absence of threatened species and ecological communities and an assessment of the baseline population;	Section 4.4 and Appendix C
(g) a description of the current quality (prior to any management activities) of the offset area(s);	Section 4.4 and Appendix C
(h) targeted management actions, regeneration and/or revegetation strategies to be undertaken on the offset area(s) to improve the ecological quality of these areas for the relevant species and communities;	Section 4.6 and Appendix C
(i) clear performance objectives for management actions that will enable maintenance and enhancement of habitat within the offset area, as well as contribute to the better protection of individuals and/or populations of the relevant species;	Section 4.6.3 and Appendix C – Management Action Plan examples.
(j) performance and completion criteria for evaluating the management of the offset area, including contingency	Section 4.6.3 and Appendix C –

actions, criteria for triggering contingency actions and a commitment to the implementation of these actions in the event that performance objectives are not met; a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria;	Management Action Plan examples
(k) timing and responsibilities for the implementation of the provisions of the Biodiversity Offset Package and achieving performance objectives;	Section 4.8
(l) details of who would be responsible for monitoring, reviewing, and implementing the Biodiversity Offset Package; and	Section 4.8
(m) a description of funding arrangements or agreements including work programs and responsible entities.	Section 4.5
Land offsets shall be consistent with the Principles for the use of Biodiversity Offsets in NSW. Any land offset shall be enduring and be secured by a conservation mechanism which protects and manages the land in perpetuity. Where land offsets cannot solely achieve compensation for the loss of habitat, additional measures shall be provided to collectively deliver an improved or maintained biodiversity outcome for the region.	Section 4.5
The Biodiversity Offset Package shall include details of the offset sites approved under condition D4, and timeframe for the delivery of the offset sites.	Section 4.4, 4.8 and Appendix C
Where monitoring required under conditions D8 and/or D9 indicates that biodiversity outcomes are not being achieved, remedial actions, as approved by the Secretary, shall be undertaken to ensure that the objectives of the Biodiversity Offset Package are achieved.	Not applicable at time of submission
The requirements of the Biodiversity Offset Package shall be implemented by the responsible parties according to the timeframes set out in the Biodiversity Offset Package, unless otherwise agreed by the Secretary. *Note:* *If an offset site proposed as a part of the Biodiversity Offset Strategy or Biodiversity Offset Package is already required to be protected as a result of a separate approval, only the management actions which can be demonstrated to be additional to those required for the separate approval, can be considered as an offset for this project in accordance with the EPBC Act Environmental Offsets Policy 2012 (or subsequent published revisions).*	Section 4.8
Commonwealth MCoA 15	
The approval holder must prepare and implement a Biodiversity Offset Strategy and Biodiversity Offset package that compensates for any residual significant impacts on threatened species and communities. The Biodiversity Offset Strategy and Biodiversity Offset	Section 4.4, Section 5 and Appendix D

Package must meet the requirements of the EPBC Offsets Policy and must be submitted to the Minister for approval.	
Commonwealth MCoA 16	
The Biodiversity Offset Strategy and Biodiversity Offset Package must be prepared in accordance with the requirements of NSW approval conditions D3, D4 and D5.	See above
Commonwealth MCoA 18	
The Biodiversity Offset Package required by Condition 15 must be approved by the **Minister** and the approved Biodiversity Offset Package must be implemented within 24 months of the approval of the Biodiversity Offset Strategy.	Section 1.2

It is noted that the Woolgoolga to Ballina Pacific Highway Upgrade Biodiversity Offset Strategy was approved on 6 January 2016 by the State and 7 January 2016 by the Commonwealth (Appendix A) and the Offset Package was required to be submitted within 2 years of the approval of the Strategy, or by 6 January 2018 unless otherwise agreed by the Director General. The Offset Package was submitted on 19 December 2017. Comments were received from the Environment Protection Authority on 24 January 2018, Department of Planning and Environment on 22 February 2018 and the Department of the Environment and Energy on 27 November 2018. An updated Offset Package was re-submitted for approval on 20 May 2020. Comments were received from the Environment Protection Authority on 26 June 2021, Department of Planning, Industry and Environment on 2 July 2020 and the Department of Agriculture, Water and the Environment on 27 April 2021. This version of the Offset Package addresses the review comments received and impacts have been updated to the final M class clearing limits.

1.3 Objectives and desired biodiversity outcomes of this Biodiversity Offset Package

The objective of the Biodiversity Offset Package is to identify a package of offsets that aims to achieve a neutral or net beneficial biodiversity outcome for all threatened species and endangered ecological communities likely to be impacted directly or indirectly during construction and operation of the project. In order to achieve this objective the Biodiversity Offset Package:

- Maintains or improves biodiversity values;
- Successfully secures the long-term (in perpetuity) protection and management of lands containing threatened species and ecological communities and habitat for threatened species (key habitat);
- Meets the requirements for offsets as specified in the conditions of approval;
- Implements the process detailed in the approved Biodiversity Offset Strategy for setting the scope and quantum of the biodiversity offsets that is transparent and justifiable on environmental, social and economic grounds i.e. value for money.

1.4 Consultation

The details within this plan have been completed through ongoing consultation with the Environment Protection Authority (EPA), Office of Environment and Heritage, Department of Primary Industries (Fisheries) and National Parks and Wildlife Service (NPWS). Details of consultation undertaken are included at Appendix B.

2 Updated Project Impacts

The Biodiversity Offset Strategy detailed the biometric vegetation types that were expected to be impacted by the Upgrade based on the Final Detailed Design clearing quantities for Sections 1 and 2 and the Submission/Preferred Infrastructure Report (SPIR) clearing impacts for Sections 3-11. Table 2.1 updates the project impacts based on the Final M Class design clearing quantities for all sections of the project as at August 2021. Clearing quantities have decreased by approximately 43 ha, leading to a reduction in the offsets required by just over 170 ha, based on the 4:1 ratio committed to in the Biodiversity Offset Strategy.

Table 2.1: Summary of Biometric Vegetation Types impacted by the Upgrade and the habitat area (hectares) that will be offset.

Keith Formation (2004)	Veg type ID	Biometric Vegetation Type	Predicted direct impacts (BOS, 2015)	Direct impacts (August 2021) (ha)	Offset Req.
Dry Sclerophyll Forests (Shrub/grass sub-formation)	NR216	Orange Gum (*Eucalyptus bancroftii*) open forest of the North Coast	9.26	8.17	32.67
	NR246	Spotted Gum - Grey Ironbark - Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	143.4	131.13	524.52
	NR162	Forest Red Gum grassy open forest of the coastal ranges of the North Coast	15.07	12.42	49.67
	NR244	Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the North Coast	11.34	10.48	41.92
	NR193	Narrow-leaved Ironbark dry open forest of the North Coast	5.47	4.5	18.00
Dry Sclerophyll Forests (Shrubby sub-formation)	NR114	Blackbutt - bloodwood dry heathy open forest on Quintenary sands of the northern North Coast	-	0.06	0.26
	NR115	Blackbutt - Bloodwood dry heathy open forest on sandstones of the northern North Coast	82.4	77.88	311.52
	NR148	Coast Cypress Pine shrubby open forest of the North Coast Bioregion	2.04	2.25	9.00
	NR227	Scribbly Gum - Needlebark Stringybark heathy open forest of coastal lowlands of the northern North Coast	69.73	63.79	255.16
	NR228	Scribbly Gum - Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	35.17	37.29	149.16
	NR200	Needlebark Stringybark - Red Bloodwood heathy woodland on	17.13	19.17	76.66

Keith Formation (2004)	Veg type ID	Biometric Vegetation Type	Predicted direct impacts (BOS, 2015)	Direct impacts (August 2021) (ha)	Offset Req.
		sandstones of the Lower Clarence of the North Coast			
	NR101	*Angophora paludosa* shrubby forest and woodland on sandstones or sands of the North Coast	0.61	0.62	2.49
	NR102	*Angophora robur* shrubby forest and woodland on sandstones of the North Coast	7.39	4.13	16.51
Forested Wetlands	NR149	Coastal floodplain sedgelands, rushlands, and forblands	3.84	6.70	26.80
	NR217	Paperbark swamp forest of the coastal lowlands of the North Coast	88.65	87.70	350.80
	NR254	Swamp Mahogany swamp forest of the coastal lowlands of the North Coast	44.25	46.13	184.52
	NR255	Swamp Oak swamp forest of the coastal lowlands of the North Coast	39.07	35.72	142.88
	NR253	Swamp Box swamp forest of the coastal lowlands of the North Coast	18.02	17.76	71.04
Freshwater Wetlands	NR150	Coastal freshwater meadows and forblands of lagoons and wetlands	-	0.54	2.18
Grassy Woodlands	NR161	Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the North Coast	45.56	42.25	169.00
	NR197	Narrow-Leaved Red Gum woodlands of the lowlands of the North Coast	25.83	22.23	88.92
Heathlands	NR152	Coastal heath on sands of the North Coast	19.93	19.07	76.28
Rainforests	NR273	Tuckeroo - Riberry - Yellow Tulipwood littoral rainforest of the North Coast	0.2	0.18	0.72
	NR110	Black Bean - Weeping Lilly Pilly riparian rainforest of the North Coast	0.97	0.86	3.43
	NR280	White Booyong - Fig Subtropical Rainforest of the North Coast	2.91	2.56	10.24

Keith Formation (2004)	Veg type ID	Biometric Vegetation Type	Predicted direct impacts (BOS, 2015)	Direct impacts (August 2021) (ha)	Offset Req.
Saline Wetlands	NR182	Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregions - Richmond River catchment (2:1)	1.26	0.51	1.02
	NR182	Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregions - Richmond River catchment (2:1)		0.10	0.20
	NR225	Saltmarsh complex of the NSW North Coast Bioregion – Clarence River Catchment	-	0.09	0.34
Wet Sclerophyll Forests (Grassy sub-formation)	NR119	Blackbutt – Tallowwood dry grassy open forest of the central parts North Coast	0.5	2.23	8.91
	NR173	Grey Gum - Grey Ironbark open forest of the Clarence Lowlands of the North Coast	62.72	56.97	227.88
	NR267	Tallowwood Dry Grassy Forest of the Far Northern Ranges of the North Coast	1.42	2.21	8.84
	NR125	Blackbutt grassy open forest of the Lower Clarence Valley of the North Coast	21.75	29.43	117.72
	NR222	Red Mahogany open forest of the coastal lowlands of the North Coast	37.78	35.39	141.56
Wet Sclerophyll Forests (Shrubby sub-formation)	NR160	Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast	7.09	7.42	29.68
	NR274	Turpentine moist open forest of the coastal hills and ranges of the North Coast	42.7	35.08	140.32
	NR117	Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the North Coast	5.38	5.53	22.13
	NR219	Pink Bloodwood -Tallowwood moist open forest of the far northern ranges of the North Coast	31	28.65	114.60
	NR140	Brush Box Tallowwood shrubby open forest of the northern ranges of the North Coast	0.55	0.46	1.86
		Total	**900.39**	**857.65**	**3429.40**

Note: shading indicates vegetation groupings per Keith vegetation formation/sub-formation.

The Woolgoolga to Ballina Biodiversity Offset Strategy predicted a total of 250.87 ha of native vegetation that is listed as threatened either at a state or a federal level or in some instances listed under both tiers of legislation. Refer to Table 2.2 for the areas of each ecological community predicted to be impacted.

Table 2.2: Threatened ecological communities (TECs) predicted to be impacted by the project (modified from Hyder, 2015)

Threatened ecological community (TSC Act)	Threatened ecological community (EPBC Act)	Predicted direct impacts BoS 2015 (ha)	Revised direct impacts August 2021 (ha)
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregion (Endangered)	Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (Critically Endangered)	0.20	0.18
Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion (Endangered)	Lowland Rainforest of Subtropical Australia (Critically Endangered)	[#] 3.37	^3.42
Coastal Cypress Pine Forest in the NSW North Coast Bioregion (Endangered)	N/A	2.04	2.25
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion (Endangered)	N/A	5.92	7.24
Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion (Endangered)	N/A	63.59	60.01
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered)	N/A	39.07	35.72
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered)	N/A	136.68	133.83
Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions (Endangered and FM Act Protected Marine Vegetation)	N/A	-	0.09
Total		**250.87**	**242.74**

[#] *3.37 ha as defined under TSC Act, including 1.88 ha as defined under EPBC Act.*
^3.42 ha August 2021 update includes 1.85 ha as defined under EPBC Act. Includes NR280 and NR110.

A total of twenty nine threatened fauna species and nineteen flora species listed either at a state or a federal level or in some instances listed under both tiers of legislation were predicted to be impacted by the project.

The updated impacts on MNES as at August 2021 are shown in Table 2.3.

Table 2.3: Updated impacts to MNES impacted by the project (modified from Hyder, 2015).

PROTECTED MATTER	COMMON NAME	EPBC Act Status	Impacts (August 2021)	
			Area (ha)	No. of individuals impacted
Threatened ecological communities				
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia		CE	0.46 ha (0.18 ha direct impacts and 0.28 indirect impacts)	
Lowland Rainforest of Subtropical Australia		CE	3.54 ha (1.85 ha direct impacts and 1.69 ha indirect impacts)	
Threatened flora species				
Angophora robur	Sandstone Rough-barked Apple	V	78.81	5933
Arthraxon hispidus	Hairy Joint-grass	V	3.56	
Cryptocarya foetida	Stinking Cryptocarya	V		59 (49 directly impacted and 10 indirectly impacted)
Eucalyptus tetrapleura	Square-fruited Ironbark	V	19.96	919
Macadamia tetraphylla	Rough Shelled Bush Nut	V		26 (14 directly impacted and 12 indirectly impacted)
Prostanthera cineolifera	Singleton Mint Bush	V	0.44	653
Quassia sp. 'Moonee Creek'	Moonee Quassia	E		210 stems (73 directly impacted and 137 indirectly impacted)
Threatened fauna species				
Anthochaera phrygia	Regent Honeyeater	E, M	668.88	
Dasyurus maculatus maculatus (SE population)	Spotted-tailed Quoll	E	751.47	
Lathamus discolor	Swift Parrot	E, M	728.68	
Litoria olongburensis	Olongburra Frog*	V	12.18	
Mixophyes iteratus	Giant Barred Frog	E	4.99	

PROTECTED MATTER	COMMON NAME	EPBC Act Status	Impacts (August 2021)	
			Area (ha)	No. of individuals impacted
Nannoperca oxleyana	Oxleyan Pygmy Perch	E	8.24	
Phascolarctos cinereus	Koala	V	852.96	
Phyllodes imperialis southern subsp.	Pink Underwing Moth	E	2.58	
Potorous tridactylus tridactylus	Long-nosed Potoroo	V	44.50	
Pteropus poliocephalus	Grey-headed Flying-fox	V	805.08	

*also known as Wallum Sedge Frog

The additional state listed fauna species predicted to be impacted are:

- Atlas Rainforest Ground Beetle *(Nurus atlas)*
- Beccari's Freetail Bat *(Mormopterus beccarii)*
- Brush-tailed Phascogale *(Phascogale tapoatafa)*
- Coastal Emu *(Dromaius novaehollandiae)*
- Common Planigale *(Planigale maculata)*
- Eastern False Pipistrelle *(Falsistrellus tasmaniensis)*
- Eastern Freetail Bat *(Mormopterus norfolkensis)*
- Eastern Long-eared Bat *(Nyctophilus bifax)*
- Eastern Pygmy Possum *(Cercartetus nanus)*
- Golden-tipped Bat *(Kerivoula papuensis)*
- Greater Broad-nosed Bat *(Scoteanax rueppellii)*
- Green-thighed Frog *(Litoria brevipalmata)*
- Hoary Wattled Bat *(Chalinolobus nigrogriseus)*
- Pale-headed Snake *(Hoplocephalus bitorquatus)*
- Rufous Bettong *(Aepyprymnus rufescens)*
- Squirrel Glider *(Petaurus norfolcensis)*
- Stephens' Banded Snake *(Hoplocephalus stephensii)*
- Yellow-bellied Glider *(Petaurus australis)*
- Yellow-bellied Sheathtail-bat *(Saccolaimus flaviventris)*

The additional state listed flora species predicted to be impacted by the project are:

- Four-tailed Grevillea *(Grevillea quadricauda)*
- Green-leaved Rose Walnut *(Endiandra muelleri subsp. bracteate)*
- Knotweed *(Persicaria elatior)*
- Maundia *(Maundia triglochinoides)*
- Noah's False Chickweed *(Lindernia alsinoides)*
- Red Lily Pilly *(Syzygium hodgkinsoniae)*
- Slender Screw Fern *(Lindsaea incisa)*
- Square-stemmed Spike-rush *(Eleocharis tetraquetra)*
- Water Nutgrass *(Cyperus aquatilis)*
- Weeping Paperbark *(Melaleuca irbyana)*
- White Lace Flower *(Archidendron hendersonii)*
- Yellow flowered King of the Fairies *(Oberonia complanata)*

3 Management of Biodiversity Impacts

3.1 Biodiversity mitigation measures

The project was approved as State Significant Infrastructure under Part 5.1 of the NSW Environmental Planning and Assessment Act 1979 (SSI-4963) on 24 June 2014, and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (2012/6394) on 14 August 2014. Ecological assessment and monitoring has been carried out throughout the development and construction phases of the project and will continue during the operation of the upgrade for the duration set out in the various Threatened Species Management Plans that have been approved by DP&E and DoEE for the project.

In addition to EIS/SPIR ecological assessments, further surveys were completed between 2014 and 2015 prior to commencement of the project's construction. These assessments refined and expanded upon previous studies and guided the development of the Woolgoolga to Ballina Biodiversity Mitigation Framework (May 2015) and specific threatened species management plans. The Biodiversity Mitigation Framework summarises ecology surveys and preconstruction baseline surveys that were completed for each of the target fauna species and ecological communities. Results of these targeted surveys were a primary driver for the final placement and design of fauna connectivity structures across the project. Assessments include detailed and targeted surveys for:

- Threatened Gliders
- Koala
- Coastal Emu
- Threatened bats
- Threatened invertebrates
- Threatened Fish
- Threatened Flora
- Rainforest

In total, 28 separate assessment reports were completed during this period and further expanded on the assessment undertaken during the EIS and SPIR.

As part of the project's construction phase additional assessments are routinely undertaken including:

- Construction pre-clearing surveys prior to commencement and during each stage of the project's construction
- Detailed ecological assessments undertaken where project refinements have occurred

The combined range of assessments has guided the development of the project and resulted in the development of a suite of mitigation measures that follow the Avoid, Minimise, Mitigate and Offset approach.

The project's design incorporates the principals established in *Upgrading the Pacific Highway Design Guidelines* (2014). The guide sets out a sensitive design approach including measures to minimise the Upgrade's impact on the fauna and flora.

Consultation with agencies including EPA, DP&E, DoE and DPI Fisheries occurred throughout the design of the Upgrade's mitigation measures including during development of specific threatened species management plans and during the detailed design phase workshops and through ongoing assessment on-ground during the construction phase.

The draft TSMPs included in the SPIR and mitigation measures summarised in Appendix H of the SPIR are considered the baseline for the project's threatened species management and mitigation measures. The findings from targeted surveys and pre-construction baseline monitoring completed in 2013 - 2015 were used to update the TSMPs. Changes were made to address expert and agency feedback. Updates resulted in changes to the avoidance, mitigation and offset measures previously presented in the SPIR and draft TSMPs, and the level of impact of the project on these species. A summary of changes proposed to avoidance, mitigation or offset measures and level of impact as a result of the change is presented in Table 5-1 of the BMF.

The key biodiversity mitigation measures for the Woolgoolga to Ballina Pacific Highway upgrade include:

- Reduced clearing footprint limits
- Fauna Crossing Measures;
- Revegetation Measures;
- Threatened flora protection and translocation;
- Installation of Nest Boxes;
- Other Fauna Mitigation Measures;
- Water Quality Measures
- Widening of the Median; and
- Biodiversity Monitoring Measures.

3.1.1 Reduced clearing footprint limits

The project has been designed to allow for a staged construction and progressive upgrade to full motorway standard (Class M). Through a combination of detailed design refinements and strict clearing limits established during construction, the overall vegetation clearing required for the upgrade has been reduced by around 10%. Under the current configuration, the overall clearing of native vegetation has reduced to around 857 ha from and original predicted impact of around 932 ha as approved in the MCoA. The clearing limits include components of the final M Class design that will not be constructed during the current phases of the project, however, the full direct impact of the future M Class design has been accounted for in the impact and offset calculations.

Watercourses crossed by the Upgrade required the installation of openings to accommodate water flows. These sites also provide the opportunity to provide connectivity for both terrestrial and aquatic fauna between habitats either side of the Upgrade. Where construction methodology has permitted, riparian vegetation has been retained throughout the construction phase of works along watercourses crossed by the project. This provision aims to assist in maintaining and re-establishing connective links as quickly as possible, and has also assisted in reducing the overall area of vegetation clearing.

3.1.2 Fauna crossing measures

As part of the environmental impact assessment it was identified that the project had the potential to negatively impact upon wildlife through the direct and indirect loss of habitat, loss of connectivity between habitats and increase in mortality due to vehicle collision. To address impacts to connectivity and vehicle collision, a draft Connectivity Strategy was prepared outlining connectivity goals and an approach to connectivity structures that would be implemented. Connectivity structures proposed at that time were based on a project concept design as outlined in the Woolgoolga to Ballina Alliance Update Structures Inventory (dated 20 February 2014).

The final Woolgoolga to Ballina Connectivity Strategy - Section 1 & 2 (GHD, 2014) and - Sections 3 – 11 (Amec Foster Wheeler, 2017) considered species records, validated presence of suitable habitat along the highway corridor, and an evaluation of species biological requirements to inform the location, number and design of connectivity structures to maximise their effectiveness.

A range of fauna crossing measures have been integrated into the upgrade, refer to Table 3.1. In order to target and address the required outcomes, the upgrade's design has considered the appropriate location and sizing of fauna crossings and the appropriate placement of fauna crossings in key habitats and regional corridors. Other considerations include linking large patches of adjacent vegetation and known movement corridors for the Coastal Emu population.

Due to the scale of the project, this Biodiversity Offset Package provides a summary of the structures that have been installed. Further details on fauna crossing measures and the species targeted for their use can be found in the Fauna Connectivity Strategy Woolgoolga to Glenugie (Section 1 and 2) (2015) and the Pacific Highway Upgrade Woolgoolga to Ballina Connectivity Strategy (Sections 3 – 11) (2017).

Table 3.1: Types of fauna connectivity structures incorporated into the Woolgoolga to Ballina Pacific Highway Upgrade.

Combined Fauna Structures	These include structures that are designed for the dual purpose of accommodating drainage and fauna passage. Where required, these structures facilitate fauna passage via the inclusion, within a drainage culvert, of special features such as a raised bench or a lowered central floor for elevated dry passage, or a raised cell that remains dry during normal rainfall but may take flow during heavy rainfall.
Dedicated Fauna Structures	These are structures that have been designed specifically for fauna passage. They are located to be within known areas of habitat for the target species, and designed in such a way to maximise effectiveness, such as including fauna furniture for Koalas to enable them to travel off the ground and away from predators. Dedicated structures may include bridges, box culverts or arboreal crossings such as rope crossings and glider poles. Some dedicated bridges are specifically for fish passage as they span watercourses but may also contain dry passage areas therefore support movement of terrestrial fauna.
Incidental Fauna Structures	These are primarily drainage structures e.g. box or pipe culverts or bridges that have been identified as being appropriate to accommodate fauna passage and therefore provide incidental benefit for fauna movement. They are structures that are additional to the combined and dedicated structures but, as it is recognised that they are likely to provide additional options for fauna crossings and in order to make them available to fauna, the project fencing design has been amended to accommodate fauna access.
Bridge	Bridges incorporating fauna underpasses provide for dry fauna passage both where the bridge traverses a watercourse or is a dedicated bridge structure. Bridges are of varying heights and lengths depending on the locational requirements. Where a waterway is present fauna passage is generally provided from the top of the waterway bank to the base of the bridge abutment.
Glider Pole	Glider poles are being installed in areas where there is suitable glider habitat on either side of the highway. The poles enable gliders to glide from one side of the highway to the other safely, including 'two-way' crossings.

Rope Crossing	Rope crossings are being installed in areas where there is suitable arboreal mammal habitat on either side of the highway. The crossings link to adjacent habitat trees by ropes or ladders tied off onto support poles and the trees.
Fauna Exclusion Fencing	The intent of fauna exclusion fencing is to prevent particular target species from entering the road carriageway to minimise vehicle strike. Fauna fencing is also being used to funnel animals towards nearby connectivity structures.
Temporary Fauna Fencing	Temporary fencing is being installed prior to clearing in designated areas that provide habitat for key target species. This includes koalas, frogs and Coastal Emu. The intent of temporary fencing is to exclude fauna from entering the clearing or construction zone, avoiding harm to the animal.
Widened Median	A widened median is an area that is retained between carriageways. Widened medians contain native vegetation that provide a refuge for fauna. These sites have been considered where glider habitat is present. Selected medians contain trees and/or glider poles which gliders can move onto to reduce the glide distance where the highway would have created a gap larger than 30m.
Fauna drop-down	Principles for the design of fauna drop down structures have been developed by TfNSW in consultation with EPA. Their purpose is to minimise the risk of fauna becoming trapped on the unsafe side of the fauna fence (i.e. the highway). The design of the structure being a 'drop' is to ensure fauna are unable to climb over from the habitat side of the fence. These will be concentrated around interchanges and breaks in the fauna fencing.
Koala Grid	Koala grids are being installed in combination with fauna fencing to minimise the potential for koala strikes on the highway and surrounding road network. These grids have been placed across the width of the road and tie into fauna fencing. The highway upgrade along Section 10 is being fully-fenced, using Koala-proof fencing, with the provision of grids near the intersections with local roads, to create a fully closed system to prevent vehicle-strike to Koalas. In addition, TfNSW is consulting with landowners with the intention to install Koala grids on driveways and self-closing gates for pedestrian access where appropriate.
Fauna Furniture	Fauna furniture is placed within culverts and under bridges to assist fauna to move through the structure safely. These structures allow fauna to stay off the ground and away from predators and any water that may be at the bottom of the culvert in periods of rainfall. Fauna furniture includes: • rails • vertical and horizontal refuge poles. The refuge poles have been designed to provide safe refuge for fauna from predators and to encourage use of the crossings by smaller fauna species.

Design principles that aim to increase the use of the connectivity structures guided the size and shape of structures and their positioning within the landscape. The project's Connectivity Strategies provide a comprehensive description and analysis of each structure and the design principles that have been applied.

Bridges and culvert structures have been provided at strategic locations for habitat connectivity for a range of fauna including Rufous Bettong, Brush-tailed Phascogale,

Green-thighed Frog, Koala, Long-nosed Potoroo, Coastal Emu, Spotted-tailed Quoll and Oxleyan Pygmy Perch.

Figure 3.1 Examples of fauna crossing structures incorporated into the Woolgoolga to Ballina Pacific Highway Upgrade including dedicated fauna crossing structures and combined fauna and drainage crossing structures.

All waterway crossings that involve new water crossing structure(s) or replacement of an existing structure have been designed to minimise impact on fish passage in accordance with Department of Industry guidelines (Fairfull & Witheridge 2003). Specific measures have been included for the Oxleyan Pygmy Perch within its known habitat range.

To complement the mitigation measures within the upgrade footprint, the offset program has specifically targeted protection of habitats adjoining crossing structures. As a result of this measure a number of key offset sites have been included within the BOP (refer Section 4.4).

Key sites include:

- About 390 ha on the east and west sides of the upgrade near Bostock Road, Tucabia in Section 4;
- About 615 ha on the east and west of the upgrade adjoining Tabbimobile Creek, Mororo in Section 6; and
- Numerous sites adjoining the upgrade between the Richmond River and Coolgardie Road in Section 10. Many of these sites provide linkages between areas of habitat and areas that are being rehabilitated as part of the Section 10 koala revegetation strategy.

3.1.3 Temporary and permanent fauna exclusion fencing

Temporary and permanent fauna exclusion fencing has been installed to guide fauna to crossing structures and to exclude specific faunal groups from the project corridor to reduce wildlife mortality during construction and operation of the project. Specific fence designs have been implemented to variously exclude large, medium and small mammals, coastal emu, fauna with the ability to climb and frog species where specific breeding habitat of threatened species has been identified through on-ground field surveys.

A total of 26 different types of fauna fencing have been installed across the project, refer to Table 3.2. Fencing types depend on the target species and other locational factors and designs have been tailored to maximise the fence's effectiveness at meeting the primary goals of fauna protection and connectivity.

Table 3.2: Fencing types and target fauna for exclusion

Fence Type	Name	Excluded Target Fauna Species						
		Koala	Emu	Mammal (Long-nosed Potoroo and Rufous Bettong	Phascogale	Wallum Sedge Frog	Green-thighed Frog	Stock
F01	Fauna (koala) exclusion fence	Yes						
F02	Fauna (koala) and stock exclusion fence	Yes						Yes
F03	Fauna (koala) and green-thighed frog exclusion fence	Yes					Yes	
F04	Fauna (koala), green-thighed frog and stock exclusion fence	Yes					Yes	Yes
F05	Fauna (koala) and Olongburra frog exclusion fence	Yes				Yes		
F06	Fauna (koala), Olongburra frog and stock exclusion fence	Yes				Yes		Yes
F07	Fauna (koala) and phascogale exclusion fence	Yes			Yes			
F08	Fauna (koala), phascogale and stock exclusion fence	Yes			Yes			Yes
F11	Mammal exclusion fence			Yes				
F12	Mammal and stock exclusion fence			Yes				Yes
F13	Mammal and Phascogale exclusion fence			Yes	Yes			
F14	Mammal, Phascogale and stock exclusion Fence			Yes	Yes			Yes
F15	Mammal, green-thighed frog and phascogale exclusion fence			Yes	Yes		Yes	
F16	Mammal, green-thighed frog, phascogale and stock exclusion fence			Yes	Yes		Yes	Yes
F17	Mammal and green-thighed frog exclusion fence			Yes			Yes	
F18	Mammal and green-thighed frog and stock exclusion fence			Yes			Yes	Yes
F21	Emu exclusion fence		Yes					
F22	Emu and stock exclusion fence		Yes					Yes
F23	Combined Emu/mammal/ phascogale exclusion fence		Yes	Yes	Yes			
F24	Emu, phascogale and stock exclusion fence		Yes		Yes			Yes
F25	Combined Emu/mammal/ phascogale/frog exclusion fence		Yes	Yes	Yes	Yes	Yes	
F26	Emu, phascogale, green-thighed frog and stock exclusion fence		Yes		Yes		Yes	Yes

Fence Type	Name	Excluded Target Fauna Species						
		Koala	Emu	Mammal (Long-nosed Potoroo and Rufous Bettong	Phascogale	Wallum Sedge Frog	Green-thighed Frog	Stock
F41	Plain wire fence							
F42	Three barbed wire fence							Yes
F45	Five barbed wire fence							Yes
F55	Hybrid emu and stock fence		Yes					Yes

During the upgrade's construction, temporary fauna exclusion fence has been installed at locations guided by ecological survey and assessment. Specific fence designs were implemented to minimise potential impacts on various fauna groups over the course of the construction work including koalas in three nominated Important Populations, Coastal Emu population and threatened frog breeding habitat.

Temporary and permanent fauna fencing and koala grids at breaks in the fence have been extended along adjoining local roads and old sections of the Pacific Highway within the Ballina Koala Population area. These measures have been complemented by temporary and permanent speed limit reductions and installation of temporary and permanent signage along various adjoining local roads where koala movement pathways and densities are known to be high in the Bagotville area.

Permanent fencing generally comprises a combination of durable wire and mesh with heights and apertures sized to target the specific species considered. In some fence designs the addition of smooth steel panels and overhangs have been included to deter fauna that have the ability to climb.

Where possible, fauna and stock fencing has been combined and installed as close to the project's footprint as possible to minimise the area of habitat cleared as part of the project and to allow fauna to access the retained habitat resources along the outer edge of the road corridor.

3.1.4 Revegetation measures

Planting and revegetation has been designed to integrate the upgrade with the surrounding landscape and is one of the suite of mitigation measures employed to reduce the potential environmental impact of the upgrade. The design aims to re-establish self-sustaining vegetation that will develop over time through natural recruitment from surrounding bushland.

Re-vegetation and rehabilitation of areas disturbed as a result of construction of the Upgrade, include specific seed mixes and plantings on:

- Fill and cut batters
- Approaches to bridges and other fauna structures
- Riparian habitats and where watercourse realignment has been required
- Intertidal areas where major rivers have been crossed at the Richmond and Clarence Rivers
- Water quality control structures such as basins and filtration channels
- Ancillary facility areas

Specific details of revegetation measures are provided in the Landscape Plans that have been developed for each of the 11 sections of the upgrade project. The broader principals and rationale behind these specific revegetation works are described in a series of five Urban Design and Landscape Plans and Reports that cover the project.

Revegetation measures include seeding and planting a range of locally occurring native shrubs, trees and ground covers. Species that have been included reflect the composition of surrounding vegetation communities and were selected to maximise the reestablishment of vegetation based on each locality's hydrology and soil conditions. Where appropriate, the reuse of site sourced topsoil will occur to allow for the reestablishment of other local species present as seed in the soil seed bank.

Riparian vegetation is being restored and rehabilitated in and around watercourses affected by the project in consultation with the EPA and the Department of Primary Industries (Fisheries). Consultation includes considering timeframes and reporting on the completion of works.

Revegetation and rehabilitation works include measures to provide and enhance fauna habitat features for threatened species.

Noxious weeds in areas disturbed by construction activities are actively managed throughout the construction phase and will be managed for a minimum of three years after construction is completed for each major project stage. Weed management is undertaken in accordance with CEMP Weed Management Plans.

In the section of the project between the Richmond River and Coolgardie, 130 ha of koala food trees have been planted in areas adjoining the upgrade corridor. The three main objectives of this revegetation are to:

- Establish new habitat for Koala using preferred Koala food trees to compensate for habitat loss.
- Improve habitat connectivity within the fragmented landscape.
- Guide movement of Koalas towards the road connectivity structures to encourage dispersal across areas of habitat adjoining the upgrade.

The species being planted include:

- Swamp Mahogany (*Eucalyptus robusta*) and Broad-leaved Paperbark (*Melaleuca quinquenervia)* on lower slopes and flats as these species are particularly suited to poorly-drained, and seasonally-inundated, boggy areas.
- Forest Red Gum (*Eucalyptus tereticornis*), Forest Oak (*Allocasuarina torulosa*), Flooded Gum (*Eucalyptus grandis*), Small-leaved Red Gum (*Eucalyptus seeana*) and Red Mahogany (*Eucalyptus resinifera*) on lower slopes on fertile soils.
- Tallowwood (*Eucalyptus microcorys*), Small-fruited Grey Gum (*Eucalyptus propinqua*), Sydney Blue Gum (*Eucalyptus saligna)* and Forest Oak (*Allocasuarina torulosa*) on mid-upper slopes.

Plantings link to dedicated and combined crossing structures and are combined with specific koala exclusion fencing along the entire upgrade length within this project section to facilitate koala movements between habitats either side of the alignment while minimising potential vehicle strikes.

3.1.5 Threatened flora protection and translocation

Surveys conducted as part of the Environmental Assessment during the project development phase and further targeted surveys following project approval resulted in the detection of 21 threatened plants that would be directly impacted:

- Four-tailed Grevillea *Grevillea quadricauda* (Vulnerable BC Act EPBC Act).
- Green-leaved rose walnut *Endiandra muelleri* subsp. *bracteata* (Endangered BC Act)
- Hairy joint-grass *Arthraxon hispidus* (Vulnerable BC Act EPBC Act).
- Maundia *Maundia triglochinoides* (Vulnerable BC Act)
- Moonee Quassia (*Quassia* sp. Moonee Creek) (Endangered BC Act & EPBC Act)
- Noah's false chickweed *Lindernia alsinoides* (Endangered BC Act)
- Red lilly pilly *Syzygium hodgkinsoniae* (Vulnerable BC Act EPBC Act).
- Rough-shelled bush-nut *Macadamia tetraphylla* (Vulnerable BC Act EPBC Act).
- Sandstone rough-barked apple (*Angophora robur*) (Vulnerable BC Act & EPBC Act)
- Siah's backbone *Streblus brunonianus* (Endangered EPBC Act)
- Singleton mint bush *Prostanthera cineolifera* (Vulnerable BC Act EPBC Act).
- Slender screw-fern *Lindsaea incisa* (Endangered BC Act)
- Stinking Cryptocarya *Cryptocarya foetida* (Vulnerable BC Act EPBC Act).
- Tall knotweed *Persicaria elatior* (Vulnerable BC Act EPBC Act).
- Square-fruited Ironbark *Eucalyptus tetrapleura* (Vulnerable BC Act & EPBC Act)
- Square-stemmed Olax *Olax angulata* (Vulnerable BC Act)
- Square-stemmed spike-rush *Eleocharis tetraquetra* (Endangered BC Act)
- Water nutgrass *Cyperus aquatilis* (Endangered BC Act)
- Weeping paperbark *Melaleuca irbyana* (Endangered BC Act)
- White laceflower *Archidendron hendersoni* (Vulnerable BC Act).
- Yellow-flowered king of the fairies *Oberonia complanata* (Endangered BC Act).

Subsequent assessment determined that there would not be an impact on one of these species, Siah's backbone and it has not been considered further.

Prior to the commencement of any construction works that resulted in the disturbance of the above species, a Threatened Flora Management Plan (SKM & AFW, 2015) and Lowland Rainforest and Threatened Rainforest Plants Management Plan (RMS, 2015) were developed to manage the plants and their habitats during construction and assess the final impact of the Upgrade. Following on from these plans and to mitigate potential impacts to threatened flora, two Translocation Strategies - Section 1 – 2 (Landmark, 2015) and Sections 3 – 11 (Landmark, 2017) were developed to assess the feasibility of the translocation of impacted plants.

Of the final 20 species determined to be impacted, it was considered feasible to translocate 17. These were:

- Four-tailed Grevillea *Grevillea quadricauda*
- Green-leaved rose walnut *Endiandra muelleri* subsp. *bracteata*
- Hairy joint-grass *Arthraxon hispidus*
- Moonee Quassia *Quassia sp*. Moonee Creek
- Noah's false chickweed *Lindernia alsinoides*
- Red lilly pilly *Syzygium hodgkinsoniae*
- Rough-shelled bush-nut *Macadamia tetraphylla*
- Singleton mint bush *Prostanthera cineolifera*
- Slender screw-fern *Lindsaea incisa*
- Stinking Cryptocarya *Cryptocarya foetida*

- Tall knotweed *Persicaria elatior*
- Square-fruited Ironbark *Eucalyptus tetrapleura*
- Square-stemmed Olax *Olax angulata*
- Square-stemmed spike-rush *Eleocharis tetraquetra*
- Weeping paperbark *Melaleuca irbyana*
- White laceflower *Archidendron hendersoni*
- Yellow-flowered king of the fairies *Oberonia complanata*

Through project refinement a further species, Square-stemmed Olax was not required to be translocated.

Sites selected for translocated plants include within lands protected in the National Estate, areas of the road reserve that do not form part of the current or future upgrade and TfNSW owned properties that will be included within this Offset Package and protected via in perpetuity conservation agreements.

3.1.6 Installation of nest boxes

In consultation with the EPA a separate Nest Box Management Plan was prepared for each of the 11 sections of the Upgrade. The plans included the results of surveys and assessments undertaken throughout the clearing footprint to determine the likely number of hollow bearing trees that would be removed by the Upgrade. From this information, replacement nest box numbers have been determined at a ratio of 1.2 installed per hollow removed. Table 3.3 details the number of boxes identified for each Upgrade section.

Table 3.3: Number of nest boxes to be installed in each project section as detailed in the Nest Box Management plans.

Project Section	Number of nest boxes
1	171
2	302
3	323
4 & 5	35
6	23
7	39
8 & 9	102
10 & 11	68
TOTAL	**1063**

The various box designs detailed in each of the 11 Nest Box Management Plans target a broad range of fauna that can be grouped based on the characteristics of the hollows which they will utilise, including:

- Scansorial Fauna (e.g. *Antechinus* sp and Brush-tailed Phascogale).
- Small Gliders (e.g. Sugar Glider [*Petaurus breviceps*]).
- Large Gliders (e.g. Yellow-bellied Glider).
- Possums (e.g. Brush-tailed Possum [*Trichosurus vulpecula*]).
- Microbats (e.g. Large-footed Myotis [*Myotis macropus*]).
- Medium Sized Parrots/ Lorikeets (Rainbow Lorikeet [*Trichoglossus haematodus*]).
- Cockatoos (e.g. Sulphur-crested Cockatoo [*Cacatua galerita*]).
- Small Owls (e.g. Southern Boobook and Barn Owl).
- Large Forest Owls (e.g. Masked Owl, Sooty Owl and Powerful Owl).

The proportion of component fauna groups that would have been likely to utilise hollows removed has been determined and an appropriate number of boxes specifically targeting each group have been distributed in specific vegetation zones adjoining the length of the alignment.

Up to a further 61 microbat boxes have been installed within and adjoining bridge and drainage structures throughout the project as detailed in the Microbat Management Plan -Section 1 & 2 (Geolink, 2014a) and Sections 3 – 11 (Geolink, 2015a). This is in addition to the range of bat boxes identified in the 11 separate upgrade Nest Box Management Plans that will be installed within vegetation near the alignment to replace roosting and breeding sites lost through vegetation clearing.

Innovative artificial nest hollows and microbat habitat have been trialled at a number of sites across the southern portion of the project. Nest hollows have been carved into trees in adjoining vegetation using chainsaws. Aeriated concrete bat boxes, false sills and box culvert segments have been spaced to provide cavities for microbat species and are being trialled in a number of culverts. Results of these trials are included in the monitoring program.

Culverts / Bridges with bat boxes include:

- 1 x Bent-winged Bat box prototype in a 2 cell box culvert at Glenugie CH 31400
- 2 x timber bat boxes beneath Serpentine Bridge Pacific Highway (southbound) CH 89300
- 4 x timber bat boxes beneath Mororo Bridge Pacific Highway (northbound) CH94000

Prior to commencement of each construction phase, additional assessments have been completed across each area to be cleared or structure to be removed. Based on this information the nest box numbers and types are adjusted. At least 70% of nest boxes have been installed prior to commencement of construction contracts in each area impacted, with the remaining 30% to be installed within 3 months of the final calculation of the number of habitat hollows impacted. Artificial hollow creation techniques are currently being trialled on the Woolgoolga to Glenugie section of the project which will be used to help inform future management actions to mitigate loss of tree hollow resource.

All installed next boxes are subject to monitoring and maintenance in accordance with the methods set out in the Nest Box Management Plans.

3.1.7 Water quality measures

The project integrates an extensive array of water quality control measures designed to protect the surrounding environment and to manage stormwater in and around the Upgrade. As required by MCoA D12 a project wide Water Quality Monitoring Program Section 1 & 2 (Geolink, 2015b) and Section 3 – 11 (Geolink, 2015c) is being carried out throughout the construction phase of the project. In addition, each construction contract requires due diligence water quality monitoring to monitor and mitigate against localised impacts during construction.

Temporary water quality basins and absorption areas were used to manage storm water during the construction phase of the project. Specific measures were employed in Oxleyan Pygmy Perch habitats in consultation with DPI (Fisheries).

Where permanent water quality basins are required during the operational phase of the Upgrade, temporary construction basins are often reconfigured to accommodate flows.

To limit impacts on groundwater and to minimise clearing footprints, channels were incorporated in completed sections of the Upgrade to replace and complement permanent basins and were specifically used in habitats that are suitable for acid loving frog species.

3.1.8 Widening of the median

In addition to the fauna underpasses listed in the project Connectivity Strategies, vegetated medians have been retained to provide a 'stepping stone' opportunity for gliders, predominantly Yellow-bellied Gliders, as well as temporary refuge for other terrestrial fauna. These are located at strategic locations within wildlife corridors in the vicinity of identified Yellow-bellied Glider populations. The location of the widened medians is detailed in the approved Connectivity Strategies for the project.

3.1.9 Other fauna mitigation measures

Additional commitments identified in the Biodiversity Offset Strategy included:

- On detection of any additional or unexpected threatened species, the unexpected finds processes in the Construction Environmental Management Plan was followed.
- A suitably qualified ecologist undertook pre-clearance surveys, including but not limited to stag watching, spotlighting, call-playback detection and searches of nests and hollow-bearing trees, to identify fauna species at risk of injury that required relocating to alternative, nearby suitable habitat. Follow-up inspections immediately before clearing and during construction were undertaken to confirm that the sites subject to pre-clearance surveys remained free of fauna. A more detailed description of the pre-clearing survey methods is provided in the CEMP.
- Appropriate natural habitat features and resources (such as hollow logs felled branches and bush rocks) removed from the project site were relocated to adjacent areas where feasible, to provide alternative temporary or permanent habitat for displaced fauna. Such relocation was undertaken in a manner to limit damage to existing vegetation and not in high condition remnant vegetation.
- Design and implementation of best management practice erosion, sediment and water quality controls as per Managing Urban Stormwater Soils and Construction Volume 2D (2008).
- Adjoining vegetation was managed to limit overhang of fauna fences or other protective barriers.
- Where large woody debris could not retained, attempts to relocate it within the river channel were made.
- Sediment basins were designed to avoid habitat trees where possible.

3.2 Biodiversity monitoring measures

An extensive range of monitoring was been undertaken throughout the development, construction and operational phases of the project. Details of monitoring are included variously in each Threatened Species Management Plan, Nest Box Management Plans and Water Quality Management Plans. The plans set out how each element of the environment potentially impacted by the Upgradewas monitored including:

- Monitoring of fauna crossing and connectivity structures;
- Installation and monitoring of wildlife nest boxes and microbat boxes;
- Salvage, translocation and monitoring of threatened flora directly impacted by the Upgrade;
- Revegetation strategies;

- Road kill and fauna fence monitoring
- Provision for annual reporting or monitoring results to the Director General and the EPA.

Monitoring undertaken during construction and operation is reported in the various compliance reports. Reports can be accessed via the TfNSW website's Woolgoolga to Ballina Project Documents pages.

4 Biodiversity Offsets

4.1 Principles for biodiversity offsets

The approved Biodiversity Offset Strategy (Hyder, 2015) outlined the principles that have been used in the development of this package:

- The vegetation communities and habitat types represented in the offset areas will reflect the vegetation communities and habitat types impacted by the project.
- Offset areas will contain suitable habitat for threatened and migratory fauna (BC Act (formely TSC Act) and EPBC Act) and will contain or be suitable for re-establishing threatened flora (TSC Act and EPBC Act) affected by the project.
- TfNSW will prioritise investigations into areas that contain vegetation communities and suitable habitat for Endangered and / or Critically Endangered species listed under the EPBC Act.
- Offset areas cannot be already funded or protected under another scheme unless it can be demonstrated that protection will be increased through additional management actions to those already required under existing obligations. For example the NSW Biodiversity Banking and Offset Scheme allows credits to be determined for several types of voluntary conservation agreements entered into prior to 2009.
- Areas that are already managed for conservation by the government, such as flora reserves, national parks and public open space will not be chosen as offsets.
- Offset properties will be located as close to the impact site as feasible.
- Offset properties will aim to protect larger patches of vegetation and habitat with preference given to sites that are connected to, provide connectivity to, or provide corridors between other core areas of habitat.
- Assess potential offset sites against the EPBC Offset Assessment Guide for Commonwealth listed species.

4.2 Selection of offset sites

4.2.1 How sites were selected for inclusion in the W2B Biodiversity Offset Package

Identification of potential offset sites commenced in 2013 and has occurred across several different stages:

Stage 1 (2013): 27 sites were identified through either the full or partial acquisition of properties for the road corridor, with a focus on properties likely to provide offsets for the MNES specified in the State D4 condition. A preliminary ecological investigation of these properties was undertaken by Jacobs Consulting Group (Jacobs, 2015a).

Stage 2 (2014-15): As a result of the initial ecological surveys of the properties identified in Stage 1, 19 sites were identified for detailed on-ground assessment. Thirteen Stage 2 properties were approved though the Threatened Biodiversity Offset Status Reports, Update 2 (Jacobs, 2015a) and Update 3 (Jacobs, 2016a). The remaining six Stage 2 properties were further assessed

for their suitability for inclusion in the offset program via the joint agency assessment panel that convened periodically to assess the sites submitted through the public Expression of Interest (EOI) process.

Stage 3 (2015-16): Additional sites were identified through direct landholder contact with TfNSW or are residual TfNSW owned properties purchased for the project that may also be suitable for the offset program. These properties were assessed for their suitability for inclusion into the offset program via the joint agency assessment panel that convened periodically to assess the sites submitted through the public EOI process.

Expression of Interest (2015-16): Public advertisement over June and July 2015 invited EOIs for rural landholders within 100 km of the Woolgoolga to Ballina project to participate in the Offset Program. These applications were assessed over three joint agency assessment panels held from September 2015, May 2016 and November 2016. The joint agency assessment panel included representatives from the TfNSW offset and property teams, EPA, OEH (meetings 2 and 3) and an expert ecologist (Jacobs). The panel was conducted in accordance with the Terms of Reference and properties were assessed against approved assessment criteria such as: distance from project, habitat suitability, connectivity to protected areas and connectivity to existing offset sites.

Targeted search (2016 – 2020): TfNSW continued to undertake targeted searches for specific vegetation communities or species habitat to address shortfalls.

