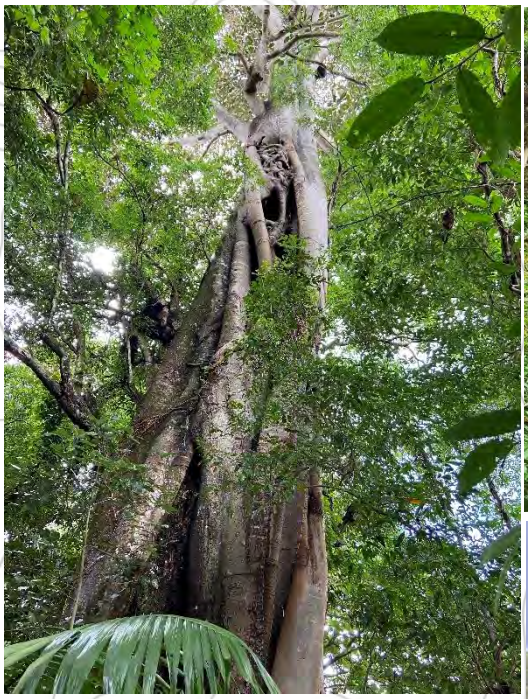
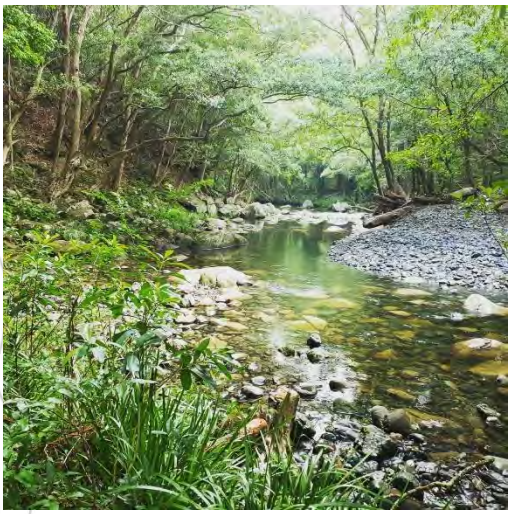
Bellingen Shire Council High Environmental Values Vegetation Mapping and Field Validation

Bellingen Shire Council





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Template 2.8.1

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Abbreviations

Abbreviation	Description
BC Act	NSW Biodiversity Conservation Act 2016
BSC	Bellingen Shire Council
Council	Bellingen Shire Council
DAWE	Commonwealth Department of Agriculture, Water and the Environment
CEEC	Critically Endangered Ecological Community
DPE	Department of Planning & Environment
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EPBC Act	NSW *Environmental Planning and Assessment Act 1979*
GHFF	Grey-headed Flying Fox
GIS	Geographic Information System
HEV	High Environmental Value
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	NSW Plant Community Types
SEPP	State Environmental Planning Policy
SoS	Saving our Species Program
TEC	Threatened Ecological Community
VEC	Vulnerable Ecological Community
VIS	Vegetation Information System

Executive Summary

The Bellingen Shire Council High Environmental Vegetation mapping provides a description of each of the chosen 29 Council owned or managed reserves mapped within the Bellingen Shire Local Government Area, and 10 private landholder sites. As a follow on from the Bellingen Biodiversity Strategy (BBS), the project aims to bring together the revised Eastern NSW Plant Community Types (PCTs) and State Vegetation Type Maps (SVTM) and existing mapping resources such as Bellingen Shire Local Mapping (DPIE 2014) to complete High Environmental Value Mapping (HEV) of the Study Area.

The HEV mapping will meet a high priority action in the recently adopted BBS and will be used to improve Council management of its land to ensure threatened ecological communities (TEC's) and species are considered in the undertaking of land management including bush fire management, daily maintenance activities, restoration works and upgrade projects.

The mapping used literature review of previous vegetation mapping, field verification assessment techniques and high resolution digital imagery. On-ground fieldwork including vegetation validation and rapid data points were undertaken throughout the Study Area to produce a fine scale map at 1:500 scale of the revised Eastern NSW PCTs.

The aim of this mapping is to refine the regional scale SVTM and identify; threatened ecological communities; significant habitat features; opportunistic sightings of threatened flora and fauna species; and potential and high-quality habitat to the four umbrella species as identified in the Biodiversity Strategy.