4.2.2 Current status of all sites considered for inclusion in the W2B Biodiversity Offset Package

Table 4.1 provides an update on the status of all properties that have been considered for inclusion in the W2B Biodiversity Offset Package, through a number of mechanisms - the Threatened Biodiversity Offset Status Reports, the public Expression of Interest, targeted searches or TfNSW residuals. Table 4.1 highlights the 28 properties that have been recommended for inclusion in the Biodiversity Offset Package and the geographical locations of these sites are shown on Figures 4.1- 4.4.

Table 4.1 details 17 sites proposed in the Package that were approved in the Threatened Biodiversity Offset Status Report Update 2 (Jacobs, 2015a) and Update 3 (Jacobs, 2016a) and an additional 14 sites to meet the majority of the remaining requirements.

Table 4.1: Status of all sites that have been considered for inclusion in the Woolgoolga to Ballina Biodiversity Offset Package

W2B Site Number	Origin of site	Current status of site	Approved in BOSR?
1	Stage 1	Unsuitable (preliminary investigation only).	
2	Stage 2	Unable to acquire.	
3	Stage 2	Unable to secure through BioBanking Agreement.	
4	Stage 2	Included (BioBanking Agreement).	YES
5	Stage 1	Unsuitable (preliminary investigation only).	
6	Stage 1,	Unsuitable (joint agency assessment	

W2B Site Number	Origin of site	Current status of site	Approved in BOSR?
	then EOI	panel)	
7	Stage 1	Property withdrawn (crown land).	
8	Stage 1	Unsuitable (preliminary investigation only).	
9	Stage 2	Not required.	
10	Stage 2	Included (acquired by TfNSW, BioBanking Agreement).	YES
11	Stage 1	Unsuitable (used for NPWS land transfer).	
12	Stage 2	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	YES
13	Stage 2	Included (BioBanking Agreement).	YES
14	Stage 2	Not required.	
15	Stage 1	Unsuitable (used for NPWS land transfer).	
16	Stage 2	Included (acquired by TfNSW, NPWS transfer).	NO
17	Stage 2	Included (acquired by TfNSW, BioBanking Agreement).	YES
18	Stage 1	Not required.	
19	Stage 2	Now included with Site 40 (acquired by TfNSW, Biodiversity Stewardship Agreement).	(YES)
20	Stage 2	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	YES
21	Stage 2	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	YES
22	Stage 2	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	YES
23	Stage 2	Included (BioBanking Agreement).	YES
24	Stage 2	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	YES
25	Stage 2	Included (acquired by TfNSW, BioBanking Agreement).	YES
26	Stage 2	Not required.	
27	Stage 2	Not required.	
28	Stage 3	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	NO
29	Stage 3	Included (BioBanking Agreement).	YES
30	EOI	Included (BioBanking Agreement).	YES
31	EOI	Property withdrawn by landowner.	
32	Stage 3	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	YES
33	Stage 3	Now included with Site 35 (acquired by TfNSW, NPWS transfer)	(YES)
34	Stage 3	Not required.	
35	Targeted search	Included (acquired by TfNSW, NPWS transfer). Includes former Site 33.	YES
36	EOI	Property withdrawn by landowner.	
37	Stage 3	Included (acquired by TfNSW, NPWS transfer).	NO
38	Stage 3	Now included with Site 40 (acquired by TfNSW, Biodiversity Stewardship	(NO)

W2B Site Number	Origin of site	Current status of site	Approved in BOSR?
		Agreement).	
39	Stage 3	Now included with Site 40 (acquired by TfNSW, Biodiversity Stewardship Agreement).	(NO)
40	Stage 3	Included (acquired by TfNSW, Biodiversity Stewardship Agreement). Includes former Sites 19, 38 and 39.	NO
41	Stage 3	Not required.	
42	Stage 3	Not required.	
43	EOI	Included (BioBanking Agreement).	NO
44	EOI	Included (BioBanking Agreement).	NO
45	EOI	Not required.	
46	EOI	Included (BioBanking Agreement).	NO
47	EOI	Included (acquired by TfNSW, NPWS transfer).	NO
48	EOI	Unsuitable (Part A costs too high).	
49	EOI	Property withdrawn by landowner.	
50	EOI	Not required.	
51	EOI	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	NO
52	EOI	Included (BioBanking Agreement).	NO
53	EOI	Included (acquired by TfNSW, Biodiversity Stewardship Agreement).	NO
54	Targeted search	Included (joint acquisition by TfNSW & NPWS).	YES
55	Targeted search	Property withdrawn by landowner.	
56	Targeted search	Included (joint acquisition by TfNSW & NPWS).	NO

4.3 Summary of proposed offset measures

TfNSW have identified 28 properties, covering 4,881 hectares, available to offset biodiversity impacts associated with the Woolgoolga to Ballina Pacific Highway upgrade. Table 4.2 summarises the key features of each property. The location of each property in relation to the Upgrade is shown in Figures 4.1 – 4.4.

Table 4.2: Offset properties identified to offset biodiversity impacts associated with the Woolgoolga to Ballina Pacific Highway Upgrade.

	Site 4	Site 10	Site 12*	Site 13*		Site 16*
Lot & DP	64//751378 (part) 86//751378	17//1193279 18//1193279 180//751365	1//1186281	10//1181228 22//755629 1//755629 12//755629 15//755629	195//751394 23//755629 32//755629 48//751394	2//1112483 (part) 21//755601 (part)
Tenure	Private	TfNSW	TfNSW	Private		TfNSW
Offset Area (ha)	110.6	394.43	125.6	517.14		22.61
Distance from Upgrade (km)	0.95	0	0	0		12.21
Protection mechanism	BioBanking Agreement	BioBanking Agreement	Biodiversity Stewardship Agreement	BioBanking Agreement		NPWS
Used for other projects?	No	No	No	No		Yes, Devil's Pulpit Upgrade

	Site 17	Site 20	Site 21	Site 22	Site 23	Site 24
Lot & DP	4//707736	61//1185033 (part) 62//1185033 (part)	1//733934 2//733934	2//543525 (part)	50//1120710	61//1088684
Tenure	TfNSW	TfNSW	TfNSW	TfNSW	Private	TfNSW
Offset Area (ha)	28.98	17.90	7.22	26.73	16.91	24.70
Distance from Upgrade (km)	0.56	0	0	0	0	0
Protection mechanism	BioBanking Agreement	Biodiversity Stewardship Agreement	Biodiversity Stewardship Agreement	Biodiversity Stewardship Agreement	BioBanking Agreement	Biodiversity Stewardship Agreement
Used for other projects?	No	No	No	No	No	No

	Site 25	Site 28	Site 29	Site 30	Site 32	Site 35
Lot & DP	2//718612 9//1163255	1//1199690 1//1222279	1//1220453 1//1223246 14//1212613 15//1212613 88//755691	13//1212613	6//843369	140//755624 147//755624 148//755624 149//755624
Tenure	TfNSW	TfNSW	Private	Private	TfNSW	TfNSW
Offset Area (ha)	395.38	249.70	18.31	29.0	16.70	117.25
Distance from Upgrade (km)	3.91	1.71	0	0	0	1
Protection mechanism	BioBanking Agreement	Biodiversity Stewardship Agreement	BioBanking Agreement	BioBanking Agreement	Biodiversity Stewardship Agreement	NPWS
Used for other projects?	No	Yes, Glenugie Upgrade.	No	No	No	No

	Site 37		Site 40*		Site 43
Lot & DP	1//780122 1//82905 11//1013485 12//1013485 13//1013485 14//1013485	15//1013485 190//755684 2//82905 3//82905 6//238008	66//1185033 5//843369 254//755691 108//1137975 109//1137975 2//543525 (part) 2//1113572 1//1123846	2//1123846 61//1185033 62//1185033 129//755731 151//755731 7//866508	103//751365 117//751365 119//751365 137//751365
Tenure	TfNSW		TfNSW		Private
Offset Area (ha)	140.0		209.3		386.62
Distance from Upgrade (km)	0		0		3.33
Protection mechanism	NPWS		Biodiversity Stewardship Agreement		BioBanking Agreement
Used for other projects?	Yes, Ballina Bypass		No		No

	Site 44	Site 46*	Site 47*	Site 51	Site 52*	Site 53
Lot & DP	164//751365	3//258347	3//870691	56//751358	81//751378	149//751365
Tenure	Private	Private	TfNSW	TfNSW	Private	TfNSW
Offset Area (ha)	177.29	180.3	485.7	122.20	52.4	122.1
Distance from Upgrade (km)	3.09	11.02	10.23	1.72	1.46	4.98
Protection mechanism	BioBanking Agreement	BioBanking Agreement	NPWS	Biodiversity Stewardship Agreement	BioBanking Agreement	Biodiversity Stewardship Agreement
Used for other projects?	No	No	No	No	No	No

	Site 54		Site 56*
Lot & DP	156//755624 157//755624 160//755624	193//755624 24//755614	22//751393 26//751393 7308//1162471
Tenure	TfNSW/NPWS		TfNSW/NPWS
Offset Area (ha)	486.44		412.7
Distance from Upgrade (km)	5.24		15
Protection mechanism	NPWS		NPWS
Used for other projects?	No		Yes, Coffs Bypass, WC2U.

*fire impacted during the 2019-20 fire events.

The ecological assessment reports undertaken by Jacobs, GHD, Sandpiper and North Coast Aerial Mapping covering the final suite of properties selected are included in Appendix C. The selected properties compare favourably to the objectives and selection criteria for offset lands as detailed in the Woolgoolga to Ballina Pacific Highway Upgrade Biodiversity Offset Strategy in that all thirty one offset sites:

- are located within the NSW North Coast Bioregion;
- are located within a 0 - 15 km radius of the project;
- contain the vegetation types required to be offset (refer Table 2.1);
- have been surveyed to determine the presence of suitable habitat for the threatened species impacted;
- comprise vegetation of at least moderate to good condition;
- enable connectivity between adjacent areas of vegetation; and
- are suitable for ongoing management for conservation through either a transfer to NPWS or the establishment of a BioBanking Agreement/Biodiversity Stewardship Agreement.

Detail is provided on each site in the sections below. The vegetation table for each site shows the area to be protected by BioBanking Agreements/Biodiversity Stewardship Agreements or included in National Parks. The area of each vegetation type on each site used to offset the MNES is also included. As the total area created by these 28 properties significantly exceeds the Woolgoolga to Ballina offset requirements, ecosystem and species credits created from some properties may be held in reserve to use for future projects or on-sold on the biodiversity credit market. An assessment of the expected surplus of each vegetation community is included in Section 5.

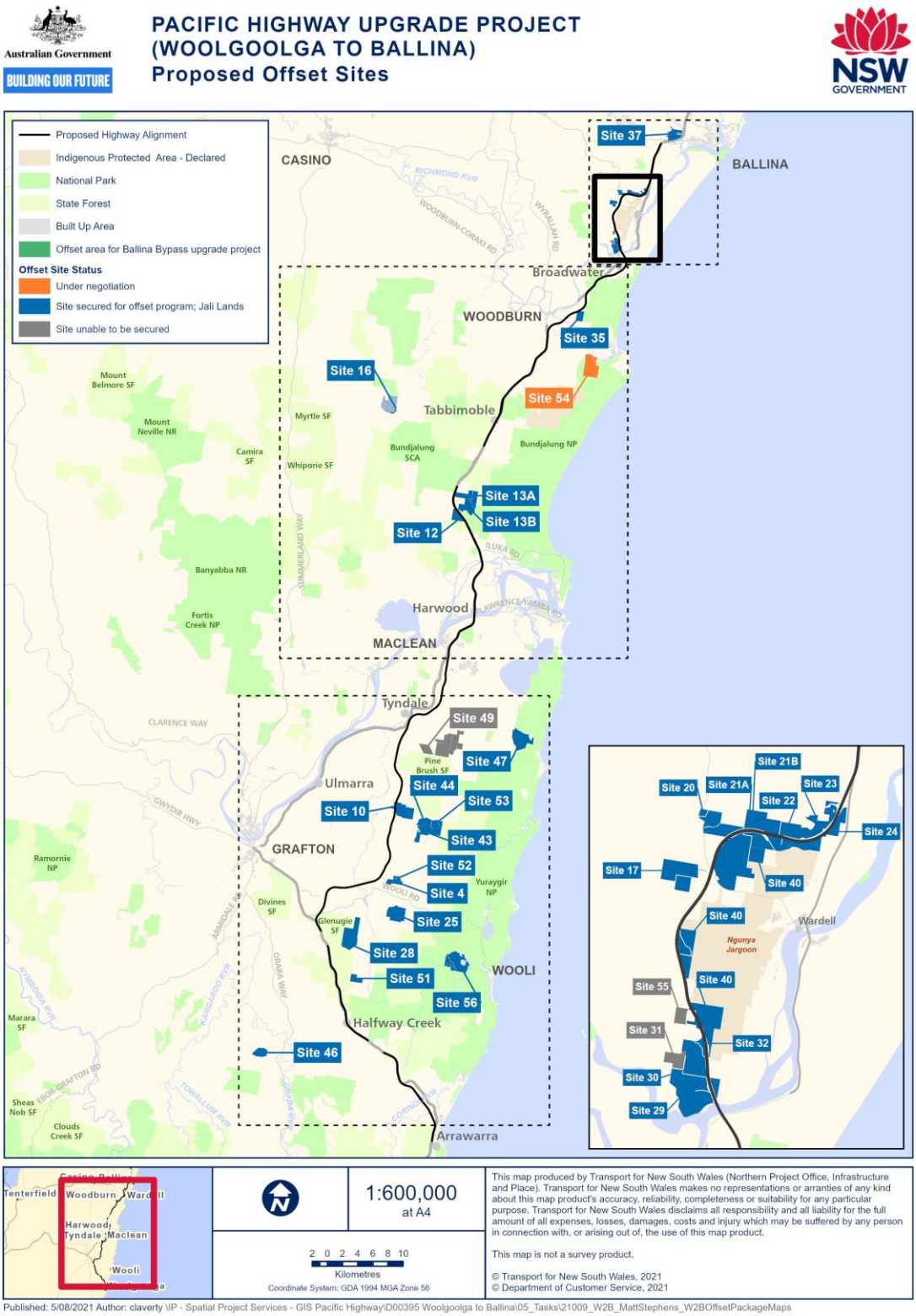

Figure 4.1: Overview of the offset sites in relation to the Woolgoolga to Ballina Pacific Highway Upgrade.

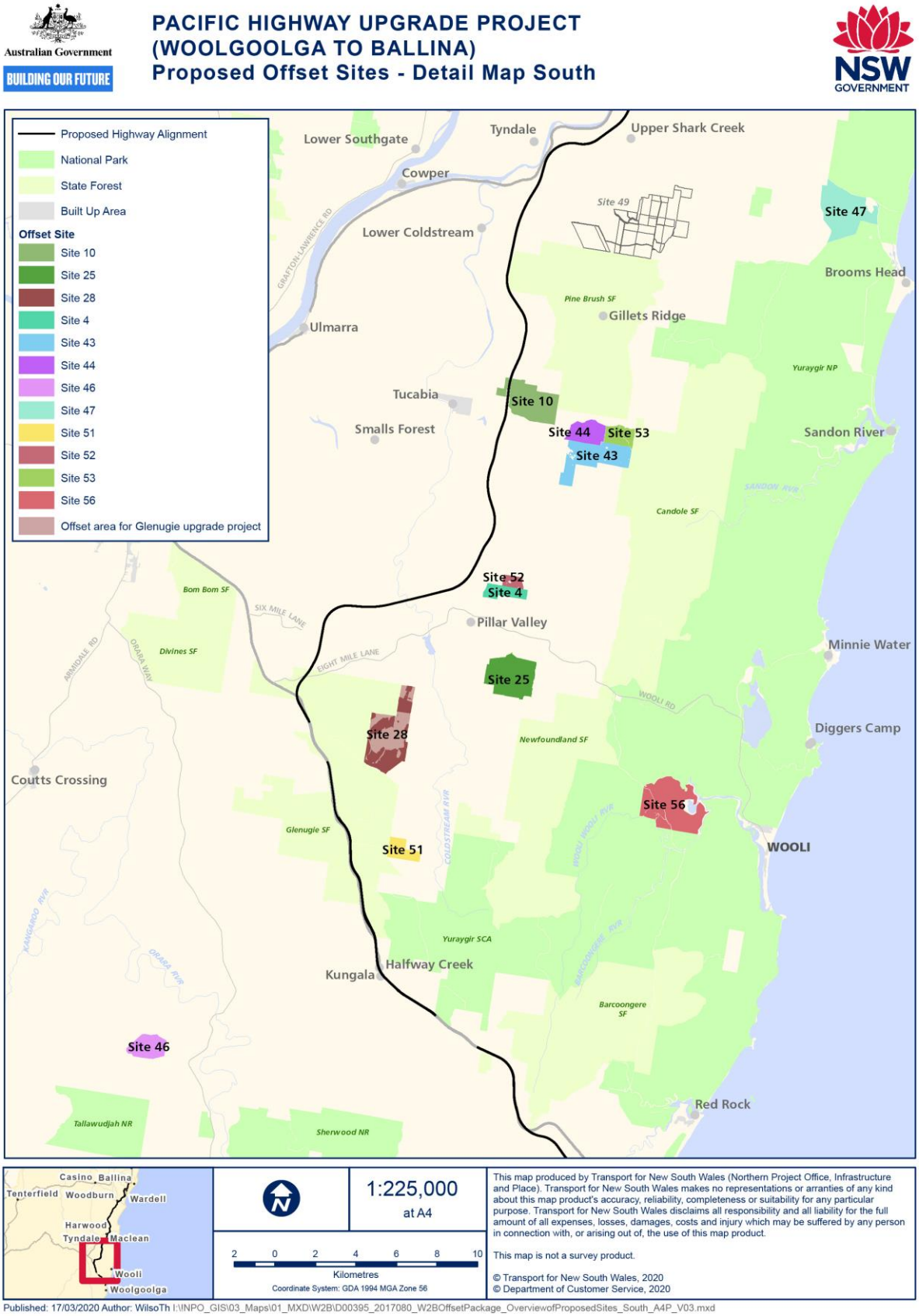

Figure 4.2: Location of the southern cluster of offset sites

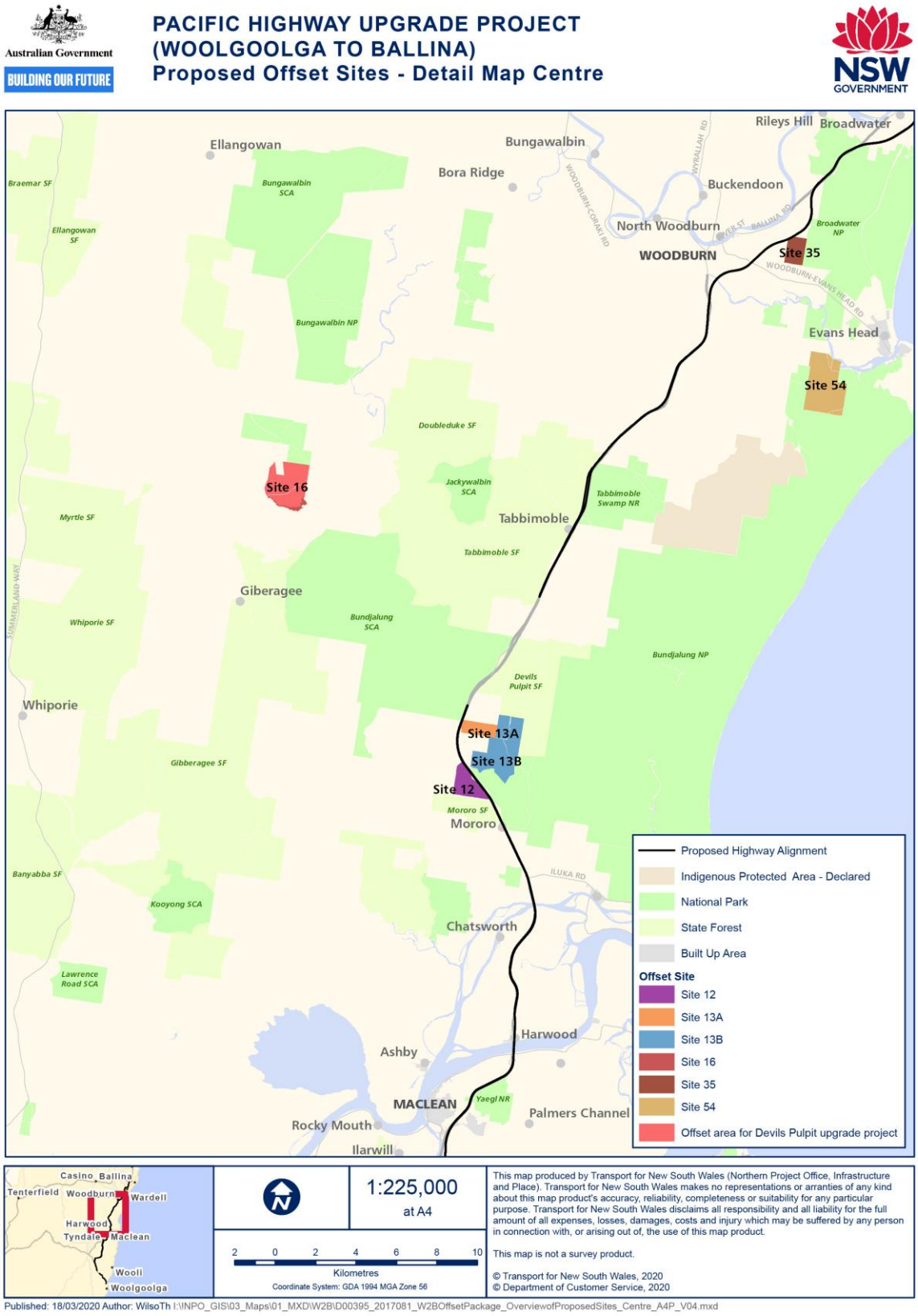

Figure 4.3: Location of the central cluster of offset sites

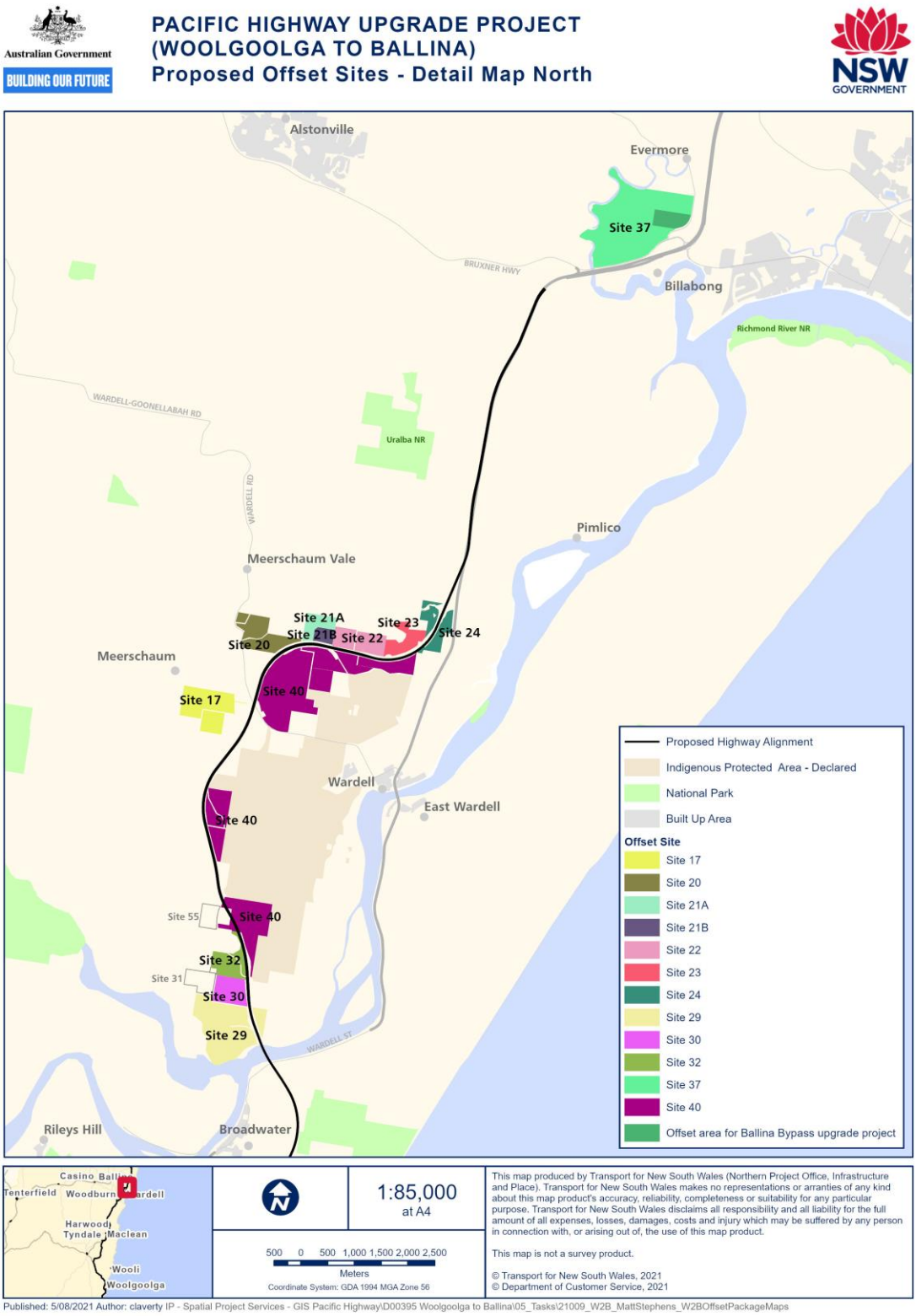

Figure 4.4: Location of the northern cluster of offset sites

4.4 Offset properties in detail

This section provides a brief summary of the detailed ecological and site management assessment reports that have been conducted on each site. The most recent assessment reports for each site are included in Appendix C. The detailed assessment reports include information about each site including vegetation extent and condition, threatened species observed and likelihood of occurrence and discussion on site management and ongoing monitoring requirements. Areas off each site that have been used to offset Commonwealth matters are included in the vegetation table for each site and summarised in Section 5, Table 5.4.

4.4.1 Site 4

Site 4 is a parcel of privately owned land that was identified in 2013 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. The site is located less than 1 km to the east of the Project in the Pillar Valley. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties (Jacobs, 2016b), and to inform the preparation of a BioBanking Application for the site (GHD, 2017a). The BioBanking Agreement for this site was executed in February 2019.

Site 4 comprises Lot 64 DP 751378 (part) and Lot 86 DP 751378. A telecommunications easement has been excluded from the BioBank site along with a 5 hectare parcel for a future dwelling.

Site 4 is around 110 hectares in area and contains wet and dry sclerophyll forest on steep near-coastal hills and swamp sclerophyll forest on poorly drained valley floors. It is 1 kilometre east of the project footprint in an equivalent position on near-coastal low hills (refer Figure 4.1). Site 4 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 4 is part of an occupied rural property. Previous land uses include cattle and sheep grazing. Evidence of grazing as well as previous timber harvesting, track construction and partial clearing was noted during field surveys.

Further information on Site 4 can be found in Appendix C.1, the BioBanking Assessment Report and Management Action Plan developed by GHD in 2017.

Vegetation present on Site 4

110.6 hectares of Site 4 has been included in the BioBanking Agreement for this site.

The biometric vegetation types surveyed from the site in 2017 are detailed in Table 4.3. Figure 4.5 shows the distribution of these vegetation communities.

Table 4.3: Vegetation communities present on Site 4 (GHD, 2017a)

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement				Total area in hectares used to meet EPBC Act offsets
			Koala - all Areas	Spotted-tailed Quoll	Swift Parrot	Regent Honey Eater	
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	3.0	2.0	3.0	-	3.0	3.0	3.0
NR144 - Brush Box tall moist forest of the northern ranges of the North Coast	13.2	12.32	12.32	-	-	-	12.32
NR125 - Blackbutt grassy open forest of the Lower Clarence Valley of the North Coast	39.9	39.9	39.9	39.9	38.14	39.9	39.9
NR228 - Scribbly Gum – Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	25.2	25.2	25.2	20.27	25.0	25.2	25.2
NR164 - Forest Redgum – Pink Bloodwood open forest of the foothills and ranges of the North Coast	17.9	0	-	-	-	-	0
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	2.0	2.0	2.0	-	2.0	0.89	2.0
NR242 - Spotted Gum – Blackbutt open forest of the lower Clarence Valley of the North Coast	9.4	9.4	9.4	-	-	-	9.4
TOTAL	**110.6**	**90.82**	91.82	60.17	68.14	68.99	**91.82**

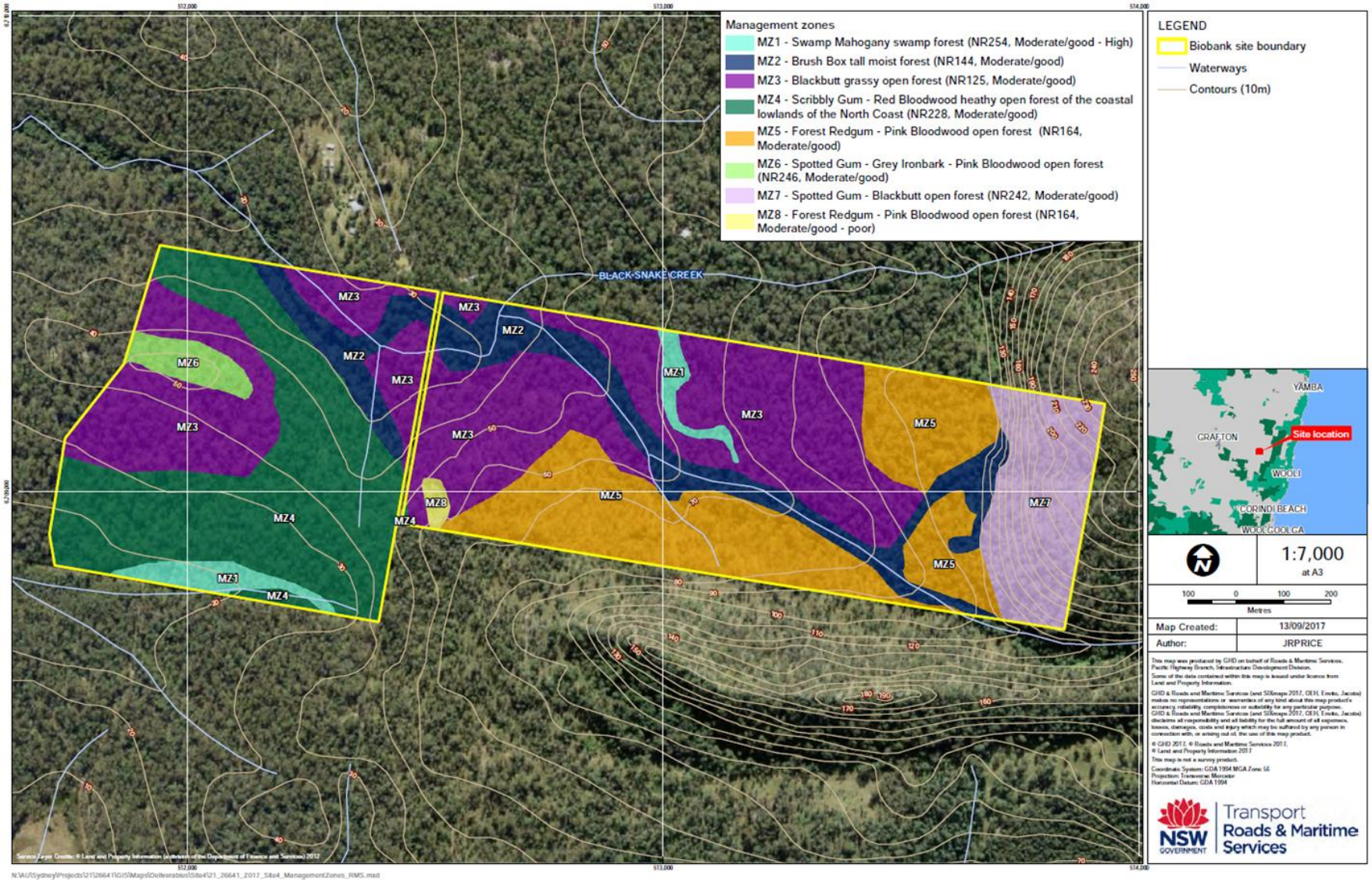

Figure 4.5: Distribution of vegetation types across Site 4 (taken from GHD, 2017a).

Species habitat present on Site 4

TfNSW commissioned GHD to conduct a full BioBanking assessment of Site 4 in 2017, in preparation for submitting a BioBanking Agreement application to the Office of the Environment and Heritage. The BioBanking Assessment is included as Appendix C.1. The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Three threatened species have been recorded on site from the 2016 Jacobs and 2017 GHD surveys. Two of these are required to be offset by the project. Suitable habitat for a further 13 threatened fauna species required to be offset was also identified on site (Table 4.4).

Table 4.4: Threatened species recorded or predicted to occur at Site 4 (by GHD, 2017a or Jacobs, 2016b*)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Sandstone Rough-barked Apple	*Angophora robur*	V	V	Yes
Glossy Black Cockatoo*	*Calyptorhynchus lathami*	V		No
Coastal Emu*	*Dromaius novaehollandiae*	EP		Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Bush Stone-curlew	*Burhinus grallarius*	E		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus* subsp. *Victoriae*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Swift Parrot	*Lathamus discolour*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Hooded Robin (south-eastern form)	*Melanodryas cucullate* subsp. *Cucullata*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. Gularis*	V		No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Turquoise Parrot	*Neophema pulchella*	V		No
Scarlet Robin	*Petroica boodang*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *Temporalis*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Wompoo Fruit-dove	Ptilinopus magnificus	V		No
Diamond Firetail	*Stagonopleura guttata*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Regent Honeyeater*	*Anthochaera phrygia*	CE	CE	Yes
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Eastern False	*Falsistrellus tasmaniensis*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Pipistrelle				
Golden-tipped Bat	*Kerivoula papuensis*	V		Yes
Northern Free-tailed Bat	*Mormopterus lumsdenae*	V		No
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala*	*Phascolarctos cinereus*	V	V	Yes
Grey-headed Flying Fox*	*Pteropus poliocephalus*	V	V	Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Common Blossom Bat	*Syconycteris australis*	V		No
FLORA PREDICTED TO OCCUR ON SITE				
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Weeping Paperbark	*Melaleuca irbyana*	E		Yes
Cryptic Forest Twiner	*Tylophora woollsii*	E	E	No

Landscape connectivity

Site 4 is part of a near continuous patch of native vegetation and habitat of many thousands of hectares, stretching to the east, north and south. In this landscape context, Site 4 comprises an area of habitat in a relatively undisturbed catchment that is surrounded by an extensive patch of native vegetation (GHD, 2017a). Key habitats and key fauna corridors have been identified less than 1 km to the west and the site would be likely to play a major role for connecting regional threatened fauna to large lowland vegetated areas (DEC, 2003). The entire site is part of the dry climate change corridor along the coastal range for supporting Coastal Emu movements. The site is approximately 4 km to the west of the coastal and moist climate change corridors which supports fauna movements along the coast in the Yuraygir National Park (Jacobs, 2016b and DECC, 2007).

Another offset site included in this package, Site 52, is located on a directly adjoining lot to the north of Site 4. Agricultural land to the west would comprise partial barriers to fauna movement and other ecological processes.

4.4.2 **Site 10**

Site 10 was acquired by TfNSW in 2018. It was identified in 2013 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. The site directly adjoins the Project north of Tucabia. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties and to inform the preparation of a BioBanking Application for the site (Jacobs, 2016c). The BioBanking Agreement was executed in February 2019.

Site 10 comprises Lot 17 DP 1193279, Lot 18 DP 1193279 and Lot 180 DP 751365. A number of small areas across the property have been excluded from the BioBank site to allow for a future dwelling and other infrastructure.

Site 10 is around 394 hectares in area and contains predominantly wet and dry sclerophyll forest with a small area of forested wetlands. It is bisected by the project footprint near the western boundary of the property (refer Figure 4.1). Site 10 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 10 is an unoccupied rural property. Previous land uses include selective logging and quarrying activities/disturbances on the mid slopes in the west of the property. The previous quarry areas are currently undergoing rehabilitation, but have been excluded from the BioBank site.

Further information on Site 10 can be found in Appendix C.2, the Ecological Assessment Report developed by Jacobs in 2016.

Vegetation present on Site 10

Approximately 394 hectares of Site 10 has been included in the BioBanking site configuration. The biometric vegetation types were surveyed by Jacobs from the site in 2014-15 and again in 2018 as part of the BioBanking application. The most recent vegetation figures are detailed in Table 4.5. Figure 4.5 shows the distribution of these vegetation communities.

Table 4.5: Vegetation communities present on Site 10 (modified from Jacobs, 2016c)

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement						Total area in hectares used to meet EPBC Act offsets
			Angophora robur	Koala – all other areas	Spotted-tailed Quol	Swift Parrot	Regent Honeyeater	Grey-headed Flying-fox	
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	6.75	6.75	-	-	6.75	6.75	6.75	-	6.75
NR253 - Swamp Box swamp forest of the coastal lowlands of the North Coast (EEC)	2.37	2.37	-	1.76	2.37	2.37	0.37	-	2.37
NR144 - Brush Box tall moist forest of the northern ranges of the North Coast	1.07	0	-	-	-	-	-	-	0
NR222 - Red Mahogany open forest of the coastal lowlands of the North Coast	123.89	123.89	28.65	123.89	123.89	123.89	123.89	55.5	123.89
NR228 - Scribbly Gum – Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	39.25	39.25	39.25	39.25	39.25	39.25	39.25	9.41	39.25
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	130.68	130.68	-	-	130.62	111.12	111.12	117.91	130.62
NR274 - Turpentine moist open forest of the coastal hills and ranges of the North Coast	19.63	19.63	-	19.63	19.63	19.63	19.63	-	19.63
NR201 - Needlebark Stringybark – Turpentine heathy open forest of the Clarence lowlands of the North Coast	70.79	0	-	-	-	-	-	-	0
TOTAL	**394.43**	**322.57**	67.9	184.53	322.51	303.01	301.01	182.82	**322.51**

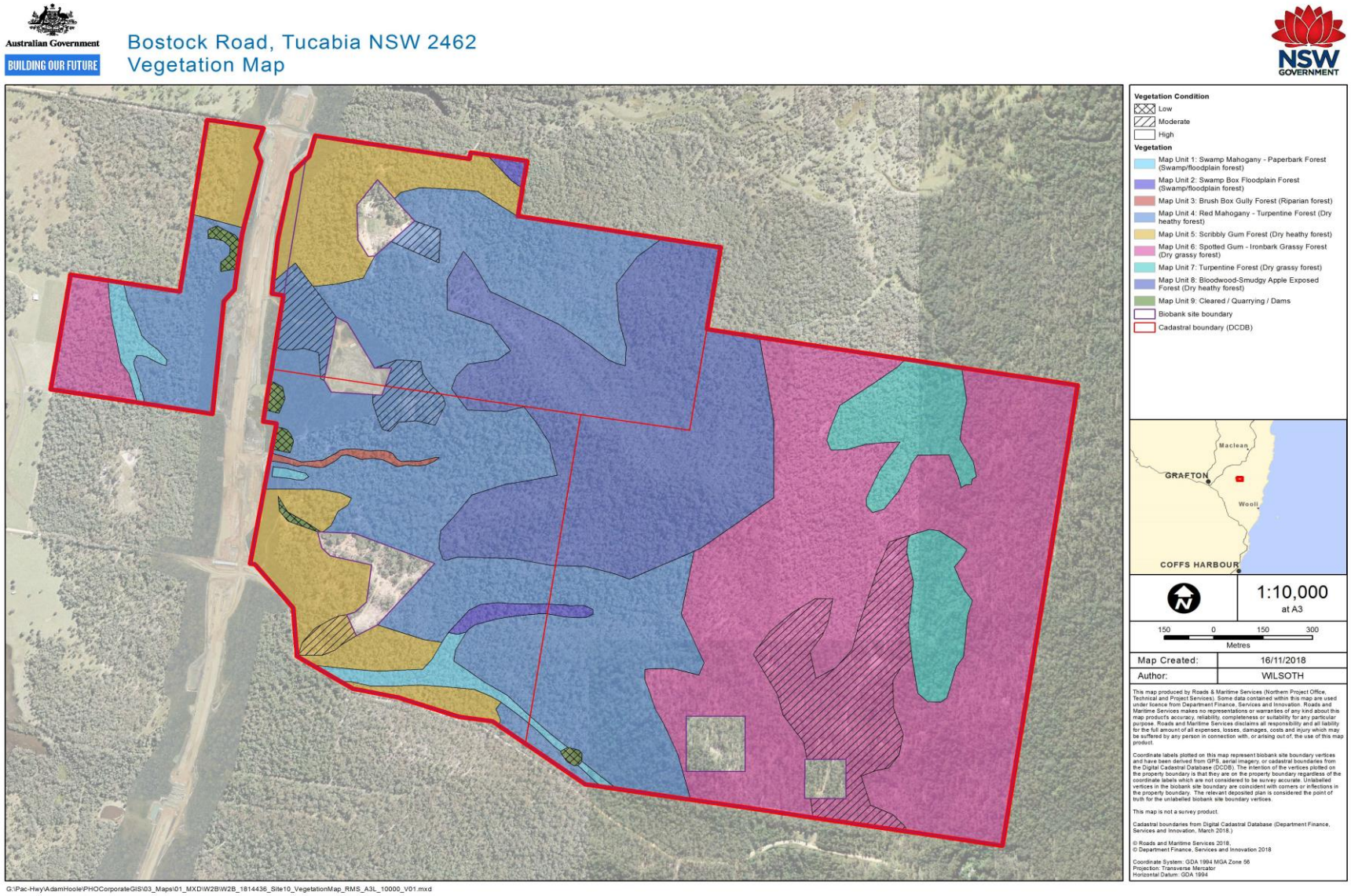

Figure 4.6: Distribution of vegetation types across Site 10 (modified from Jacobs, 2016c).

Species habitat present on Site 10

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 10 in 2014, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2016c). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

A total of eight threatened species have been recorded at the site as listed in Table 4.6. Four of these are required to be offset by the project. The site also provides suitable habitat for a further 24 species that are required to be offset.

Table 4.6: Threatened and migratory species recorded at Site 10 (by Jacobs, 2016c)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Sandstone Rough-barked Apple	*Angophora robur*	V	V	Yes
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Maundia	*Maundia triglochinoides*	V		Yes
Birds				
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Little Lorikeet	*Glossopsitta pusilla*	V		No
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
Bush Stone-curlew	*Burhinus grallarius*	E		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus* subsp. *Victoriae*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Hooded Robin (south-eastern form)	*Melanodryas cucullata* subsp. *Cucullata*	V		No
Hooded Robin	*Melanodryas cucullata*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. Gularis*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Spectacled Monarch	*Monarch trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *Temporalis*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Diamond Firetail	*Stagonopleura guttata*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Rainbow Bee-eater	*Merops ornatus*		M	No
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Rock Wallaby	*Petrogale penicillata*	E		No
Koala	*Phascolarctos cinereus*	V	V	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	V		No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V		No
Reptiles				
White-crowned Snake	*Cacophis harriettae*	V		No
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
Giant Barred Frog	*Mixophyes iteratus*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Noah's False Chickweed	*Lindernia alsinoides,*	E		Yes
Rotala	*Rotala tripartita*	E		No

Landscape connectivity

Key habitats have been identified over approximately five hectares of the property and key corridors have been identified in the eastern portion of the property which supports regional connectivity to Pine Brush State Forest, particularly for Brush-tailed Phascogale (DEC, 2003). The entire area of the property has been identified as part of the dry climate change corridors which support movements for Coastal Emu along the coastal range (DECC, 2007). Moist and coastal climate change corridors have been identified to the east of the property including areas of Yuraygir National Park.

4.4.3 **Site 12**

Site 12 is a parcel of land that was acquired by TfNSW in 2016. It was identified in 2013 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties (Jacobs, 2016d) and in preparation for a Biodiversity Stewardship Agreement (Jacobs, 2021a).

Site 12 comprises Lot 1 DP 1186281. A large cleared area in the centre of the property has been excluded from the Biodiversity Stewardship site to allow for a future dwelling and farming enterprise.

The offset area on Site 12 is around 125 hectares in area and contains wet sclerophyll forest, grassy woodlands and forested wetlands. It is directly adjacent to the project and Site 13 at Mororo with the eastern boundary of the property adjoining the road corridor and Tabimobile Bridge (refer Figure 4.1). Site 12 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset. The site occurs within the Woombah Koala Population area.

Site 12 is an unoccupied rural property. Previous land uses include cattle grazing and selective tree clearing.

Further information on Site 12 can be found in Appendix C.3, the Biodiversity Stewardship Site Assessment Report developed by Jacobs in 2021.

Vegetation present on Site 12

Approximately 125 hectares of Site 12 has been included in the Biodiversity Stewardship site configuration. The biometric vegetation types surveyed from the site in 2018-19 are detailed in Table 4.7. Figure 4.7 shows the distribution of these vegetation communities.

Table 4.7: Vegetation communities present on Site 12 (Jacobs, 2021a).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement					Total area in hectares used to meet EPBC Act offsets
			Singleton Mint Bush	Koala – all other areas	Swift Parrot	Regent Honeyeater	Grey-headed Flying-fox	
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	21.6	21.6	-	21.6	13.0	9.3	21.6	21.6
NR253 - Swamp Box swamp forest of the coastal lowlands of the North Coast(EEC)	7.8	2.49	-	2.4	2.49	-	-	2.49
NR161 - Forest Red Gum – Swamp Box of the Clarence Valley lowlands of the North Coast(EEC)	37.4	35.7	-	35.7	35.7	35.7	35.7	35.7
NR222 - Red Mahogany open forest of the coastal lowlands of the North Coast	5.8	5.8	-	5.8	-	-	-	5.8
NR173 - Grey Gum – Grey Ironbark open forest of the Clarence lowlands of the North Coast	53	1.4	1.4	-	-	-	-	1.4
TOTAL	**125.6**	**66.99**	**1.4**	**65.5**	**51.19**	**45.0**	**57.3**	**66.99**

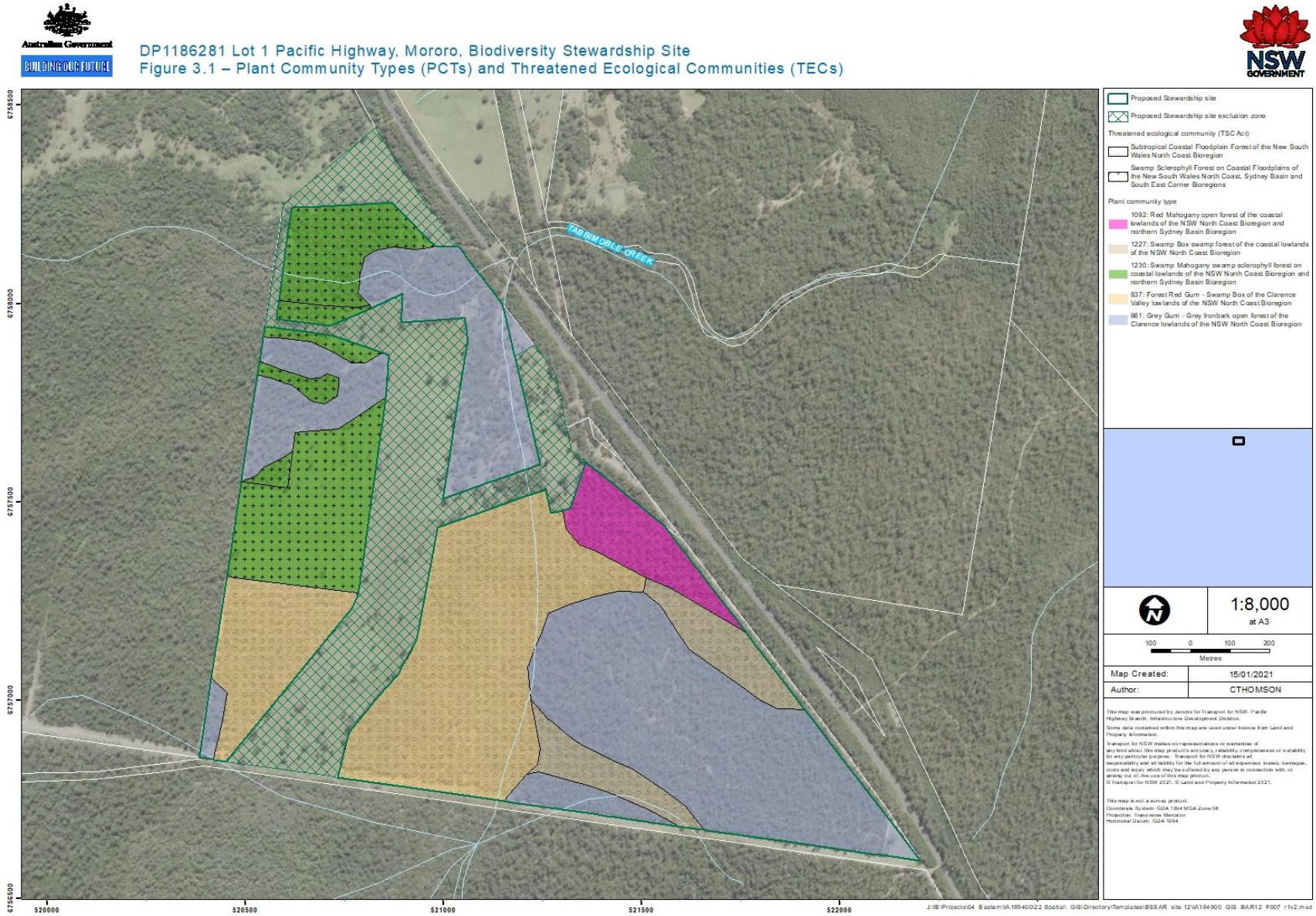

Figure 4.7: Distribution of vegetation types across Site 12 (taken from Jacobs, 2021a).

Species habitat present on Site 12

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 12 in 2014, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2016a). Subsequently, the site was re-surveyed for a Biodiversity Stewardship Site application (Jacobs, 2021a). The following information regarding threatened species presence and suitable habitat has been extracted from these assessments and one additional record during Project construction.

One threatened flora species, Singleton Mintbush and one threatened fauna, Koala have been recorded at the site as listed in Table 4.8. Suitable habitat for a number of other threatened species also occurs at the site. Twenty-nine of these are required to be offset by the project.

Table 4.8: Threatened and migratory species recorded at Site 12 (by Jacobs, 2016d, ^2021a and *C Thomson, pers comm)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Singleton Mintbush	*Prostanthera cineolifera*	V	V	Yes
Mammals				
Koala^	*Phascolarctos cinereus*	V	V	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Pale-vented Bush-hen^	*Amaurornis moluccana*	V		No
Regent Honeyeater^	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
Australasian Bittern^	*Botaurus poiciloptilus*	E	E	No
Bush Stone-curlew	*Burhinus grallarius*	E		No
Glossy Black Cockatoo^	*Calyptorhynchus lathami*	V		No
Speckled Warbler^	*Chthonicola sagittata*	V		No
Spotted Harrier	*Circus assimulis*	V		No
Brown Treecreeper (eastern subspecies)^	*Climacteris picumnus* subsp. *Victoriae*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella^	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Black-necked Stork^	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet^	*Glossopsitta pusilla*	V		No
White-bellied Sea-eagle^	*Haliaeetus leucogaster*	V		No
Black Bittern^	*Ixobrychus flavicollis*	V		No
Swift Parrot^	*Lathamus discolor*	E	CE	Yes
Square-tailed kite^	*Lophoictinia isura*	V		No
Hooded Robin (south-eastern form)^	*Melanodryas cucullata* subsp. *Cucullata*	V		No
Black-chinned	*Melighreptus gluaris subsp.*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Honeyeater^	*Gularis*			
Rainbow Bee-eater	*Merops ornatus*		M	No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Turquoise Parrot^	*Neophema pulchella*	V		No
Barking Owl^	*Ninox connivens*	V		No
Powerful Owl^	*Ninox strenua*	V		No
Osprey^	*Pandion haliaetus*	V	M	No
Scarlet Robin^	*Petroica boodang*	V		No
Flame Robin^	*Petroica phoenicea*	V		No
Grey-crowned Babbler (eastern subspecies)^	*Pomatostomus temporalis* subsp. *Temporalis*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Superb Fruit-dove^	*Ptilinopus superbus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Diamond Firetail^	*Stagonopleura guttata*	V		No
Masked Owl^	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat^	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll^	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle^	*Falsistrellus tasmaniensis*	V		Yes
Golden-tipped Bat^	*Kerivoula papuensis*	V		Yes
Little Bentwing Bat^	*Miniopterus australis*	V		No
Eastern Bentwing Bat^	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Northern Free-tailed Bat^	*Mormopterus lumsdenae*	V		No
Eastern Freetail Bat^	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat^	*Nyctophilus bifax*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Yellow-bellied Glider^	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Long-nosed Potoroo^	*Potorous tridactylus*	V	V	Yes
Eastern Chestnut Mouse^	*Pseudomys gracilicaudatus*	V		No
Grey-headed Flying Fox^	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat^	*Saccolaimus flaviventris*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Greater Broad-nosed Bat^	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat^	*Syconycteris australis*	V		No
Eastern Cave Bat	*Vespadelus troughtoni*	V		No
Reptiles				
White-crowned Snake	*Cacophis harriettae*	V		No
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
Giant Barred Frog	Mixophyes iteratus	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Slender Screw Fern	*Lindernia alsinoides*	E		Yes
Noah's False Chickweed	*Lindsaea incisa*	E		Yes
Weeping Paperbark	*Melaleuca irbyana*	E		Yes
Tall Knotweed*	*Persicaria elatior*	V	V	Yes
Rotala	*Rotala tripartita*	E		No

Landscape connectivity

Key habitats have been identified over approximately 1.4 ha of the property and key corridors have been identified in the southern portion of the property which supports regional connectivity to Mororo State Forest (DEC, 2003). The entire site is part of the moist climate change corridor (Richmond-Iluka Range) along the coastal range. The site is also in close proximity to the dry climate change corridor (Richmond Range-Bungawalbin) to the west. The property is part of the coastal climate change corridor (Coastal Connector) which supports passages through Yuraygir National Park, Mororo Nature Reserve, Bundjalung National Park and Broadwater National Park (DECC, 2007). The site provides a vegetated corridor along Tabimobile Creek which provides connectivity across the project alignment to Site 13 and Bundjalung National Park.

4.4.4 **Site 13**

Site 13 is a privately owned parcel of land that was identified in 2013 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties (Jacobs, 2016d), a survey of Oxleyan Pygmy Perch (Geolink, 2014b) and to inform the preparation of a BioBanking Application for the site (Jacobs, 2017a). The BioBanking Agreement was executed in February 2019.

Site 13 comprises a number of separate lots as detailed in Table 4.2. Several exclusion areas have been allowed across the site for existing and future dwellings and infrastructure. A grazing paddock has also been excluded.

Site 13 is around 517 hectares in area and contains wet and dry sclerophyll forest, grassy woodlands and forested wetlands. It is directly adjacent to the project footprint with the western boundary of the property adjoining the road corridor and Tabimobile Bridge (refer Figure 4.1). It directly adjoins Bundjalung National Park along its southern boundary and is adjacent to Site 12. Site 13 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 13 is an occupied rural property. The majority of the site has been managed for conservation by the current landowners for the past three decades.

Further information on Site 13 can be found in Appendix C.4, the Ecological Assessment Reports developed by Jacobs in 2017 and Geolink 2014b.

Vegetation present on Site 13

Approximately 517 hectares of Site 13 has been included in the BioBanking site configuration. The biometric vegetation types surveyed from the site in 2015 are detailed in Table 4.9. Figure 4.8 shows the distribution of these vegetation communities. A total of 333 hectares of this vegetation is listed as Endangered under the BC Act.

Table 4.9: Vegetation communities present on Site 13 (Jacobs, 2017a).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offset	Area used to meet part EPBC Act offset requirement							Total area in hectares used to meet EPBC Act offsets
			Koala - Iluka/Woombah population	Koala – all other areas	Oxleyan Pygmy Perch	Spotted-tailed Quoll	Swift Parrot	Regent Honeyeater	Grey-headed Flying-fox	
NR149 - Coastal floodplain sedgelands, rushlands and forblands (EEC)	0.81	0.81	-	-	-	-	-	-	-	-
NR217 - Paperbark swamp forest of the coastal lowlands of the North Coast (EEC)	97.78	97.78	-	97.78	-	-	96.68	96.68	97.78	97.78
NR253 - Swamp Box swamp forest of the coastal lowlands of the North Coast (EEC)	62.18	62.18	-	61.62	-	61.04	62.18	62.18	62.18	62.18
NR161 - Forest Red Gum – Swamp Box of the Clarence Valley lowlands of the North Coast (EEC)	178.38	178.38	-	178.38	11.67	173.38	173.38	175.08	178.38	178.38
NR222 - Red Mahogany open forest of the coastal lowlands of the North Coast	16.75	11.87	16.75	6.84	-	-	-	-	-	16.75
NR173 - Grey Gum – Grey Ironbark open forest of the Clarence lowlands of the North Coast	115.58	115.58	10.9	105.42	-	115.58	115.58	115.58	115.58	115.58
NR228 - Scribbly Gum – Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	25.48	25.48	20.25	3.53	-	-	7.18	25.48	25.48	25.48
NR216 - Orange Gum (Eucalyptus bancroftii) open forest of the North Coast	20.18	17.87	-	18.97	-	-	-	-	-	18.97
TOTAL	**517.14**	**509.95**	47.9	472.54	11.67	350	455.0	475.0	479.4	**515.12**

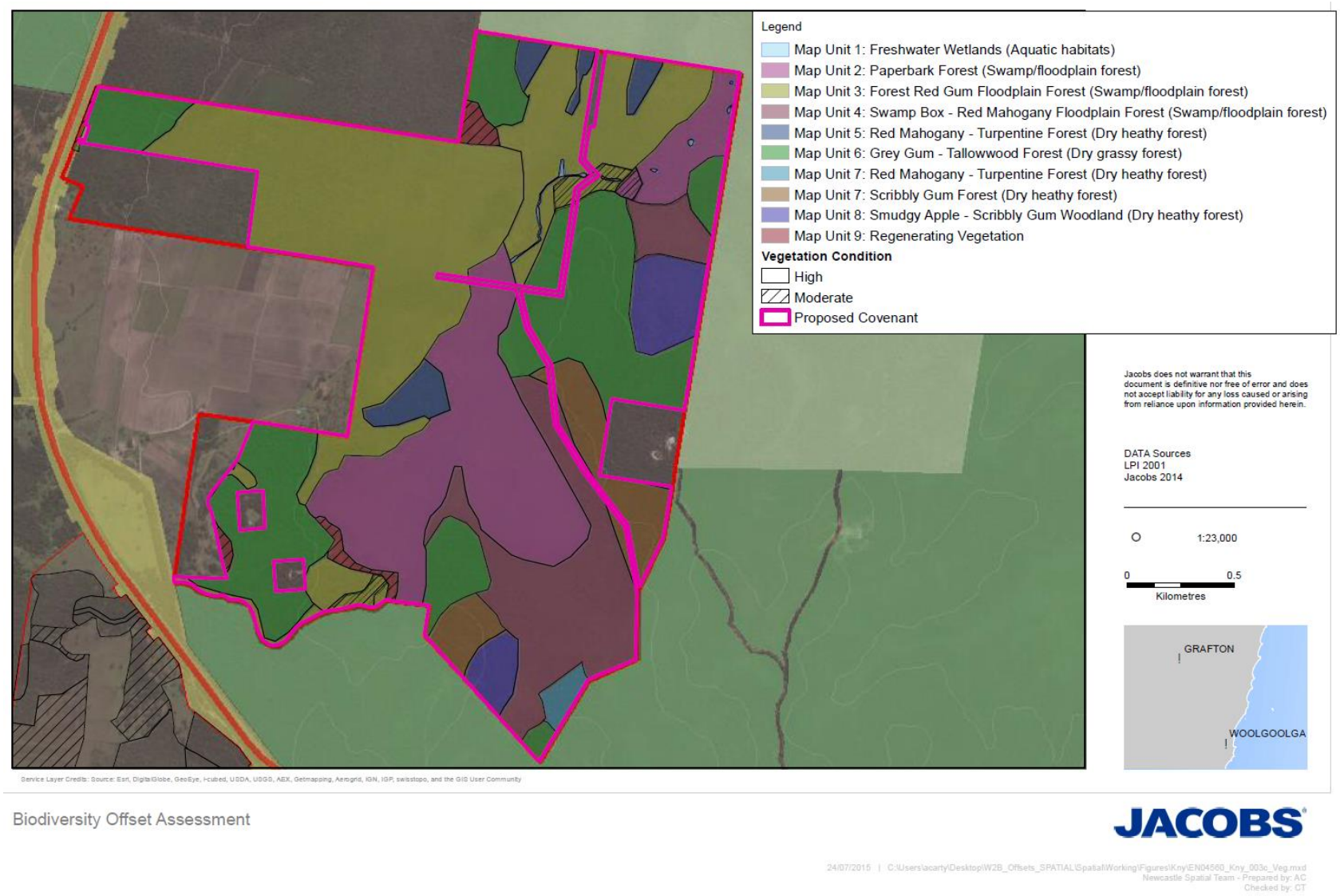

Figure 4.8: Distribution of vegetation types across Site 13 (taken from Jacobs, 2017a).

Species habitat present on Site 13

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 13 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project and a BioBanking Agreement application (Jacobs, 2017a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Four threatened species have been recorded at the site as listed in Table 4.10. Three of these are required to be offset. Suitable habitat for a number of other threatened species also occurs at the site. Twenty-nine of these are required to be offset by the project.

Table 4.10: Threatened and migratory species recorded at Site 13 (by Jacobs, 2017a or *C Thomson, pers comm)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Maundia	*Maundia triglochinoides*	V		Yes
Singleton Mintbush	*Prostanthera cineolifera*	V	V	Yes
Birds				
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V		No
Fish				
Oxleyan Pygmy Perch	*Nannoperca oxleyana*	E	E	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
Australasian Bittern	*Botaurus poiciloptilus*	E	E	No
Bush Stone-curlew	*Burhinus grallarius*	E		No
White-eared Monarch	*Carterornis leucotis*	V		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Spotted Harrier	*Circus assimulis*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus* subsp. *Victoriae*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Comb-crested Jacana	*Irediparra gallinacea*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Hooded Robin (south-	*Melanodryas cucullata* subsp.	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
eastern form)	*Cucullata*			
Black-chinned Honeyeater	*Melighreptus gluaris subsp. Gularis*	V		No
Rainbow Bee-eater	*Merops ornatus*		M	No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *Temporalis*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Diamond Firetail	*Stagonopleura guttata*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	V		No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom	*Syconycteris australis*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Bat				
Eastern Cave Bat	*Vespadelus troughtoni*	V		No
Reptiles				
White-crowned Snake	*Cacophis harriettae*	V		No
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
Giant Barred Frog	*Mixophyes iteratus*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Weeping Paperbark	*Melaleuca irbyana*	E		Yes
Soldiers Crest Orchid	*Oberonia titania*	V		No
Tall Knotweed*	*Persicaria elatior*	V	V	Yes
Lesser Swamp-orchid	*Phaius australis*	E	E	No
Rotala	*Rotala tripartita*	E		No

Landscape connectivity

Key habitats have been identified over approximately 241ha of the property. Three key fauna corridors have been identified on the site, two of which only occur within the property linking Devils Pulpit State Forest and Bundjalung National park. The entire site is part of the moist climate change corridor (Richmond-Iluka Range) along the coastal range. The site is also part of the dry climate change corridor (Richmond Range-Bungawalbin) to the west and the coastal climate change corridor (Broadwater-Lower Clarence) which connects Yuraygir National Park, Bundjalung National Park and Broadwater National Park (DECC, 2007).

4.4.5 **Site 16**

Site 16 is part of a parcel of land that was acquired by TfNSW in 2014 to offset the Devil's Pulpit Pacific Highway Upgrade project. The entire property is 386 ha. The majority of the property has been used to offset the Devil's Pulpit Pacific Highway Upgrade project with the residual 22.61 ha to be used to offset the Woolgoolga to Ballina Pacific Highway Upgrade project (hereafter referred to as Site 16).

The Devil's Pulpit project required a number of terrestrial fauna to be offset, including Grey-headed Flying Fox, Spotted-tailed Quoll, Regent Honeyeater and Swift Parrot. The Devil's Pulpit Biodiversity Offset Strategy (Roads and Maritime, 2017) identified an area of known Giant Barred Frog habitat on the site (Benchmark Environmental Management, 2012 and Rohweder pers comm.). As Giant Barred Frog was not required to be offset by the Devil's Pulpit project, TfNSW can use this area as an offset for another project, provided additional management actions are identified for the Giant Barred Frog. The site has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of the Devil's Pulpit Biodiversity Offset Strategy (Benchmark Environmental Management, 2012) and as part of a preliminary assessment of candidate properties for the Woolgoolga to Ballina project (Jacobs, 2016e).

Site 16 comprises part of Lot 21 DP 755601and Lot 2 DP 1112483 as detailed in Table 4.2. As the entire property has been transferred to NPWS, no exclusion areas were required.

Site 16 contains forested wetland. It is 12 kilometres west of the project footprint (refer Figure 4.1). Site 16 includes one vegetation community that contributes to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 16 occurs on an unoccupied rural property. Previous land use at the property includes timber harvesting, although the assessment report notes this has been light in the Woolgoolga to Ballina offset area.

Further information on Site 16 can be found in Appendix C.5, the Ecological Assessment Report developed by Jacobs in 2016.

<u>Vegetation present on Site 16</u>

Approximately 22.61 hectares of Site 16 has been allocated to the Woolgoolga to Ballina Upgrade. The biometric vegetation types surveyed from the site in 2015 are detailed in Table 4.11. Figure 4.9 shows the distribution of these vegetation communities.

Table 4.11: Vegetation communities present on Site 16 (Jacobs, 2016e).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement	Total area in hectares used to meet EPBC Act offsets
			Giant Barred Frog	
NR160 - Flooded Gum – Tallowwood – Brush Box moist open forest of the coastal ranges of the North Coast	22.61	22.61	17.3	17.3
TOTAL	**22.61**	**22.61**	**17.3**	**17.3**

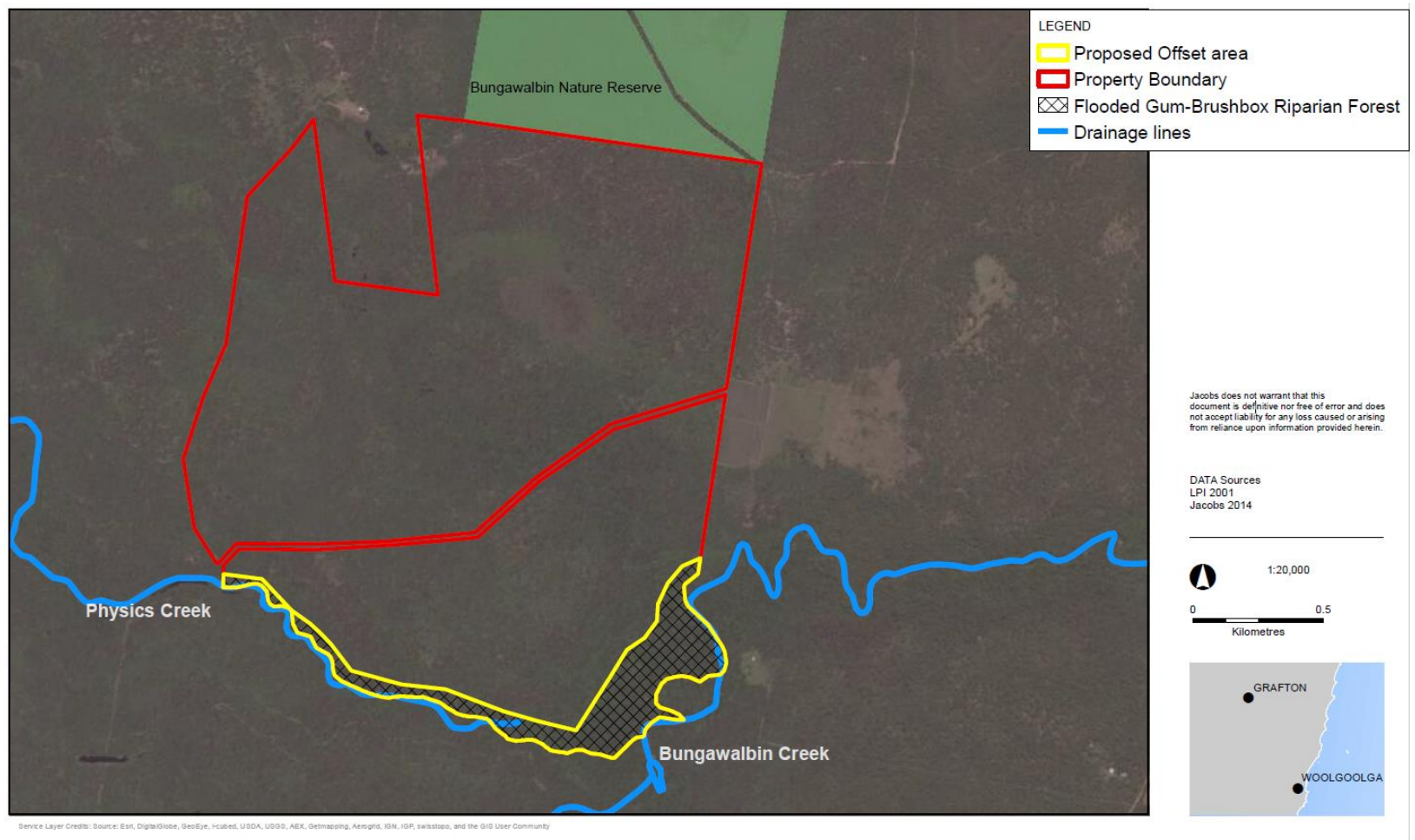

Figure 4.9: Distribution of vegetation types across Site 16 (taken from Jacobs, 2016e).

Species habitat present on Site 16

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 16 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2016e). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Two threatened species have been recorded at the site as listed in Table 4.12. Suitable habitat for a number of other threatened species also occurs at the site. While 27 of these are required to be offset by the project, this site is only being used to offset the Giant Barred Frog as per the EPBC offset policy.

Table 4.12: Threatened and migratory species recorded at Site 16 (by Jacobs, 2016e or * D. Rohweder, Sandpiper).

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
Black Bittern	*Ixobrychus flavicollis*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Amphibians				
Giant Barred Frog*	*Mixophyes iteratus*	E	E	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
Bush Stone-curlew	*Burhinus grallarius*	E		No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Little Lorikeet	*Glossopsitta pusilla*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Hooded Robin (south-eastern form)	*Melanodryas cucullata subsp. Cucullata*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. Gularis*	V		No
Rainbow Bee-eater	*Merops ornatus*		M	No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Masked Owl	*Tyto novaehollandiae*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V		No
Reptiles				
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
FLORA PREDICTED TO OCCUR ON SITE				
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Netted Bottle Brush	*Callistemon linearifolius*	V		No
White-flowered Wax Plant	*Cynanchum elegans*	E	E	No
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Smooth Davidson's Plum	*Davidsonia johnsonii*	E	E	No
Rusty Rose Walnut	*Endiandra hayesii*	V	V	No
Slaty Red Gum	*Eucalyptus glaucina*	V	V	No
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V	Yes
Pink Nodding Orchid	*Geodorum densiflorum*	E		No
Sweet Myrtle	*Gossia fragrantissima*	E	E	No
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Weeping Paperbark	*Melaleuca irbyana*	E		Yes
Ripple-leaf Muttonwood	*Myrsine richmondensis*	E	E	No
Rusty Plum, Plum Boxwood	*Niemeyera whitei*	V		No
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Southern Ochrosia	*Ochrosia moorei*	E	E	No
	Oldenlandia galioides	E		No
Tall Knotweed*	*Persicaria elatior*	V	V	Yes
Southern Swamp Orchid	*Phaius australis*	E	E	No
Lady Tankerville's Swamp Orchid	*Phaius tancarvilleae*	E	E	No

Landscape connectivity

Key habitats have been identified over the entire 22.61 ha offset site along with the majority of the entire property. Fauna corridors are identified across the broader property which connect to the adjoining Bungawalbin Nature Reserve and support movement for terrestrial and arboreal fauna such as Brush-tailed Phascogale and Squirrel Glider. The proposed offset area is part of the dry climate change corridor (Richmond Range-Bungawalbin) which connects several national park estates and state forests (DECC, 2007).

4.4.6 **Site 17**

Site 17 was acquired by TfNSW in 2018. It was identified in 2013 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. Detailed ecological surveys were undertaken to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties and to inform the preparation of a BioBanking Application for the site (Jacobs, 2016f). The BioBanking Agreement was executed in February 2019.

Site 17 comprises Lot 4 DP 707736. Approximately half of the lot, totalling 28 hectares, would be excluded encompassing existing and future dwellings, several grazing paddocks and other infrastructure.

The offset area on Site 17 is around 29 hectares in area and contains subtropical rainforest and wet sclerophyll forest. It is adjacent to the project footprint on the eastern boundary of the property (refer Figure 4.1). Site 17 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 17 is an occupied rural property. Livestock (cattle) are run on the cleared areas of the property.

Further information on Site 17 can be found in Appendix C.6, the Ecological Assessment Report developed by Jacobs in 2016.

Vegetation present on Site 17

Approximately 29 hectares of Site 17 has been included in the BioBanking site configuration. The biometric vegetation types identified during surveys of the site in 2015 are detailed in Table 4.13. Figure 4.10 shows the distribution of these vegetation communities.

Table 4.13: Vegetation communities present on Site 17 (Jacobs, 2016f).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement					Total area in hectares used to meet EPBC Act offsets
			Lowland Rainforest	Cryptocarya foetida	Macadamia tetraphylla	Koala Coolgardie/Bagotville	Long-nosed Potoroo	
NR219 - Pink Bloodwood-Tallowwood moist open forest of the far northern ranges of the North Coast	16.41	16.41	-	-	-	16.2	16.41	16.41
NR280 - White Booyong – Fig subtropical rainforest of the North Coast (EEC)	12.57	12.57	12.57	2*	2*	-	12.57	12.57
TOTAL	**28.98**	**28.98**	12.57	2*	2*	16.2	28.98	**28.98**

Note: * refers to number of individuals

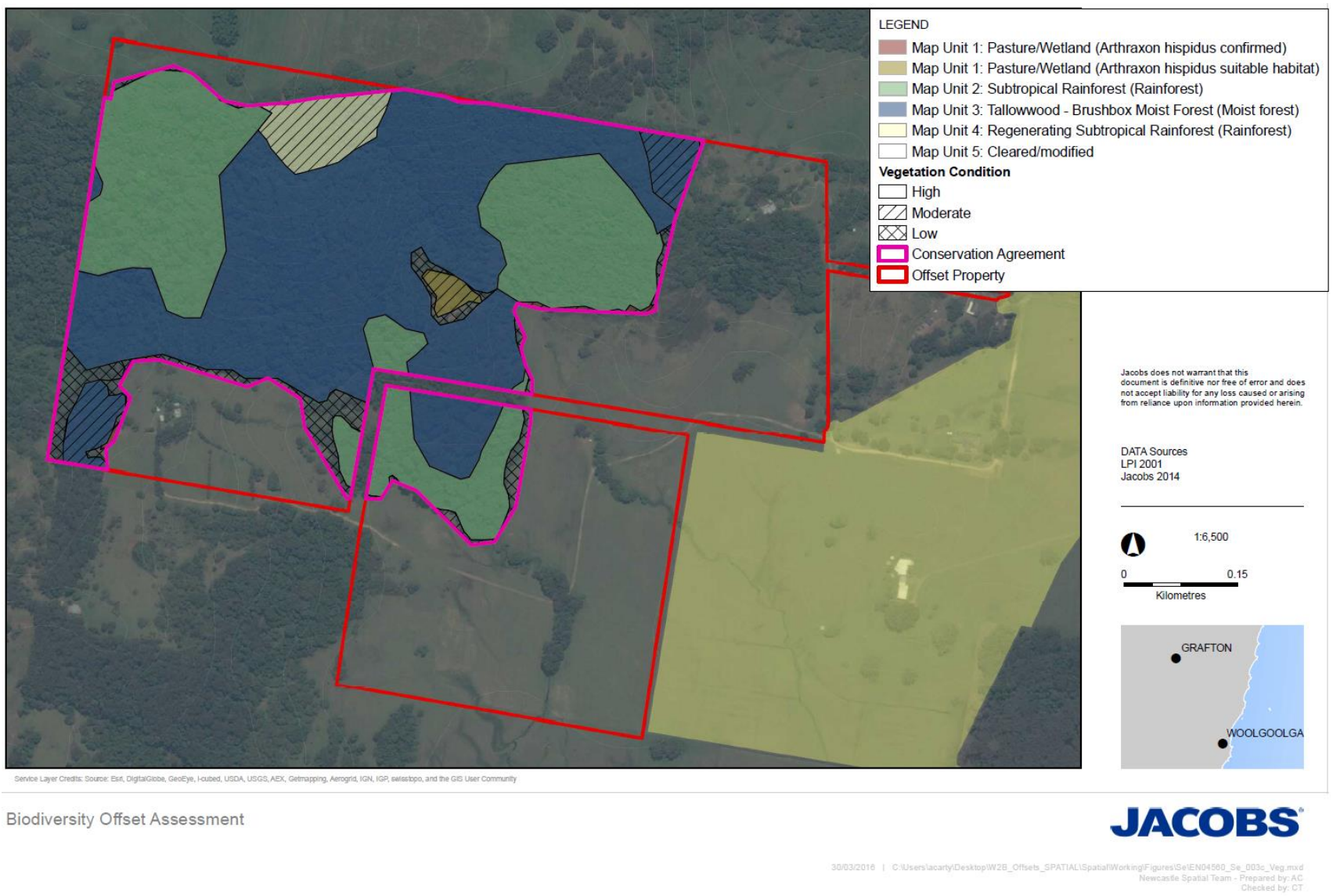

Figure 4.10: Distribution of vegetation types across Site 17 (taken from Jacobs, 2016f).

Species habitat present on Site 17

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 17 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2016f). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Twelve threatened species have been recorded at the site as listed in Table 4.14. Six of these are required to be offset. Suitable habitat for a number of other threatened species also occurs at the site. Eleven of these are required to be offset by the project.

Table 4.14: Threatened and migratory species recorded at Site 17 (by Jacobs, 2016f, or *Jacobs, 2017)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Stinking Cryptocarya	*Croypocarya foetida*	V	V	Yes
Rusty Rose Walnut	*Endiandra hayesii*	V	V	No
Green-leaved Rose Walnut	*Endiandra muelleri*	V	V	Yes
Rough-shelled Bush-nut	*Macadamia tetrapylla*	V	V	Yes
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Brown Fairy-chain Orchid	*Peristeranthus hillii*	V		No
Whalebone Tree	*Sterblus pendulinus*		E	No
Red Lily Pilly	*Syzgium hodgkinsoniae*	V	V	Yes
Arrow-head Vine	*Tinospora tinosporoides*	V		No
Mammals				
Koala	*Phascolarctos cinerus*	V	V	Yes
Birds				
Rainbow Bee-eater	*Merops ornatus*		M	No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Fork-tailed Swift	*Apus pacificus*		M	No
Cattle Egret	*Bubulcus ibis*		M	No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
White-eared Monarch	*Carterornis leucotis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Albert's Lyrebird	*Menura alberti*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Long-nosed potoroo*	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Red-legged Pademelon	*Thylogale stigmatica*	V		No
Reptiles				
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Invertebrates				
Atlas Rainforest Ground-beetle	*Nurus atlas*	E		Yes
FLORA PREDICTED TO OCCUR ON SITE				
Jointed Baloghia	*Baloghia marmorata*	V	V	No
Ball Nut	*Floydia praealta*	V	V	No
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Southern Ochrosia	*Ochrosia moorei*	E	E	No

Landscape connectivity

Key habitats have been identified over approximately 15 hectares of the property. The Blackwall Range key corridor passes though the western end of the property (DEC, 2003). The entire area of the property has been identified as part of the moist and coastal climate change corridors, including the Alstonville Plateau Link moist corridor and the Uralba-Tuckean Swamp coastal corridor.

4.4.7 **Site 20**

Site 20 was purchased by TfNSW as part of the Woolgoolga to Ballina Section 10 project corridor. In 2013 the residual areas of the property were identified as being likely to be suitable to secure biodiversity offsets for the project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties and the Threatened Biodiversity Offset Status Report (Jacobs, 2016h).

Site 20 comprises the residuals of Lot 61 and 62 of DP 1185033 to the west of the project alignment. The site is proposed to be placed under a Biodiversity Stewardship Agreement. A small exclusion area in the western area of the property will accommodate a future dwelling and domestic area.

The offset area on Site 20 is around 17 hectares in area and contains wet and dry sclerophyll forest. Site 20 is bordered by the project to the east (refer Figure 4.1). Site 20 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset. Formerly cleared areas used for cattle grazing and cane farming within Site 20 have been included in the project's koala revegetation strategy and they were revegetated with suitable seedlings in autumn 2017. These areas will be protected under the site's Biodiversity Stewardship Agreement but do not form part of the project's offset area.

Site 20 is an unoccupied rural property. Previous land uses included cattle grazing and cane farming.

Further information on Site 20 can be found in Appendix C.7, the Ecological Assessment Report developed by Jacobs in 2016, note the site boundary has been modified since this assessment was undertaken.

Vegetation present on Site 20

Approximately 3 hectares of native vegetation on Site 20 has been allocated to the Woolgoolga to Ballina Upgrade. A further 18.33 hectares of cleared land is being rehabilitated as part of the Section 10 koala re-vegetation strategy and will be included in the Biodiversity Stewardship site. The biometric vegetation types surveyed from the site in 2015 are detailed in Table 4.15. Figure 4.11 shows the distribution of these vegetation communities.

Table 4.15: Vegetation communities present on Site 20 (modified Jacobs, 2016h).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement	Total area in hectares used to meet EPBC Act offsets
			Arthraxon hispidus	
NR144 - Brush Box tall moist forest of the northern ranges of the North Coast	11.3	0	-	-
NR121 - Blackbutt – Tallowwood tall moist forest of the far north east of the North Coast	5.6	1.86	-	-
Arthraxon hispidus habitat	1	0	1	1
Total	**17.9**	**1.86**	1	**1**

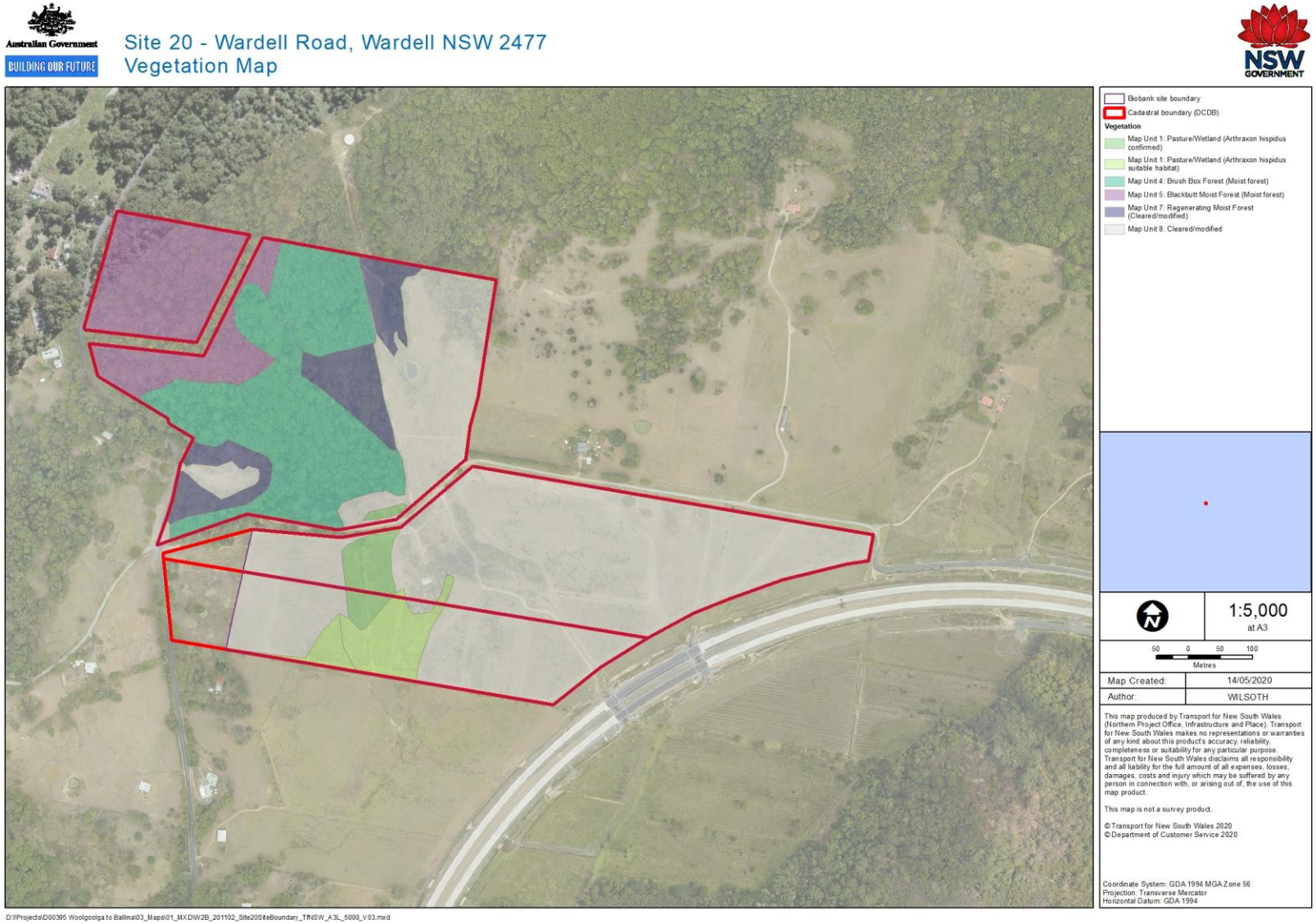

Figure 4.11: Distribution of vegetation types across Site 20 (modified from Jacobs, 2016h).

Species habitat present on Site 20

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 20 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2016a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Two threatened species have been recorded at the site as listed in Table 4.16, of which one is required to be offset. Suitable habitat for a number of other threatened species also occurs at the site. Ten of these are required to be offset by the project.

Table 4.16: Threatened and migratory species recorded at Site 20 (by Jacobs, 2016h)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Red-flowered King of the Fairies	*Oberonia titania*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Cattle Egret	*Bubulcus ibis*		M	No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
White-eared Monarch	*Carterornis leucotis*	V		No
Spotted Harrier	*Circus assimulis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Albert's Lyrebird	*Menura alberti*	V		No
Powerful Owl	*Ninox strenua*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed	*Phascogale tapoatafa*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Phascogale				
Koala	*Phascolarctos cinereus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Red-legged Pademelon	*Thylogale stigmatica*	V		No
Reptiles				
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
FLORA PREDICTED TO OCCUR ON SITE				
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Cryptic Forest Twiner	*Tylophora woollsii*	E	E	No

Landscape connectivity

Key habitats have been identified over approximately 15 hectares of the higher elevated portions of the property. The Blackwall Range key corridor passes through the higher elevated western end of the property and the Wardell – Blackwell key corridor includes the lower elevated forested areas as the eastern end of the property (DEC, 2003). The entire area of the property has been identified as part of the moist and coastal climate change corridors, including the Alstonville Plateau Link moist corridor and the Uralba-Tuckean Swamp coastal corridor.

4.4.8 Site 21

Site 21 was purchased by TfNSW as part of the Woolgoolga to Ballina Section 10 project corridor. In 2013 the residual areas of the property were identified as being likely to be suitable to secure biodiversity offsets for the project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties and the Threatened Biodiversity Offset Status Report (Jacobs, 2016i).

Site 21 comprises Lot 1 and 2 of DP 733934. The site is separated into two titles, both proposed to be placed under Biodiversity Stewardship Agreements. A small exclusion area for the current dwellings is included on each title.

The offset area on Site 21 is around 5.5 hectares in area and contains subtropical rainforest. The project footprint adjoins the southern boundary of the property (refer Figure 4.1). Site 21 includes one vegetation community that contributes to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset. Site 21 is also a koala revegetation area and was planted with suitable seedlings in autumn 2017.

Site 21 is an occupied rural property. Previous land uses included cattle grazing.

Further information on Site 21 can be found in Appendix C.8, the Ecological Assessment Report developed by Jacobs in 2016.

Vegetation present on Site 21

Approximately 2 hectares of native vegetation on Site 21 has been allocated to the Woolgoolga to Ballina Upgrade. A further 14.16 hectares of cleared land is being rehabilitated as part of the Section 10 koala re-vegetation strategy and will be included in the Biodiversity Stewardship site. The biometric vegetation types surveyed from the site in 2015 are detailed in Table 4.17. Figure 4.12 shows the distribution of these vegetation communities.

Table 4.17: Vegetation communities present on Site 21 (Jacobs, 2016i).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement *Arthraxon hispidus*	Total area in hectares used to meet EPBC Act offsets
NR280 - White Booyong – Fig subtropical rainforest of the North Coast (EEC)	5.5	0	-	-
Arthraxon hispidus habitat	1.72		1.72	1.72
TOTAL	**7.22**	**0**	1.72	**1.72**

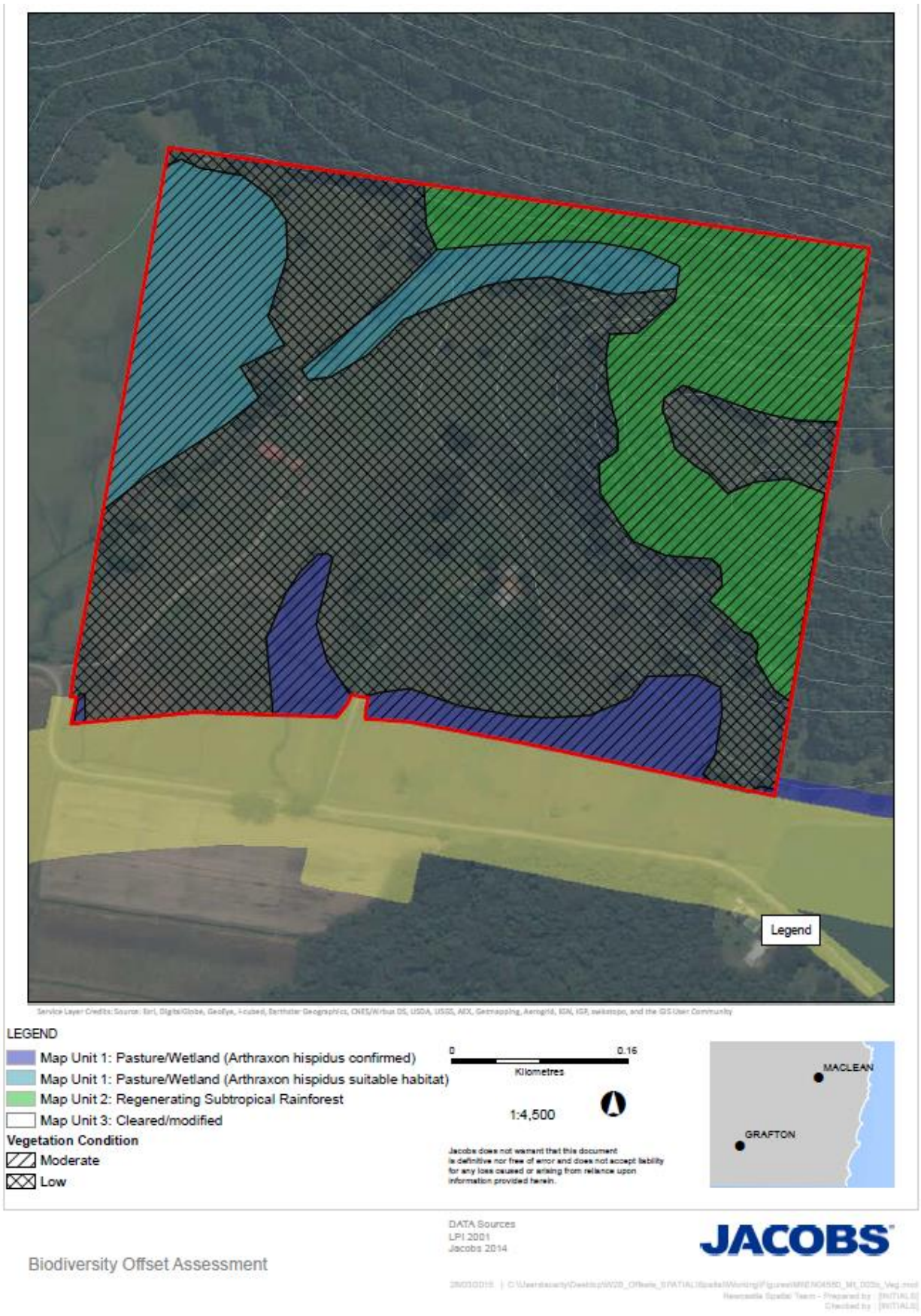

Figure 4.12: Distribution of vegetation types across Site 21 (taken from Jacobs, 2016i).

Species habitat present on Site 21

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 21 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2016a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Two threatened species have been recorded at the site as listed in Table 4.18. Suitable habitat for a number of other threatened species also occurs at the site. Nine of these are required to be offset by the project.

Table 4.18: Threatened and migratory species recorded at Site 21 (by Jacobs, 2016i or * Jacobs, 2017)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
***RECORDED ON SITE**				
Flora				
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Rough-shelled Bush-nut	*Macadamia tetrapylla*	V	V	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
White-eared Monarch	*Carterornis leucotis*	V		No
Spotted Harrier	*Circus assimulis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Black Bittern	*Ixobrychus flavicollis*	V		No
Albert's Lyrebird	*Menura alberti*	V		No
Powerful Owl	*Ninox strenua*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Long-nosed Potoroo*	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied	*Saccolaimus flaviventris*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Sheathtail-bat				
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Red-legged Pademelon	*Thylogale stigmatica*	V		No
Reptiles				
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No

Landscape connectivity

Key habitats have been identified in adjacent areas to the south and north of the property. The entire area of the property has been identified as part of the Wardell – Blackwall key corridor (DEC, 2003) as well as the moist and coastal climate change corridors, including the Alstonville Plateau Link moist corridor and the Uralba-Tuckean Swamp coastal corridor.

4.4.9 **Site 22**

Site 22 was purchased by TfNSW as part of the Woolgoolga to Ballina Section 10 project corridor. In 2013 the residual areas of the property were identified as being likely to be suitable to secure biodiversity offsets for the project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties and the Threatened Biodiversity Offset Status Report (Jacobs, 2015a).

Site 22 comprises portions of Lot 2 DP 543525 to the north of the project alignment. The site will be placed under a Biodiversity Stewardship Agreement. A small exclusion area has been allowed to provide for existing and future dwellings and infrastructure.

The offset area on Site 22 is around 25 hectares in area and contains subtropical rainforest. It is directly adjacent to the project footprint on the southern boundary of the property (refer Figure 4.1). Site 22 includes one vegetation community that contributes to the project's offset requirements as well as providing suitable habitat for a number of threatened species required to be offset. Site 22 is also a koala revegetation area and was planted with suitable seedlings in autumn 2017.

Site 22 is an unoccupied rural property. Previous land uses include cattle grazing.

Further information on Site 22 can be found in Appendix C.9, the Ecological Assessment Report developed by Jacobs in 2015.

Vegetation present on Site 22

Approximately 27 hectares of native vegetation on Site 22 has been allocated to the Woolgoolga to Ballina Upgrade. A further 4.37 hectares of cleared land is being rehabilitated as part of the Section 10 koala re-vegetation strategy and will be included in the Biodiversity Stewardship site. The area has been planted out with expert advice given the cleared area is occupied habitat for Hairy Joint Grass (ECOS Environmental, 2017). The biometric vegetation types surveyed from the site in 2015 are detailed in Table 4.19. Figure 4.13 shows the distribution of these vegetation communities (modified due to a change in the site boundary).

Table 4.19: Vegetation communities present on Site 22 (modified from Jacobs, 2015b).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area or individuals used to meet part EPBC Act offset requirement					Total area in hectares used to meet EPBC Act offsets
			Lowland Rainforest	*Cryptocarya foetida*	*Macadamia tetraphylla*	*Arthraxon hispidus*	Long-nosed Potoroo	
NR280 - White Booyong – Fig subtropical rainforest of the North Coast (EEC)	24.7	24.7	9.34	71*	33*	-	24.52	24.52
Arthraxon hispidus habitat	2.03	-	-	-	-	2.03	-	2.03
TOTAL	**26.73**	**24.7**	9.34	71*	33*	2.03	24.52	**26.55**

Note: * refers to number of individuals

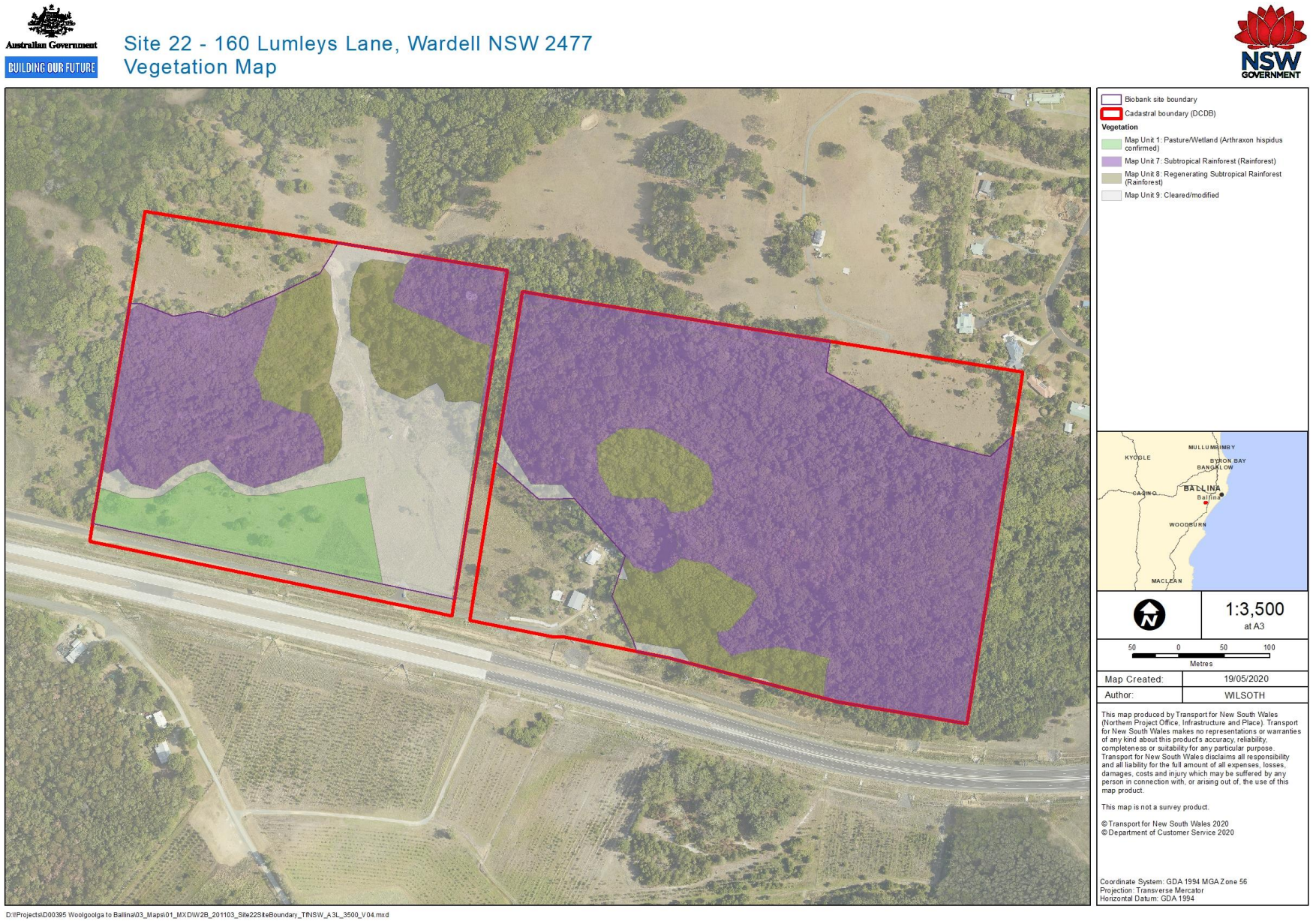

Figure 4.13: Distribution of vegetation types across Site 22 (modified from Jacobs, 2015b).

Species habitat present on Site 22

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 22 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2015a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Ten threatened species have been recorded at the site as listed in Table 4.20. Five of these are required Suitable habitat for a number of other threatened species also occurs at the site. Fourteen of these are required to be offset by the project.

Table 4.20: Threatened and migratory species recorded at Site 22 (by Jacobs, 2015b or *Jacobs, 2017)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
White Lace Flower	*Archidendron hendersonii*	V		Yes
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Stinking Cryptocarya	*Croypocarya foetida*	V	V	Yes
Davidson's Plum	*Davidsonia johnsonii*	E	E	No
Rusty Rose Walnut	*Endiandra hayesii*	V	V	No
Axe-Breaker	*Geijera paniculata*	E		No
Rough-shelled Bush-nut	*Macadamia tetrapylla*	V	V	Yes
Whalebone Tree	*Sterblus pendulinus*		E	No
Birds				
Cattle Egret	*Bubulcus ibis*		M	No
Invertebrates				
Atlas Rainforest Ground-beetle	*Nurus atlas*	E		Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Fork-tailed Swift	*Apus pacificus*		M	No
White-eared Monarch	*Carterornis leucotis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Albert's Lyrebird	*Menura alberti*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *Temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Eastern Grass Owl	*Tyto longimembris*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo*	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Red-legged Pademelon	*Thylogale stigmatica*	V		No
Reptiles				
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Invertebrates				
Pink Underwing Moth	*Phyllodes imperialis*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Arrow-head Vine	*Tinospora tinosporoides*	V		No
Jointed Baloghia	*Baloghia marmorata*	V	V	No
Green-leaved Rose Walnut	*Endiandra muelleri subsp. bracteata*	E		Yes
Ball Nut	*Floydia praealta*	V	V	No
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Southern Ochrosia	*Ochrosia moorei*	E	E	No
Red Lilly Pilly	*Syzygium hodgkinsoniae*	V	V	Yes

Landscape connectivity

Key habitats have been identified over approximately 22 hectares of the property covering the subtropical rainforest habitats in the northeast of the property. The entire area of the property has been identified as part of the moist and coastal climate change corridors, including the Alstonville Plateau Link moist corridor and the Uralba-Tuckean Swamp coastal corridor (DECC, 2007).

4.4.10 **Site 23**

Site 23 is a privately owned parcel of land that was identified in 2013 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties, the Threatened Biodiversity Offset Status Report and to inform the preparation of a BioBanking Application for the site (Jacobs, 2016j). The BioBanking Agreement was executed in January 2019.

Site 23 comprises Lot 50 DP 1120710. The site has been placed under a Biobanking Agreement. Several exclusion areas have been allowed to provide for existing and future dwellings and infrastructure.

The offset area on Site 23 is around 15 hectares in area and contains subtropical rainforest and floodplain forest. It adjoins the project footprint on the southern boundary of the property (refer Figure 4.1). Site 23 includes two vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 23 is an occupied rural property. Previous land uses include cattle grazing.

Further information on Site 23 can be found in Appendix C.10, the Ecological Assessment Report developed by Jacobs in 2016.

Vegetation present on Site 23

Approximately 17 hectares of Site 23 has been included in the BioBanking site configuration. The biometric vegetation types surveyed from the site in 2015 are detailed in Table 4.21. Figure 4.14 shows the distribution of these vegetation communities.

Table 4.21: Vegetation communities present on Site 23 (modified from Jacobs, 2016j due to slight boundary modification).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area or individuals used to meet part EPBC Act offset requirement						Total area in hectares used to meet EPBC Act offsets
			Lowland Rainforest	*Cryptocarya foetida*	*Macadamia tetraphylla*	*Arthraxon hispidus*	Pink Underwing Moth	Long-nosed Potoroo	
NR280 - White Booyong – Fig subtropical rainforest of the North Coast (EEC)	14.89	14.89	14.89	3*	25*	-	8.25	14.89	14.89
NR217 – Paperbark swamp forest of the coastal lowlands of the North Coast (EEC) habitat	0.41	0.41	-	-	-	-	-	0.41	0.41
Arthraxon hispidus	1.61	-	-	-	-	1.61	-	-	1.61
TOTAL	**16.91**	**15.30**	14.89	3*	25*	1.61	8.25	15.3	**16.91**

Note: * refers to number of individuals

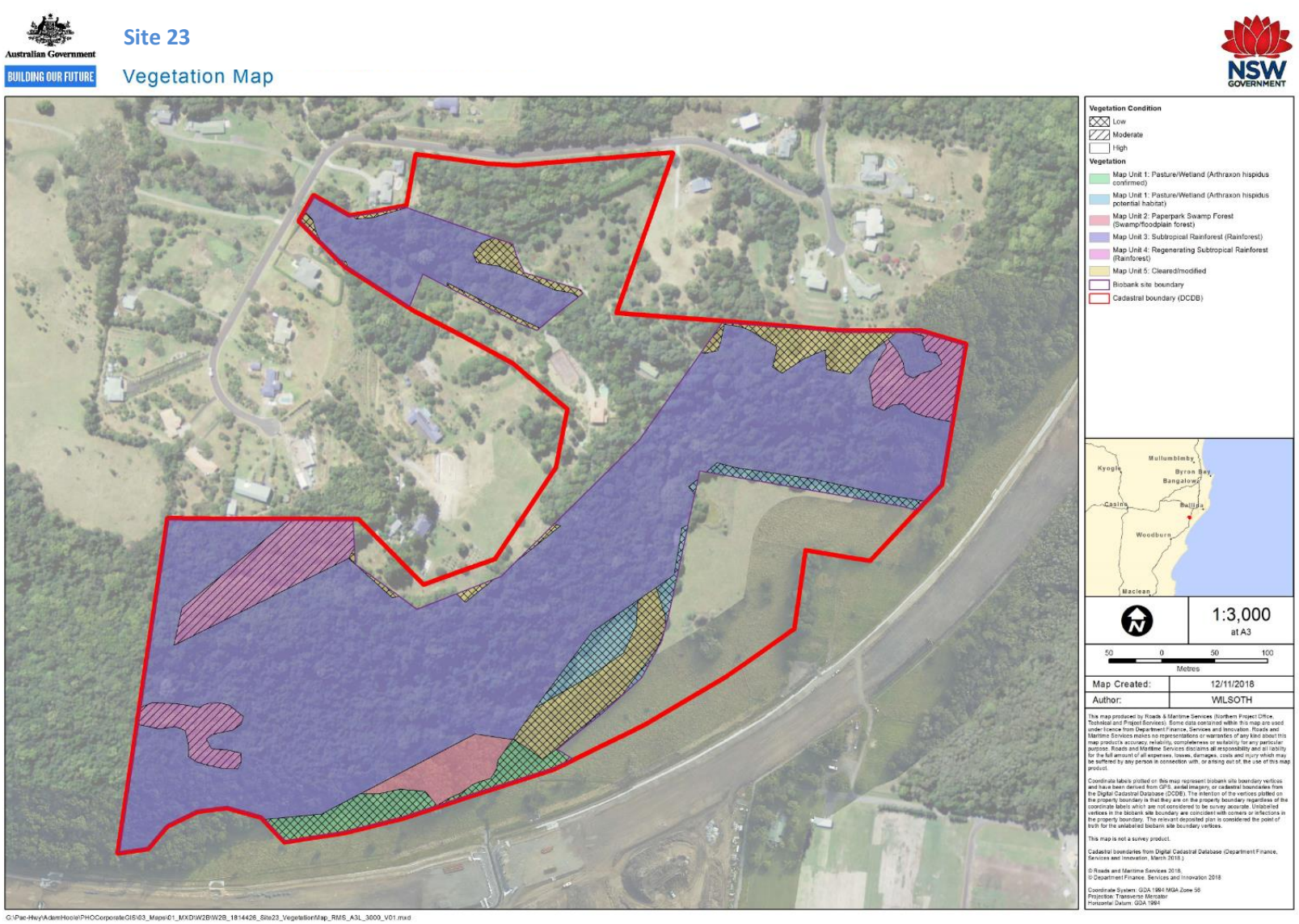

Figure 4.14: Distribution of vegetation types across Site 23 (modified from Jacobs, 2016j).

Species habitat present on Site 23

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 23 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2016a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Nine threatened species have been recorded at the site as listed in Table 4.22. Six of these are required to be offset. Suitable habitat for a number of other threatened species also occurs at the site. Twelve of these are required to be offset by the project.

Table 4.22: Threatened and migratory species recorded at Site 23 (by Jacobs, 2016j)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Stinking Cryptocarya	*Croypocarya foetida*	V	V	Yes
Rusty Rose Walnut	*Endiandra hayesii*	V	V	No
Green-leaved Rose Walnut	*Endiandra muelleri*	V	V	Yes
Rough-shelled Bush-nut	*Macadamia tetrapylla*	V	V	Yes
Whalebone Tree	*Sterblus pendulinus*		E	No
Birds				
Cattle Egret	*Bubulcus ibis*		M	No
Invertebrates				
Pink Underwing Moth	*Phyllodes imperialis*	E	E	Yes
Atlas Rainforest Ground-beetle	*Nurus atlas*	E		Yes
PREDICTED TO OCCUR ON SITE				
Birds				
Fork-tailed Swift	*Apus pacificus*		M	No
White-eared Monarch	*Carterornis leucotis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Comb-crested Jacana	*Irediparra gallinacea*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Albert's Lyrebird	*Menura alberti*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Powerful Owl	*Ninox strenua*	V		No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *Temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Eastern Grass Owl	*Tyto longimembris*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Red-legged Pademelon	*Thylogale stigmatica*	V		No
Reptiles				
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
FLORA PREDICTED TO OCCUR ON SITE				
Jointed Baloghia	*Baloghia marmorata*	V	V	No
Davidson's Plum	*Davidsonia johnsonii*	E	E	No
Ball Nut	*Floydia praealta*	V	V	No
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Southern Ochrosia	*Ochrosia moorei*	E	E	No
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Red Lilly Pilly	*Syzygium hodgkinsoniae*	V	V	Yes
Arrow-head Vine	*Tinospora tinosporoides*	V		No

Landscape connectivity

Key habitats have been identified over a small area of subtropical rainforest habitat at the western end of the property, which extends into the adjacent property (Site 22). The Wardell – Uralba key corridor includes areas at the eastern end of the property (DEC, 2003). The entire area of the property has been identified as part of the moist and coastal climate change corridors, including the Alstonville Plateau Link moist corridor and the Uralba-Tuckean Swamp coastal corridor.

4.4.11 **Site 24**

Site 24 was purchased by TfNSW as part of the Woolgoolga to Ballina Section 10 project corridor. In 2013 the residual areas of the property were identified as being likely to be suitable to secure biodiversity offsets for the project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties and the Threatened Biodiversity Offset Status Report (Jacobs, 2015a).

Site 24 comprises Lot 61 DP 1088684. The site will be placed under a Biodiversity Stewardship Agreement. Several exclusion areas have been allowed to provide for existing and future dwellings and infrastructure.

The offset area on Site 24 is around 24 hectares in area and contains subtropical rainforest. It is bisected by the project footprint (refer Figure 4.1). Site 24 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 24 is an unoccupied rural property. Previous land uses include cattle grazing.

Further information on Site 24 can be found in Appendix C.11, the Ecological Assessment Report developed by Jacobs in 2015.

Vegetation present on Site 24

Approximately 25 hectares of Site 24 has been included in the Biodiversity Stewardship site configuration. The biometric vegetation types surveyed from the site in 2015 are detailed in Table 4.23. Figure 4.15 shows the distribution of these vegetation communities.

Table 4.23: Vegetation communities present on Site 24 (from Jacobs, 2015c).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement					NSW Biometric Vegetation Types Surveyed Total area in hectares used to meet EPBC Act offsets
			Lowland Rainforest	*Macadamia tetraphylla*	*Arthraxon hispidus*	Koala – coolgardie/Bagotvill	Long-nosed Potoroo	
NR280 - White Booyong – Fig subtropical rainforest of the North Coast (EEC)	9.30	9.3	-	32*	-	-	9.3	9.3
NR273 - Tuckeroo – Riberry – Yellow Tulipwood littoral rainforest of the North Coast (EEC)	1.0	1.0	-	-	-	-	1.0	1.0
NR179 - Hoop Pine – Yellow Tulipwood dry rainforest of the North Coast (EEC)	0.6	0.6	-	-	-	-	-	0
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	1.5	1.5	-	-	-	1.5	1.5	1.5
NR253 - Swamp Box swamp forest of the coastal lowlands of the North Coast (EEC)	4.0	4.0	-	-	-	1.7	4.0	4.0
NR114 - Blackbutt – Bloodwood dry heathy open forest on Quaternary sands of the northern North Coast	3.40	3.4	-	-	-	-	-	0
NR200 - Needlebark Stringybark - Red Bloodwood heathy woodland on sandstones of the Lower Clarence of the North Coast	3.60	3.6	-	-	-	-	3.6	3.6
Arthraxon hispidus habitat	1.3	0	-	-	1.3	-	-	1.3
TOTAL	**24.7**	**23.4**	0	32*	1.3	3.2	19.4	**20.7**

Note: * refers to number of individuals

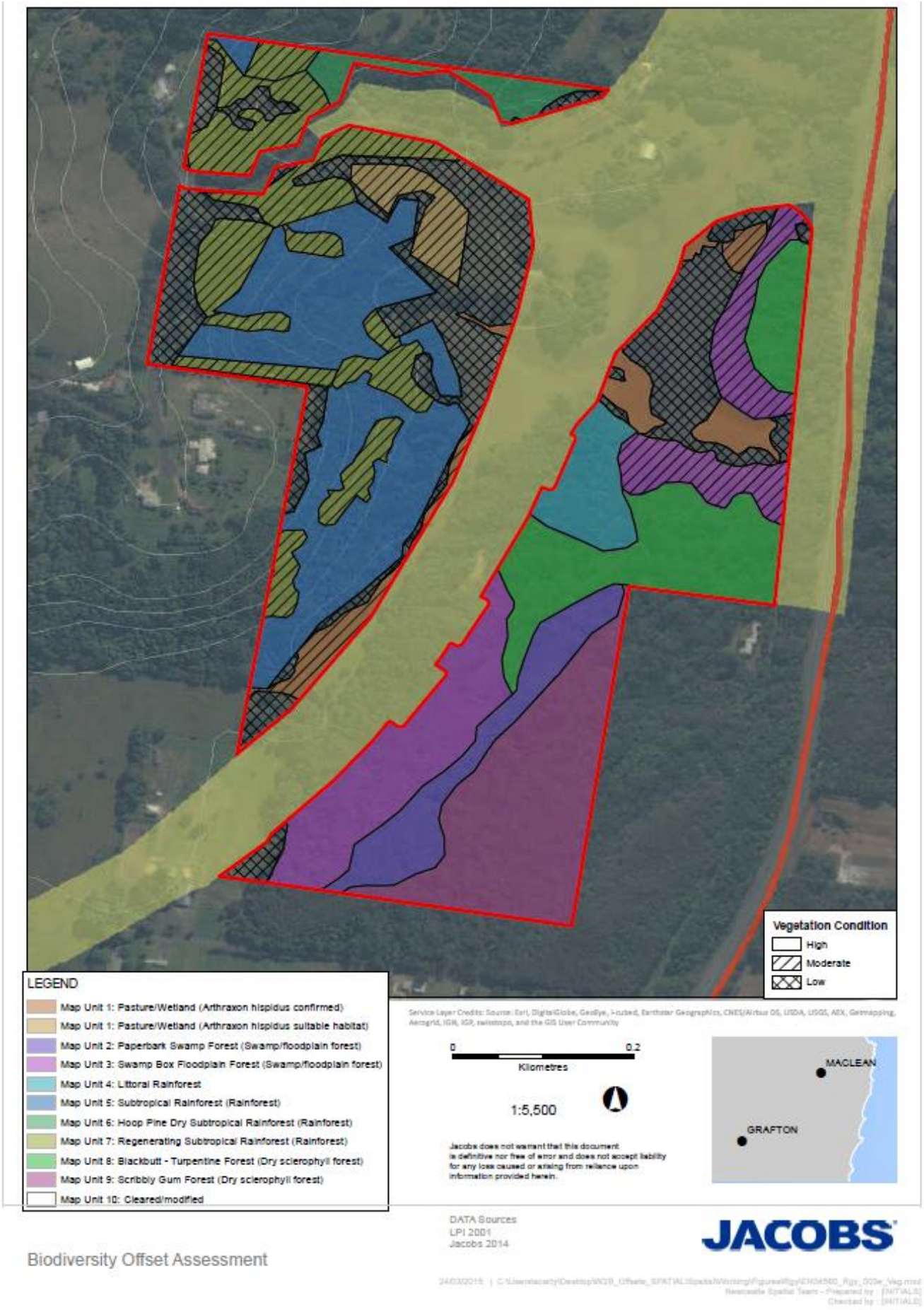

Figure 4.15: Distribution of vegetation types across Site 24 (modified from Jacobs, 2015c).

Species habitat present on Site 24

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 24 in 2014-15, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project (Jacobs, 2015a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Five threatened species have been recorded at the site as listed in Table 4.24. Three of these are required to be offset. Suitable habitat for a number of other threatened species also occurs at the site. Sixteen of these are required to be offset by the project.

Table 4.24: Threatened and migratory species recorded at Site 24 (by Jacobs, 2015c)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
White Lace Flower	*Archidendron hendersonii*	V		Yes
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Rough-shelled Bush-nut	*Macadamia tetrapylla*	V	V	Yes
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Whalebone Tree	*Sterblus pendulinus*		E	No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Fork-tailed Swift	*Apus pacificus*		M	No
Cattle Egret	*Bubulcus ibis*		M	No
White-eared Monarch	*Carterornis leucotis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Comb-crested Jacana	*Irediparra gallinacea*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Albert's Lyrebird	*Menura alberti*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Powerful Owl	*Ninox strenua*	V		No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *Temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Eastern Grass Owl	*Tyto longimembris*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Mammals				
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo*	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Red-legged Pademelon	*Thylogale stigmatica*	V		No
Reptiles				
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Invertebrates				
Atlas Rainforest Ground-beetle	*Nurus atlas*	E		Yes
Pink Underwing Moth	*Phyllodes imperialis*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Scented Acronychia	*Acronychia littoralis*	E	E	No
Jointed Baloghia	*Baloghia marmorata*	V	V	No
Stinking Cryptocarya	*Cryptocarya foetida*	V	V	Yes
Ball Nut	*Floydia praealta*	V	V	No
Rusty Rose Walnut	*Endiandra hayesii*	V	V	No
Green-leaved Rose Walnut	*Endiandra muelleri subsp. bracteata*	E		Yes
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Southern Ochrosia	*Ochrosia moorei*	E	E	No
Red Lilly Pilly	*Syzygium hodgkinsoniae*	V	V	Yes
Arrow-head Vine	*Tinospora tinosporoides*	V		No

Landscape connectivity

Key habitats have been identified over a small area of subtropical rainforest habitat at the western end of the property, which extends into the adjacent property (Site 23). The entire area of the property has been identified as part of the Wardell – Uralba key corridor (DEC, 2003) as well as part of the moist and coastal climate change corridors, including the Alstonville Plateau Link moist corridor and the Uralba-Tuckean Swamp coastal corridor.

4.4.12 **Site 25**

Site 25 was acquired by TfNSW in 2014 as an offset property for the Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties, the Threatened Biodiversity Offset Status Report and to inform the preparation of a BioBanking Application for the site (Jacobs, 2016k). The BioBanking Agreement was finalised in January 2019.

Site 25 comprises Lot 2 DP 718612 and Lot 9 DP 1163255. A number of small areas across the property have been excluded from the BioBank site to allow for a future dwelling and other infrastructure.

Site 25 is around 400 hectares in area and contains predominantly wet and dry sclerophyll forest. It is approximately 4 km south-east of the project footprint (refer Figure 4.1). Site 25 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing occupied and suitable habitat for a number of threatened species required to be offset.

Site 25 is an unoccupied rural property. Previous land uses include selective timber harvesting. The property had a sub-division approval which has been extinguished by TfNSW.

Further information on Site 25 can be found in Appendix C.12, the Ecological Assessment Report developed by Jacobs in 2016.

Vegetation present on Site 25

Approximately 395 hectares of Site 25 has been included in the BioBanking site configuration. The biometric vegetation types surveyed from the site in 2014-15 are detailed in Table 4.25. Figure 4.16 shows the distribution of these vegetation communities.

Table 4.25: Vegetation communities present on Site 25 (modified from Jacobs, 2016k due to slight boundary adjustments).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement						Total area in hectares used to meet EPBC Act offsets
			Angophora robur	Quassia sp. Moonee Creek	Koala - all other areas	Spotted-tailed Quoll	Swift Parrot	Grey-headed Flying-fox	
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	15.2	15.2	-	-	15.2	15.2	-	15.2	15.2
NR161 - Forest Red Gum – Swamp Box of the Clarence Valley lowlands of the North Coast (EEC)	8.75	0	-	-	-	-	-	-	0
NR144 - Brush Box tall moist forest of the northern ranges of the North Coast	5.04	5.04	-	-	5.04	5.04	-	-	5.04
NR123 - Blackbutt – Turpentine dry heathy open forest on sandstones of the lower Clarence Valley of the North Coast	7.41	0	-	-	-	-	-	-	0
NR125 - Blackbutt grassy open forest of the lower Clarence Valley of the North Coast	69.31	69.31	69.31	1770*	69.31	69.31	-	69.31	69.31
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	11.62	11.62	-	-	-	11.62	-	11.62	11.62
NR104 - Bailey's Stringybark – Needlebark Stringybark heathy woodland on sandstones of the lower Clarence Valley of the North Coast	257.78	207.13	210.69	-	-	207.13	211	207.13	211
NR242 - Spotted Gum – Blackbutt open forest of the lower Clarence Valley of the North Coast	20.27	15.02	-	-	15.02	15.02	-	15.02	15.02
TOTAL	**395.38**	**323.32**	280	1770*	104.57	323.32	211	318.28	**327.19**

Note: * refers to number of individuals.

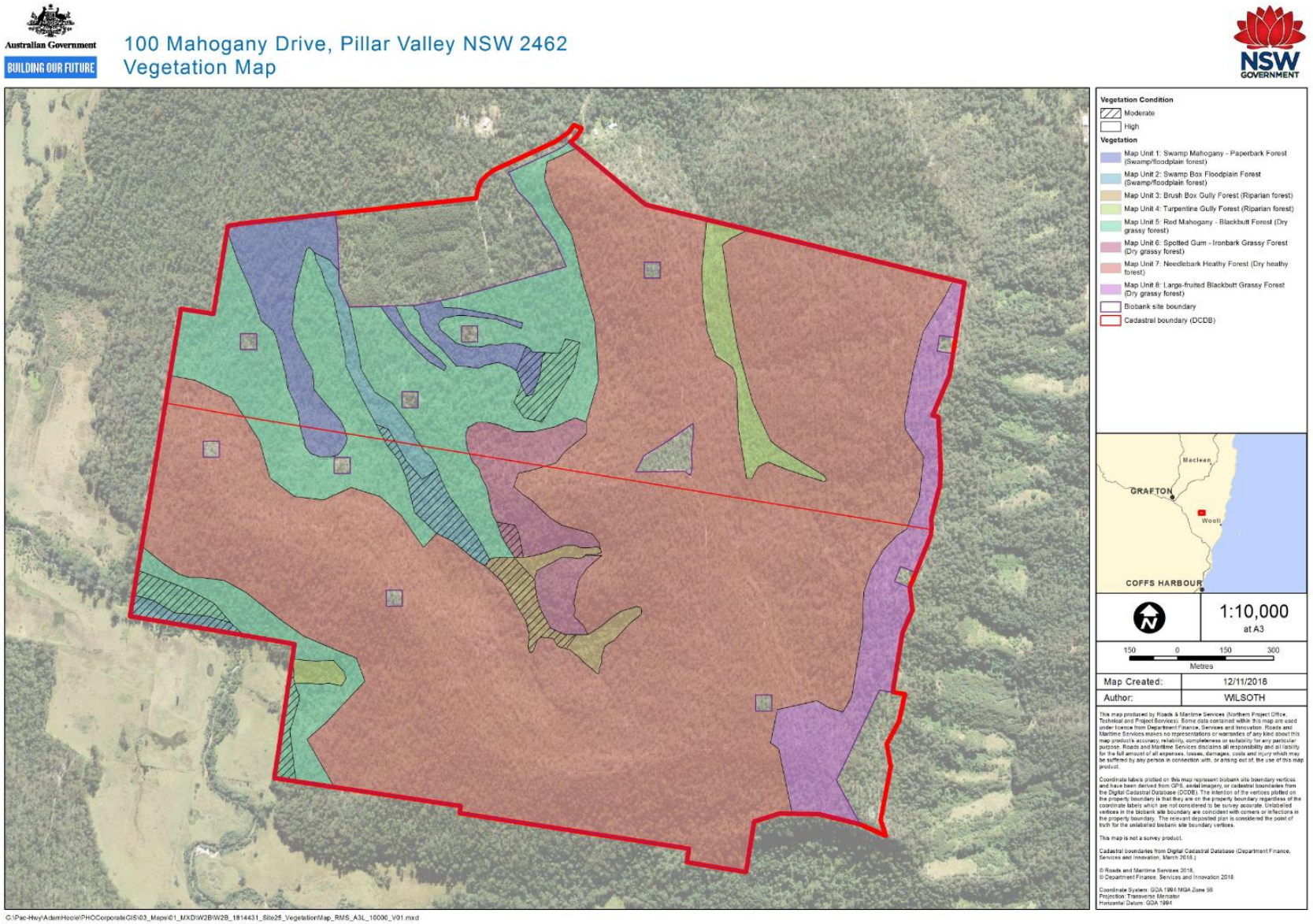

Figure 4.16: Distribution of vegetation types across Site 25 (modified from Jacobs, 2016k due to slight boundary adjustments).

Species habitat present on Site 25

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 25 in 2014, in order to prepare the Threatened Biodiversity Offset Status Report for the Woolgoolga to Ballina project and to submit a BioBanking Agreement application (Jacobs, 2016k). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

A total of eight threatened species have been recorded at the site as listed in Table 4.26. Five of these are required to be offset by the project. The site also provides suitable habitat for a further 23 species that are required to be offset.

Table 4.26: Threatened and migratory species recorded at Site 25 (by Jacobs, 2016k)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Sandstone Rough-barked Apple	*Angophora robur*	V	V	Yes
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Hairy Melichrus	*Melichrus hirsutus*	E	E	No
Moonee Quassia	*Quassia sp. Moonee Creek*	E	E	Yes
Birds				
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Rainbow Bee-eater	*Merops ornatus*		M	No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
Bush Stone-curlew	*Burhinus grallarius*	E		No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus* subsp. *Victoriae*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Hooded Robin (south-eastern form)	*Melanodryas cucullata* subsp. *Cucullata*	V		No
Hooded Robin	*Melanodryas cucullata*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. Gularis*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Rose-crowned Fruit Dove	*Ptilinopus regina*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Diamond Firetail	*Stagonopleura guttata*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Rock Wallaby	*Petrogale penicillata*	E		No
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V		No
Reptiles				
White-crowned Snake	*Cacophis harriettae*	V		No
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded	*Hoplocephalus stephensii*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Snake				
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
Giant Barred Frog	*Mixophyes iteratus*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Swamp Foxglove	*Centranthera cochinchinensis*	E		No
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V	Yes
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Southern Swamp Orchid	*Phaius australis*	E	E	No
Cryptic Forest Twiner	*Tylophora woollsii*	E	E	No

Landscape connectivity

Key habitats have been identified over approximately 230 hectares of the property and key corridors have been identified in surrounding areas (DEC, 2003). The entire area of the property has been identified as part of the dry climate change corridors (DECC, 2007). Moist and coastal climate change corridors have been identified to the east of the property including areas of Yuraygir National Park and Candole State Forest.

4.4.13 **Site 28**

Site 28 was acquired by TfNSW in 2010 as an offset property for the Glenugie upgrade project. The 603 hectare property includes 440 hectares of good quality native vegetation and 160 hectares of cleared or regenerating lands. The Glenugie offset strategy requires 230 hectares of native vegetation and 70 hectares of cleared/regenerating land to meet the offset approval conditions of the Glenugie upgrade project. This leaves a residual of approximately 213 hectares of native vegetation and a minimum of 37 ha of regenerating vegetation available to offset the Woolgoolga to Ballina Pacific Highway upgrade project. The entire property has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of the development of the Glenugie Upgrade Biodiversity Offset Strategy and a Biodiversity Stewardship Agreement application (Jacobs, 2021b).

Site 28 (the W2B offset area of this property) comprises part of Lot 1 DP 1199690 and Lot 1 DP 1222279. As the site will be placed under a Biodiversity Stewardship Agreement, an area has been identified at the northern end of the property for a building envelope and a central cleared area has been excluded for future grazing and other rural infrastructure.

The area to be used on Site 28 for the project is around 250 hectares and contains predominantly dry sclerophyll forest and grassy woodlands. It is approximately 2 km east of the project footprint (refer Figure 4.1). Site 28 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing occupied and suitable habitat for a number of threatened species required to be offset.

Site 28 is an unoccupied rural property, but a grazing lease covers some of the cleared areas. Previous land uses include selective timber harvesting and cattle grazing.

Further information on Site 28 can be found in Appendix C.13, the Ecological Assessment Report prepared by Jacobs.

Vegetation present on Site 28

Approximately 240 hectares of Site 28 has been allocated to Woolgoolga to Ballina biodiversity offsets. The biometric vegetation types surveyed for the Biodiversity Stewardship site assessment in the Woolgoolga to Ballina area are detailed in Table 4.27. Figure 4.17 shows the distribution of these vegetation communities across the entire site, including the 300 ha Glenugie offset area.

Table 4.27: Vegetation communities present in the W2B offset area on Site 28 (Jacobs, 2021b).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement				Total area in hectares used to meet EPBC Act offsets
			Koala - all other areas	Spotted-tailed Quoll	Swift Parrot	Regent Honeyeater	
NR161 - Forest Red Gum – Swamp Box of the Clarence Valley lowlands of the North Coast (EEC)	3.5	0	-	-	-	-	0
NR197 - Narrow-leaved Red Gum woodlands of the lowlands of the North Coast (EEC)	10.3	10.3	-	10.3	10.3	10.3	10.3
NR228 - Scribbly Gum - Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	45.5	45.5	45.5	45.5	-	-	45.5
NR216 - Orange Gum (*Eucalyptus bancroftii*) open forest of the North Coast	6.5	0	-	-	-	-	0
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	166.4	166.4	166.4	166.4	166.4	166.4	166.4
NR244 - Spotted Gum – Grey Box – Grey Ironbark dry open forest of the Clarence Valley lowlands of the North Coast	17.5	17.5	-	6.10	7.11	-	7.11
TOTAL	**249.7**	**239.7**	211.9	228.3	183.81	176.7	**229.31**

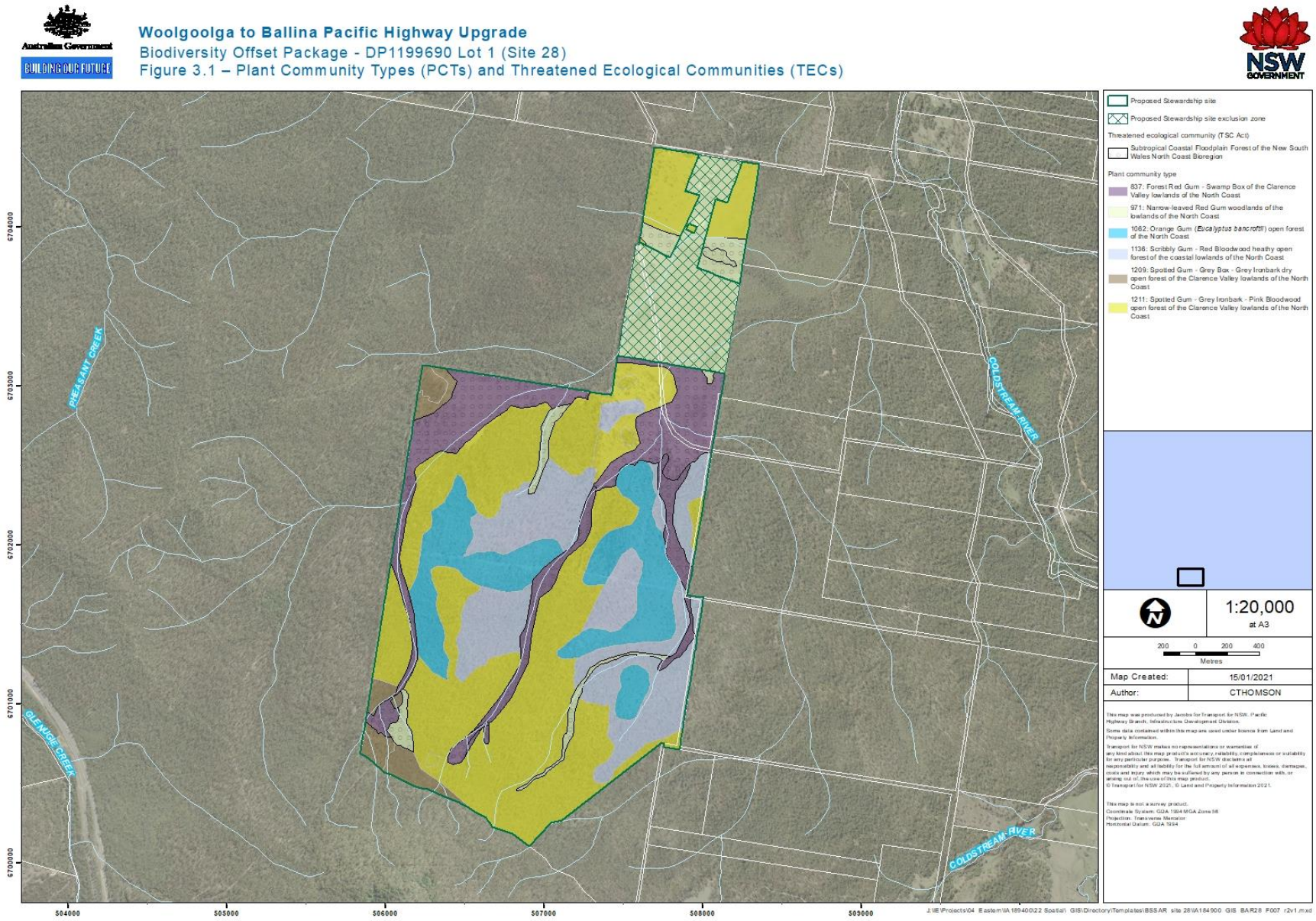

Figure 4.17: Distribution of vegetation types across Site 28, including the W2B and Glenugie offset areas (Jacobs, 2021b).

Species habitat present on Site 28

TfNSW commissioned Jacobs to conduct a full ecological assessment of the entire Glenugie property, including Site 28, in 2014, in order to prepare the Glenugie Upgrade Biodiversity Offset Strategy and a Biodiversity Stewardship Agreement application (Jacobs, 2021). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

A total of 13 threatened species have been recorded at the site as listed in Table 4.28. Six of these are required to be offset by the project. The site also provides suitable habitat for a further 20 species that are required to be offset.

Table 4.28: Threatened species recorded at Site 28 (by Jacobs, 2021b)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Swamp Foxglove	*Centranthera cochinchinensis*	E		No
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V	Yes
Maundia	*Maundia triglochinoides*	V		Yes
Weeping Paperbark	*Melaleuca irbyana*	E		Yes
Birds				
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus* subsp. *victoriae*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Little Lorikeet	*Glossopsitta pusilla*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. gularis*	V		No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Bush Stone-curlew	*Burhinus grallarius*	E		No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	V		No
Painted Honeyeater	*Grantiella picta*	V	V	No
Brolga	*Grus rubicunda*	V		No
Black-breasted Buzzard	*Hamirostra melanosternon*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Hooded Robin	*Melanodryas cucullata*	V		No
Barking Owl	*Ninox connivens*	V		No
Diamond Firetail	*Stagonopleura guttata*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	V		No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V		No
Reptiles				
White-crowned Snake	*Cacophis harriettae*	V		No
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Giant Barred Frog	*Mixophyes iteratus*	E	E	Yes

Landscape connectivity

Key habitats have been identified over the northern area of the property and the property provides a linkage between the key habitats in Glenugie State Forest to the west and Yuraygir National Park to the east (DEC, 2003). The entire area of the property has been identified as part of the dry climate change corridors (DECC, 2007).

4.4.14 **Site 29**

Site 29 is a privately owned parcel of land that was identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of the Threatened Biodiversity Offset Status Report Update 3 and to inform the preparation of a BioBanking Application for the site (Jacobs, 2018). The BioBanking Agreement was executed in February 2019.

Site 29 comprises part of a number of lots as detailed in Table 4.2. A large part of the property is excluded from the offset area to allow continued farming practices and a house site.

The offset area on Site 29 is around 18 hectares in area and contains 18 hectares of native vegetation including wet and dry sclerophyll forest, grassy woodlands and forested wetlands. It is bisected by the project footprint (refer Figure 4.1). Site 29 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 29 is currently unoccupied, but a working agricultural property. Cane is grown on the cleared paddocks and cattle are also grazed in the exclusion area.

Further information on Site 29 can be found in Appendix C.14, the Ecological Assessment Report developed by Jacobs in 2018.

Vegetation present on Site 29

Approximately 18 hectares of native vegetation from Site 29 has been included in the BioBanking site configuration. The biometric vegetation types surveyed from the site in 2016 are detailed in Table 4.29. Figure 4.18 shows the distribution of these vegetation communities.

Table 4.29: Vegetation communities present on Site 29 (Jacobs, 2018).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement	Total area in hectares used to meet EPBC Act offsets
			Koala - Coolgardie/ Bagotville	
NR148 - Coast Cypress Pine shrubby open forest of the North Coast (EEC)	1.43	1.43	-	0
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	3.29	3.29	3.29	3.29
NR197 - Narrow-leaved Red Gum woodlands of the lowlands of the North Coast (EEC)	1.34	1.34	1.17	1.17
NR125 - Blackbutt grassy open forest of the Lower Clarence Valley of the North Coast	6.33	6.33	6.33	6.33
NR117 - Blackbutt – Pink Bloodwood shrubby open forest of the coastal lowlands of the North Coast	5.92	5.92	5.92	5.92
TOTAL	**18.31**	**18.31**	16.71	**16.71**

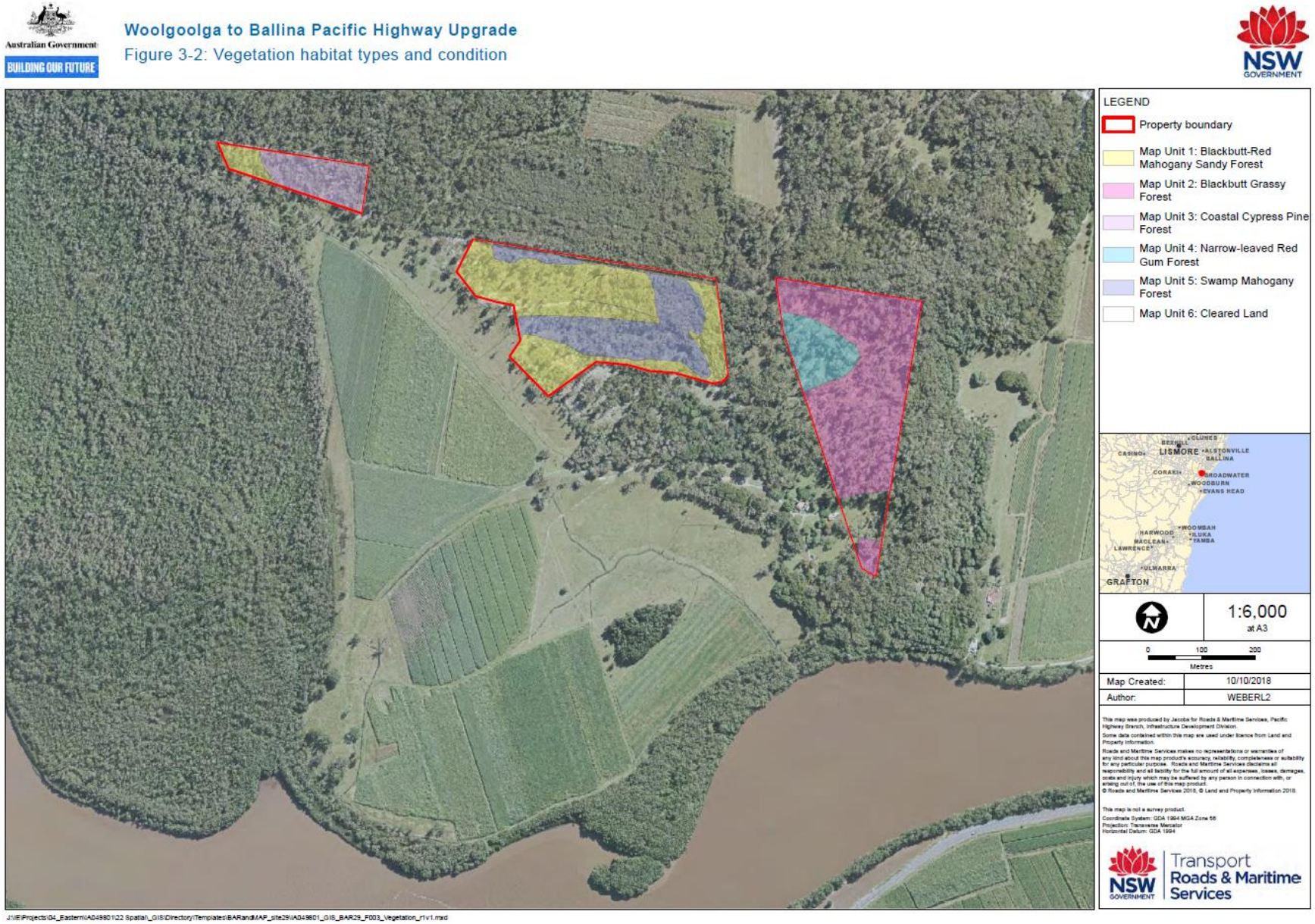

Figure 4.18: Distribution of vegetation types across Site 29 (taken from Jacobs, 2018).

Species habitat present on Site 29

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 29 in 2016, in order to prepare the Threatened Biodiversity Offset Status Report Update 3 for the Woolgoolga to Ballina project and a BioBanking Agreement application (Jacobs, 2018). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

A total of four threatened species and two migratory species have been recorded at the site as listed in Table 4.30. Two of these are required to be offset by the project. The site also provides suitable habitat for a further 11 species that are required to be offset.

Table 4.30: Threatened and migratory species recorded at Site 29 (by Jacobs, 2018)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
Cattle Egret	*Bubulcus ibis*		M	No
Rainbow Bee-eater	*Merops ornatus*		M	No
Powerful Owl	*Ninox strenua*	V		No
Mammals				
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Koala	*Phascolarctos cinerus*	V	V	Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
White-eared Monarch	*Carterornis leucotis*	V		No
Spotted Harrier	*Circus assimilis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Eastern Grass Owl	*Tyto longimembris*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Amphibians				
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Red Flowered King of the Fairies	*Oberonia titania*	V		No
Southern Swamp Orchid	*Phaius australis*	E	E	No

Landscape connectivity

Key habitats have been identified across most of the property, particularly the central and western portions. The Broadwater key corridor (DEC, 2003) includes the entire conservation area. The property is also entirely within the Alstonville Plateau Link climate change moist corridor and the Uralba-Tuckean Swamp coastal corridor (DECC, 2007).

4.4.15 **Site 30**

Site 30 is a privately owned parcel of land that was identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of the Threatened Biodiversity Offset Status Report Update 3 (Jacobs, 2016a) and to inform the preparation of a BioBanking Application for the site (Jacobs, 2016l). The BioBanking Agreement was executed in January 2019.

Site 30 comprises part of Lot 13 DP 1212613. A large part of the property is excluded from the offset area to allow continued farming practices and a house site.

The offset area on Site 30 is around 23 hectares in area and contains native vegetation including wet and dry sclerophyll forest and forested wetlands. It is bisected by the project footprint (refer Figure 4.1). Site 30 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 30 is an occupied, working agricultural property. Cane is grown on the cleared paddocks and cattle are also grazed in the exclusion area.

Further information on Site 30 can be found in Appendix C.15, the Ecological Assessment Report developed by Jacobs in 2016.

Vegetation present on Site 30

Approximately 29 hectares on Site 30 has been included in the BioBanking site configuration. This consists of approximately 23 hectares of native vegetation and 6 hectares of previous cane land that is now being revegetated with suitable native vegetation including koala food trees. The biometric vegetation types surveyed from the site in 2016 are detailed in Table 4.31. Figure 4.19 shows the distribution of these vegetation communities.

Table 4.31: Vegetation communities present on Site 30 (Jacobs, 2016l).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement Koala - Coolgardie/ Bagotville	Total area in hectares used to meet EPBC Act offsets
NR148 - Coast Cypress Pine shrubby open forest of the North Coast (EEC)	0.6	0.6	-	-
NR228 - Scribbly Gum – Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	1.18	1.18	-	-
NR227 - Needlebark Stringybark heathy open forest of coastal lowlands of the northern North Coast	7.95	7.95	7.2	7.2
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	3.88	3.88	1.89	1.89
NR117 - Blackbutt – Pink Bloodwood shrubby open forest of the coastal lowlands of the North Coast	9.7	9.7	9.4	9.4
TOTAL	**23.31**	**23.31**	18.49	**18.49**

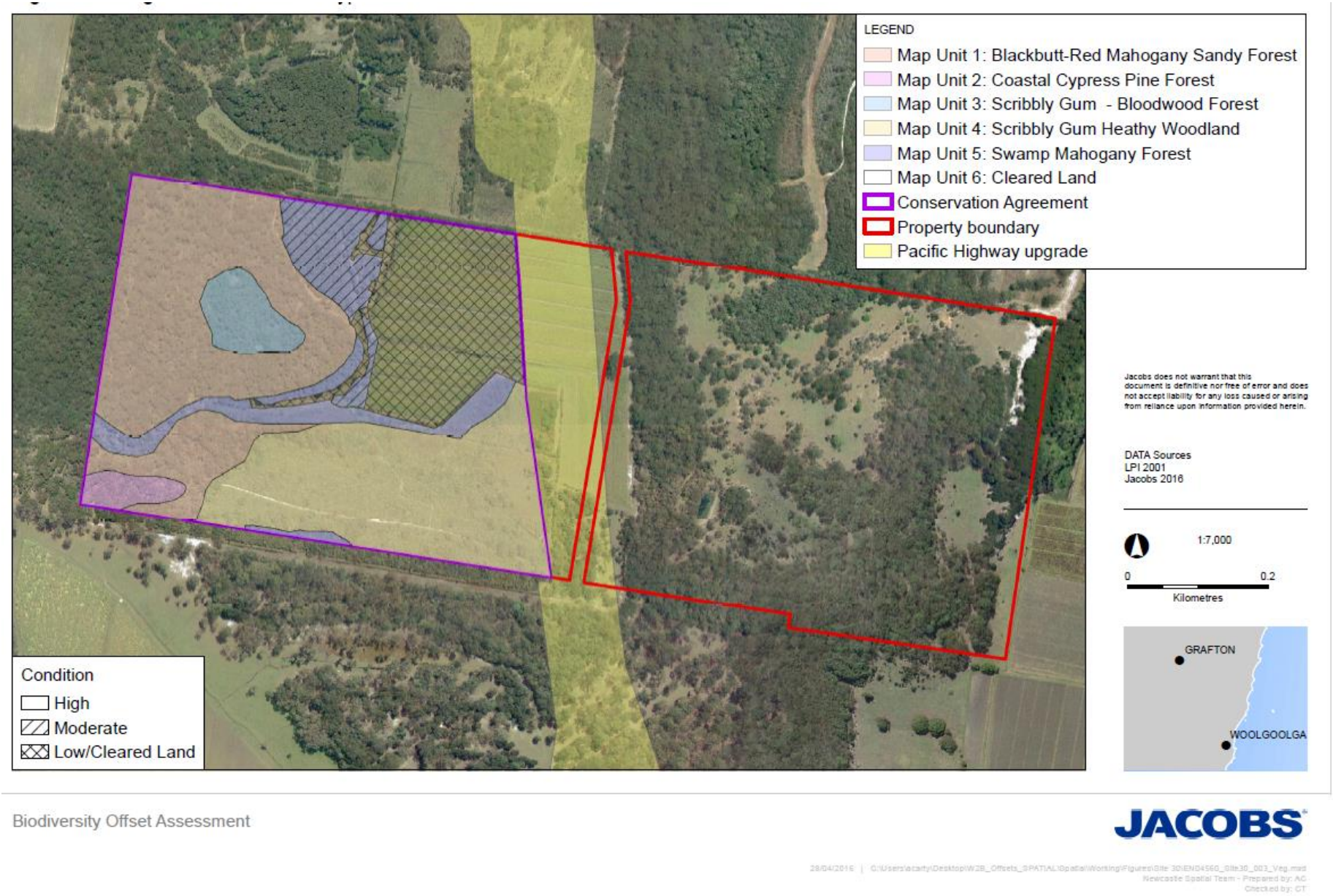

Figure 4.19: Distribution of vegetation types across Site 30 (taken from Jacobs, 2016l).

Species habitat present on Site 30

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 30 in 2016, in order to prepare the Threatened Biodiversity Offset Status Report Update 3 for the Woolgoolga to Ballina project (Jacobs, 2016a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

A total of two threatened species and one migratory species have been recorded at the site as listed in Table 4.32. One of these is required to be offset by the project. The site also provides suitable habitat for a further 12 species that are required to be offset.

Table 4.32: Threatened and migratory species recorded at Site 30 (by Jacobs, 2016l)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
Rainbow Bee-eater	*Merops ornatus*		M	No
Mammals				
Koala	*Phascolarctos cinerus*	V	V	Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
Cattle Egret	*Bubulcus ibis*		M	No
Spotted Harrier	*Circus assimilis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
White-eared Monarch	*Carterornis leucotis*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Powerful Owl	*Ninox strenua*	V		No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rose-crowed Fruit Dove	*Ptininopus regina*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Eastern Grass Owl	*Tyto longimembris*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Amphibians				
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Red Flowered King of the Fairies	*Oberonia titania*	V		No
Southern Swamp Orchid	*Phaius australis*	E	E	No

Landscape connectivity

Key habitats have been identified across the majority of the forested section of the property. The Broadwater key corridor (DEC, 2003) includes the entire conservation area. The property is also part of the Alstonville Plateau Link climate change moist corridor and the Uralba-Tuckean Swamp coastal corridor (DECC, 2007).

4.4.16 **Site 32**

Site 32 was purchased by TfNSW as part of the Woolgoolga to Ballina project corridor. In 2013 the residual areas of the property were identified as being likely to be suitable to secure biodiversity offsets for the project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of a preliminary assessment of candidate properties and the Threatened Biodiversity Offset Status Report (Jacobs, 2016a).

Site 32 comprises part of Lot 6 DP 843369. The site will be placed under a Biodiversity Stewardship Agreement. A small exclusion area has been allowed to provide for a future dwelling.

The offset area on Site 32 is around 17 hectares and contains native vegetation including wet and dry sclerophyll forest, grassy woodlands and forested wetlands. It is bisected by the project footprint (refer Figure 4.1). Site 32 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 32 is an unoccupied rural property. Previous land uses included livestock grazing, cropping, earthworks and quarrying.

Further information on Site 32 can be found in Appendix C.16, the Ecological Assessment Report developed by Jacobs in 2016.

Vegetation present on Site 32

Approximately 17 hectares of native vegetation on Site 32 has been allocated to the Woolgoolga to Ballina Upgrade. A further 1.68 hectares of cleared land is being rehabilitated as part of the Section 10 koala re-vegetation strategy and will be included in the Biodiversity Stewardship site. The biometric vegetation types surveyed from the site in 2016 are detailed in Table 4.33. Figure 4.20 shows the distribution of these vegetation communities.

Table 4.33: Vegetation communities present on Site 32 (Jacobs, 2016m).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement	Total area in hectares used to meet EPBC Act offsets
			Koala - Coolgardie/Bagotville	
NR227 - Scribbly Gum – Needlebark Stringybark heathy open forest of coastal lowlands of the northern North Coast	1.6	1.6	-	-
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	8.3	8.3	8.3	8.3
NR125 - Blackbutt grassy open forest of the Lower Clarence Valley of the North Coast	3.9	3.9	3.8	3.8
NR117 - Blackbutt – Pink Bloodwood shrubby open forest of the coastal lowlands of the North Coast	1.8	1.8	-	-
NR149 - Coastal floodplain sedgelands, rushlands and forblands (EEC)	1.1	1.1	-	-
TOTAL	**16.70**	**16.7**	12.1	**12.1**

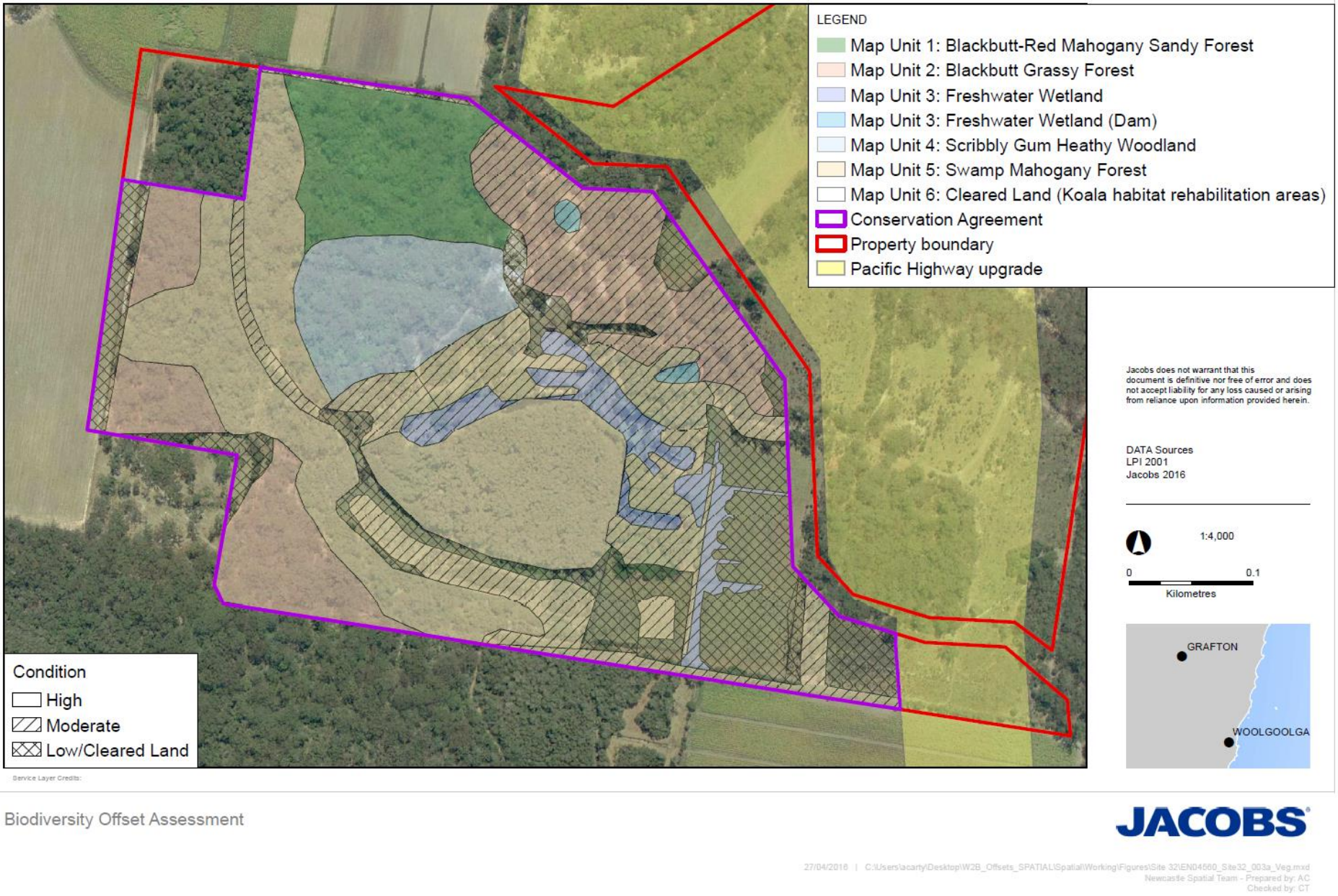

Figure 4.20: Distribution of vegetation types across Site 32 (taken from Jacobs, 2016m).

Species habitat present on Site 32

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 32 in 2016, in order to prepare the Threatened Biodiversity Offset Status Report Update 3 for the Woolgoolga to Ballina project (Jacobs, 2016a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

A total of three threatened species and two migratory species have been recorded at the site as listed in Table 4.34. Two of these are required to be offset by the project. The site also provides suitable habitat for a further 13 species that are required to be offset.

Table 4.34: Threatened and migratory species recorded at Site 32 (by Jacobs, 2016m)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Birds				
Rainbow Bee-eater	*Merops ornatus*		M	No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Mammals				
Koala	*Phascolarctos cinerus*	V	V	Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Magpie Goose	*Anseranas semipalmata*	V		No
Fork-tailed Swift	*Apus pacificus*		M	No
Cattle Egret	*Bubulcus ibis*		M	No
Spotted Harrier	*Circus assimilis*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Amphibians				
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Soldier's Crest Orchid	*Oberonia titania*	V		No
Southern Swamp Orchid	*Phaius australis*	E	E	No

Landscape connectivity

Key habitats have been identified across the majority of the forested section of the property. The Broadwater key corridor (DEC, 2003) includes the majority of the conservation area. The property is also entirely within the Alstonville Plateau Link climate change moist corridor and the Uralba-Tuckean Swamp coastal corridor (DECC, 2007).

4.4.17 **Site 35**

Site 35 is a 117 hectare property that was acquired by TfNSW in 2018 for the W2B upgrade project. It now incorporates the site previously referred to as Site 33. The entire property has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset (Jacobs, 2016n) and detailed BAM assessment was undertaken in mid 2021. The updated assessment report should be available by late 2021.

Site 35 comprises Lots 140, 147, 148 and 149 DP 755624. The entire property is proposed to be transferred to NPWS after a Biodiversity Stewardship Agreement has been placed on the title. As the property will be incorporated into the Broadwater National Park, no exclusion area has been included.

Site 35 supports a variety of undisturbed remnant vegetation types including forest, heathland, woodland and rainforest. The entire property is below 10 metres AHD mainly comprising floodplain areas supporting threatened ecological communities Swamp Sclerophyll Forest and Subtropical Coastal Floodplain Forest. The floodplain adjoins deep sands towards the eastern boundary including low sand dunes supporting littoral rainforest, mallee woodland and heathland and sandy depressions supporting swamp sclerophyll forest and wet heathland. A drainage line is present along the northern boundary of the property which is known to support the threatened Oxleyan Pygmy Perch (*Nannoperca oxleyana*).

Site 35 has not been subject to substantial anthropogenic disturbances in the recent past. There is minimal infrastructure on the property, apart from a perimeter fence on the southern, western and northern boundaries adjoining cleared areas.

Further information on Site 35 can be found in Appendix C.17, the ecological assessment reports for Sites 33 and 35 prepared by Jacobs.

<u>Vegetation present on Site 35</u>

The biometric vegetation types surveyed from the site in 2016 are detailed in Table 4.35. Figure 4.21 shows the distribution of these vegetation communities. The exclusion area shown in the assessment report has been removed and Site 33 has been incorporated. The vegetation areas have been updated accordingly.

Table 4.35: Vegetation communities present on Site 35 (modified from Jacobs, 2016n).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement Litoral Rainforest	Total area in hectares used to meet EPBC Act offsets
NR152 - Coastal heath on sands of the North Coast	13.30	13.3	-	-
NR153 - Coastal mallee of the North Coast	7.25	6.6	-	-
NR217 - Paperbark swamp forest of the coastal lowlands of the North Coast	43.40	43.4	-	-
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast (EEC)	41.75	41.75	-	-
NR273 - Tuckeroo – Riberry – Yellow Tulipwood littoral rainforest of the North Coast (EEC)	5.27	4.0	4.0	4.0
NR278 - Wet heathland and shrubland of coastal lowlands of the North Coast	5.71	0	-	-
NR161 - Forest Red Gum – Swamp Box of the Clarence Valley Lowlands of the North Coast	0.57	0.57	-	-
TOTAL	**117.25**	**109.62**	4.0	**4.0**

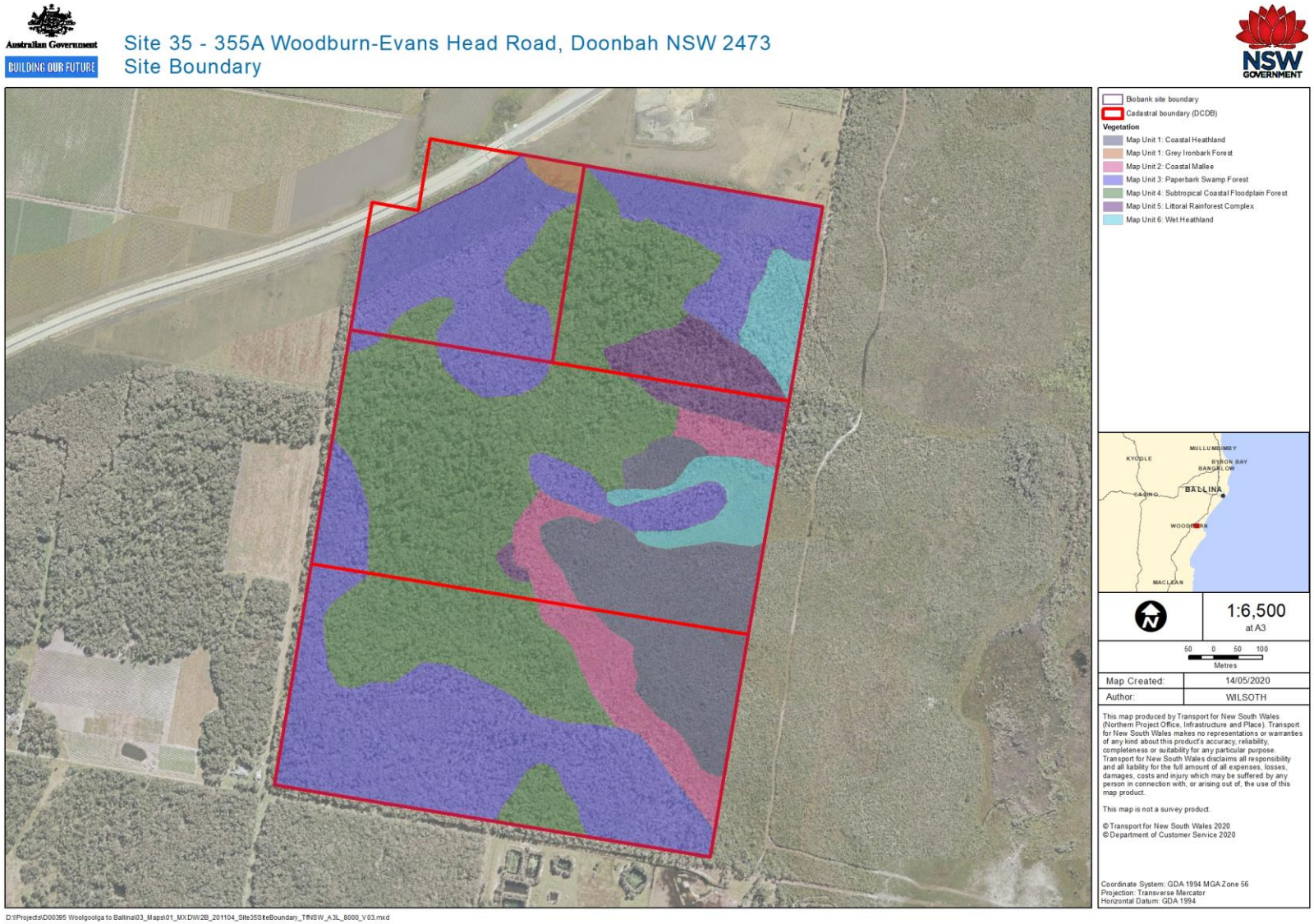

Figure 4.21: Distribution of vegetation types across Site 35 (modified from Jacobs, 2016n).

Species habitat present on Site 35

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 35 in 2016, in order to prepare the Threatened Biodiversity Offset Status Report Update 3 for the Woolgoolga to Ballina project (Jacobs, 2016a). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

A total of three threatened species and two migratory species have been recorded at the site as listed in Table 4.35. Two of these are required to be offset by the project. The site also provides suitable habitat for a further 14 species that are required to be offset.

Table 4.35: Threatened and migratory species recorded at Site 35 (by Jacobs, 2016n)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
Rainbow Bee-eater	*Merops ornatus*		M	No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Mammals				
Koala	*Phascolarctos cinerus*	V	V	Yes
Fish				
Oxleyan Pygmy Perch	*Nannoperca oxleyana*	E	E	Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
White-eared Monarch	*Carterornis leucotis*	V		No
Spotted Harrier	*Circus assimilis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Powerful Owl	*Ninox strenua*	V		No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Wompoo Fruit-Dove	*Ptilinopus magnificus*	V		No
Rose-crowed Fruit Dove	*Ptininopus regina*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Eastern Grass Owl	*Tyto longimembris*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Large-eared Pied Bat	*Chalinolobus dwyeri*	V		No
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Amphibians				
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Scented Acronychia	*Acronychia littoralis*	E	E	No
White Lace Flower	*Archidendron hendersonii*	V		Yes
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Soldier's Crest Orchid	*Oberonia titania*	V		No
Southern Swamp Orchid	*Phaius australis*	E	E	No

Landscape connectivity

Key habitats have been identified across the majority of the property and the eastern boundary adjoins Broadwater National Park. The Woodburn key corridor (DEC, 2003) extends through the central area of the property between Broadwater National Park and habitats to the west. The property is also part of the Broadwater – Bungawalbin climate change coastal corridor (DECC, 2007).

4.4.18 **Site 37**

Site 37 is part of a large 220 hectare property that was acquired by TfNSW in 2008 as an offset for the Ballina Bypass upgrade project. An 18 hectare parcel on the site has been used to meet the offset approval conditions of the Ballina Bypass upgrade project (Australian Wetland Consulting, 2012). This leaves a residual of approximately 202 hectares available to offset other projects including the Woolgoolga to Ballina Pacific Highway upgrade project. Of this, approximately 62 hectares has been identified as 'open waterbodies' and 140 hectares of native vegetation. The entire property has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset as part of the development of the Review and Update of Integrated Wetland Management Sub Plan and Compensation Habitat Agreement (Australian Wetland Consulting, 2012) and as part of a BioBanking assessment (Australian Wetlands Consulting, 2016).

Site 37 (the W2B offset area of this property) comprises a number of lots as detailed in Table 4. The entire property is proposed to be transferred to NPWS, therefore no exclusion area has been included.

The W2B offset area on Site 37 is around 140 hectares in area and contains predominantly forested wetlands, mangrove and saltmarsh communities. It adjoins the project footprint (refer Figure 4.1). Site 37 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing occupied and suitable habitat for a number of threatened species required to be offset.

Site 37 is an unoccupied rural property, but a current grazing lease covers some of the cleared areas. Previous land uses include cattle grazing and cane farming.

Further information on Site 37 can be found in Appendix C.18, the BioBanking Assessment Report prepared by Australian Wetlands Consulting.

Vegetation present on Site 37

Approximately 66 hectares of Site 37 has been allocated to Woolgoolga to Ballina offsets. A further 80 ha including the 18 hectare Ballina Bypass site has also been included in the National Parks transfer site configuration. The biometric vegetation types surveyed from the site in 2016 are detailed in Table 4.37. Figure 4.22 shows the distribution of these vegetation communities in the W2B offset area.

To improve hydrological function of the site, works were undertaken as part of the Ballina Bypass Pacific Highway Upgrade in consultation with Ballina Shire Council, DPI (Fisheries) and the NSW Department of Planning. The works involved impeding water flows that unnaturally drained the site through constructed drainage channels. The works have resulted in the re-established native vegetation across much of the site and will be monitored to ensure the ongoing functioning of ecological processes.

Table 4.37: Vegetation communities present in the W2B offset area on Site 37 (Australian Wetlands Consulting, 2016)

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Total area in hectares used to meet EPBC Act offsets
NR182 - Mangrove – Grey Mangrove low closed forest of the NSW coastal region (FM Act Protected Marine Vegetation)	7.0	0.2	0
NR225 - Saltmarsh complex of the NSW North Coast Bioregion (EEC & FM Act Protected Marine Vegetation)	67.0	0	0
NR217 - Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion (EEC)	7.0	7.0	0
NR255 - Swamp Oak forest of the coastal lowlands of the NSW North Coast Bioregion (EEC)	59.0	59.0	0
TOTAL	**140.0**	**66.2**	**0**

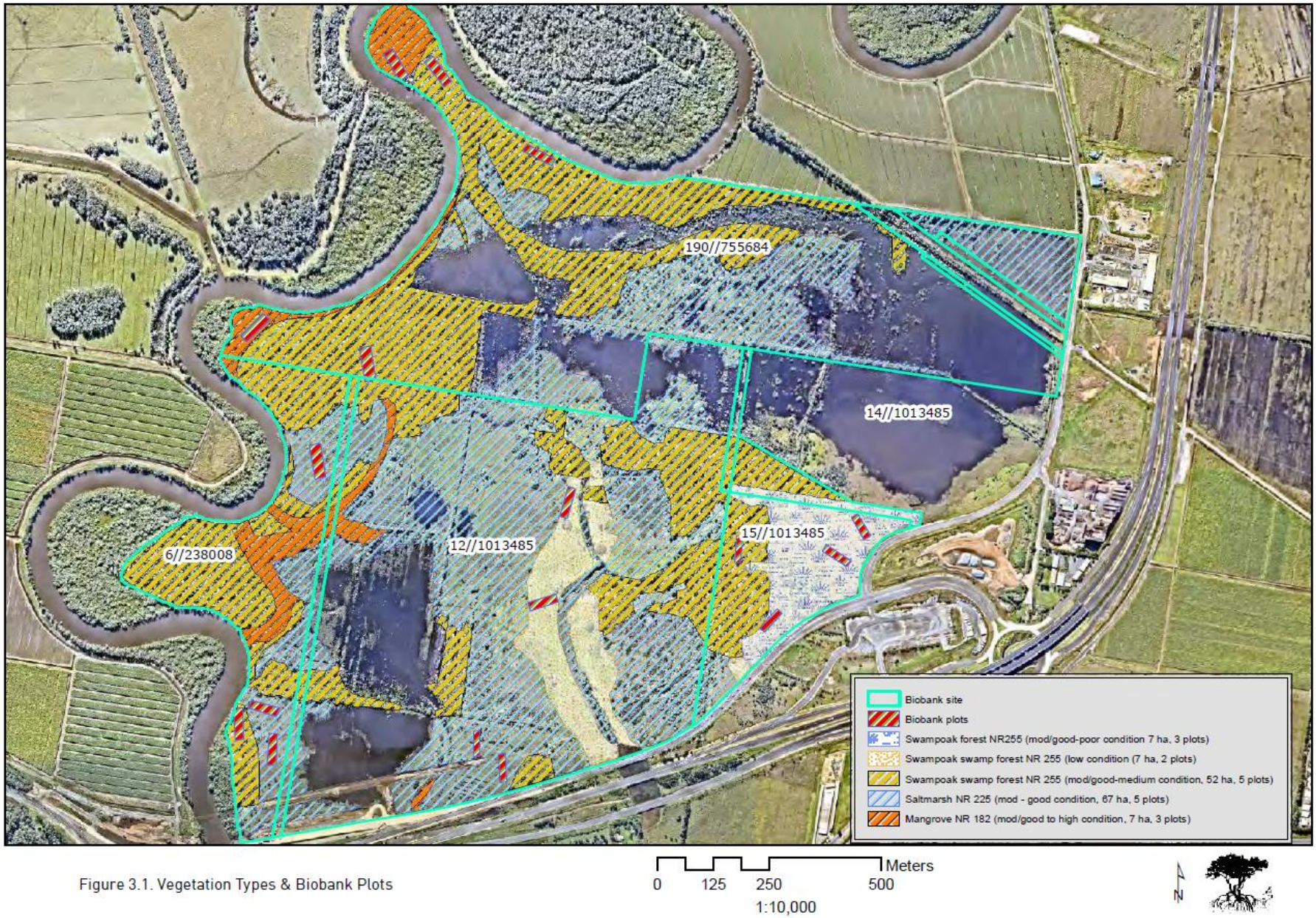

Figure 4.22: Distribution of vegetation types across Site 37 (Australian Wetlands Consulting, 2016).

Species habitat present on Site 37

The Ballina Bypass Alliance contracted Australian Wetlands Consulting to provide a review and update of the Integrated Wetland Management sub plan and compensation habitat agreement in 2012 (Australian Wetlands Consulting, 2012). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

One threatened species was recorded at the site as listed in Table 4.38. The site also provides suitable habitat for a further five species that are required to be offset.

Table 4.38: Threatened and migratory species recorded at Site 37 (by Australian Wetland Consulting, 2016, NSW Bionet Wildlife and Eremaea eBird sightings, 2021)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Common Sandpiper	*Actitis hypoleucos*		M	No
Pale-vented Bush-hen	*Amaurornis moluccana*	V		No
Great Egret	*Ardea alba*		M	No
Australasian Bittern	*Botaurus poiciloptilus*	E	E	No
Cattle Egret	*Bubulcus ibis*		M	No
Sharp-tailed Sandpiper	*Calidris acuminata*		M	No
Curlew Sandpiper	*Calidris ferruginea*	E	CE	No
White-eared Monarch	*Carterornis leucotis*	V		No
Spotted Harrier	*Circus assimilis*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Brown Falcon	*Falco berigora*		M	No
Grey-tailed Tattler	*Heteroscelis brevipes*		M	No
Little Eagle	*Hieraaetus morphnoides*	V		No
White-throated Needletail	*Hirundapus caudacutus*		V	No
Black Bittern	*Ixobrychus flavicollis*	V		No
Mangrove Honeyeater	*Lichenostomus fasciogularis*	V		No
Square-tailed kite	*Lophoictinia isura*	V		No
Rainbow Bee-eater	*Merops ornatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Whimbrel	*Numenius phaeopus*		M	No
Osprey	*Pandion haliaetus*	V	M	No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Freckled Duck	*Stictonetta naevosa*	V		No
Collared Kingfisher	*Todiramphus chloris*	V		No
Marsh Sandpiper	*Tringa stagnatilis*		M	No
Eastern Grass Owl	*Tyto longimembris*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Little Bentwing Bat	*Miniopterus australis*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Invertebrates				
Mitchell's Rainforest Snail	*Thersites michellae*	E	CE	No

Landscape connectivity

Key habitats have been identified over the north-western area of the property. A section of a sub-regional corridor runs adjacent to the riparian zone along the western boundary of the site (Emigrant Creek) and connects the site to the Uralba – Ballina regional corridor. The entire site is also included within the Ballina Coastal Connector climate change corridor.

4.4.19 **Site 40**

Site 40 now includes former Sites 19, 38 and 39. The sites were purchased by TfNSW as part of the Woolgoolga to Ballina Section 10 project corridor. In 2020 the residual areas of the property were identified as being likely to be suitable to secure biodiversity offsets for the project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset and to be included in a Biodiversity Stewardship Agreement (Sandpiper, 2020).

Site 40 comprises fourteen whole or part lots as shown in Table 4.2. The whole site is proposed to be placed under a Biodiversity Stewardship Agreement and transferred to an adjoining landowner.

The offset area on Site 40 is around 209 hectares in area and contains wet and dry sclerophyll forests, heathlands and forested and freshwater wetlands. It directly adjoins the project footprint on the western and northern boundary of the property (refer Figure 4.26). Site 40 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset. All cleared areas within Site 40 have been included in the project's koala revegetation strategy and they were revegetated with suitable seedlings in autumn 2017. These areas will be protected under the site's Biodiversity Stewardship Agreement but do not form part of the project's offset area.

Site 40 is an unoccupied rural property. Previous land uses included cattle grazing and a quarry (on former Site 38) which has been rehabilitated by the previous landowner.

Further information on Site 40 can be found in Appendix C.19, the Biodiversity Stewardship Site Assessment Report developed by Sandpiper in 2020.

Vegetation present on Site 40

Approximately 200 hectares of native vegetation on Site 40 has been allocated to the Woolgoolga to Ballina Upgrade. A further 60 hectares of cleared land is being rehabilitated as part of the Section 10 koala re-vegetation strategy and will be included in the Biodiversity Stewardship site. The biometric vegetation types surveyed from the site in 2020 are detailed in Table 4.39. Figures 4.23, 4.24 and 4.25 show the distribution of these vegetation communities.

Table 4.39: Vegetation communities present on Site 40 (Sandpiper, 2020).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement			Total area in hectares used to meet EPBC Act offsets
			Arthraxon hispidus	Koala - Coolgardie/ Bagotville	Long-nosed Potoroo	
NR217 - Paperbark swamp forest of the coastal lowlands of the North Coast (EEC)	100.81	100.81	-	20.60	-	20.60
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast	3.29	3.29	-	2.53	-	2.53
NR255 - Swamp Oak swamp forest of the coastal lowlands of the North Coast	2.47	2.47	-	-	-	-
NR149 - Coastal floodplain sedgelands, rushlands and forblands	5.74	5.74	-	-	-	-
NR278 - Wet heathland and shrubland of coastal lowlands of the North Coast	3.55	0	-	-	-	-
NR152 - Coastal heath on sands of the North Coast	30.64	30.64	-	-	-	-
NR153 - Coastal mallee of the NSW North Coast Bioregion	18.36	10.3	-	-	-	-
NR280 - White Booyong-Fig subtropical rainforest of the North Coast	1.08	1.08	-	-	-	-
NR274 - Turpentine moist open forest of the coastal hills and ranges of the North Coast	12.25	12.25	-	-	-	-
NR114 - Blackbutt – Bloodwood dry heathy open forest on Quaternary sands of the northern North Coast	20.5	20.5	-	-	-	-
NR148 - Coast Cypress Pine shrubby open forest of the North Coast Bioregion	0.46	0.46	-	-	-	-
NR228 - Scribbly Gum-Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	7.39	7.39	-	-	-	-
NR115 - Blackbutt-Bloodwood dry heathy open forest on sandstones of the northern North Coast	2.76	2.76	-	2.76	-	2.76
Arthraxon hispidus habitat	-	-	2.62	-	-	2.62
Long-nosed Potoroo species credit polygon area	-	-	-	-	43.77	43.77
TOTAL	**209.3**	**197.69**	2.62	25.89	43.77	**72.28**

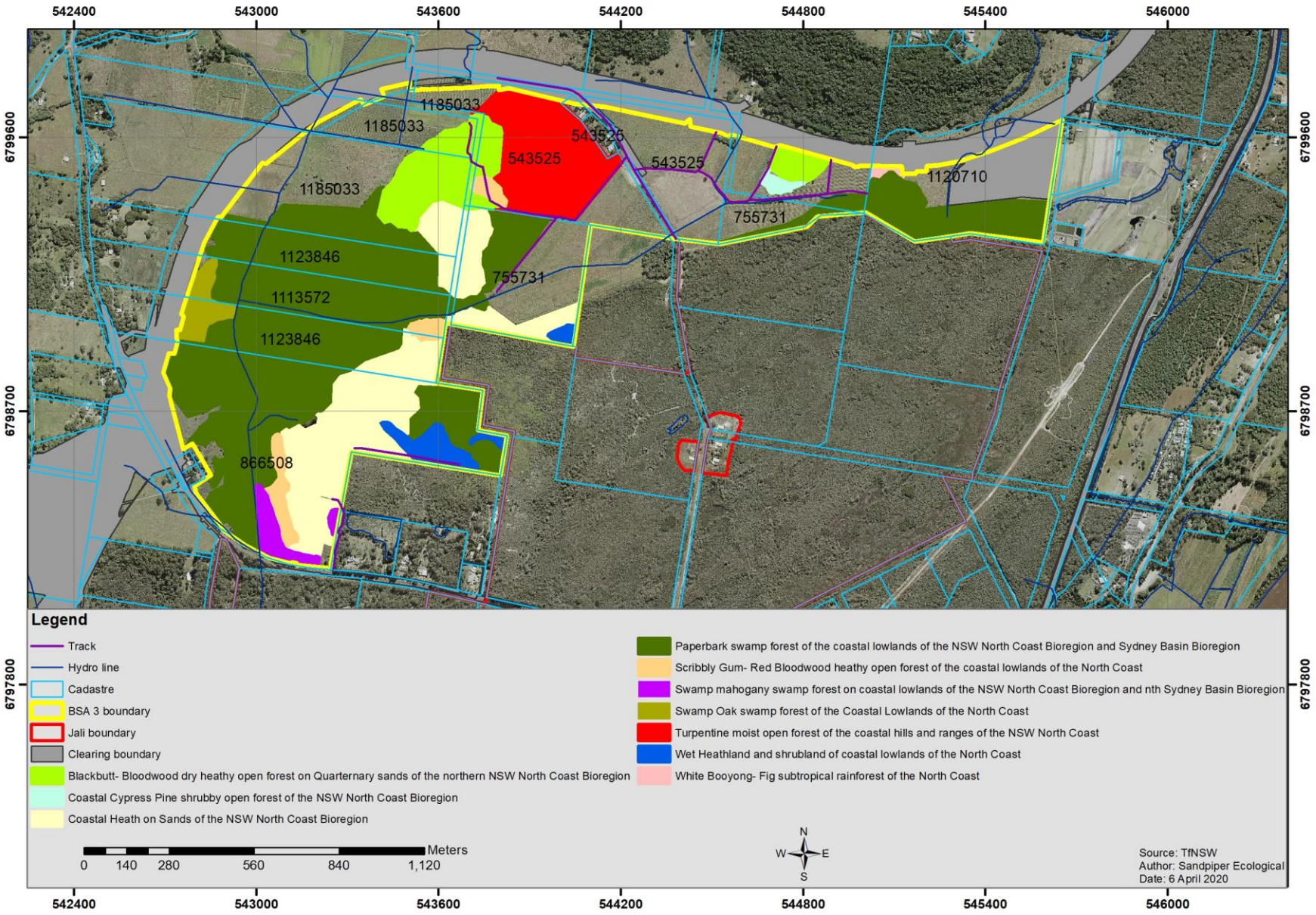

Figure 4.23: Distribution of vegetation types across Site 40a (Sandpiper, 2020).

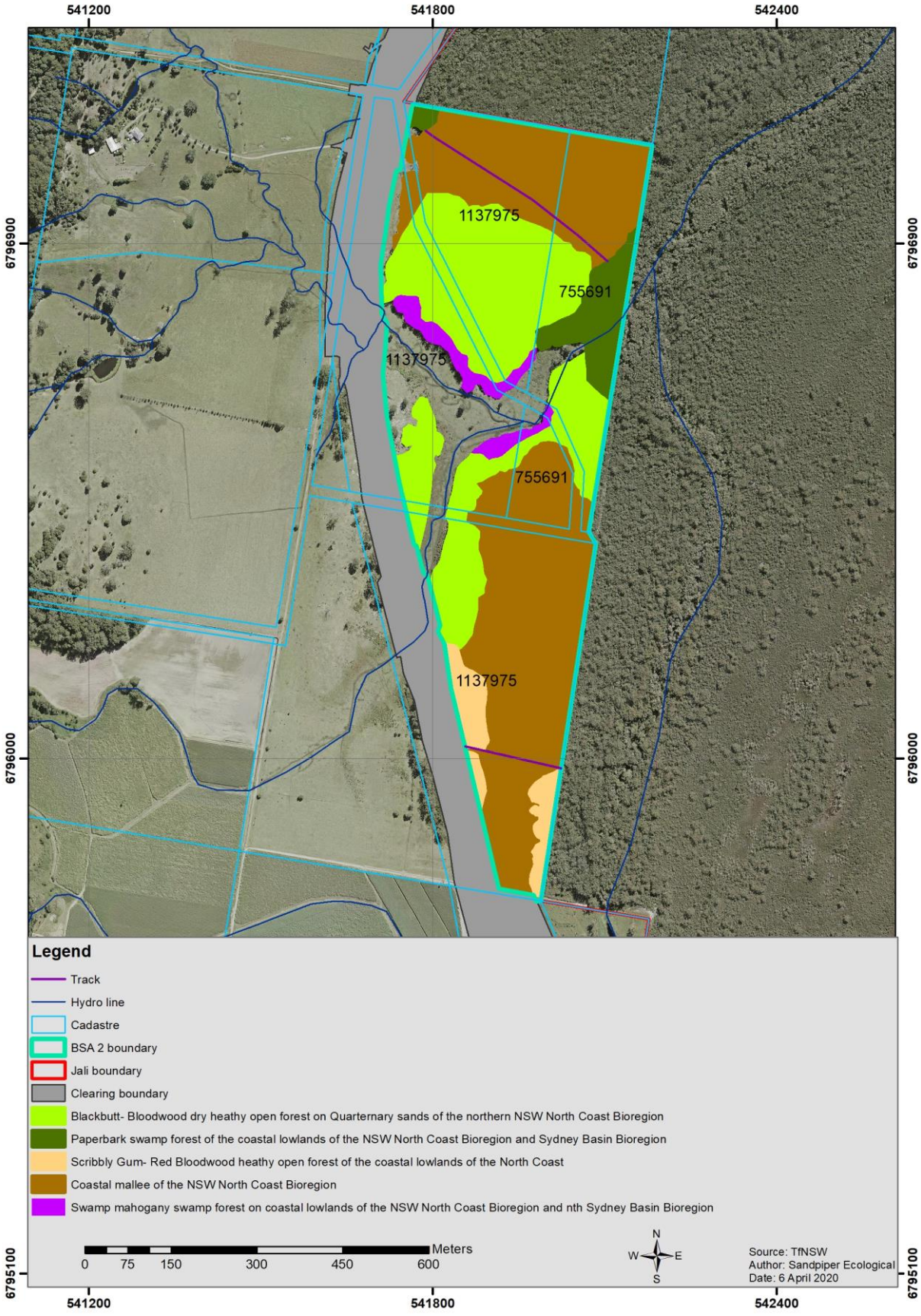

Figure 4.24: Distribution of vegetation types across Site 40b (Sandpiper, 2020).

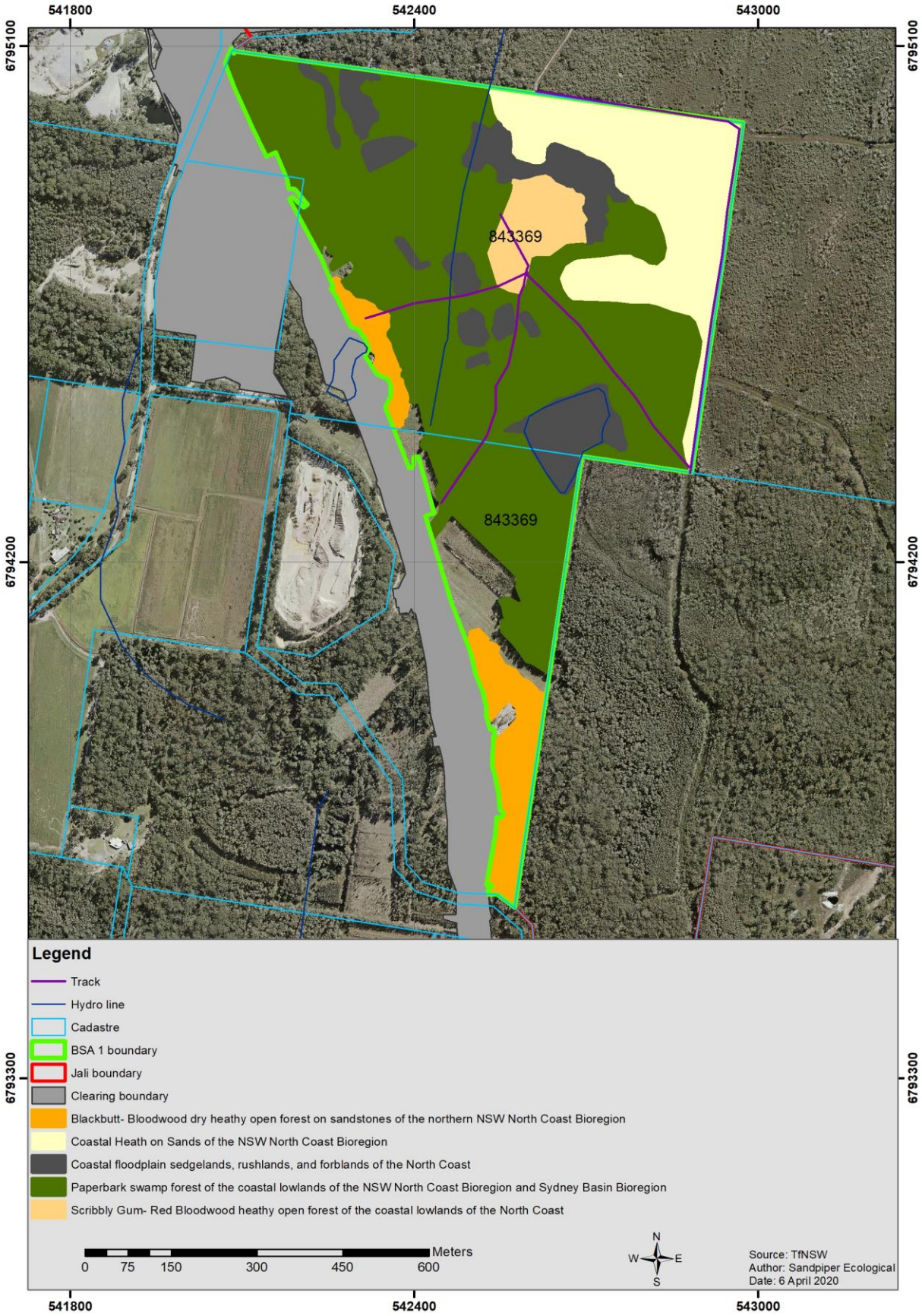

Figure 4.25: Distribution of vegetation types across Site 40c (Sandpiper, 2020).

Species habitat present on Site 40

TfNSW commissioned Sandpiper to conduct a full ecological assessment of Site 40 in 2020, in order to prepare an application for a Biodiversity Stewardship Agreement. Additional data has been taken from the Jacobs assessment of former Site 19, which is now included in Site 40 (Jacobs, 2016g). The following information regarding threatened species presence and suitable habitat has been extracted from these assessments.

Nineteen threatened species and one migratory species have been recorded at the site as listed in Table 4.40. Nine of these are required to be offset by the project. Suitable habitat for a further 68 other threatened or migratory species also occurs at the site. Eighteen of these are required to be offset by the project.

Table 4.40: Threatened and migratory species recorded and predicted to occur at Site 40 (by *Sandpiper, 2020 and Jacobs, 2016g)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
Cattle Egret	*Bubulcus ibis*		M	No
White-bellied Sea-eagle*	*Haliaeetus leucogaster*	V		No
Black Bittern*	*Ixobrychus flavicollis*	V		No
Powerful Owl*	*Ninox strenua*	V		No
Rose-crowed Fruit Dove*	*Ptininopus regina*	V		No
Eastern Grass Owl*	*Tyto longimembris*	V		No
Mammals				
Koala*	*Phascolarctos cinerus*	V	V	Yes
Long-nosed Potoroo*	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox*	*Pteropus poliocephalus*	V	V	Yes
Amphibians				
Wallum Froglet*	*Crinia tinnula*	V		No
Olongburra Frog*	*Litoria olongburensis*	V	V	Yes
Flora				
Scented acronychia*	*Acronychia littoralis*	E	E	Yes
White laceflower*	*Archidendron hendersoni*	V		Yes
Hairy Jointgrass *	*Arthraxon hispidus*	V	V	Yes
Stinking Cryptocarya*	*Cryptocarya foetida*	V	V	Yes
Green-leaved Rose Walnut*	*Endiandra muelleri*	V	V	Yes
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Scrub Turpentine*	*Rhodamnia rubescens*	CE		No
Native guava*	*Rhodomyrtus psidioides*	CE		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Magpie Goose*	*Anseranas semipalmata*	V		No
Regent Honeyeater*	*Anthochaera phrygia*	CE	CE	Yes
Fork-tailed Swift	*Apus pacificus*		M	No
Dusky Woodswallow*	*Artamus cyanopterus*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
	cyanopterus			
Australasian Bittern*	*Botaurus poiciloptilus*	E	E	No
Glossy Black-cockatoo*	*Calyptorhynchus lathami*	V		No
White-eared Monarch	*Carterornis leucotis*	V		No
Speckled Warbler*	*Chthonicola sagittata*	V		No
Spotted Harrier*	*Circus assimilis*	V		No
Brown Treecreeper (eastern subspecies)*	*Climacteris picumnus victoriae*	V		No
Barred Cuckoo-shrike*	*Coracina lineata*	V		No
Varied Sittella*	*Daphoenositta chrysoptera*	V		No
Black-necked Stork*	*Ephippiorhynchus asiaticus*	E		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet*	*Glossopsitta pusilla*	V		No
Brolga*	*Grus rubicunda*	V		No
Little Eagle*	*Hieraaetus morphnoides*	V		No
Comb-crested Jacana*	*Irediparra gallinacea*	V		No
Swift Parrot*	*Lathamus discolor*	E	CE	Yes
Square-tailed kite*	*Lophoictinia isura*	V		No
Rainbow Bee-eater	*Merops ornatus*		M	No
Black-faced Monarch	*Monarcha melanopsis*		M	No
Spectacled Monarch	*Monarcha trivirgatus*		M	No
Satin Flycatcher	*Myiagra cyanoleuca*		M	No
Barking Owl*	*Ninox connivens*	V		No
Blue-billed duck*	*Oxyura australis*	V		No
Osprey*	*Pandion haliaetus*	V	M	No
Grey-crowned Babbler (eastern subspecies)*	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Wompoo Fruit Dove*	*Ptilinopus magnificus*	V		No
Superb Fruit-dove*	*Ptilinopus superbus*	V		No
Rufous Fantail	*Rhipidura rufifrons*		M	No
Australian Painted Snipe*	*Rostratula australis*	E	E	No
Freckled Duck*	*Stictonetta naevosa*	V		No
Masked Owl*	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	No
Hoary Wattled Bat*	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll*	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle*	*Falsistrellus tasmaniensis*	V		Yes
Black-striped Wallaby*	*Macropus dorsalis*	E		No
Eastern Freetail Bat*	*Micronomus norfolkensis*	V		Yes
Little Bentwing Bat*	*Miniopterus australis*	V		No
Large Bent-winged Bat*	*Miniopterus orianae oceanensis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Beccari's Freetail Bat	*Mormopterus beccarii*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat*	*Nyctophilus bifax*	V		Yes
Northern Free-tailed Bat*	*Ozimops lumsdenae*	V		No
Yellow-bellied Glider*	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Golden-tipped bat*	*Phoniscus papuensis*	V		No
Common Planigale	*Planigale maculata*	V		Yes
Eastern Chestnut Mouse*	*Pseudomys gracilicaudatus*	V		No
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Yellow-bellied Sheathtail-bat*	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat*	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat*	*Syconycteris australis*	V		No
Red-legged Pademelon*	*Thylogale stigmatica*	V		No
Reptiles				
Three-toed Snake-tooth Skink	*Coeranoscincus reticulatus*	V	V	No
Invertebrates				
Atlas Rainforest Ground-beetle	*Nurus atlas*	E		Yes
FLORA PREDICTED TO OCCUR				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Rough-shelled Bush Nut*	*Macadamia tetraphylla*	V	V	Yes
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Soldier's Crest Orchid	*Oberonia titania*	V		No
Brown fairy-chain orchid*	*Peristeranthus hillii*	V		No
Southern Swamp Orchid	*Phaius australis*	E	E	No
Red Lilly Pilly*	*Syzygium hodgkinsoniae*	V	V	Yes

Landscape connectivity

Key habitats have been identified over large areas of the property. The Wardell - Blackwall Range key corridor includes the lower elevated forested areas at the south-eastern end of the property (DEC, 2003). The entire area of the property has been identified as part of the moist and coastal climate change corridors, including the Alstonville Plateau Link moist corridor and the Uralba-Tuckean Swamp coastal corridor.

4.4.20 **Site 43**

Site 43 is a parcel of privately owned land that was identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset and to inform the preparation of a BioBanking Application for the site (Jacobs, 2017b). The BioBanking Agreement was executed in January 2019.

Site 43 comprises a number of lots as detailed in Table 4.2. A number of small areas across the property have been excluded from the BioBank site to allow for a future dwelling and other infrastructure.

Site 43 is around 387 hectares in area and contains predominantly wet and dry sclerophyll forest with a small area of forested wetlands. It is located approximately 3 km to the east of the project footprint (refer Figure 4.1). Site 43 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 43 is an occupied rural property. Previous land uses include selective timber harvesting and cattle grazing. The current landowners have invested significant time on weed control on Lots 119 and 137 DP 751365. Two additional lots and a number of paper roads have recently been acquired and added to this property.

Further information on Site 43 can be found in Appendix C.20, the BioBanking Assessment Report developed by Jacobs in 2017.

Vegetation present on Site 43

Approximately 387 hectares of Site 43 has been included in the BioBanking site configuration. The biometric vegetation types surveyed from the site in 2016-17 are detailed in Table 4.41. Figure 4.26 shows the distribution of these vegetation communities.

Table 4.41: Vegetation communities present on Site 43 (Jacobs, 2017b).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement				Total area in hectares used to meet EPBC Act offsets
			Koala - all other areas	Spotted-tailed Quoll	Swift Parrot	Grey-headed Flying-fox	
NR125 - Blackbutt grassy open forest of the lower Clarence Valley of the NSW North Coast Bioregion	146.83	14.01	14.01	3.14	13.27	14.01	14.01
NR173 - Grey Gum - Grey Ironbark open forest of the Clarence lowlands of the NSW North Coast Bioregion	49.54	46.24	49.54	-	49.54	49.42	49.54
NR160 - Flooded Gum - Brush Box - Tallowwood mesic tall open forest on ranges of the lower North Coast	69.86	69.86	69.86	69.86	69.86	69.86	69.86
NR217 - Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion (EEC)	17.41	17.41	17.41	-	17.41	17.41	17.41
NR218 - Pink Bloodwood - Red Mahogany - Smudgy Apple shrubby open forest on sandstone of northern NSW North Coast Bioregion	74.21	0	-	-	-	-	-
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	28.77	28.77	28.77	-	28.77	28.77	28.77
TOTAL	**386.62**	**176.29**	179.59	73	178.85	179.47	**179.59**

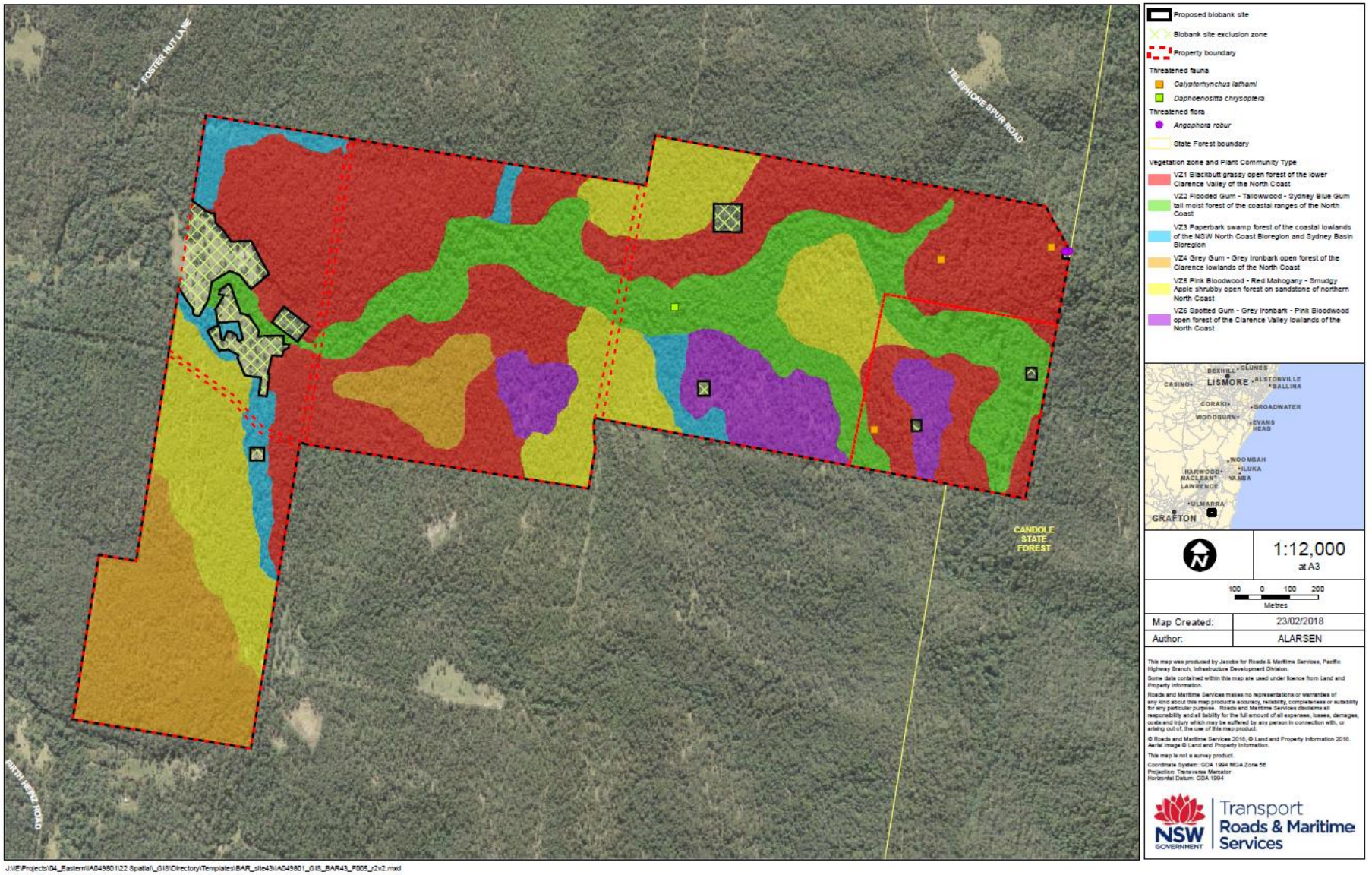

Figure 4.26: Distribution of vegetation types across Site 43 (taken from Jacobs, 2017b).

Species habitat present on Site 43

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 43 in 2017, in order to prepare a BioBanking Application for the site (Jacobs, 2017b). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Five threatened species were recorded at the site as listed in Table 4.42, three of which are required to be offset. The site also provides suitable habitat for a further 28 species that are required to be offset.

Table 4.42: Threatened species recorded at Site 43 (by Jacobs, 2017b or *Jacobs, 2017)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Sandstone Rough-barked Apple	*Angophora robur*	V	V	Yes
Birds				
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Mammals				
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Bush Stone-curlew	*Burhinus grallarius*	E		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. gularis*	V		No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Scarlet Robin	*Petroica boodang*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Golden-tipped Bat	*Kerivoula papuensis*	V		Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Northern Free-tailed Bat	*Ozimops lumsdenae*	V		No
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	V		No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Reptiles				
White-crowned Snake	*Cacophis harriettae*	V		No
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Giant Barred Frog	*Mixophyes iteratus*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Needle-leaf Fern	*Belvisia mucronata*	E		No
Swamp Foxglove	*Centranthera cochinchinensis*	E		No
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Leafless Tongue Orchid	*Cryptostylis hunteriana*	V	V	No
Spider Orchid	*Dendrobium melaleucaphilum*	E		No
Square-stemmed Spike-rush	*Eleocharis tetraquetra*	E		Yes
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V	Yes
Pink Nodding Orchid	*Geodorum densiflorum*	E		No
Narrow-leaf Finger Fern	*Grammitis stenophylla*	E		No
Four-tailed Grevillea	*Grevillea quadricauda*	V	V	Yes
Noah's False	*Lindernia alsinoides*	E		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Chickweed				
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Slender Marsdenia	*Marsdenia longiloba*	E	V	No
Maundia	*Maundia triglochinoides*	V		Yes
Rusty Plum, Plum Boxwood	*Niemeyera whitei*	V		No
Red-flowered King of the Fairies	*Oberonia titania*	V		No
Milky Silkpod	*Parsonsia dorrigoensis*	V	E	No
Brush Sophora	*Phyllanthus microcladus*	E		No
Rainforest Cassia	*Senna acclinis*	E		No
Stinky Lily	*Typhonium sp. aff. Brownii (Typhonium clemeshaii)*	E		No

Landscape connectivity

The property is adjacent to the Pine-Candole key fauna corridor (DEC, 2003) with the eastern edge of the conservation area intersecting the corridor. The property is part of the Coastal Range dry climate change corridor (DECC, 2007).

The site directly adjoins Site 44 which is also proposed as an offset site in this Package.

4.4.21 **Site 44**

Site 44 is a parcel of privately owned land that was identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset and to inform the preparation of a BioBanking Application for the site (Jacobs, 2017c). The BioBanking Agreement was executed in January 2019.

Site 44 comprises Lot 164 DP 751365. A number of small areas across the property have been excluded from the BioBank site to allow for a future dwelling and other infrastructure.

Site 44 is around 177 hectares in area and contains predominantly wet and dry sclerophyll forest with a smaller area of forested wetlands. It is located approximately 3 km to the east of the project footprint (refer Figure 4.1). Site 44 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 44 is an occupied rural property. Previous land uses include selective timber harvesting and cattle grazing. The current landowner has invested significant time on bush rehabilitation and weed control.

Further information on Site 44 can be found in Appendix C.21, the BioBanking Assessment Report developed by Jacobs in 2017.

Vegetation present on Site 44

Approximately 177 hectares of Site 44 has been included in the BioBanking site configuration. The biometric vegetation types surveyed from the site in 2016-17 are detailed in Table 4.43. Figure 4.27 shows the distribution of these vegetation communities.

Table 4.43: Vegetation communities present on Site 44 (Jacobs, 2017c).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement			Total area in hectares used to meet EPBC Act offsets
			Koala - all other areas	Spotted-tailed Quoll	Grey-headed Flying-fox	
NR125 - Blackbutt grassy open forest of the lower Clarence Valley of the NSW North Coast Bioregion	78.46	78.46	78.46	78.46	78.46	78.46
NR217 - Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion (EEC)	19.85	19.85	19.85	-	19.85	19.85
NR218 - Pink Bloodwood - Red Mahogany - Smudgy Apple shrubby open forest on sandstone of northern NSW North Coast Bioregion	39.86	0.8	0.8	-	0.8	0.8
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	39.12	39.12	39.12	25.54	39.12	39.12
TOTAL	**177.29**	**138.23**	138.23	104	138.23	**138.23**

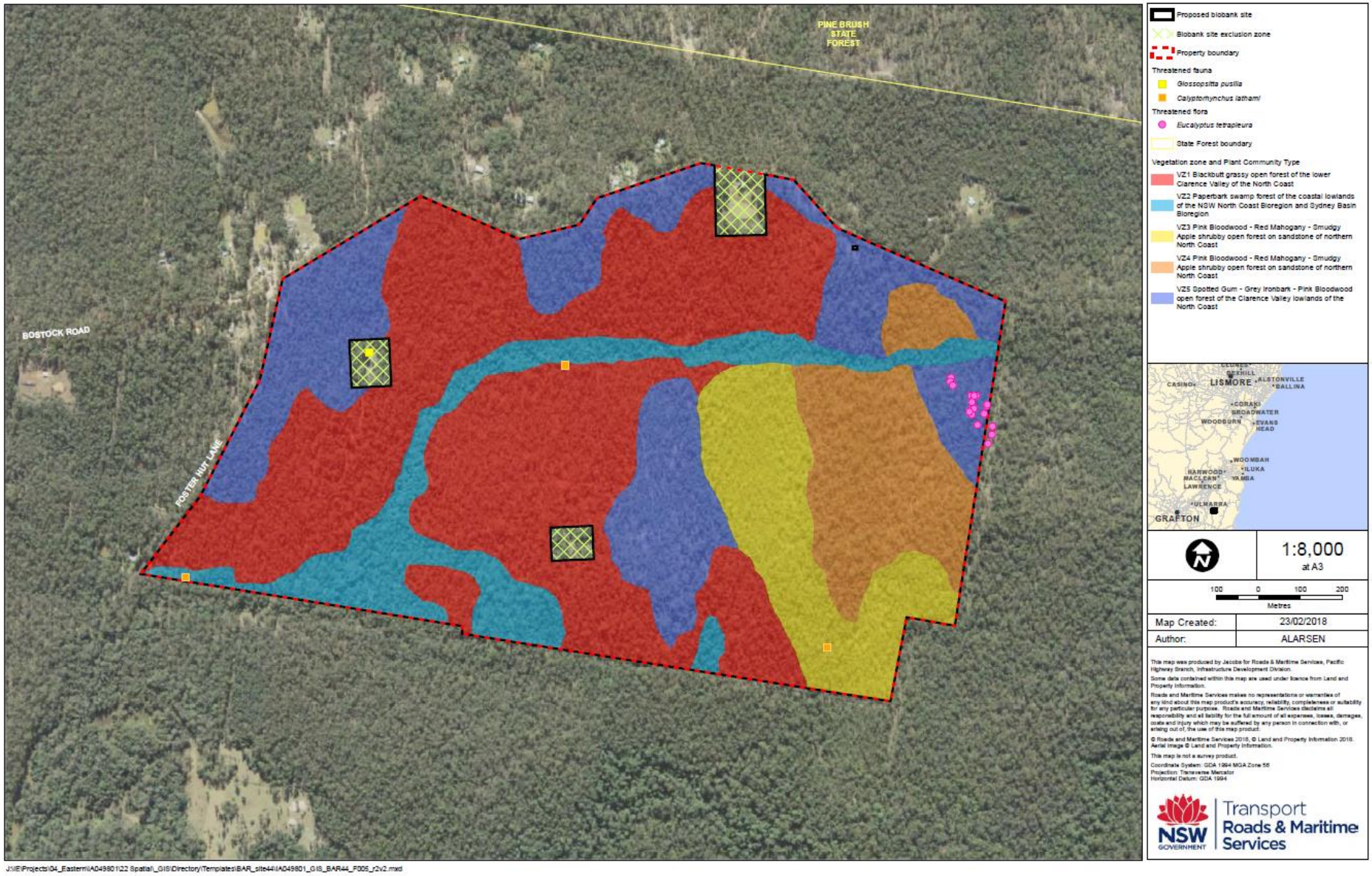

Figure 4.27: Distribution of vegetation types across Site 44 (taken from Jacobs, 2017c).

Species habitat present on Site 44

TfNSW commissioned Jacobs to conduct a full ecological assessment of Site 44 in 2017, in order to prepare a BioBanking Application for the site (Jacobs, 2017c). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Five threatened species were recorded at the site as listed in Table 4.44, two of which are required to be offset. The site also provides suitable habitat for a further 28 species that are required to be offset.

Table 4.44: Threatened species recorded at Site 44 (by Jacobs, 2017c or *Jacobs, 2017)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V	Yes
Birds				
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Barking Owl^	*Ninox connivens*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Bush Stone-curlew	*Burhinus grallarius*	E		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. gularis*	V		No
Powerful Owl	*Ninox strenua*	V		No
Scarlet Robin	*Petroica boodang*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Golden-tipped Bat	*Kerivoula papuensis*	V		Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Northern Free-tailed Bat	*Ozimops lumsdenae*	V		No
Yellow-bellied Glider	*Petaurus australis*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	V		No
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox*	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Reptiles				
White-crowned Snake	*Cacophis harriettae*	V		No
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Giant Barred Frog	*Mixophyes iteratus*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Swamp Foxglove	*Centranthera cochinchinensis*	E		No
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Leafless Tongue Orchid	*Cryptostylis hunteriana*	V	V	No
Spider orchid	*Dendrobium melaleucaphilum*	E		No
Square-stemmed Spike-rush	*Eleocharis tetraquetra*	E		Yes
Pink Nodding Orchid	*Geodorum densiflorum*	E		No
Narrow-leaf Finger Fern	*Grammitis stenophylla*	E		No
Four-tailed Grevillea	*Grevillea quadricauda*	V	V	Yes
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Maundia	*Maundia triglochinoides*	V		Yes
Red-flowered King of the Fairies	*Oberonia titania*	V		No

^ NSW BioNet Atlas, November 2007 (the State Forests Biodata)

Landscape connectivity

The property is 350m from the Pine-Candole key fauna corridor (DEC, 2003) and connects to the corridor through a neighbouring offset site, site 43. The property is part of the Yamba - Nymboida moist climate change corridor and the Coastal Range dry climate change corridor (DECC, 2007).

The site directly adjoins Site 43 which is also proposed as an offset site in this Package.

4.4.22 **Site 46**

Site 46 is a parcel of privately owned land that was identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of detailed ecological surveys to establish its suitability as a biodiversity offset and to inform the preparation of a BioBanking Application for the site (GHD, 2017b). The BioBanking Agreement was executed in January 2019.

Site 46 comprises Lot 3 DP 258347. Portions of the site that will continue to be used for a domestic dwelling, bushfire hazard management and recreational land uses have been excluded from the BioBank site.

Site 46 is around 180 hectares in area and contains predominantly dry sclerophyll forest and grassy woodlands. It is located approximately 11 km to the south-west of the project footprint (refer Figure 4.1). Site 46 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 46 is an occupied rural residential property. The site appears to have been maintained as vegetated open space. There is some evidence of selective timber harvesting in the southern portion of the site. Based on the presence of over mature and hollow-bearing trees, it appears that the majority of the site has never been intensively harvested.

Further information on Site 46 can be found in Appendix C.22, the BioBanking Assessment Report developed by GHD in 2017.

Vegetation present on Site 46

Approximately 180 hectares of Site 46 has been included in the BioBanking site configuration. The biometric vegetation types surveyed from the site in 2016-17 are detailed in Table 4.45. Figure 4.28 shows the distribution of these vegetation communities.

Table 4.45: Vegetation communities present on Site 46 (GHD, 2017b).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement		Total area in hectares used to meet EPBC Act offsets
			Regent Honeyeater	Grey-headed Flying-fox	
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	8.3	8.3	-	-	0
NR227 - Scribbly Gum - Needle bark Stringybark heathy open forest of coastal lowlands of the northern North Coast	28.3	28.3	-	14.5	14.5
NR200 - Needlebark Stringybark - Red Bloodwood healthy woodland on sandstones of the Lower Clarence of the North Coast	46.6	46.6	-	46.6	46.6
NR102 - Angophora robur shrubby forest and woodland on sandstones or sands of the North Coast	20.0	19.0	18.6	-	18.6
NR199 - Needlebark Stringybark - Large-fruited Blackbutt heathy open forest on sandstones of the northern North Coast	61.5	0	-	-	0
NR161 - Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the North Coast (EEC)	15.6	15.6	-	-	0
TOTAL	**180.3**	**117.8**	18.6	61.1	**79.7**

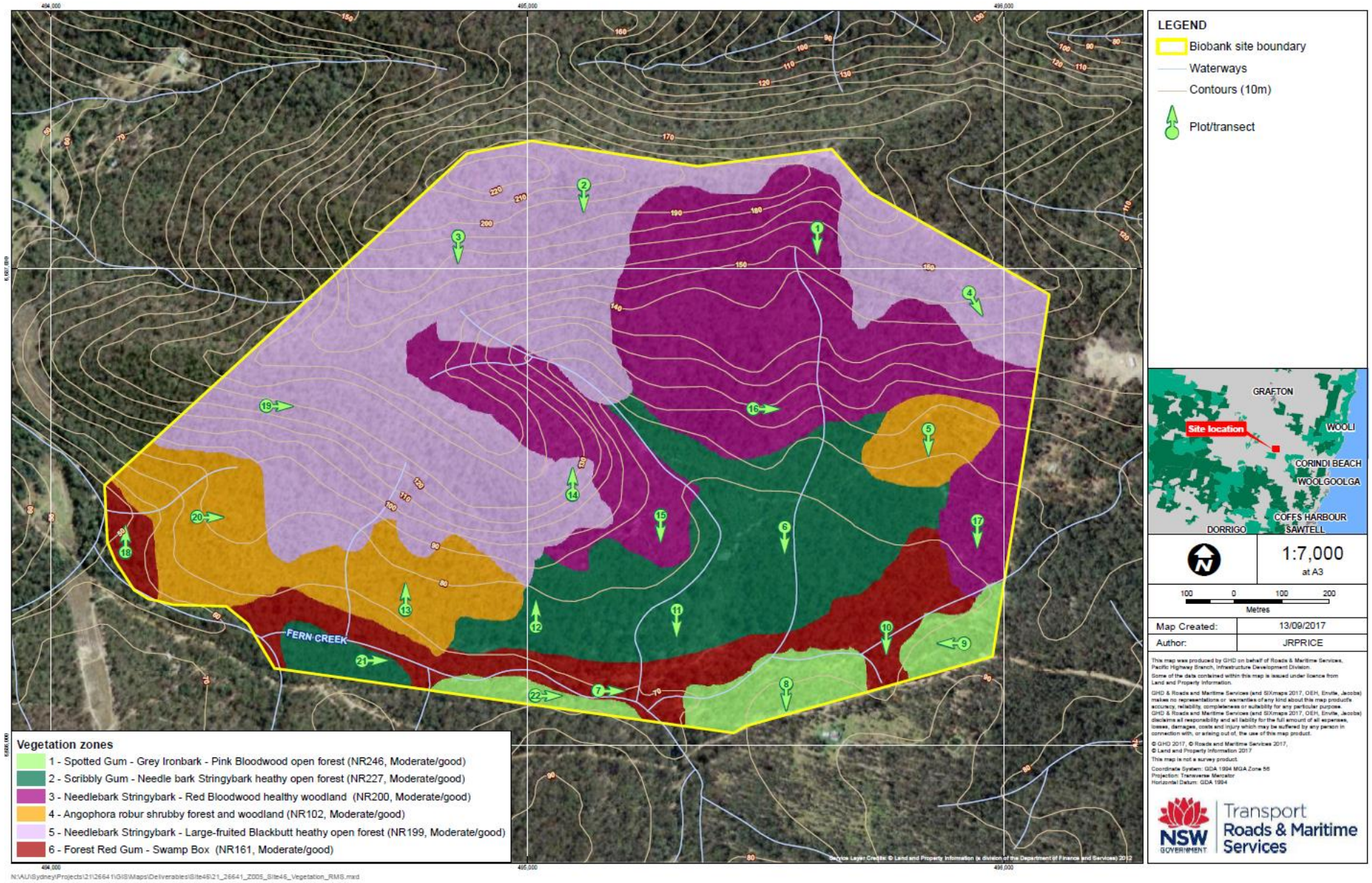

Figure 4.28: Distribution of vegetation types across Site 46 (taken from GHD, 2017b).

Species habitat present on Site 46

TfNSW commissioned GHD to conduct a full ecological assessment of Site 46 in 2017, in order to prepare a BioBanking Application for the site (GHD, 2017b). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Two threatened species were recorded at the site as listed in Table 4.46, one of which is required to be offset. The site also provides suitable habitat for a further 21 species that are required to be offset.

Table 4.46: Threatened species recorded at Site 46 (by GHD, 2017b or *Harre and Richards, 2016)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Hairy Melichrus	*Melichrus hirsuta*	E	E	No
Sandstone Rough-barked Apple	*Angophora robur*	V	V	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Bush Stone-curlew	*Burhinus grallarius*	E		No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Red Goshawk	*Erythrotriorchis radiatus*	CE	V	No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Hooded Robin (south-eastern form)	*Melanodryas cucullata* subsp. *cucullata*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. gularis*	V		No
Turquoise Parrot	*Neophema pulchella*	V		No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Scarlet Robin	*Petroica boodang*	V		No
Flame Robin	*Petroica phoenicea*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Diamond Firetail	*Stagonopleura guttata*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Northern Free-tailed Bat	*Mormopterus lumsdenae*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox*	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Reptiles				
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Invertebrates				
Coastal Petaltail	*Petalura litorea*	E		No
FLORA PREDICTED TO OCCUR ON SITE				
Rupp's Wattle	*Acacia ruppii*	E	E	No
Heart-leaved Star Hair	*Astrotricha cordata*	E		No
Shannon Creek Boronia	*Boronia hapalophylla*	E		No
Swamp Foxglove	*Centranthera cochinchinensis*	E		No
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Spider orchid	*Dendrobium melaleucaphilum*	E		No
Square-stemmed Spike-rush	*Eleocharis tetraquetra*	E		Yes
Banyabba Shiny-barked Gum	*Eucalyptus pachycalyx subsp. banyabba*	E	E	No
Banyabba Grevillea	*Grevillea banyabba*	V	V	No
Four-tailed Grevillea	*Grevillea quadricauda*	V	V	Yes
Kardomia prominens	*Kardomia prominens*	CE		No
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Maundia triglochinoides	*Maundia triglochinoides*	V		Yes
Weeping Paperbark	*Melaleuca irbyana*	E		Yes
Paspalidium grandispiculatum	*Paspalidium grandispiculatum*	V	V	No
Brush Sauropus	*Phyllanthus microcladus*	E		No
Prostanthera sejuncta	*Prostanthera sejuncta*	V		No
Moonee Quassia	*Quassia sp. Moonee Creek*	E	E	Yes
Rotala tripartita	*Rotala tripartita*	E		No
Heath Wrinklewort	*Rutidosis heterogama*	V	V	No
Tephrosia filipes	*Tephrosia filipes*	V		No
Creek Triplarina	*Triplarina imbricata*	E	E	No

Landscape connectivity

Key habitats have been identified over a small area of Dry Sclerophyll Forest habitats at the southern edge of the property. The property is part of the Bull-Paddock key fauna corridor (DEC, 2003) with the conservation area covering the width of the corridor. The property is part of the Clarence Valley-Tablelands dry climate change corridor (DECC, 2007).

The site is part of a near continuous patch of native vegetation and habitat of many thousands of hectares. Tallawudjah Nature Reserve lies two kilometres to the south-west of the site and beyond that there is an extensive network of native vegetation in National Parks and State Forests that stretches to the Great Dividing Range. Site 46 is connected to this extensive area of habitat via native vegetation in private land and State Forests.

4.4.23 **Site 47**

Site 47 was acquired by TfNSW after being identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of rapid vegetation and threatened species habitat ecological assessment to establish its suitability as a biodiversity offset (Harre and Richards, 2016) and subsequently a full assessment under the Biodiversity Assessment Method 2020 in preparation for a Biodiversity Stewardship Agreement. TfNSW will transfer the site to NPWS for inclusion in the Yuraygir National Park.

Site 47 comprises Lot 3 DP 870691. As the site is being transferred to NPWS, no exclusion areas have been provided.

Site 47 is around 485 hectares in area and contains predominantly dry sclerophyll forest, heathlands and freshwater wetlands. It is located approximately 10 km to the east of the project footprint (refer Figure 4.1). Site 47 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 47 is an unoccupied rural property. The site appears to have been maintained as vegetated open space.

Further information on Site 47 can be found in Appendix C.23, the Biodiversity Stewardship Site Assessment Report for Site 47, (NCAM, 2020).

Vegetation present on Site 47

Approximately 485 hectares of Site 47 has been included National Parks transfer site configuration. The biometric vegetation types surveyed from the site in 2020 are detailed in Table 4.47. Figure 4.29 shows the distribution of these vegetation communities.

Table 4.47: Vegetation communities present on Site 47 (NCAM, 2020).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement			Total area in hectares used to meet EPBC Act offsets
			Spotted-tailed Quoll	Regent Honeyeater	Grey-headed Flying-fox	
NR218 - Pink Bloodwood – Red Mahogany – Smudgy Apple shrubby open forest on sandstones of the northern North Coast	48.3	48.3	39.5	39.5	48.3	48.3
NR115 - Blackbutt – Bloodwood dry heathy open forest on sandstones of the northern North Coast	25.3	25.3	-	21.6	-	21.6
NR227 - Scribbly Gum - Needle bark Stringybark heathy open forest of coastal lowlands of the northern North Coast	49.5	49.5	29.7	29.7	36.94	36.94
NR200 - Needlebark Stringybark - Red Bloodwood healthy woodland on sandstones of the Lower Clarence of the North Coast	164.5	26.46	26.46	26.2	26.46	26.46
NR199 - Needlebark Stringybark – Large fruited Blackbutt heathy open forest on coastal sands of the North Coast	19.6	0	-	-	-	0
NR254 - Swamp Mahogany swamp forest of the coastal lowlands of the North Coast	19.2	19.2	7.44	-	1	7.44
NR278 - Wet heathland and shrubland of coastal lowlands of the North Coast	133.1	0	-	-	-	0
NR167 - Graminoid clay heaths of the coastal lowlands of the North Coast	12.7	12.7	12.7	-	12.7	12.7
NR152 - Coastal heath on sands of the North Coast	13.5	13.5	13.5	-	13.5	13.5
TOTAL	**485.7**	**194.96**	129.3	117	138.9	**166.94**

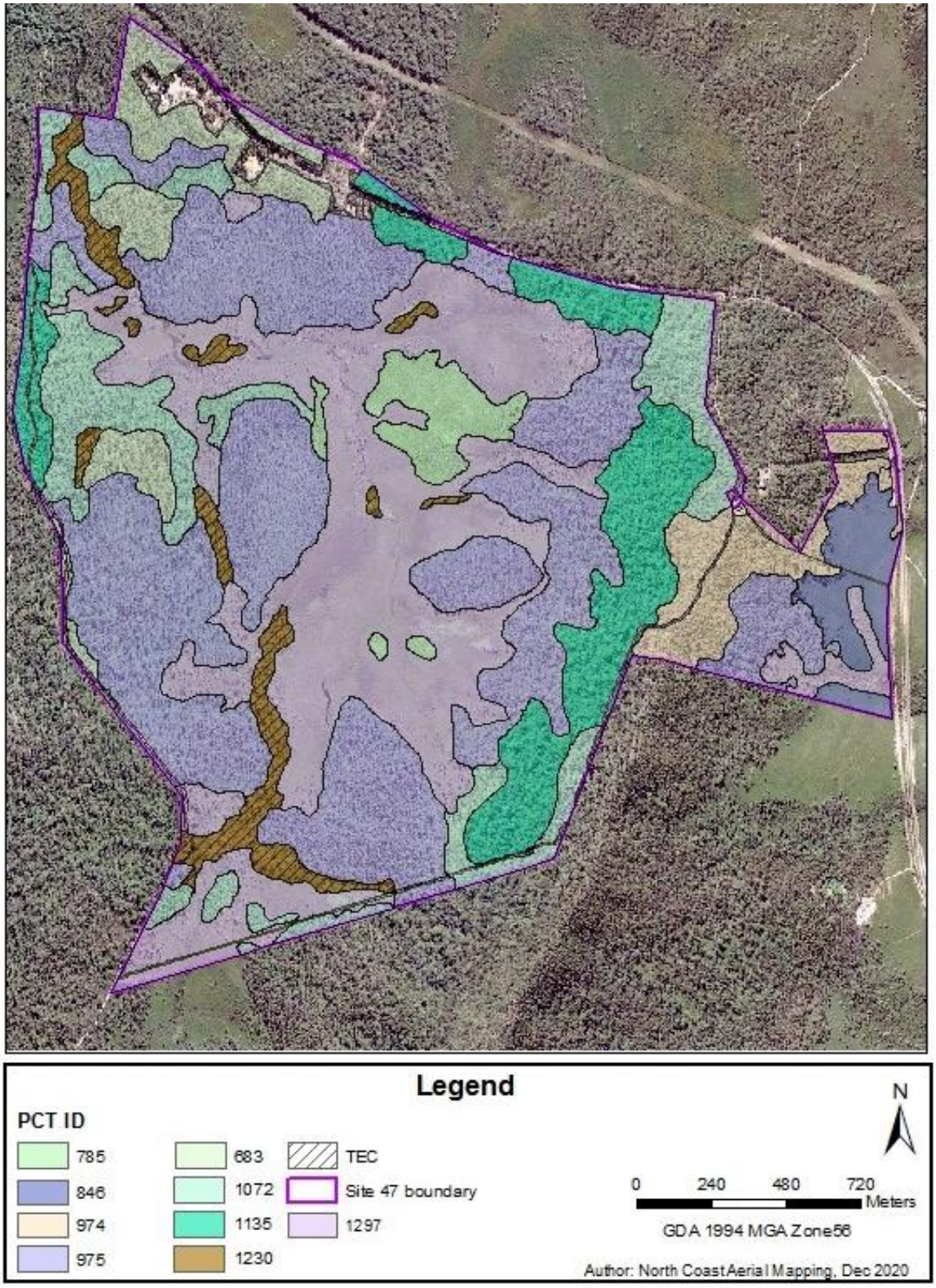

Figure 4.29: Distribution of vegetation types across Site 47 (taken from NCAM, 2020).

Species habitat present on Site 47

TfNSW commissioned North Coast Aerial Mapping to conduct a rapid ecological assessment of Site 47 in 2016, in order to determine the property's suitability to include in the Woolgoolga to Ballina Biodiversity Offset Package (Harre and Richards, 2016). The site was subsequently surveyed under the BAM for a Biodiversity Stewardship Agreement (NCAM, 2020). The following information regarding threatened species presence and suitable habitat has been extracted from these assessments. The rapid assessment focused on species required to be offset by the project and did not include a full threatened species assessment.

Six threatened species were recorded at the site as listed in Table 4.48, one of which is required to be offset. The site also provides suitable habitat for a further 26 species that are required to be offset.

Table 4.48: Threatened and migratory species recorded and predicted to occur at Site 47 (by Harre and Richards, 2016 and *NCAM, 2020)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Heath Wrinklewort	*Rutidosis heterogama*	V	V	No
Birds				
Glossy Black Cockatoo*	*Calyptorhynchus lathami*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Little Lorikeet	*Glossopsitta pusilla*	V		
Little Eagle*	*Hieraaetus morphnoides*	V		
Eastern Osprey	*Pandion cristatus*	V	M	No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Pale-vented Bush-hen*	*Amaurornis moluccana*	V		No
Regent Honeyeater*	*Anthochaera phrygia*	CE	CE	Yes
Dusky Woodswallow*	*Artamus cyanopterus cyanopterus*	V		No
Spotted Harrier*	*Circus assimilis*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella*	*Daphoenositta chrysoptera*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle*	*Haliaeetus leucogaster*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		
Swift Parrot*	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl*	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)*	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Hoary Wattled Bat*	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll*	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle*	*Falsistrellus tasmaniensis*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V		No
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Eastern Long-eared Bat*	*Nyctophilus bifax*	V		Yes
Northern Free-tailed Bat	*Ozimops lumsdenae*	V		
Yellow-bellied Glider*	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala*	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
Eastern Chestnut Mouse*	*Pseudomys gracilicaudatus*	V		No
Grey-headed Flying Fox*	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat*	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat*	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Reptiles				
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
Fish				
Oxleyan Pygmy Perch	*Nannoperca oxleyana*	E	E	Yes
FLORA PREDICTED TO OCCUR ON SITE				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Square-stemmed Spikerush	*Eleocharis tetraquetra*	E		Yes
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes
Slender Screw Fern	*Lindsaea incisa*	E		Yes

Landscape connectivity

Key habitats have been identified over several small areas of the property. The property is part of the Yuraygir link key fauna corridor (DEC, 2003) with the conservation area effectively covering the length and width of this key corridor. The property is part of the Lower Clarence coastal climate change corridor and the Coastal Range dry climate change corridor (DECC, 2007).

The site is part of a near continuous patch of native vegetation and habitat of many thousands of hectares. Yuraygir National Park surrounds the property to the south, east and north. TfNSW understands that NPWS are also currently negotiating to acquire the site directly to the west of Site 47.

4.4.24 **Site 51**

Site 51 was acquired by TfNSW after being identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of a rapid ecological assessment to establish its suitability as a biodiversity offset (Harre and Richards, 2016). A full Biodiversity Stewardship Agreement assessment is due to be finalised by the end of 2021.

Site 51 comprises Lot 56 DP 751358. TfNSW are in negotiations with FCNSW to establish a new Flora Reserve, therefore no exclusion area has been included.

Site 51 is around 122 hectares in area and contains various vegetation communities including dry sclerophyll forest, and forested wetlands. It is located approximately 2km to the east of the project footprint (refer Figure 4.1). Site 51 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 51 is an unoccupied rural property. Current and previous land uses include cattle grazing and selective timber harvesting.

Further information on Site 51 can be found in Appendix C.24, the Woolgoolga to Ballina Pacific Highway Upgrade Biodiversity Offset Program Priority Property Rapid Ecological Assessment, Site 51 (Harre and Richards, 2016).

Vegetation present on Site 51

Approximately 117 hectares of Site 51 has been allocated to the Woolgoolga to Ballina Upgrade. The biometric vegetation types surveyed from the site in 2016 are detailed in Table 4.49. Figure 4.30 shows the distribution of these vegetation communities.

Table 4.49: Vegetation communities present on Site 51 (Harre and Richards, 2016).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement					Total area in hectares used to meet EPBC Act offsets
			Eucalyptus tetrapleura	Koala - all other areas	Spotted-tailed Quoll	Regent Honeyeater	Grey-headed Flying-fox	
NR161 - Forest Red Gum – Swamp Box of the Clarence Valley lowlands of the North Coast (EEC)	16.6	16.6	-	-	16.6	16.6	-	16.6
NR216 - Orange Gum (*Eucalyptus bancroftii*) open forest of the North Coast	38.4	32.8	32.8	32.8	28.6	32.8	-	32.8
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	67.2	67.2	67.2	32.8	67.2	18	64	67.2
TOTAL	**122.2**	**116.6**	100	65.6	112.4	67.4	64	**116.6**

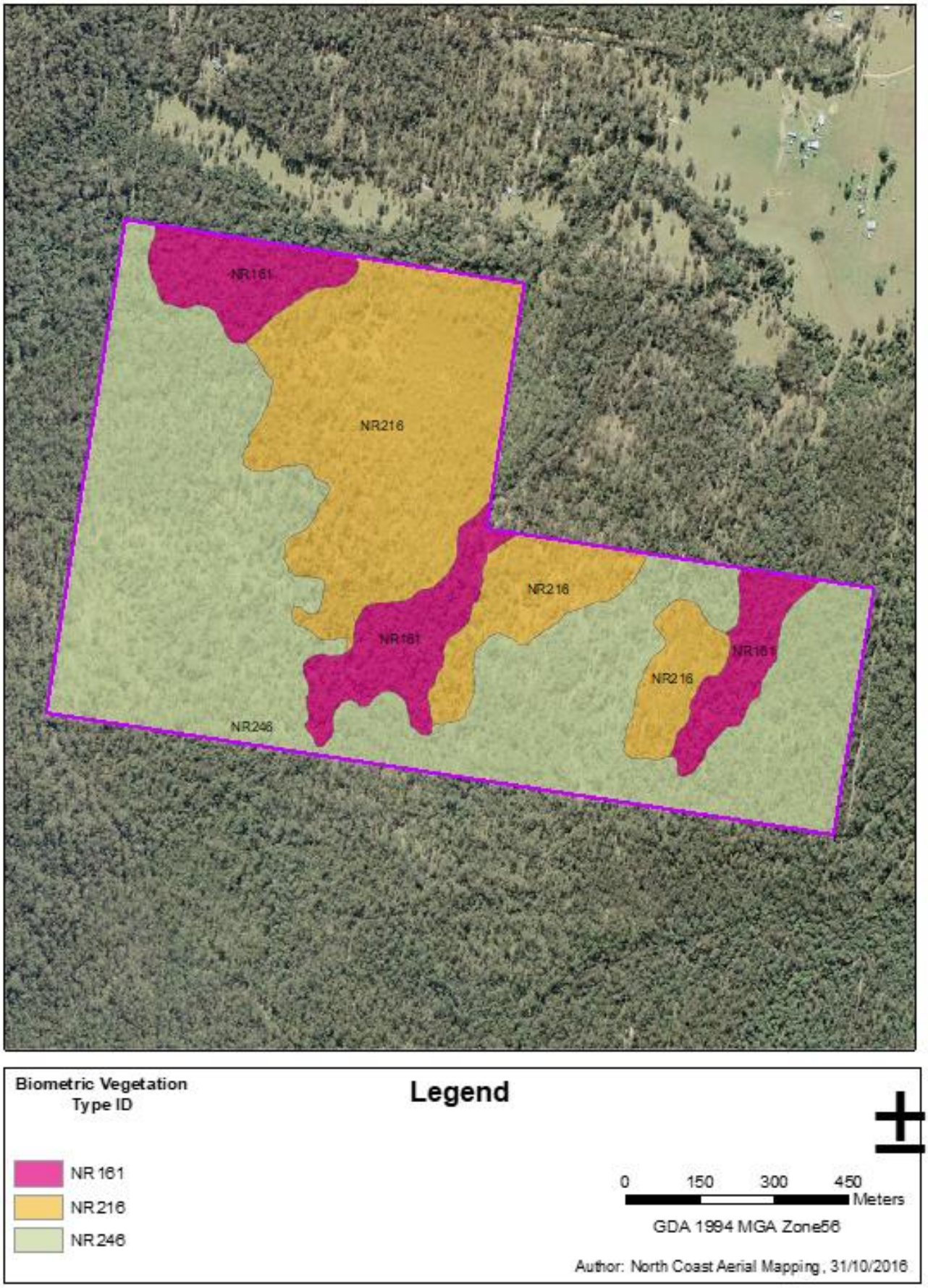

Figure 4.30: Distribution of vegetation types across Site 51 (Harre and Richards, 2016).

Species habitat present on Site 51

TfNSW commissioned North Coast Aerial Mapping to conduct a rapid ecological assessment of Site 51 in 2016, in order to determine the property's suitability to include in the Woolgoolga to Ballina Biodiversity Offset Package (Harre and Richards, 2016). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment. The rapid assessment focused on species required to be offset by the project and did not include a full threatened species assessment.

Site 51 includes occupied habitat for the Square-fruited Ironbark which is required to be offset by the project. The site also provides suitable habitat for a further 26 species that are required to be offset (see Table 4.50).

Table 4.50: Threatened species recorded at Site 51 (by Harre and Richards, 2016)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Bush Stone-curlew	*Burhinus grallarius*	E		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Reptiles				

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
FLORA PREDICTED TO OCCUR ON SITE				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Square-stemmed Spikerush	*Eleocharis tetraquetra*	E		Yes
Noah's False Chickweed	*Lindernia alsinoides*	E		Yes
Weeping Paperbark	*Melaleuca irbyana*	E		Yes

Landscape connectivity

Key habitats have been identified over part of the property, mainly in the eastern part of the property where they extend into the neighbouring property. The property is part of a key fauna corridor with the property forming the northern part of the link between the key habitats in Glenugie State Forest to the west and Yuraygir National Park to the east (DEC, 2003). The property is part of the Coastal Range dry climate change corridor (DECC, 2007).

4.4.25 Site 52

Site 52 is a parcel of privately owned land that was identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of a rapid ecological assessment to establish its suitability as a biodiversity offset (Harre and Richards, 2016) and a full BioBanking Assessment in order to prepare a BioBanking Application (GHD, 2017c). The BioBanking Agreement was executed in February 2019.

Site 52 comprises Lot 81 DP 751358. Three areas of the property have been excluded from the BioBank site for an existing and potential additional domestic dwellings.

Site 52 is around 52 hectares in area and contains dry sclerophyll forest, wet riparian forest and subtropical rainforest. It is located approximately 1.5 km to the east of the project footprint (refer Figure 4.1). Site 52 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 52 is an occupied rural property. The property has been maintained as vegetated open space for many years, but previously may have been subject to cattle grazing. There is some evidence of low-intensity timber harvesting, track construction and partial clearing. However, based on the relative abundance of over mature and hollow-bearing trees, it appears that the site has been subject to very little human disturbance.

Further information on Site 52 can be found in Appendix C.25, the BioBanking Assessment Report prepared by GHD in 2017.

Vegetation present on Site 52

52 hectares of Site 52 has been included in the BioBanking site configuration.

The biometric vegetation types surveyed from the site in 2017 are detailed in Table 4.51. Figure 4.31 shows the distribution of these vegetation communities.

Table 4.51: Vegetation communities present on Site 52 (GHD, 2017c)

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Total area in hectares used to meet EPBC Act offsets
NR115 - Blackbutt – Bloodwood dry heathy open forest on sandstones of the northern North Coast	48.5	48.5	0
NR110 - Black Bean – Weeping Lilly Pilly riparian rainforest of the North Coast	2.6	2.6	0
NR166 - Giant Stinging Tree – Fig dry subtropical rainforest of the North Coast and Brigalow Belt South Bioregions	1.3	-	0
TOTAL	**52.4**	**51.1**	**0**

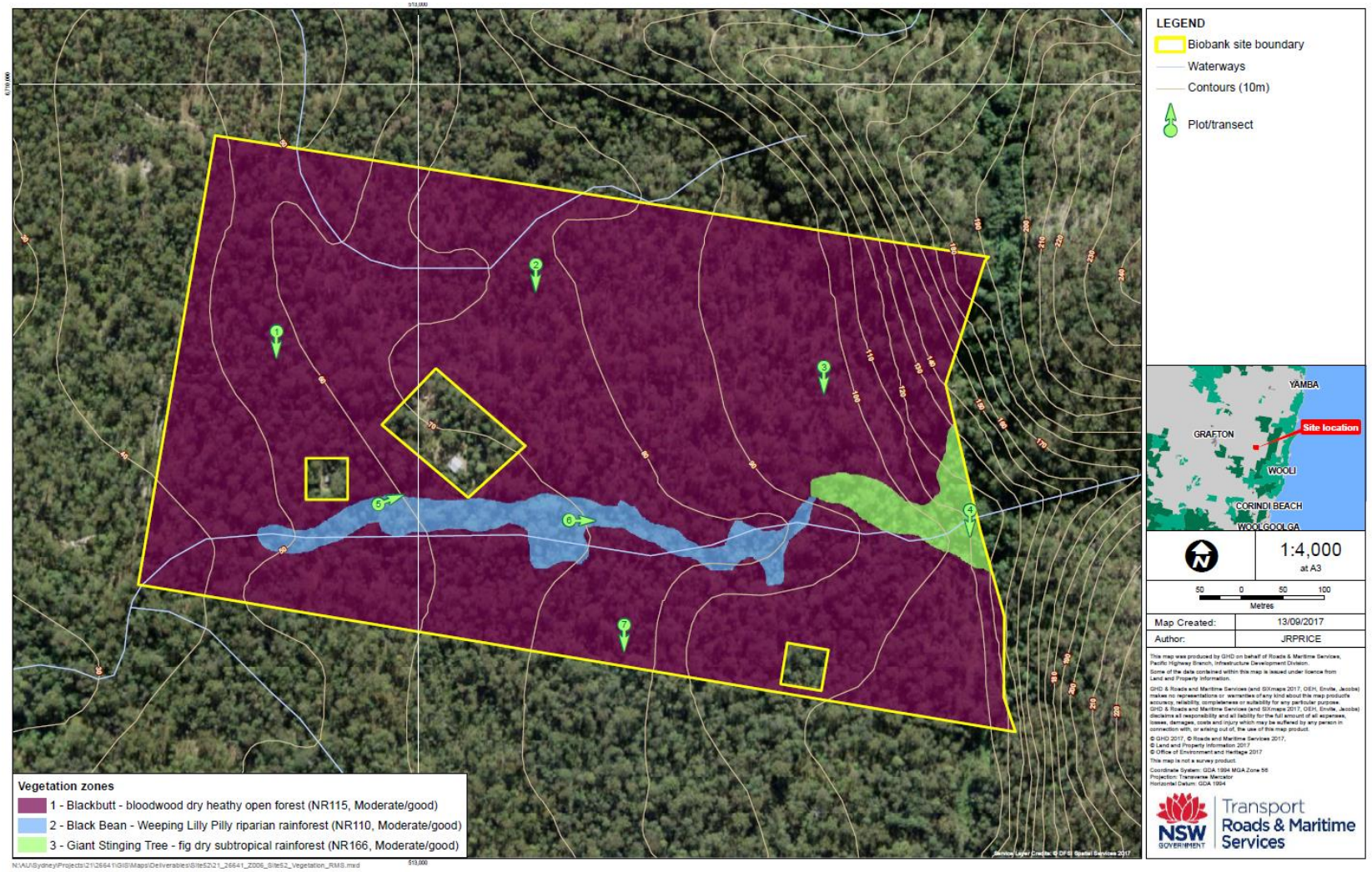

Figure 4.31: Distribution of vegetation types across Site 52 (taken from GHD, 2017c).

Species habitat present on Site 52

TfNSW commissioned GHD to conduct a full BioBanking assessment of Site 52 in 2017, in preparation for submitting a BioBanking Agreement application to the Office of the Environment and Heritage. The BioBanking Assessment is included as Appendix C.26. The following information regarding threatened species presence and suitable habitat has been extracted from this assessment.

Thirty two threatened species have been recorded on site (GHD, 2017c) of which 15 are required to be offset by the project. Suitable habitat for a number of other threatened fauna and flora species was also identified on site (Table 4.52) including habitat for a further nine species that are required to be offset.

Table 4.52: Threatened species recorded or predicted to occur at Site 52 (by GHD, 2017c)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Bush Stone-curlew	*Burhinus grallarius*	E		No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Brolga	*Grus rubicunda*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Rose-crowed Fruit Dove	*Ptininopus regina*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V		No
Eastern Bentwing Bat	*Miniopterus schreibersii oceanenis*	V		No
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		Yes
Southern Myotis	*Myotis macropus*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
New Holland Mouse	*Pseudomys novaehollandiae*		V	No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Eastern Cave Bat	*Vespadelus troughtoni*	V		No
Reptiles				
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Speckled Warbler	*Chthonicola sagittata*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Square-tailed kite	*Lophoictinia isura*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Mammals				
Golden-tipped Bat	*Kerivoula papuensis*	V		Yes
Northern Free-tailed Bat	*Ozimops lumsdenae*	V		
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
FLORA PREDICTED TO OCCUR ON SITE				
Rupp's Wattle	*Acacia ruppii*	E	E	No
Sandstone Rough-barked Apple	*Angophora robur*	V	V	Yes
Hairy Jointgrass	*Arthraxon hispidus*	V	V	Yes
Heart-leaved Star Hair	*Astrotricha cordata*	E		No
Needle-leaf Fern	*Belvisia mucronata*	E		No
Orara Boronia	*Boronia umbellata*	V	V	No
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Square-stemmed Spike-rush	*Eleocharis tetraquetra*	E		Yes
Banyabba Grevillea	*Grevillea banyabba*	V	V	No
Four-tailed Grevillea	*Grevillea quadricauda*	V	V	Yes
Bordered Guinea Flower	*Hibbertia marginata*	V	V	No
Kardomia prominens	*Kardomia prominens*	E		No
Slender Screw Fern	*Lindsaea incisa*	E		Yes
Hairy Melichrus	*Melichrus hirsutus*	E	E	No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Square-stemmed Olax	*Olax angulata*	V		No
Milky Silkpod	*Parsonsia dorrigoensis*	V	E	No
Paspalidium grandispiculatum	*Paspalidium grandispiculatum*	V	V	No
Brush Sauropus	*Phyllanthus microcladus*	E		No
Nightcap Plectranthus	*Plectranthus nitidus*	E	E	No
Prostanthera sejuncta	*Prostanthera sejuncta*	V		No
Moonee Quassia	*Quassia sp. Moonee Creek*	E	E	Yes
Tephrosia filipes	*Tephrosia filipes*	V		No
Tinospora Vine	*Tinospora smilacina*	E		No

Landscape connectivity

Site 52 is part of a near continuous patch of native vegetation and habitat of many thousands of hectares, stretching to the east, then north and south.

The property is 700m from the Pine Brush – Glenugie key fauna corridor (DEC, 2003) and connects to the corridor through a neighbouring offset site, Site 4 that directly adjoins Site 52 to the south. The corridor would play a major role for connecting regional threatened fauna to large lowland vegetated areas. The property is part of the Coastal Range dry climate change corridor supporting Coastal Emu movements (DECC, 2007). The site is approximately 4 km to the west of the coastal and moist climate change corridors which supports fauna movements along the coast in the Yuraygir National Park (Jacobs, 2016a and DECC, 2007). Agricultural land to the west would comprise partial barriers to fauna movement and other ecological processes. The Woolgoolga to Ballina Pacific Highway upgrade is also located approximately 1.5 km to the west of the site.

4.4.26 **Site 53**

Site 53 was acquired by TfNSW in 2018 after being identified by a public Expression of Interest in 2015 as being likely to be suitable to secure biodiversity offsets for the nearby Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of a rapid ecological assessment to establish its suitability as a biodiversity offset (Harre and Richards, 2016) and a full Biodiversity Stewardship Agreement assessment (Jacobs, 2021c). The site will be placed under a Biodiversity Stewardship Agreement and on-sold.

Site 53 comprises Lot 149 DP 751365. To provide for a future dwelling and domestic areas, exclusion areas have been incorporated into the site configuration.

Site 53 is around 122 hectares in area and contains wet and dry sclerophyll forest. It is located approximately 5km to the east of the project footprint (refer Figure 4.1). Site 53 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 53 is an unoccupied rural property. Current and previous land uses include cattle grazing and selective timber harvesting.

Further information on Site 53 can be found in Appendix C.26, the Biodiversity Stewardship Assessment Report developed by Jacobs (Jacobs, 2021c).

Vegetation present on Site 53

Approximately 94 hectares of Site 53 has been allocated to the Woolgoolga to Ballina Upgrade. The biometric vegetation types surveyed from the site in 2018-2020 are detailed in Table 4.53. Figure 4.32 shows the distribution of these vegetation communities.

Table 4.53: Vegetation communities present on Site 53 (Jacobs, 2021c).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Total area in hectares used to meet EPBC Act offsets
NR125 - Blackbutt grassy open forest of the lower Clarence Valley of the NSW North Coast Bioregion	4.0	4.0	0
NR173 - Grey Gum - Grey Ironbark open forest of the Clarence lowlands of the NSW North Coast Bioregion	24.8	16.41	0
NR160 - Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast	3.0	3.0	0
NR218 - Pink Bloodwood - Red Mahogany - Smudgy Apple shrubby open forest on sandstone of northern NSW North Coast Bioregion	20.1	0	0
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	66.9	66.9	0
NR217 - Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion (EEC)	3.3	3.3	0
TOTAL	**122.1**	**93.61**	**0**

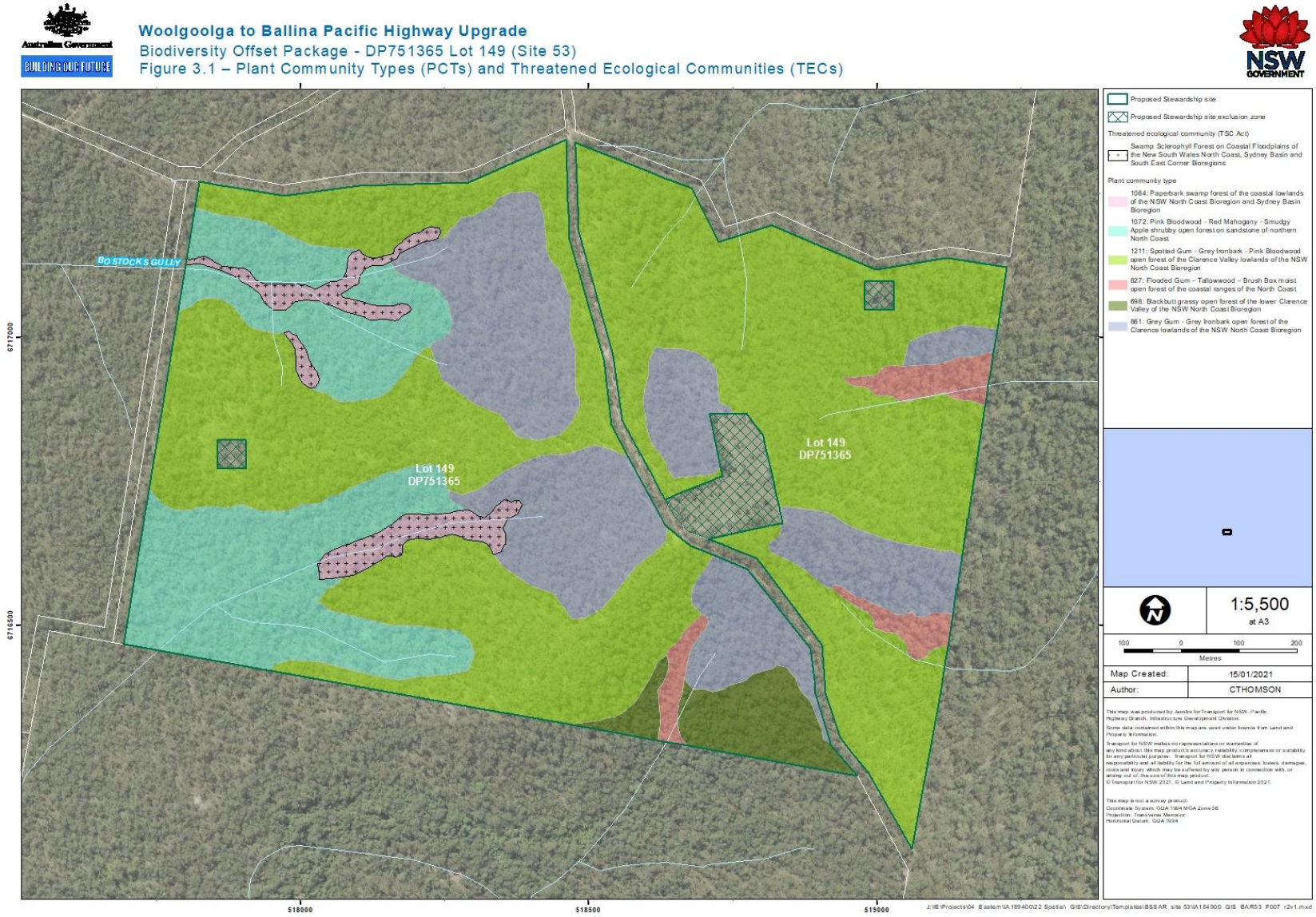

Figure 4.32: Distribution of vegetation types across Site 53 (Jacobs, 2021c).

Species habitat present on Site 53

TfNSW commissioned North Coast Aerial Mapping to conduct a rapid ecological assessment of Site 53 in 2016, in order to determine the property's suitability to include in the Woolgoolga to Ballina Biodiversity Offset Package (Harre and Richards, 2016). TfNSW have since commissioned Jacobs to undertake the Biodiversity Stewardship Agreement assessment (Jacobs, 2021). The following information regarding threatened species presence and suitable habitat have been extracted from these assessments.

Six threatened species were recorded from Site 53 during the Biodiversity Stewardship Site assessment (Jacobs, 2021c), of which one is required to be offset by the project. Site 53 has suitable habitat for an additional 22 species that are required to be offset (see Table 4.54).

Table 4.54: Threatened species recorded at Site 53 (by Harre and Richards, 2016 and Jacobs, 2021c)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V	Yes
Birds				
Glossy Black Cockatoo	*Calyptorhynchus lathami*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus subsp. victoriae*	V		No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Powerful Owl	*Ninox strenua*	V		No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis subsp. temporalis*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V		No
Bush Stone-curlew	*Burhinus grallarius*	E		No
Speckled Warbler	*Chthonicola sagittata*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Little Eagle	*Hieraaetus morphnoides*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Square-tailed kite	*Lophoictinia isura*	V		No
Hooded Robin (south-eastern form)	*Melanodryas cucullata* subsp. *cucullata*	V		No
Black-chinned Honeyeater	*Melighreptus gluaris subsp. gularis*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Barking Owl	*Ninox connivens*	V		No
Osprey	*Pandion haliaetus*	V	M	No
Scarlet Robin	*Petroica boodang*	V		No
Wompoo Fruit-dove	*Ptilinopus magnificus*	V		No
Superb Fruit-dove	*Ptilinopus superbus*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Rufous Bettong	*Aepyprymnus rufescens*	V		Yes
Eastern Pygmy Possum	*Cercartetus nanus*	V		Yes
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Golden-tipped Bat	*Kerivoula papuensis*	V		Yes
Black-striped Wallaby	*Macropus dorsalis*	E		No
Eastern Coastal Freetail Bat	*Micronomus norfolkensis*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Northern Free-tailed Bat	*Ozimops lumsdenae*	V		No
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	V		No
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No
Reptiles				
Pale-headed Snake	*Hoplocephalus bitorquatus*	V		Yes
Stephens' Banded Snake	*Hoplocephalus stephensii*	V		Yes
Amphibians				
Green-thighed Frog	*Litoria brevipalmata*	V		Yes
FLORA PREDICTED TO OCCUR ON SITE				
Four-tailed Grevillea	*Grevillea quadricauda*	V	V	Yes

Landscape connectivity

The property is part of the Pine-Candole key fauna corridor (DEC, 2003) with the eastern half of the conservation area intersecting the corridor. The property is part of the Yamba - Nymboida moist climate change corridor and the Coastal Range dry climate change corridor (DECC, 2007).

Key corridors identified in the eastern portion of the property support regional connectivity to Candole State Forest, particularly for Brush-tailed Phascogale (DEC, 2003). The entire area of the property has been identified as part of the dry climate change corridors which support movements for Coastal Emu along the coastal range (DECC, 2007). Moist and coastal climate change corridors have been identified to the east of the property including areas of Yuraygir National Park.

4.4.27 **Site 54**

Site 54 is a parcel of privately owned land currently on the market that was identified by a targeted search in the Broadwater area. It was identified as being suitable to secure biodiversity offsets for the nearby Broadwater koala population as required by the approval conditions for the Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of a rapid ecological assessment to establish its suitability as a biodiversity offset (Harre and Knock, 2017). TfNSW and NPWS are currently negotiating with the landowner to acquire the site. The site will be incorporated into the Bundjalung National Park.

Site 54 comprises a number of Lots as detailed in Table 4.2. As the site will be included in the National Parks estate no exclusion area has been incorporated into the site configuration.

Site 54 is around 486 hectares in area and contains a number of different vegetation communities including wet and dry sclerophyll forest, grassy woodlands, forested wetlands and mangroves. It is located approximately 5km to the east of the project footprint (refer Figure 4.1). Site 54 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset.

Site 54 is an unoccupied rural property. Previous land use include selective timber harvesting.

Further information on Site 54 can be found in Appendix C.27, the Woolgoolga to Ballina Pacific Highway Upgrade Biodiversity Offset Program Olive Gap Road Rapid Ecological Assessment, (Harre and Knock, 2017).

Vegetation present on Site 54

Approximately 291 hectares of Site 54 has been allocated to the Woolgoolga to Ballina Upgrade. The biometric vegetation types surveyed from the site in 2017 are detailed in Table 4.55. Figure 4.33 shows the distribution of these vegetation communities.

Table 4.55: Vegetation communities present on Site 54 (Harre and Knock, 2017).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement		Total area in hectares used to meet EPBC Act offsets
			Koala - Broadwater population	Total all Koala - all other areas	
NR246 - Spotted Gum – Grey Ironbark – Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	134.3	3.53	-	-	0
NR114 - Blackbutt – Bloodwood dry heathy open forest on Quaternary sands of the northern North Coast	57.4	57.4	-	-	0
NR227 - Scribbly Gum - Needle bark Stringybark heathy open forest of coastal lowlands of the northern North Coast	68.7	68.7	-	-	0
NR201 - Needlebark Stringybark – Turpentine heathy open forest of the Clarence lowlands of the North Coast	26.4	0	-	-	0
NR217 - Paperbark swamp forest of the coastal lowlands of the North Coast (EEC)	63.3	63.3	-	-	0
NR182 - Mangrove – Grey Mangrove low closed forest of the NSW Coastal Bioregions (FM Act Protected Marine Vegetation)	5.1	0	-	-	0
NR152 - Coastal heath on sands of the North Coast	1.94	1.94	-	-	0
NR160 - Flooded Gum – Tallowwood – Brush Box moist open forest of the coastal ranges of the North Coast	30.0	30.0	-	27	27
NR161 - Forest Red Gum – Swamp Box of the Clarence Valley lowlands of the North Coast (EEC)	7.5	0	-	-	0
NR173 - Grey Gum – Grey Ironbark open forest of the Clarence Lowlands of the North Coast	91.8	66.0	66	-	66
TOTAL	**486.44**	**290.87**	66	27	**93**

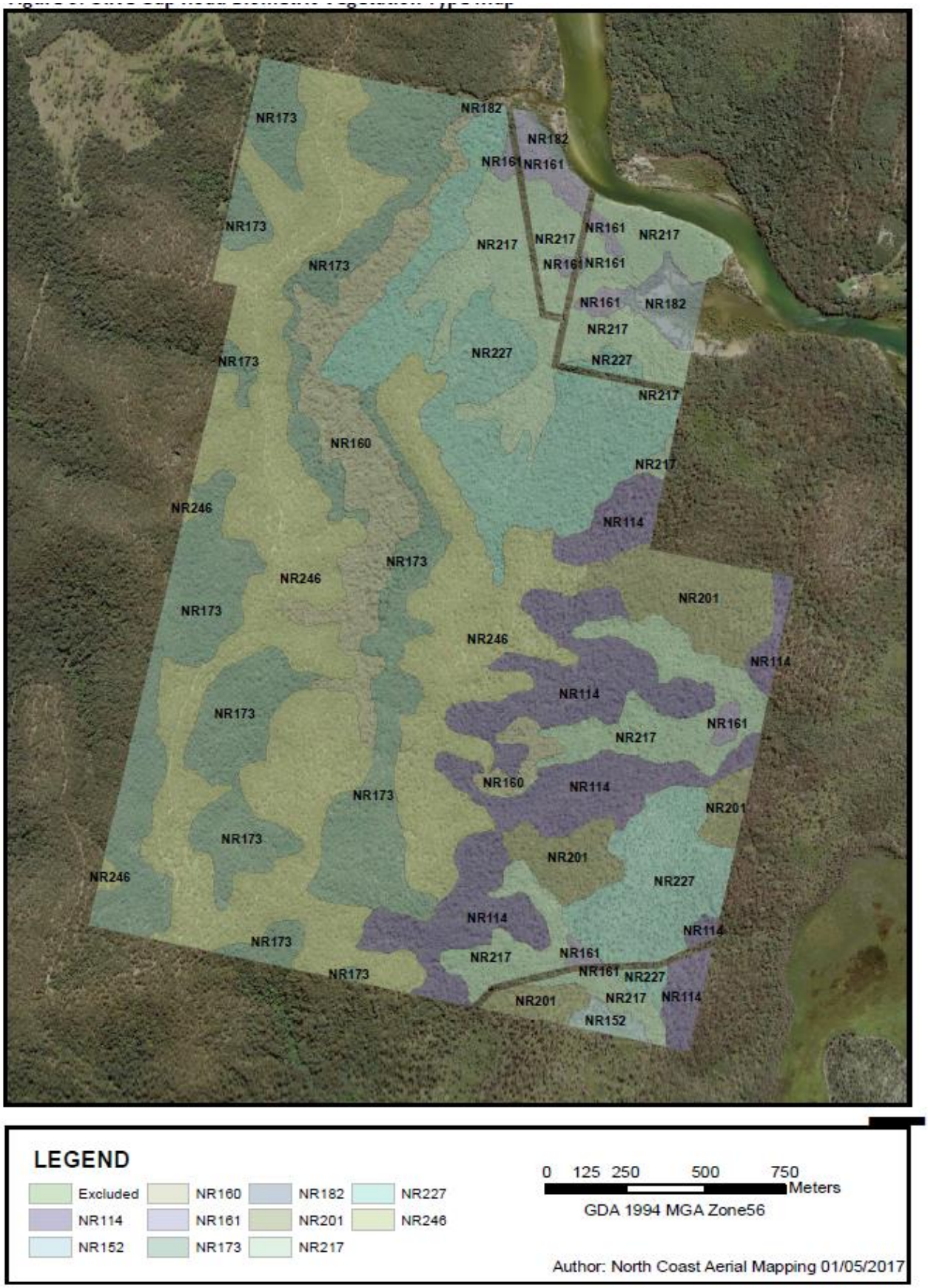

Figure 4.33: Distribution of vegetation types across Site 54 (taken from Harre and Knock, 2017).

Species habitat present on Site 54

TfNSW commissioned North Coast Aerial Mapping to conduct a rapid ecological assessment of Site 54 in 2017, in order to determine the property's suitability to include in the Woolgoolga to Ballina Biodiversity Offset Package (Harre and Knock, 2017). The following information regarding threatened species presence and suitable habitat has been extracted from this assessment. The rapid assessment concentrated on species required to be offset by the project, with a focus on koalas, and did not include a full threatened species assessment.

Ten threatened species were recorded at the site as listed in Table 4.56, four of which are required to be offset. The site also provides suitable habitat for a further 12 species that are required to be offset.

Table 4.56: Threatened and migratory species recorded and predicted to occur at Site 54 (by Harre and Knock, 2017)

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Flora				
Needle-leaf Fern	*Belvisia mucronata*	E		No
Pink Nodding Orchid	*Geodorum densiflorum*	E		No
Birds				
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus* subsp. *victoriae*	V		No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Eastern Osprey	*Pandion cristatus*	V	M	No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V		No
Mammals				
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Squirrel Glider	*Petaurus norfolcensis*	V		Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Pale-vented Bush-hen	*Amaurornis moluccana*	V		No
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Bush Stone-curlew	*Burhinus grallarius*	E		No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
Spotted Harrier	*Circus assimilis*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Coastal Emu	*Dromaius novaehollandiae*	EP		Yes
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No
Brolga	*Grus rubicunda*	V		No
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Eastern Curlew	*Numenius madagascariensis*		CE	No
Eastern Ground Parrot	*Pezoporus wallicus wallicus*	V		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Wompoo Fruit Dove	*Ptilinopus magnificus*	V		No
Rose-crowed Fruit Dove	*Ptininopus regina*	V		No
Eastern Grass Owl	*Tyto longimembris*	V		No
Masked Owl	*Tyto novaehollandiae*	V		No
Mammals				
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Common Planigale	*Planigale maculata*	V		Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
FLORA PREDICTED TO OCCUR ON SITE				
Water Nutgrass	*Cyperus aquatilis*	E		Yes
Spider Orchid	*Dendrobium melaleucaphilum*	E		No
Yellow flowered King of the Fairies	*Oberonia complanata*	E		Yes
Red flowered King of the Fairies	*Oberonia titania*	V		No
Brown Fairy-chain Orchid	*Peristeranthus hillii*	V		No
Southern Swamp Orchid	*Phaius australis*	E	E	No
Rainforest Cassia	*Senna acclinis*	E		No

Landscape connectivity

The site is part of a near continuous patch of native vegetation and habitat of many thousands of hectares. The property adjoins Bundjalung National Park on the eastern, southern and western boundaries. A regional fauna corridor runs through the far eastern section of the property and within 1km to the west of the property (Harre and Richards, 2017).

Key habitats have been identified over the majority of the property, particularly in the centre. The property is adjacent to the Bundjalung key fauna corridor (DEC, 2003) with the eastern edge of the conservation area intersecting the corridor. The property is also within 350m of the Olive Gap key fauna corridor. The property is part of the Broadwater – Bungawalbin coastal climate change corridor (DECC, 2007).

4.4.28 **Site 56**

Site 56 was a parcel of privately owned land that has been acquired by TfNSW and NPWS. It was identified as being likely to be suitable to secure biodiversity offsets for the swamp forest vegetation types required by the approval conditions for the Woolgoolga to Ballina Pacific Highway upgrade project. It has been the subject of a full Biodiversity Stewardship Agreement assessment to establish its suitability as a biodiversity offset (Jacobs, 2021d). The site will be included in the Yuraygir National Park with funding provided for its ongoing management.

Site 56 comprises Lot 22 DP 751393, Lot 26 DP 751393 and Lot 7308 DP 1162471. As the site will be included in the Yuraygir National Park no exclusion area has been included, however a cleared area that includes a historic hut has not been included in the vegetation mapping.

Site 56 is around 585 hectares in area and contains wet and dry sclerophyll forest, heathlands, and forested, freshwater and saline wetlands. It is located 15 km west of the project footprint (refer Figure 4.1). Site 56 includes a range of vegetation communities that contribute to the project's offset requirement as well as providing suitable habitat for a number of threatened species required to be offset. Some areas on the property are also being used to offset the Coffs Bypass and Warrell Creek to Urunga projects. As such the area available for W2B offsets is reduced to approximately 413 hectares.

Site 56 is an unoccupied rural property.

The Biodiversity Stewardship Site Assessment Report for this property, the HQS scores provided by Jacobs and the additional management and monitoring/reporting requirements for MNES agreed with NPWS have been included at Appendix C.28.

Vegetation present on Site 56

Approximately 214 hectares of native vegetation from Site 56 has been allocated to the Woolgoolga to Ballina Upgrade. The biometric vegetation types surveyed from the site in 2019-2020 are detailed in Table 4.57. Figure 4.34 shows the distribution of these vegetation communities.

Table 4.57: Vegetation communities present on Site 56 (Jacobs, 2021d).

NSW Biometric Vegetation Types Surveyed	Total area in hectares available	Total area in hectares used to meet state vegetation offsets	Area used to meet part EPBC Act offset requirement			Total area in hectares used to meet EPBC Act offsets
			Koala – all other areas	Wallum Sedge Frog	Grey-headed Flying-fox	
NR125 - Blackbutt grassy open forest of the Lower Clarence Valley of the North Coast	11.66	0	-	-	-	0
NR167 - Graminoid clay heaths of the coastal lowlands of the NSW North Coast Bioregion	49.26	7.31	-	-	-	0
NR173 - Grey Gum – Grey Ironbark open forest of the Clarence lowlands of the NSW North Coast Bioregion	15.31	0	-	-	-	0
NR182 - Mangrove – Grey Mangrove low closed forest of the NSW Coastal Bioregion	29.59	0	-	-	-	0
NR216 - Orange Gum (Eucalyptus bancroftii) open forest of the NSW North Coast Bioregion	25.60	0	-	-	-	0
NR225 - Saltmarsh complex of the NSW North Coast Bioregion	2.38	0	-	-	-	0
NR227 - Scribbly Gum – Needlebark Stringybark heathy open forest of costal lowlands of the northern NSW North Coast Bioregion	57.57	57.57	-	-	24.88	24.88
NR149 - Coastal floodplain sedgelands, rushlands, and forblands	40.02	21.33	-	4.3	-	4.3
NR255 - Swamp Oak swamp forest of the coastal lowlands of the NSW North Coast Bioregion	40.79	40.79	-	-	-	0
NR217 - Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion (EEC)	140.52	94.92	98.12	35.9	98.12	98.12
TOTAL	**412.7**	**221.92**	98.12	40.2	123	**127.3**

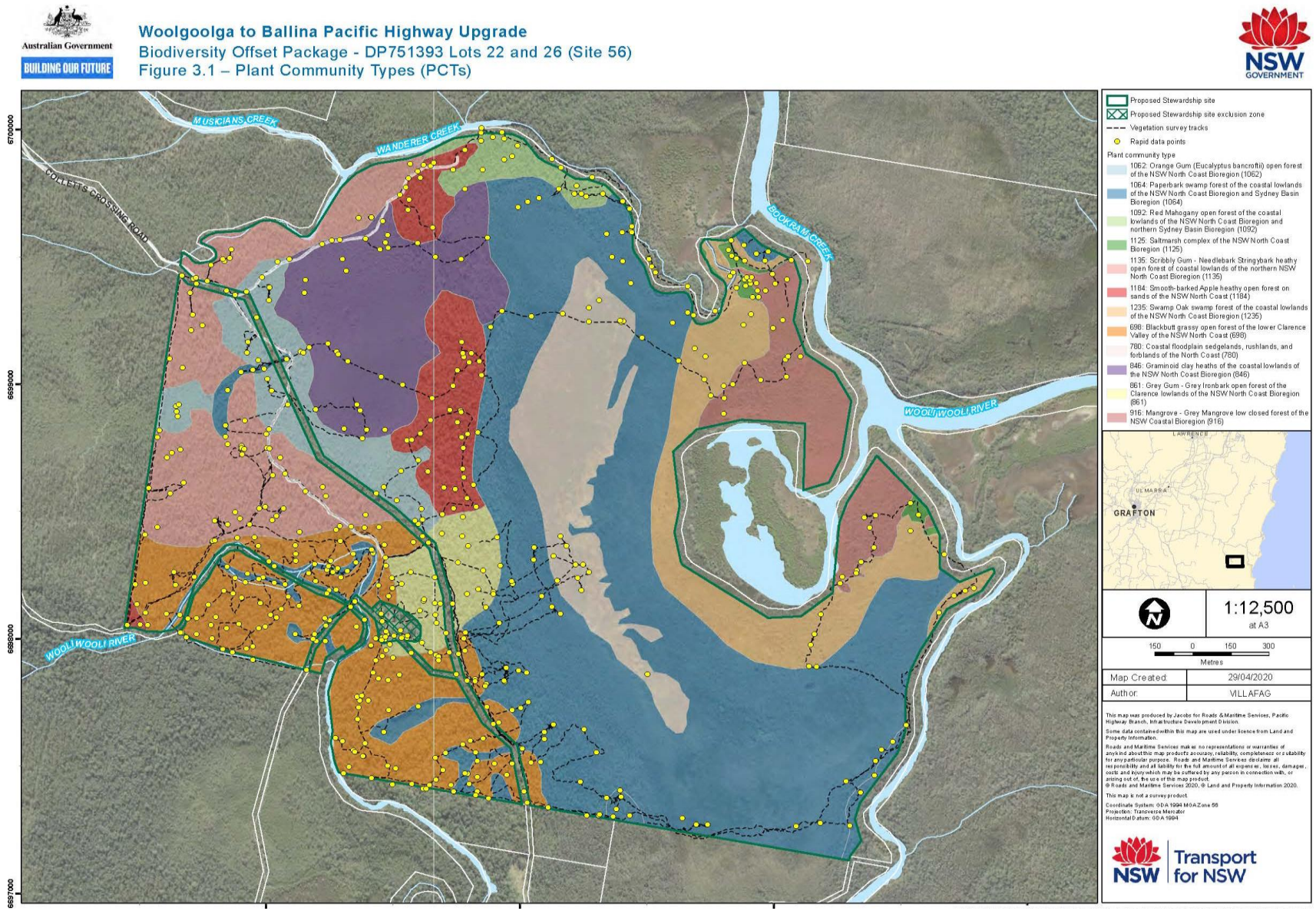

Figure 4.34: Distribution of vegetation types across Site 56 (taken from Jacobs, 2021d).

Species habitat present on Site 56

TfNSW commissioned Jacobs to conduct a full Biodiversity Assessment Method assessment of Site 56 in 2019, focussing on the biometric vegetation types present and targeted species surveys (Jacobs, 2021d). The detailed results of the assessments are available in the Biodiversity Stewardship Site Assessment Report included at Appendix C.28. Seven threatened species were recorded on-site including, Olongburra Frog and Grey-headed Flying-fox which are required to be offset. The site also provides suitable habitat for a further 11 species that are required to be offset (Table 4.64). In addition, Jacobs provided TfNSW with HQS for Olongburra Frog, Grey-headed Flying Fox, Koala, Swift Parrot, Spotted-tailed Quoll and Regent Honeyeater for use in the offset calculations (included at Appendix C.28).

Table 4.58: Threatened and migratory species recorded and predicted to occur at Site 56 (by Jacobs, 2021d).

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
RECORDED ON SITE				
Birds				
Black-necked Stork	*Ephippiorhynchus asiaticus*	V		No
Little Lorikeet	*Glossopsitta pusilla*	V		No
Mammals				
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	Yes
Amphibians				
Wallum Froglet	*Crinia tinnula*	V		No
Olongburra Frog	*Litoria olongburensis*	V	V	Yes
Invertebrates				
Coastal Petaltail	*Petalura litorea*	E		No
Flora				
Maundia	*Maundia triglochinoides*	V		No
FAUNA PREDICTED TO OCCUR ON SITE				
Birds				
Pale-vented Bush-hen	*Amaurornis moluccana*	V		No
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V		No
Australasian Bittern	*Botaurus poiciloptilus*	E	E	No
Curlew Sandpiper	*Calidris ferruginea*	E	CE	No
Great Knot	*Calidris tenuirostris*	V	CE	No
Glossy Black-cockatoo	*Calyptorhynchus lathami*	V		No
Greater Sand-plover	*Charadrius mongolus*	V	V	No
Lesser Sand-plover	*Charadrius mongolus*	V	E	No
Spotted Harrier	*Circus assimilis*	V		No
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		No
Barred Cuckoo-shrike	*Coracina lineata*	V		No
Varied Sittella	*Daphoenositta chrysoptera*	V		No
Beach Stone-curlew	*Esacus magnirostris*	CE		No

Common name	Scientific name	BC Act Status	EPBC Act	Required for project?
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V		No
Little Eagle	*Hieraaetus morphnoides*	V		No
Comb-crested Jacana	*Irediparra gallinacea*	V		No
Black Bittern	*Ixobrychus flavicollis*	V		No
Swift Parrot	*Lathamus discolor*	E	CE	Yes
Black-tailed Godwit	*Limosa limosa*	V		No
Square-tailed kite	*Lophoictinia isura*	V		No
Turquoise Parrot	*Neophema pulchella*	V		No
Barking Owl	*Ninox connivens*	V		No
Powerful Owl	*Ninox strenua*	V		No
Osprey	*Pandion haliaetus*	V	M	No
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis* subsp. *temporalis*	V		No
Australian Painted Snipe	*Rostratula australis*	E	E	No
Little Tern	*Sternula albifrons*	E		No
Masked Owl	*Tyto novaehollandiae*	V		No
Sooty Owl	*Tyto tenebricosa*	V		No
Terek Sandpiper	*Zenus cinereus*	V		No
Mammals				
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		Yes
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes
Little Bentwing Bat	*Miniopterus australis*	V		No
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V		No
Eastern Long-eared Bat	*Nyctophilus bifax*	V		Yes
Northern Free-tailed Bat	*Ozimops lumsdenae*	V		No
Yellow-bellied Glider	*Petaurus australis*	V		Yes
Koala	*Phascolarctos cinereus*	V	V	Yes
Long-nosed Potoroo	*Potorous tridactylus*	V	V	Yes
Eastern Chestnut Mouse	*Pseudomys gracilicaudatus*	V		No
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		Yes
Common Blossom Bat	*Syconycteris australis*	V		No

Landscape connectivity

Key habitats occur on the property. The property is surrounded by Yuraygir National Park on the coastal plain in an area dominated by unconsolidated sediments associated with the Wooli River. The site sits within important coastal fauna corridors and is part of the north-south coastal migratory and east-west elevational corridors identified in the Mid North Coast Regional Conservation Plan (DECCW, 2010).

The property is covered by three climate change corridors, with the coastal habitat climate change corridor covering the majority of the property and the dry habitat and moist habitat climate change corridors overlapping towards the western boundary of the property.

4.5 Protection mechanisms to be used

Three different protection mechanisms will be used to provide in-perpetuity protection for the 28 offset properties included in this offset package, including BioBanking Agreements (for applications underway prior to 25 August 2017), Biodiversity Stewardship Agreements and transfers to NPWS. The protection mechanism proposed for each offset property is summarised in Table 4.64.

Table 4.64: Summary of protection mechanism proposed for each offset site

Offset site number	Protection mechanism
4, 10, 13, 17, 23, 25, 29, 30, 43, 44, 46, 52	BioBanking Agreement (all finalised)
12, 20, 21, 22, 24, 28, 32, 40, 51, 53	Biodiversity Stewardship Agreement (in progress)
16, 35, 37, 47, 54 & 56	Transfer to NPWS (in progress)

A detailed description of each of these mechanisms is included below.

4.5.1 BioBanking Agreement/Biodiversity Stewardship Agreement

Up to 22 properties are proposed to be conserved under a BioBanking Agreement under the NSW *Threatened Species Conservation Act 1995* (the TSC Act) or a Biodiversity Stewardship Agreement under the NSW Biodiversity Conservation Act 2016 (BC Act). The NSW Government established BioBanking under Part 7A of the TSC Act. The *Threatened Species Conservation (Biodiversity Banking) Regulation 2008* and the BioBanking Assessment Methodology complete the legal framework that provides for the creation of biodiversity credits that can be sold on the open market. In August 2016 the BC Act replaced the TSC Act and now provides the legislative framework for the creation of biodiversity credits. Throughout this package, BioBanking Agreement and biobank sites are used to cover both BioBanking Agreements and Biodiversity Stewardship Agreements. Table 4.2 indicates which would apply to each site.

The BioBanking Scheme was replaced by the Biodiversity Offsets Scheme under the BC Act which commenced on 25 August 2017. Existing BioBanking agreements remain in place and are managed under the BC Act as Biodiversity Stewardship Agreements. The Biodiversity Conservation Trust (BCT) has taken on the ongoing management of BioBanking agreements, including administration of annual reports and annual payments (Department of Planning, Industry and Environment, 2021). Credits are created when a landowner enters into a Biobanking agreement to maintain or improve their land's biodiversity values by undertaking management actions. The land is then known as a biobank site. The agreement is attached to the land title and includes provisions that require current and future landowners to:

- Carry out management actions to improve biodiversity values on the site.
- Not undertake activities that will reduce the biodiversity values of the site.

When a landowner sells their credits, a specified minimum amount from the sale proceeds (a portion or all of the Total Fund Deposit) is paid into the BioBanking Trust Fund. Annual payments are then made to the landowner from the fund. This endowment runs with the land in perpetuity to benefit current and future owners.

Where TfNSW is the landowner of the offset sites, TfNSW will initiate a Biodiversity Stewardship agreement with the BCT, retire the required number of credits generated on the property and deposit all of the Total Fund Deposit required into the Biodiversity Stewardship Payments Fund prior to on-selling the property to a third party with the Biodiversity Stewardship agreement in place. The ecosystem credits generated will be retired in accordance with the vegetation trading tables included in Chapter 5. For vegetation types where the entire area has been allocated as a W2B offset, 100% of the credits generated will be retired. Surplus ecosystem credits and species credits, for any species not required to be offset under this package will be retained for other projects or to sell on the open market.

Similarly, TfNSW has assisted the landowners of the private sites to enter into a BioBanking agreement with the BCT and has purchased all of the biodiversity credits generated. These will be retired as per the process outlined above for TfNSW owned properties.

BCT assume responsibility for monitoring, compliance and enforcement of all Biodiversity Stewardship agreements as outlined in the Biodiversity Conservation Trust Compliance Policy (BCT, 2019). BCT monitor compliance through annual reports submitted by owners of Biodiversity Stewardship sites, inspections and compliance audits. BCT and DPIE have a range of enforcement responses at their disposal, applied on a risk basis. These include:

- Warning letters and inspections.
- Suspension or cancellation of biodiversity credits if management actions, as specified in a site's site-specific Management Actions Plan, have not been carried out.
- Biodiversity Credits Enforcement Orders, directing a person to retire credits if management actions are not carried out. Alternatively the Minister may direct an agreement holder to carry out work or other actions to rectify a breach of a Biodiversity Stewardship agreement.
- Civil proceedings in the Land and Environment Court to remedy or restrain a breach of any Biodiversity Stewardship agreement.
- Criminal proceedings, if the BCT forms a reasonable view that an agreement holder is likely to have committed an offence against the Biodiversity Conservation Act 2016, the BCT will refer the matter to DPIE for consideration.

A Biodiversity Stewardship agreement is the strongest covenant available on private lands in NSW and extinguishes all land uses other than conservation unless the Biodiversity Stewardship agreement is varied or terminated by the NSW Minister for the Environment to permit alternative uses. Certain mining rights may be granted over a Biodiversity Stewardship site, and certain development can be carried out by public authorities on a Biodiversity Stewardship site, but any impacts from these activities must be offset again as an addition to any offsetting activities required by a given project in its own right.

The precise terms of the Biodiversity Stewardship agreements will be developed by the BCT in consultation with TfNSW and the landowners of the private sites, but will include the following broad conditions:

- Exclusion of activities that will result in impacts on habitat for the affected threatened fauna, including timber harvesting, vegetation clearing, grazing,

apiary, exclusion of cats or dogs from the conservation area, and restriction of uncontrolled public access.

- Management of the property in accordance with the management actions plan which will include reference to site specific management activities consistent with Section 4.6 of this offset package (see management actions plan for Sites 4 and 10 included with Appendix C).
- Ongoing monitoring in accordance with Section 4.7 of this offset package.

4.5.2 Transfer to NPWS

Sites 35, 37, 47, 54 and 56 will be transferred to National Parks & Wildlife Services (NPWS) to maintain and manage in perpetuity. TfNSW currently owns Site 35, 37 and 47. Two joint acquisition of Site 54 and Site 56 are currently underway. TfNSW are well-progressed with discussions with NPWS to undertake the long-term management and conservation of these properties. Site 16 has recently been transferred to NPWS. Site 16 will be incorporated into the Bungawalbin Nature Reserve, Site 35 the Broadwater National Park, Site 47 and 56 the Yuraygir National Park and Site 54 will be incorporated into the Bundjalung National Park. Site 37 will be created as a new National Park or Nature Reserve.

These six offset sites will be managed as native vegetation for biodiversity conservation. To ensure in-perpetuity funding will be available to manage the sites, TfNSW will provide funding to NPWS as a lump sum payment at the commencement of the agreement based on that provided for a Biodiversity Stewardship Agreement.

The properties will be managed by site specific management plans to be developed by NPWS. The broad management strategies for both sites are outlined in Section 4.6 and planned monitoring in Section 4.7 of this offset package.

4.6 Offset site management framework

4.6.1 Aims and objectives

The aim of the management framework is to address the Conditions of Approval D5 (e) and (h). The objective of this condition is to detail appropriate management measures and actions to maintain the ecological values of the sites included in the package. In this regard, the management of the properties shall aim primarily at preserving in perpetuity the flora and associated fauna values of the site in a natural and undisturbed condition to:

a) Protect and preserve vegetation across the sites, including biodiversity offsets for the MNES, other threatened flora species and communities and threatened fauna habitats.

b) Protect and preserve high condition vegetation on the site as fauna habitat offsets for the ten fauna MNES significantly impacted by the project.

c) Provide areas for future scientific study, so long as such work does not upset the essentially undisturbed state of the properties.

d) Assist in understanding the growth processes in the natural forest.

e) Manage the sites in such a manner as to protect and enhance the each property's conservation values.

f) Manage the sites in such a manner to ensure weeds, feral animals and fire risk is managed across the sites to protect each site's values and adjacent properties from these threats.

4.6.2 Threats to biodiversity

Detailed biodiversity assessments have been completed across most sites with the remainder to be completed by the end of 2021. Assessments are undertaken by ecologists accredited under the Accreditation Scheme for Application of the Biodiversity Assessment Method 2020 as stipulated in the BC Act 2016. These assessments incorporate State and Commonwealth policy and statutory requirements including considering NSW and Commonwealth Threatened Species Survey and Assessment guidelines, conservation advice, Australian Government Species Profile and Threats database, threat abatements plans and recovery plans to identify key threats and specific management actions that are required on a site to address these threats. Further details are provided in the individual site assessment reports.

A number of threats to biodiversity were noted at the properties during the field surveys and these form the basis of development of management actions. Proactive management of the current threats to biodiversity in the offset areas and the overall properties, would effectively improve the condition of any disturbed and degraded habitats on the sites. Table 4.65 summarises the current biodiversity threats across the offset sites which are a result of past and present land use activities.

Table 4.65 Threats to biodiversity at the offset sites

Key threats	Likely cause	Site locations
Soil compaction	Large machinery involved in clearing vegetation	Mostly on the rural zone holdings but also associated with soft soils around drainage areas, including crossing of creeks and associated sedimentation and erosion.
Grazing	Cattle and horses leading to trampling of vegetation, introducing weeds and gradually changing the structure and diversity of vegetation. These animals were observed on several of the properties.	All forested areas
Weed invasion	General disturbance (machinery, use of tracks and trails, stock trampling). High priority weeds found across the many of the offset sites – *Baccharis halimifolia* (Groundsel Bush); *Cinnamomum camphora* (Camphor laurel), *Lantana camara*.	Particularly in clearings and edge areas such as along tracks through forest.
Inappropriate fire regime (intensity and fire frequency).	While the fire history of many of the sites is unknown, there are signs of fire damage, such as loss of mature trees, and a very dense regrowth of early colonisers such as Acacia and Melaleuca spp.	Across various sites
Disturbance due to selective	Selective logging and stockpiling, soil compaction and loss of mature trees with potential to create hollows.	Across all sites

Key threats	Likely cause	Site locations
logging		
Feral animals	Are likely to occur across the majority of the sites. Horses, pigs, foxes and dogs have been observed on many of the offset sites.	Across all sites

4.6.3 Management Framework

An important component of every offset site, be it a Biodiversity Stewardship agreement or NPWS transfer, is the creation of a detailed and site specific Management Plan, which details long- and short-term conservation land management actions. Each property's Management Plan details the conditions the land managers must observe in accordance with the objectives and strategies to achieve sustainable land management and assist habitat restoration. The Management Plan is developed and agreed to when the Biodiversity Stewardship Agreement or land transfer to NPWS is finalised. Funding to assist the implementation of the plan is provided by TfNSW, either to the Biodiversity Stewardship Agreement Fund, from which annual payments are made to the landholder to undertake the required management actions or directly to NPWS. The recommended management framework for the offset areas is detailed in Table 4.66.

Table 4.66 Management framework for the W2B offset sites

Objective	Strategy	Measures of success
Achieve an appropriate conservation agreement or land zoning for the site. Protection and conservation of key biodiversity values of the site under a conservation agreement or land zoning to provide protection in perpetuity.	Formalise the protection mechanism for each offset site (see Table 4.64).	Each site formally protected within 24 months of approval of this package.
Management of impacts from adjacent land uses for Biodiversity Stewardship sites.	Ensure that management of residual lands are consistent with the objectives of the biodiversity offset areas	Clear delineation of residual lands and offset areas on Biodiversity Stewardship sites. Adequate fencing of the proposed offset area maintained in perpetuity to exclude livestock and feral horses entering a site from residual lands and adjoining landholdings including highway, private property and State Forest boundaries. Establishment of access trails to provide access to residual lands for management vehicles.
Manage pest animals	Comply with the Regional Pest Animal Management Plan	Implementation of pest animal management actions for the offset sites. Measured reduction in evidence of pest animal species.
Manage weed species	Comply with the Regional Weed Management Plan	Implementation of weed management actions for the offset sites. Measured reduction of cover of exotic species and weeds reduced to a maintenance level of control in perpetuity.
Fire management	Comply with the Regional Fire Management Plan	Implementation of fire management for conservation actions for the offset sites.

4.7 Monitoring

Periodic monitoring will occur on all offset sites and is a key component of the adaptive management framework that allows for potential threats and opportunities to be identified and managed.

As part of an adaptive management framework, sub-plans within the Site Management Plans that have been developed for each of the offset sites include detailed information on:

- the potential approaches to management of each specific site attribute including specific approaches for intact and regenerating native vegetation areas and, where relevant, threatened species and their habitats
- the selected approaches that will be implemented for each area
- trigger points for adoption of alternative management techniques
- a monitoring and review regime to be undertaken by appropriately experienced and qualified ecologist / bush regenerators and the landholder that will include:
    - Annual reporting of site monitoring, management actions taken and biodiversity outcomes to the Biodiversity Conservation Trust of NSW for Biobanking and Stewardship sites and as described below for NPWS and the potential Flora reserve
    - Minimum 5 yearly established vegetation plot monitoring events for a minimum period of 20 years
    - Reviews of weed, feral animal and fire management sub-plans every 5 or 6 years to identify if changes to management actions may be required
    - Annual photo point monitoring of plots that will be submitted to the BCT along with the Annual Report for Biobanking and Stewardship sites and as described below for NPWS and the potential Flora Reserve.

The potential management approaches detailed in the Site Management Plans provide the basis upon which adaptive management will be applied as a result of monitoring implemented to identify successes and failures of the management approaches employed.

The monitoring framework will provide opportunities for review and the addressing of any deficiencies in the management of each of the sites and provides enforceable oversight where conservation outcomes are not being achieved.

BioBanking and Biodiversity Stewardship sites

The following monitoring programs and reports will apply to the Biobank and Biodiversity Stewardship sites:

- Management actions performance monitoring, from the approval of the agreement. Annual reports, which include detailed records of management actions undertaken including for weed, fire, feral pest and other disturbances and photo point monitoring, will be prepared by the landowner and submitted to BCT.
- Pest fauna control monitoring, comprising annual monitoring of pest fauna populations and documenting of control activities from the approval of this offset package. Reporting on these activities will be the responsibility of the landholder and submitted to BCT as part of the agreement's annual report. BCT monitoring and auditing to be completed on an ongoing basis from approval of the agreement.
- Biodiversity Stewardship agreements will also include 5 yearly vegetation integrity plot monitoring.

NPWS – Sites 16, 35, 37, 47, 54 and 56

The NPWS will monitor biodiversity values at these six offset sites as part of their management of the relevant National Park or Nature Reserve. Monitoring will include an annual assessment of the general extent and quality of habitat for the affected

threatened fauna and the effectiveness of management actions as per the site species Management Plan developed by NPWS (refer Appendix C.28b for an example). The following monitoring programs and reports will apply to Sites 16, 35, 37, 47, 54 and 56:

- Vegetation and habitat monitoring, including establishment of photo points, collection of data on vegetation structure and any changes to habitat suitability for relevant MNES, with submission of 5 yearly reports for a 20 year period.
- Monitoring and reporting to confirm continued presence of MNES offset on each site every 5 years for a 20 year period.
- Pest fauna control monitoring, comprising minimally annual survey of pest fauna populations and documenting of control activities.
- Monitoring of fire activity across the sites.

4.8 Timing and responsibility for implementation of package

Each offset site will require different actions and have a different timetable, depending on the protection mechanism selected. Table 4.67 details the completed actions and timing and responsibility for the expected actions required to protect the sites in perpetuity and for on-going management for each of the protection mechanisms.

Table 4.67: Required actions, timing and responsibility for implementation of the W2B offset package.

Protection mechanism	Offset Site	Actions required	Target timeframe	Responsibility
BioBanking Agreements (all finalised)	Private sites (4, 13, 23, 29, 30, 43, 44, 46 and 52)	Submit BioBanking Application to OEH	COMPLETED (February 2018)	TfNSW/ Landowners
		Create and execute BioBanking Agreement	COMLETED (January-February 2019)	OEH/TfNSW
		Transfer of credits to TfNSW	COMPLETED (March-April 2019)	Landowners/ TfNSW
		Implement Management Action Plan and annual monitoring	ON-GOING (upon execution of BioBanking Agreements)	Landowners
		Retirement of required credits	Within 3 months of approval of this BoP	TfNSW
	TfNSW sites (10, 17 and 25)	Submit BioBanking Application to OEH	COMPLETED (February 2018)	TfNSW
		Create and execute Biodiversity Stewardship Agreement	COMPLETED (January-February 2019)	OEH/TfNSW
		Implement Management Action Plan and annual monitoring	ON-GOING (upon execution of BioBanking Agreements.)	TfNSW and future landowners
		Retire required credits	Within 3 months of approval of this BoP.	TfNSW
Biodiversity Stewardship Agreement	TfNSW sites (12, 20, 21, 22, 24, 28, 32, 40, 51 and 53)	Submit Biodiversity Stewardship Agreement applications to BCT	June 2021 - April 2022	TfNSW
		Create and execute Biodiversity Stewardship Agreement	March - October 2022	BCT/TfNSW
		Implement Management Action Plan and annual monitoring	From execution of Agreements	TfNSW and future landowners

Protection mechanism	Offset Site	Actions required	Target timeframe	Responsibility
		Retire required credits	Within 3 months of creation (if BoP approved) or 3 months after approval of the BoP	TfNSW
NPWS Transfer	Site 16	Finalise management actions and funding	COMPLETED (July 2020)	TfNSW/NPWS
		Transfer title to NPWS and deposit management funding into Biodiversity Conservation Trust Fund	COMPLETED (August – September 2021)	TfNSW
		Include in National Parks Estate and implement management actions and annual monitoring	ON-GOING (upon property transfer).	NPWS
	Site 35, 37, 47, 54 and 56	Agree management actions and funding	October 2021 – June 2022	TfNSW/NPWS
		Transfer title to NPWS and deposit management funding into Biodiversity Conservation Trust Fund or directly to NPWS	Upon agreement of funding	TfNSW
		Include in National Parks Estate and implement management actions and annual monitoring	Upon finalisation of acquisition/transfer to NPWS and receipt of management funding	NPWS

5 Summary of offsets provided by package

Vegetation

The Biodiversity Offset Strategy for the W2B upgrade specified 34 biometric vegetation types that were impacted by the project. Through further vegetation assessments and separating out the mangrove impacts by catchments, an additional 4 biometric vegetation types are also required to be offset. All of the biometric vegetation types recorded on each offset site as detailed in Section 4 have been summarised in Table 5.1, along with the total offset area provided for each community.

Table 5.2 shows the direct offsets met for each biometric vegetation type. Vegetation trades to meet direct offset shortfalls, as agreed with OEH in 2017, are also shown along with the residual deficit and surplus for each biometric vegetation type.

Table 5.1 Biometric Vegetation Communities found on each offset property and the total area of offsets provided for each Biometric Vegetation Community impacted by the project (in bold).

Keith Formation (2004)	BVT ID	Biometric Vegetation Type	W2B Offset Properties		Transport for NSW purchased sites																Private sites with finalised BioBanking Agreements									Joint acquisition with NPWS ongoing	Joint acquisition with NPWS 2017	Total (ha)
					10	12	16	17	20	21	22	24	25	28	32	35	37	40	47	51	53	4	13	23	29	30	43	44	46	52	54	56	
			Direct impacts (August 2021) (ha)	Offset Req	Biobank	Stewardship Agreement	Transfer to NPWS	Biobank	Stewardship Agreement	Stewardship Agreement	Stewardship Agreement	Stewardship Agreement	Biobank	Stewardship Agreement	Stewardship Agreement	NPWS transfer	Transfer to NPWS	Stewardship Agreement	Transfer to NPWS	Stewardship Agreement	Stewardship Agreement	Biobank	Biobank	Biobank	Biobank	Biobank	Biobank	Biobank	Biobank	Biobank	NPWS joint purchase	NPWS joint purchase	
Dry Sclerophyll Forests (Shrubby/grass sub-formation)	NR216	Orange Gum (Eucalyptus bancroftii) open forest of the North Coast	8.17	32.67										6.50						38.40			20.18								25.60	90.68
	NR246	Spotted Gum - Grey Ironbark - Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	131.13	524.52	130.68								11.62	166.40						67.20	66.90	2.00					28.77	39.12	8.30		134.30		655.29
	NR162	Forest Red Gum grassy open forest of the coastal ranges of the North Coast	12.42	49.67												0.57																0.57
	NR236	Smooth-barked Apple heathy open forest on sands of the North Coast																														0.00
	NR244	Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the North Coast	10.48	41.92										17.50																		17.50
	NR242	Spotted Gum - Blackbutt open forest of the lower Clarence Valley of the North Coast											20.27									9.40										29.67
	NR164	Forest Redgum - Pink Bloodwood open forest of the foothills and ranges of the North Coast																				17.90										17.90
	NR193	Narrow-leaved Ironbark dry open forest of the North Coast	4.50	18.00																												0.00
Dry Sclerophyll Forests (Shrubby sub-formation)	NR218	Pink Bloodwood - Red Mahogany - Smudgy Apple shrubby open forest on sandstone of northern North Coast																	48.30		20.10						74.21	39.86					182.47
	NR114	Blackbutt - bloodwood dry heathy open forest on Quintenary sands of the northern North Coast	0.06	0.26								3.40						20.50													57.40		81.30
	NR115	Blackbutt - Bloodwood dry heathy open forest on sandstones of the northern North Coast	77.88	311.52														2.76	25.30											48.50			76.56
	NR148	Coast Cypress Pine shrubby open forest of the North Coast Bioregion	2.25	9.00														0.46							1.43	0.60							2.49
	NR227	Scribbly Gum - Needlebark Stringybark heathy open forest of coastal lowlands of the northern North Coast	63.79	255.16											1.60				49.50							7.95			28.30		68.70	57.57	213.62
	NR116	Blackbutt - Needlebark Stringybark shrubby open forest on coastal sands of the North Coast																															0.00
	NR104	Bailey's Stringybark - Needlebark Stringybark heathy woodland on sandstones of the lower Clarence Valley of the North Coast											257.78																				257.78
	NR228	Scribbly Gum - Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	37.29	149.16	39.25									45.50				7.39				25.20	25.48			1.18							144.00
	NR200	Needlebark Stringybark - Red Bloodwood heathy woodland on sandstones of the Lower Clarence of the North Coast	19.17	76.66								3.60							164.50										46.60				214.70
	NR101	Angophora paludosa shrubby forest and woodland on sandstones or sands of the North Coast	0.62	2.49																													0.00
	NR102	Angophora robur shrubby forest and woodland on sandstones of the North Coast	4.13	16.51																									20.00				20.00
	NR201	Needlebark Stringybark - Turpentine heathy open forest of the Clarence lowlands of the North Coast			70.79																										26.40		97.19
	NR123	Blackbutt - Turpentine dry heathy open forest on sandstones of the lower Clarence of the North Coast											7.41																				7.41
	NR199	Needlebark Stringybark - Large-fruited Blackbutt heathy open forest on sandstones of the northern North Coast																	19.60										61.50				81.10
	NA	Needlebark Stringybark - Large-fruited Blackbutt heathy open forest on coastal sands of the North Coast																															0.00
Forested Wetlands	NR149	Coastal floodplain sedgelands, rushlands, and forblands	6.70	26.80											1.10			5.74					0.81								40.02		47.67
	NR217	Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion	87.70	350.80												43.40	7.00	100.81			3.30		97.78	0.41			17.41	19.85			63.30	140.52	493.78
	NR254	Swamp Mahogany swamp forest of the coastal lowlands of the North Coast	46.13	184.52	6.75	21.60						1.50	15.20		8.30	41.75		3.29	19.20				3.00		3.29	3.88							127.76
	NR255	Swamp Oak swamp forest of the coastal lowlands of the North Coast	35.72	142.88													59.00	2.47													40.79		102.26
	NR253	Swamp Box swamp forest of the coastal lowlands of the North Coast	17.76	71.04	2.37	7.80						4.00											62.18										76.35
Freshwater Wetlands	NR278	Wet heathland and shrubland of coastal lowlands of the North Coast														5.71		3.55	133.10														142.36
	NR150	Coastal freshwater meadows and forblands of lagoons and wetlands	0.54	2.18																													0.00
Grassy Woodlands	NR161	Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the North Coast	42.25	169.00		37.40							8.75	3.50						16.60			178.38						15.60		7.50		267.73
	NR197	Narrow-Leaved Red Gum woodlands of the lowlands of the North Coast	22.23	88.92										10.30											1.34								11.64
Heathlands	NR153	Coastal mallee of the North Coast														7.25		18.36															25.61
	NR167	Graminoid clay heaths of the coastal lowlands of the North Coast																	12.70													49.26	61.96
	NR152	Coastal heath on sands of the North Coast	19.07	76.28												13.30		30.64	13.50												1.94		59.38
Rainforests	NR273	Tuckeroo - Riberry - Yellow Tulipwood littoral rainforest of the North Coast	0.18	0.72								1.00				5.27																	6.27
	NR110	Black Bean - Weeping Lilly Pilly riparian rainforest of the North Coast	0.86	3.43																										2.60			2.60
	NR179	Hoop Pine - Yellow Tulipwood dry rainforest of the North Coast										0.60																					0.60
	NR280	White Booyong - Fig Subtropical Rainforest of the North Coast	2.56	10.24				12.57		5.50	24.70	9.30						1.08						14.89									68.04
	NR166	Giant Stinging Tree - Fig dry subtropical rainforest of the North Coast and Brigalow Belt South Bioregions																												1.30			1.30
Saline Wetlands	NR225	Saltmarsh complex of the NSW North Coast Bioregion - Clarence River catchment	0.09	0.34																											2.38		2.38
	NR225	Saltmarsh complex of the NSW North Coast Bioregion - Richmond River catchment															67.00																67.00
	NR182	Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregions - Richmond River catchment	0.10	0.20													7.00													5.10			12.10
	NR182	Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregions - Clarence River catchment	0.51	1.02																											29.59		29.59
Wet Sclerophyll Forests (Grassy sub-formation)	NR119	Blackbutt – Tallowwood dry grassy open forest of the central parts North Coast	2.23	8.91																													0.00
	NR173	Grey Gum - Grey Ironbark open forest of the Clarence Lowlands of the North Coast	56.97	227.88		53.00															24.80		115.58				49.54				91.80	15.31	350.03
	NR267	Tallowwood Dry Grassy Forest of the Far Northern Ranges of the North Coast	2.21	8.84																													0.00
	NR144	Brush Box tall moist forest of the northern ranges of the North Coast			1.07				11.30				5.04																13.20				30.61
	NR125	Blackbutt grassy open forest of the Lower Clarence Valley of the North Coast	29.43	117.72									69.31		3.90						4.00	39.90			6.33		146.83	78.46				11.66	360.39
	NR222	Red Mahogany open forest of the coastal lowlands of the North Coast	35.39	141.56	123.89	5.80																	16.75										146.44
Wet Sclerophyll Forests (Shrubby sub-formation)	NR160	Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast	7.42	29.68			22.61														3.00						69.86				30.00		125.47
	NR274	Turpentine moist open forest of the coastal hills and ranges of the North Coast	35.08	140.32	19.63													12.25															31.88
	NR117	Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the North Coast	5.53	22.13											1.80										5.92	9.70							17.42
	NR121	Blackbutt - Tallowwood tall moist forest of the far north east of the North Coast							5.60																								5.60
	NR219	Pink Bloodwood -Tallowwood moist open forest of the far northern ranges of the North Coast	28.65	114.60				16.41																									16.41
	NR140	Brush Box Tallowwood shrubby open forest of the northern ranges of the North Coast	0.46	1.86																													0.00
		Total	**857.65**	**3429.40**	**394.43**	**125.60**	**22.61**	**28.98**	**16.90**	**5.50**	**24.70**	**23.40**	**395.38**	**249.70**	**16.70**	**117.25**	**140.00**	**209.30**	**485.70**	**122.20**	**122.10**	**110.60**	**517.14**	**15.30**	**18.31**	**23.31**	**386.62**	**177.29**	**180.30**	**52.40**	**486.44**	**412.70**	**4880.86**

Table 5.2 Summary of direct offsets achieved, vegetation trades undertaken to meet shortfalls, residual deficits and surpluses for each biometric vegetation type

Summary of vegetation impacts			Predicted Impacts (BOS 2015) (ha)	Impacts (August 2021) (ha)	Offset Req (August 2021) (4:1)	Total available on offset properties (ha) August 2021	Direct offset status (August 2021)	Trades to meet remaining shortfall.	Offset status or surplus available after variation rules and alternative trades applied	% cleared in NR CMA	Offset trading group tier
Keith Formation 2004	BVT ID	Biometric Vegetation Type									
Dry Sclerophyll Forests (Shrub/grass sub-formation)	NR216	Orange Gum (Eucalyptus bancroftii) open forest of the North Coast	9.26	8.17	32.67	90.68	58.01	Use 18.00 ha for NR193 deficit and an additional 1.1 ha for EPBC offset	38.91	75	4
	NR246	Spotted Gum - Grey Ironbark - Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	143.4	131.13	524.52	655.29	130.77		130.77	70	4
	NR162	Forest Red Gum grassy open forest of the coastal ranges of the North Coast	15.07	12.42	49.67	0.57	-49.10	Deficit met by 49.10 ha NR218	0.00	50	6
	NR244	Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the North Coast	11.34	10.48	41.92	17.50	-24.42	Deficit met by: 24.42 ha NR242	0.00	45	7
	NR242	Spotted Gum - Blackbutt open forest of the lower Clarence Valley of the North Coast	-	-	0	29.67	29.67	Use 24.42 ha for NR244 deficit	5.25	30	7
	NR164	Forest Redgum - Pink Bloodwood open forest of the foothills and ranges of the North Coast	-	-	0	17.90	17.90		17.90	20	7
	NR236	Smooth-barked Apple heathy open forest on sands of the North Coast	-	-	0	0.00	0.00		0.00		
	NR193	Narrow-leaved Ironbark dry open forest of the North Coast	5.47	4.50	18.00	0.00	-18.00	Deficit met by: 18.00 ha of NR216.	0.00	70	4
Dry Sclerophyll Forests (Shrubby sub-formation)	NR218	Pink Bloodwood - Red Mahogany - Smudgy Apple shrubby open forest on sandstone of northern North Coast	-	-	0	182.47	182.47	Use 49.10 ha for NR162 deficit	133.37	65	6
	NR114	Blackbutt - bloodwood dry heathy open forest on Quintenary sands of the northern North Coast	-	0.06	0.26	81.30	81.04	Use 81.04 ha for NR115 deficit.	0.00	40	7
	NR115	Blackbutt - Bloodwood dry heathy open forest on sandstones of the northern North Coast	82.4	77.88	311.52	76.56	-234.96	Deficit met by 81.04 ha NR114, 153.92 ha NR104	0.00	40	7
	NR148	Coast Cypress Pine shrubby open forest of the North Coast Bioregion	2.04	2.25	9.00	2.49	-6.51	Deficit met by: 6.51 ha NR104 surplus. Note as discussed with OEH, TfNSW propose to use additional 20.01 ha residual NR167 which is associated with Byron Bay Graminoid clay heath EEC. TfNSW do not have a requirement to offset this EEC. NOTE Pending Site 32 assessment.	0.00	40	7
	NR227	Scribbly Gum - Needlebark Stringybark heathy open forest of coastal lowlands of the northern North Coast	69.73	63.79	255.16	213.62	-41.54	Deficit met by: 41.54 ha NR104	0.00	40	7
	NR116	Blackbutt - Needlebark Stringybark shrubby open forest on coastal sands of the North Coast	-	-	0	0.00	0.00		0.00	30	7
	NR104	Bailey's Stringybark - Needlebark Stringybark heathy woodland on sandstones of the lower Clarence Valley of the North Coast	-	-	0	257.78	257.78	Use 41.54 ha for NR227, 5.16 ha for NR228, 6.51 ha for NR148, 153.92 for NR115 deficit & additional 3.87 for EPBC *Angophora robur* & Swift Parrot	46.78	25	7
	NR228	Scribbly Gum - Red Bloodwood heathy open forest of the coastal lowlands of the North Coast	35.17	37.29	149.16	144.00	-5.16	Deficit met by 5.16 ha NR104	0.00	25	7
	NR200	Needlebark Stringybark - Red Bloodwood heathy woodland on sandstones of the Lower Clarence of the North Coast	17.13	19.17	76.66	214.70	138.04		138.04	20	7
	NR101	Angophora paludosa shrubby forest and woodland on sandstones or sands of the North Coast	0.61	0.62	2.49	0.00	-2.49	Deficit met by 2.49 ha NR102	0.00	15	7
	NR102	Angophora robur shrubby forest and woodland on sandstones of the North Coast	7.39	4.13	16.51	20.00	3.49	Use 2.49 ha for NR101 deficit	1.00	15	7
	NR201	Needlebark Stringybark - Turpentine heathy open forest of the Clarence lowlands of the North Coast	-	-	0	97.19	97.19		97.19	15	7
	NR123	Blackbutt - Turpentine dry heathy open forest on sandstones of the lower Clarence of the North Coast	-	-	0	7.41	7.41		7.41	10	7
	NR199	Needlebark Stringybark - Large-fruited Blackbutt heathy open forest on sandstones of the northern North Coast	-	-	0	81.10	81.10		81.10	5	7
	NA	Needlebark Stringybark - Large-fruited Blackbutt heathy open forest on coastal sands of the North Coast	-	-						5	7
Forested Wetlands	NR149	Coastal floodplain sedgelands, rushlands, and forblands	3.84	6.70	26.80	47.67	20.87	Use 2.18 ha for NR150 deficit	18.69	80	4
	NR217	Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin Bioregion	88.65	87.70	350.80	493.78	142.98	Use 56.76 ha for NR254 deficit and 40.62 for NR255 deficit.	42.40	75	4
	NR254	Swamp Mahogany swamp forest of the coastal lowlands of the North Coast	44.25	46.13	184.52	127.76	-56.76	Deficit met by 56.76 ha NR217	0.00	75	4
	NR255	Swamp Oak swamp forest of the coastal lowlands of the North Coast	39.07	35.72	142.88	102.26	-40.62	Use 40.62 ha NR217	0.00	75	4
	NR253	Swamp Box swamp forest of the coastal lowlands of the North Coast	18.02	17.76	71.04	76.35	5.31		5.31	70	4

Freshwater Wetlands	NR278	Wet heathland and shrubland of coastal lowlands of the North Coast	-	-	0	142.36	142.36		142.36	75	4
	NR150	**Coastal freshwater meadows and forblands of lagoons and wetlands**	**0**	**0.54**	**2.18**	**0.00**	**-2.18**	**Deficit met by 2.18 ha NR149**	**0.00**	**40**	**7**
Grassy Woodlands	**NR161**	**Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the North Coast**	**45.56**	**42.25**	**169.00**	**267.73**	**98.73**	**Use 77.28 ha for NR197 deficit.**	**21.45**	**60**	**6**
	NR197	**Narrow-Leaved Red Gum woodlands of the lowlands of the North Coast**	**25.83**	**22.23**	**88.92**	**11.64**	**-77.28**	**Deficit met by 77.28 ha NR161**	**0.00**	**40**	**7**
Heathlands	NR153	Coastal mallee of the North Coast	-	-	0.00	25.61	25.61	use 16.90 ha for NR152 deficit	8.71	40	7
	NR167	Graminoid clay heaths of the coastal lowlands of the North Coast	-	-	0.00	61.96	61.96	Use 20.01 ha for NR148 Coastal Cypress deficit (as per discussions with OEH).	41.95	30	7
	NR152	**Coastal heath on sands of the North Coast**	**19.93**	**19.07**	**76.28**	**59.38**	**-16.90**	**Use 16.90 ha of NR 153 surplus**	**0.00**	**10**	**7**
Rainforests	**NR273**	**Tuckeroo - Riberry - Yellow Tulipwood littoral rainforest of the North Coast**	**0.20**	**0.18**	**0.72**	**6.27**	**5.55**	**Additional 5 ha used to meet EPBC Littoral Rainforest offset requirements.**	**1.27**	**90**	**2**
	NR110	**Black Bean - Weeping Lilly Pilly riparian rainforest of the North Coast**	**0.97**	**0.86**	**3.43**	**2.60**	**-0.83**	**Deficit met by: 0.83 ha NR280 surplus**	**0.00**	**75**	**4**
	NR179	Hoop Pine - Yellow Tulipwood dry rainforest of the North Coast	-	-	0	0.60	0.60	Surplus used to meet part EPBC Littoral Rainforest offset requirements.	0.00	30	7
	NR280	**White Booyong - Fig Subtropical Rainforest of the North Coast**	**2.91**	**2.56**	**10.24**	**68.04**	**57.80**	**Lowland RF EEC (TSC Act). Use 0.83 ha for NR110. Additional 51.47 ha used to address EPBC offset requirements.**	**5.50**	**75**	**4**
	NR166	Giant Stinging Tree - Fig dry subtropical rainforest of the North Coast and Brigalow Belt South Bioregions	-	-	0	1.30	1.30		1.30	70	4
Saline Wetlands	**NR225**	**Saltmarsh complex of the NSW North Coast Bioregion - Clarence River Catchment**	**0.00**	**0.09**	**0.34**	**2.38**	**-0.34**	**Note: 2.38 ha available on Site 56 and 67 ha available in the Richmond River catchment whilst impact is in the Clarence River catchment.**	**-0.34**	**75**	**4**
	NR225	Saltmarsh complex of the NSW North Coast Bioregion -Richmond River Catchment	0	0.00	0	67.00	67		67.00	75	4
	NR182	**Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregions - Richmond River catchment**	**1.26**	**0.10**	**0.2**	**12.10**	**0.2**	**Additional surplus available can't be used as impact in another catchment. Offset at 2:1 ratio under Fisheries Management Act**	**0.00**		
	NR182	**Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregions - Clarence River catchment**		**0.51**	**1.02**	**29.59**	**0**	**Note: 29.59 on Site 56 but none in the Clarence River catchment. Offset at 2:1 ratio under Fisheries Management Act**	**-1.02**		
Wet Sclerophyll Forests (Grassy sub-formation)	**NR119**	**Blackbutt – Tallowwood dry grassy open forest of the central parts North Coast**	**0.5**	**2.23**	**8.91**	**0.0**	**-8.91**	**Deficit met by 8.91 ha NR173.**	**0.00**	**55**	**6**
	NR173	**Grey Gum - Grey Ironbark open forest of the Clarence Lowlands of the North Coast**	**62.72**	**56.97**	**227.88**	**350.03**	**122.15**	**Use 8.91 ha for NR119 & 8.84 ha for NR267 deficits.**	**101.10**	**20**	**7**
	NR267	**Tallowwood Dry Grassy Forest of the Far Northern Ranges of the North Coast**	**1.42**	**2.21**	**8.84**	**0.00**	**-8.84**	**Deficit met by: 8.84 ha NR173 surplus**	**0.00**	**45**	**7**
	NR144	Brush Box tall moist forest of the northern ranges of the North Coast	-	-	0	30.61	30.61	Use 12.65 ha for part NR274 & 4.71 ha for NR117 deficits.	13.25	35	7
	NR125	**Blackbutt grassy open forest of the Lower Clarence Valley of the North Coast**	**21.75**	**29.43**	**117.72**	**360.39**	**242.67**	**Use 98.19 ha for NR219 deficit.**	**144.48**	**30**	**7**
	NR222	**Red Mahogany open forest of the coastal lowlands of the North Coast**	**37.78**	**35.39**	**141.56**	**146.44**	**4.88**		**0.00**	**30**	**7**
Wet Sclerophyll Forests (Shrubby sub-formation)	**NR160**	**Flooded Gum - Tallowwood - Brush Box moist forest of the coastal ranges of the North Coast**	**7.09**	**7.42**	**29.68**	**125.47**	**95.79**	**Use all surplus: 95.79 ha for NR274 deficit.**	**0.00**	**40**	**7**
	NR274	**Turpentine moist open forest of the coastal hills and ranges of the North Coast**	**42.70**	**35.08**	**140.32**	**31.88**	**-108.44**	**Deficit met by: 95.79 ha NR160 and 12.65 ha NR144 .**	**0.00**	**55**	**6**
	NR117	**Blackbutt - Pink Bloodwood shrubby open forest of the coastal lowlands of the North Coast**	**5.38**	**5.53**	**22.13**	**17.42**	**-4.71**	**Deficit met by 4.71 ha NR144**	**0.00**	**50**	**6**
	NR121	Blackbutt - Tallowwood tall moist forest of the far north east of the North Coast	-	-	0	5.60	5.6	Use 1.86 for NR140 deficits.	3.74	15	7
	NR219	**Pink Bloodwood -Tallowwood moist open forest of the far northern ranges of the North Coast**	**31.00**	**28.65**	**114.60**	**16.41**	**-98.19**	**Deficit met by: 98.19 ha NR125 surplus**	**0.00**	**40**	**7**
	NR140	**Brush Box Tallowwood shrubby open forest of the northern ranges of the North Coast**	**0.55**	**0.46**	**1.86**	**0.0**	**-1.86**	**Deficit met by: 1.86 ha NR121 surplus.**	**0.00**	**25**	**7**
		Note: double lines indicate vegetation groups per Keith vegetation formation / sub formation	**900.39**	**857.65**	**3429.40**	**4880.86**	**1408.81**				

A total of 4880.86 ha is available from the 28 properties included in this offset package. The direct offset requirements have been fully met for 16 and partially met for a further 13 of the 38 biometric vegetation communities impacted by the project.

The surplus areas of these 16 communities, along with additional biometric vegetation types found on the offset properties have been used to trade off existing shortfalls in 20 of the remaining 22 vegetation types. The Biodiversity Conservation Regulation 2017 under the Biodiversity Conservation Act 2016 allows for Variation Rules (Section 6.4) under the biodiversity offsets scheme to be applied where certain conditions have been met. To meet its offset obligations and through application of the Variation Rules, the Woolgoolga to Ballina Pacific Highway Upgrade includes trading between vegetation communities where there is a clear conservation gain through doing so. This includes where offsetting was possible in contiguous patches of vegetation across properties rather than a piecemeal approach being taken on smaller parcels of land. The principles governing where Variation Rules have been applied include:

- Where available, all vegetation from each impacted Biometric Vegetation Type (BVT) present on an offset property has been used.
- Where a deficit in available offsets for a particular impacted BVT remained, an equivalent amount of a BVT within the same vegetation formation and within the same trading group available on offset properties was selected.
- Vegetation was targeted where it adjoined other areas of vegetation used to offset impacts of the Woolgoolga to Ballina Pacific Highway Upgrade.

The trades were undertaken in line with the approved variation rules, with five alternative trades based on consultation with OEH in 2017. The direct offsets and trades applied are shown in Table 5.2.

There is a remaining shortfall of 1.36 ha across the following biometric vegetation types:

- Saltmarsh complex of the NSW North Coast Bioregion – Clarence River Catchment, 0.34 ha shortfall.
- Mangrove – Grey Mangrove low closed forest of the NSW Coastal Bioregions – Clarence River catchment, 1.02 ha shortfall.

These shortfalls will be addressed by the end of 2021, by providing a direct offset or by an approved works program. Discussions with Department of Primary Industries (Fisheries) around securing offsets is continuing with potential candidate sites identified. Negotiations have commenced to secure offsets with the relevant landholders. These offsets will be finalised in consultation with DPI Fisheries.

A total of 3520.76 hectares have been used for the State and Commonwealth offsets required for this project. An additional area of 10.28 hectares has been used for Hairy Joint Grass offsets. A surplus area of 1360.10 hectares of native vegetation is available across 27 vegetation communities (Table 5.2). This area has not been used for state vegetation or threatened species offsets or MNES offsets. The surplus area will be used for other TfNSW projects as required.

Endangered Ecological Communities

The offsets provided for Endangered Ecological Communities (EECs) are shown in Table 5.3. Six of the EECs are in surplus:

- Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregion (Endangered);

- Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion (Endangered);
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion (Endangered);
- Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion (Endangered);
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered);
- Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions (Endangered and FM Act Protected Marine Vegetation).

Two EECs are in deficit:

- Coastal Cypress Pine Forest in the NSW North Coast Bioregion (Endangered) – 6.51 ha deficit which has been met using the surplus community associated with Byron Bay Dwarf Graminoid Clay Heath EEC. This was agreed as the best possible trade for this EEC with OEH in 2017 and has been applied at a 10:1 ratio as an additional offset;
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered) – 40.62 ha deficit which has been offset using the surplus of associated swamp forest communities with which it occurs (Swamp Sclerophyll Forest on Coastal Floodplains EEC).

Overall, there is a 96.84 hectare surplus in EEC offsets provided by this package.

Commonwealth Matters of National Environmental Significance

The offsets provided for the 19 MNES are shown in Table 5.4. A detailed summary of the calculator inputs and rationale is included in Appendix D and the EPBC calculator sheets for each MNES are included in Appendix E.

The offset requirements as per the EPBC offset calculator have been met by direct offsets for all of the MNES.

State Threatened species

The 28 offset sites have been assessed as either containing known presence of the species or suitable habitat for threatened species likely to be impacted by the project. Table 5.5 indicates known presence or potential habitat on each offset site for each threatened species listed in the Biodiversity Offset Strategy.

Effects of 2019-20 bushfires on W2B offset properties

Parts of the NSW North Coast were burnt by widespread and sometimes intense bushfires between October 2019 and January 2020. Fires impacted upon seven of the 28 sites included in this package (refer Table 5.6). Fire impacts on these sites ranged from less than 10% through to approximately 90% of a property's vegetation.

Based on recovery seen in other TfNSW offset sites impacted by fire over recent years (Site 25 in this package and a large offset site at South Kempsey), it is considered unlikely that there will be significant ongoing effects from the impact of these fires on the vegetation communities and threatened species habitat present on each of the sites. Vegetation communities that were burnt showed signs of previous fire events. Minimal fire sensitive vegetation communities such as Wet Sclerophyll or Rainforest communities were impacted by these fires.

The management regime for each offset site includes provisions for an ecological burning regime and all vegetation communities that have been impacted by this recent fire event are included within this regime. Where appropriate, the site management plans for each of the sites have been amended to ensure that any proposed future burns are delayed and will only occur within an appropriate timeframe recommended for the particular vegetation community.

Follow up ecological assessments will be undertaken across all sites including detailed vegetation survey plots, ongoing photo point monitoring and other general site condition assessments which will be included in the annual monitoring reports of Biobanking and Stewardship Sites and monitoring reports prepared by NPWS. If it is deemed necessary, the site specific Site Management Plans will be amended in consultation with the Biodiversity Conservation Trust.

Table 5.3: Offsets for BC Act EEC provided in the package

Threatened ecological community (BC Act)	Direct impacts (ha)		Offset requirement (ha) 4:1		Area on Offset Sites (ha)	Area used to meet all offsets (ha)	Area in excess of 4:1 ratio (ha)
	BOS (predicted)	August 2021	BOS (predicted)	August 2021			
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregion (Endangered)	0.20	0.18	0.80	0.72	6.27	4.0	+ 3.28
Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion (Endangered)	3.37 #	3.42##	13.48	13.67	72.54	36.8	+ 23.13
Coastal Cypress Pine Forest in the NSW North Coast Bioregion (Endangered)	2.04	2.25	8.16	9.00	2.49	2.49	- 6.51
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion (Endangered)	5.92	7.24	23.68	28.98	47.67	28.98	0
Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion (Endangered)	63.59	60.01	254.36	240.04	344.08	317.32	+77.28
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered)	39.07	35.72	156.28	142.88	102.26	102.26	-40.62
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered)	136.68	133.83	546.72	535.32	621.54	575.94	+40.62
Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions (Endangered and FM Act Protected Marine Vegetation)	0	0.09	0	0.34	69.38^	0	-0.34
Total	**250.87**	**242.74**	**1003.48**	**970.95**	**1266.23**	**1067.79**	**+96.84**
Mangrove (FM Act Protected Marine Vegetation)*	1.26	0.61	2.52	1.22	41.69	0.2	-1.02^

3.37 ha as defined under BC Act, including 1.88 ha as defined under EPBC Act.
3.42 ha as defined under the BC Act, includes NR280 and NR110 with 1.85 ha as defined under the EPBC Act.
* Mangrove is offset at 2:1 ratio in line with Fisheries policy.
^Offsets occur in different catchment to impact.

Table 5.4: Offsets for EPBC MNES provided in the package

Threatened ecological community (EPBC Act)	Impacts (ha)		Offset requirement (ha)		Offset Site(s)
	BOS (predicted)	August 2021	BOS (predicted)	August 2021 (actual)	
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (Critically Endangered)	0.42 ha	0.46 ha total including 0.18 ha direct and 0.28 ha indirect	3.4	4.0	35
Lowland Rainforest of Subtropical Australia (Critically Endangered)	3.27 ha total EPBC Act including 1.88 ha direct and 1.39 ha indirect	3.54 ha total including 1.85 ha direct and 1.69 ha indirect	26.6	36.8	17, 22 and 23

Protected Matter	Common Name	EPBC Act Status	Impacts (ha)		Offsets	
			BOS (predicted)	August 2021	Area (ha) /individual no	Offset sites
Threatened flora species						
Angophora robur	Sandstone Rough-barked Apple	V	91.68	78.81	347.9	10, 25
Arthraxon hispidus	Hairy Joint-grass	V	3.11	3.56	10.28	20, 21, 22, 23, 24 & 40
Cryptocarya foetida	Stinking Cryptocarya	V	48 (41 directly and 7 indirectly impacted)	59 (49 directly and 10 indirectly impacted)	76 individuals	17, 22 & 23
Eucalyptus tetrapleura	Square-fruited Ironbark	V	20.97	19.96	100	51
Macadamia tetraphylla	Rough Shelled Bush Nut	V	15 (10 directly and 5 indirectly impacted)	26 (14 directly and 12 indirectly impacted)	92 individuals	17, 22, 23 & 24

Protected Matter	Common Name	EPBC Act Status	Impacts (ha)		Offsets	
			BOS (predicted)	August 2021	Area (ha) /individual no	Offset sites
Prostanthera cineolifera	Singleton Mint Bush	V	0.42	0.44	1.4	12
Quassia sp. 'Moonee Creek'	Moonee Quassia	E	210 stems (73 directly and 137 indirectly impacted)	210 stems (73 directly and 137 indirectly impacted)	1770 stems	25
Threatened fauna species						
Anthochaera phrygia	Regent Honeyeater	E, M	722.73	668.88	1269.7	4, 10, 12, 13, 28, 46, 47, 51
Dasyurus maculatus (SE population)	Spotted-tailed Quoll	E	795.8	751.47	1703	4, 10, 13, 25, 28, 43, 44, 47, 51
Lathamus discolor	Swift Parrot	E, M	773.24	728.68	1451	4, 10, 12, 13, 25, 28, 43,
Litoria olongburensis	Olongburra Frog	V	12.73	12.18	40.2	56
Mixophyes iteratus	Giant Barred Frog	E	4.91	4.99	17.3	16
Nannoperca oxleyana	Oxleyan Pygmy Perch	E	8.68	8.24	11.67	13
Phascolarctos cinereus	Koala – all habitat	V	884.73	852.96	1845.89	4, 10, 12, 13, 17, 24, 25, 28, 29, 30, 32, 40, 43, 44, 51, 54, 56
	Woombah-Iluka population		22.96	23.99	47.9	13
	Broadwater population		37.84	33.61	66	54
	Coolgardie/Bagotville population		39.23	40.13	92.59	17, 24, 29, 30, 32, 40
Phyllodes imperialis southern subsp.	Pink Underwing Moth	E	2.61	2.58	8.25	23
Potorous tridactylus	Long-nosed Potoroo	V	49.32	44.50	131.97	17, 22, 23, 24, 40
Pteropus poliocephalus	Grey-headed Flying-fox	V	845.91	805.08	1742.5	10, 12, 13, 25, 43, 44, 46, 47, 51, 56

Table 5.5 BC and EPBC Act threatened species impacted by the project and available habitat and presence on each offsite site Note: (SH = Suitable Habitat, K= Known)

Common name	Scientific name	BC Act	EPBC Act	Offset Site																												
				4	10	12	13	16	17	20	21	22	23	24	25	28	29	30	32	35	37	40	43	44	46	47	51	52	53	54	56
Fauna																																
Atlas Rainforest Ground Beetle	*Nurus atlas*	E							SH			K	K	SH								SH									
Beccari's Freetail Bat	*Mormopterus beccarii*	V			SH	SH	SH		SH	SH	SH	SH	SH	SH	SH	SH						SH									
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH		SH	SH	SH		SH	SH	K		K	
Coastal Emu	*Dromaius novaehollandiae*	EP		K	K	SH	SH								K	K							K	K		K	SH		SH	SH	
Common Planigale	*Planigale maculata*	V				SH	SH		SH	SH		SH	SH	SH			SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	K	SH	SH	
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		SH	SH	SH	SH	SH							SH	SH							SH	SH		SH	SH	K			
Eastern Freetail Bat	*Mormopterus norfolkensis*	V		SH	SH	SH	SH	SH							SH	SH					SH		SH	SH	SH	SH	SH	K	SH		
Eastern Long-eared Bat	*Nyctophilus bifax*	V			SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH				SH	SH	K	SH	SH	
Eastern Pygmy Possum	*Cercartetus nanus*	V			SH		SH								SH	SH							SH	SH		SH	SH		SH		
Giant Barred Frog	*Mixophyes iterates*	E	E		SH	SH	SH	SH							SH	SH							SH	SH							
Golden-tipped Bat	*Kerivoula papuensis*	V		SH																			SH	SH				SH	SH		
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	K	SH		
Green-thighed Frog	*Litoria brevipalmata*	V			SH	SH	SH								SH	K							SH	SH	SH	SH	SH		SH		
Grey-headed Flying Fox	*Pteropus poliocephalus*	V	V	SH	SH	SH	SH		SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	K	SH	SH	SH
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V		SH	SH	SH	SH	SH							SH	SH	SH	SH	SH	SH		SH	SH	SH	SH	SH	SH	K	SH	SH	
Koala	*Phascolarctos cinereus*	V	V		SH	K	SH		K		SH	SH	SH	SH	SH	SH	K	K	K	K		K	SH	SH		SH	SH		SH	K	SH
Long-nosed Potoroo	*Potorous tridactylus tridactylus*	V	V								SH	SH	SH	SH		SH	SH	SH	SH	SH		SH				SH	SH		SH	SH	
Olongburra Frog	*Litoria olongburensis*	V	V		SH	SH	SH								SH		SH	SH	SH	SH		SH									K
Oxleyan Pygmy Perch	*Nannoperca oxleyana*	E	E				K													K											
Pale-headed Snake	*Hoplocephalus bitorquatus*	V			SH	SH	SH	SH							SH	SH							SH	SH	SH	SH	SH		SH		
Pink Underwing Moth	*Phyllodes imperialis southern subsp.*	E	E									SH	K	SH																	
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	SH	SH	SH	SH								SH	SH	SH	SH	SH	SH		SH	SH	SH	SH	SH	SH	K	SH	SH	SH
Rufous Bettong	*Aepyprymnus rufescens*	V			SH	SH	SH								SH	K							SH	SH			SH	K	SH		
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	SH	SH	SH	SH		SH		SH	SH	SH	SH	SH	SH	SH			SH		SH	K	SH	SH	SH	SH	K	SH	K	SH
Squirrel Glider	*Petaurus*	V			SH	SH	SH	SH	SH	SH		SH	SH	SH	SH	SH	SH	SH	SH	SH		SH	SH	SH		SH	SH	K	SH	K	

Common name	Scientific name	BC Act	EPBC Act	Offset Site																										
				4	10	12	13	16	17	20	21	22	23	24	25	28	29	30	32	35	37	40	43	44	46	47	51	52	53	54	56
	norfolcensis																														
Stephens' Banded Snake	*Hoplocephalus stephensii*	V			SH	SH	SH	SH							SH	SH							SH	SH		SH	SH	K	SH		
Swift Parrot	*Lathamus discolour*	E	CE	SH	SH	SH	SH								SH	SH			SH				SH	SH	SH	SH	SH	K	SH	SH	SH
Yellow-bellied Glider	*Petaurus australis*	V		SH	SH	SH	SH	SH							SH	SH		SH	SH	SH		SH	SH	SH	SH	SH	SH	K	SH	SH	
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH	SH		SH	SH	SH	SH	SH	SH	SH	SH	SH	
Four-tailed Grevillea	*Grevillea quadricauda*	V	V																				SH	SH	SH			SH	SH		
Green-leaved Rose Walnut	*Endiandra muelleri subsp. bracteata*	E						SH	K			SH	K	SH								SH									
Hairy Joint-grass	*Arthraxon hispidus*	V	V					SH	K	K	K	K	K	K								K	SH	SH				SH			
Knotweed	*Persicaria elatior*	V	V			SH	SH	SH																							
-	*Maundia triglochinoides*	V			K		K									K							SH	SH	SH						
Moonee Quassia	*Quassia sp. 'Moonee Creek'*	E	E												K										SH			SH			
Noah's False Chickweed	*Lindernia alsinoides*	E		SH	SH	SH	SH								SH								SH	SH	SH	SH	SH				
Red Lily Pilly	*Syzygium hodgkinsoniae*	V	V									SH	SH	SH								SH									
Rough-shelled Bush Nut	*Macadamia tetraphylla*	V	V						K		K	K	K	K								SH									
Sandstone Rough-barked Apple	*Angophora robur*	V	V	K	K										K								K		K			SH			
Singleton Mint Bush	*Prostanthera cineolifera*	V	V			K	K																								
Slender Screw Fern	*Lindsaea incisa*	E		SH	K	SH	SH								K								SH	SH	SH	SH		SH			
Square-fruited Ironbark	*Eucalyptus tetrapleura*	V	V					SH							SH	K							SH	K			K				
Square-stemmed Spike-rush	*Eleocharis tetraquetra*	E																					SH	SH	SH	SH		SH			
Stinking Cryptocarya	*Cryptocarya foetida*	V	V						K			K	K	SH								SH									
Water Nutgrass	*Cyperus aquatilis*	E			SH	SH	SH	SH											K			SH	SH	SH	SH	SH	SH	SH		SH	
Weeping Paperbark	*Melaleuca irbyana*	E		SH		SH	SH	SH								K									SH		SH				
White Lace Flower	*Archidendron hendersonii*	V										K		K						SH		SH									
Yellow flowered King of the Fairies	*Oberonia complanata*	E																												SH	

Table 5.6 Offset sites impacted by 2019-20 bushfires

Site number	Protection mechanism	Location	Approximate extent of fire
12	BSA	Coastal swamp forest and dry Sclerophyll forest. Singleton Mintbush population	>90% of the property impacted. Significant regeneration observed May 2020, including new seedlings of Singleton Mintbush.
13	BBA	Coastal swamp forest and dry Sclerophyll forest. Singleton Mintbush population and Woombah / Iluka koala offset	>70% of the property impacted. Significant regeneration observed May 2020.
16	NPWS	Coastal swamp forest and dry Sclerophyll forest. Coastal swamp forest and dry Sclerophyll forest including habitat for Giant Barred Frog	>90% of the property impacted. Significant regeneration observed May 2020.
40	BSA	Coastal swamp forest and dry Sclerophyll forest and coastal heaths. Includes part of the Coolgardie / Bagotville koala offset area	Approximately 30% of the property impacted.
46	BBA	Dry Sclerophyll forest	>70% of the property impacted.
47	BSA	Coastal swamp forest and dry Sclerophyll forest and coastal heaths	Approximately 40% of the property impacted.
56	NPWS	Coastal swamp forest and dry Sclerophyll forest and coastal heaths	Approximately 10% – 20% of the property impacted.

6 Conclusions

The approved Biodiversity Offset Strategy for the Woolgoolga to Ballina Pacific Highway upgrade identified biodiversity mitigation and offsetting measures to be implemented including reduced clearing limits, fauna crossings, temporary and permanent fauna exclusion fencing, revegetation, threatened flora translocation, installation of nest boxes, water quality measures, widening of the median and biodiversity monitoring during the construction and operational phases as well as outlining the process to be followed for biodiversity offsetting.

The Biodiversity Offset Package provides details on the 28 offset properties proposed for the Woolgoolga to Ballina upgrade including timeframes and responsibilities for implementation. This package has been developed in consultation with stakeholders and will deliver environmental outcomes for the vegetation communities and threatened flora and fauna impacted by the project.

The Package involves securing, through three in perpetuity protection mechanisms, 4880.86 ha of native vegetation communities. Of this, 3520.76 hectares is required for the Woolgoolga to Ballina project and 1360.10 hectares is currently in surplus. Twenty-five properties will be placed under BioBanking and Biodiversity Stewardship Agreements and six properties are proposed to be transferred to NPWS for inclusion in the National Parks estate. All of the sites will be managed under site specific plans of management.

The offset package provides suitable offsets for 36 of the 38 biometric vegetation types and all of the 19 MNES and known or suitable habitat for the full suite of State listed threatened species likely to be impacted by the project.

The package outlines the proposed process to overcome the shortfalls for the two vegetation communities, mangroves and saltmarsh in the Clarence catchment, in conjunction with DPI Fisheries by the end of 2021.

Comparison with Biodiversity Offsets Strategy Objectives

A summary of how the offset properties satisfy the objectives of the Biodiversity Offset Strategy is provided in Table 6.1

Table 6.1: Compliance of the offset properties with the Biodiversity Offset Strategy objectives.

Objective	Comment
An outcome that maintains or improves biodiversity values	The biodiversity values of each offset property have been assessed by an independent ecologist and management actions have been developed to ensure the ecological condition of the sites continues to improve over time.
Successfully securing the long-term (in perpetuity) protection and management of lands containing endangered ecological communities and habitat for threatened species (key habitat)	The W2B offset area contains 3520.76 ha of native vegetation, including 1067.79 ha of EEC. This vegetation provides suitable habitat for all of the threatened species affected by the upgrade.
Meeting the minimum requirements for offsets as specified in the conditions of approval.	The 4:1 offset requirements for all native vegetation has been met for 36 of the 38 vegetation communities.

Objective	Comment
	A process and timeframe has been identified to address these shortfalls. Offsets have been provided in line with the EPBC offset calculator for all of the 19 MNES impacted by the project.
The offset requirements listed in the MCoA have been met.	The area of land offset is 4 times greater than the direct impacts of the project.
The process for setting the scope and quantum of the biodiversity offsets is transparent and justifiable on environmental, social and economic grounds.	The offset assessment process has been fully transparent. Ongoing consultation has been undertaken with state departments during the assessment phase and post approval.

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Appendix A – Biodiversity Offset Strategy

Appendix B – Stakeholder consultation

TfNSW have consulted with a number of agencies in the development and preparation of this package:

Department of Planning and Environment:

- Approval of the new offset site for the Broadwater koala population (Site 54) (2017).
- Review of the Woolgoolga to Ballina Biodiversity Offset Package, December 2017 (2018), comments and TfNSW responses below.
- Review of the Woolgoolga to Ballina Biodiversity Offset Package, May 2020, comments and TfNSW responses below.

Department of the Environment and Energy:

- Approval of the new offset site for the Broadwater koala population (Site 54) via an addendum to the Threatened Biodiversity Offset Status Report Update 3 (2017).
- Review of the Woolgoolga to Ballina Biodiversity Offset Package, December 2017 (2018), comments and TfNSW responses below.
- Review of the Woolgoolga to Ballina Biodiversity Offset Package, May 2020, comments and TfNSW responses below.

National Parks and Wildlife Service:

- Site visits and consultation regarding the transfer and on-going management of Site 16 (2014 - 2021);
- Consultation regarding the range of available properties that could be transferred to NPWS (2017-2021);
- Consultation regarding the acquisition and on-going management of Site 54 (2017) and Site 56 (2019-2021).

Office of the Environment and Heritage:

- Member of the expert assessment panel for ranking the Expression of Interest applications and potential offset sites (three meeting over 2015 - 2017);
- Consultation regarding the vegetation trading assessment and endorsement of final results (2017).

Environment Protection Authority:

- Member of the expert assessment panel for ranking the Expression of Interest applications and potential offset sites (three meetings over 2015 - 2017);
- Consultation regarding the new offset site for the Broadwater Koala population (Site 54) (2016);
- Site inspections of a number of offset properties (2015 – 2017).
- Review of the Woolgoolga to Ballina Biodiversity Offset Package, December 2017 (2018).
- Review of the Woolgoolga to Ballina Biodiversity Offset Package, May 2020.

DPI (Fisheries):

- Consultation of the offset site selected for Oxleyan Pygmy Perch (Site 13) (2015);
- Consultation on the purchase of Site 12 to protect Oxleyan Pygmy Perch habitat (2016);
- Advice received regarding offsetting mangrove and saltmarsh under the Fisheries offset policy (2017 and 2020).

FCNSW:

- Consultation regarding potential new flora reserves from available offset properties (2015 - 2020).

Appendix C – Ecological Assessment Reports for 28 offset sites

Appendix D – EPBC offset calculations.

Appendix E – EPBC offset calculator sheets for all MNES impacted.