The study area was mapped using Aerial Photo Interpretation (API) with a methodical approach that involved an initial draft vegetation map using high resolution digital aerial photography and previous vegetation mapping, a Stereo Analyst and PLANAR viewer. This was followed by extensive field verification where, overall, 306 API Rapid data points were collected to check line boundaries and attribution. Subsequent polygon and error corrections were made. Finally, topology checking, attribute table consistency checking and corrections were undertaken to finalise the map.

The study area covered an area of 268.36 ha of the Bellingen Shire across Council reserve Crown land and private property from Dorrigo Plateau, Bellinger Valley and Coastal areas. All extant vegetation was mapped within the study area and assessed and attributed to the revised Eastern Plant Community Types (PCTs). Mapping layers have been provided in an ESRI File Geodata base in MGA Zone 56 (GDA 2020) projection.

A total of 268 ha and 44 PCT's were mapped across the study area. Fifteen Wet Sclerophyll Forests dominated the study area followed by; 11 Forested Wetlands; 7 Rainforests, 4 Dry Sclerophyll Forests; 2 Grasslands; 3 Heathlands; 3 Saline Wetlands; and 1 Freshwater Wetlands. The total hectares of vegetation mapped by formation are:

Vegetation formation mapped	Hectares
Wet sclerophyll forests	72.41
Dry sclerophyll forests	24
Rainforest	32.99
Forested wetlands	38.64
Freshwater wetlands	0.03
Saline wetlands	2.46
Heathlands	2.55
Grasslands	6.11

Each PCT was also assessed for its equivalency to Threatened Ecological Communities under State and Federal legislation. The Study Area contains a total of 179.20 ha of native vegetation of which 9 Threatened Ecological Communities (TEC's) were mapped under the BC Act and 6 under the EPBC Act.

Threatened ecological communities listed under the BC Act included:

TEC	BC Act	EPBC Act	Hectares
Coastal Saltmarsh	Yes	Yes	0.73
Freshwater Wetlands	Yes	No	0.03
Littoral Rainforest	Yes	Yes	13.66
Lowland Rainforest	Yes		10.64
Lowland Rainforest on Floodplain	Yes	Yes	4.44
Subtropical Coastal Floodplain Forest	Yes	No	14.05
Swamp Oak Floodplain Forest	Yes	Yes	4.12
Swamp Sclerophyll Forest	Yes	Yes	12.11
Themeda Grassland	Yes	No	0.010

The vegetation map is suitable for use at a 1:500 scale and will support bushfire planning and assessment within the study area. Fire should be entirely excluded from rainforests, mangroves and salt marsh communities. Burning should be avoided at locations of the recorded threatened species. This report recommends undertaking planned "cool" burning in drier communities only where there is a clear ecological benefit. Any planned burning should involve careful planning and funding for post-fire weed control and Myrtle Rust infections. Weed management and restoration works should be targeted at sites with high biodiversity values.

1. Introduction

1.1. Background

Bellingen Shire Council commissioned Eco Logical Australia (ELA) to undertake mapping of key environmental assets to plan for their improved protection in future bushfire activities and fire-fighting. The project focus is on field validation and mapping of high environmental value flora on both council managed reserves and private land, where owners wish to voluntarily improve management of high environmental value assets by identifying them and factoring them into property level bushfire planning.'

1.2. Ecology

The Bellingen Shire Council High Environmental Vegetation mapping provides a description of each of the chosen 29 Council owned reserves mapped within the Bellingen Shire Local Government Area (Study Area) (Refer to Figure 1) and private properties, where landowners requested the mapping. Mapping of high environmental value assets were provided directly to the landowners and are not included in this report. As a follow on from the Bellingen Biodiversity Strategy (BBS), the project aims to bring together the revised Eastern NSW Plant Community Types (PCTs) and State Vegetation Type Maps (SVTM) and existing mapping resources such as Bellingen Shire Local Mapping (DPIE 2014) to complete High Environment Value Mapping (HEV) of the Study Area.

The HEV mapping will meet a high priority action in the recently adopted BBS and will be used to improve Council management of its land to ensure threatened ecological communities (TEC's) and species are considered in the undertaking of land management including bush fire management, daily maintenance activities, restoration works and upgrade projects.

On-ground fieldwork including vegetation validation and rapid data points were undertaken throughout the Study Area to produce a fine scale map at 1:500 scale of the revised Eastern NSW PCTs. This HEV mapping will aid in refining the regional scale SVTM and identify:

- Threatened ecological communities listed under both the *Biodiversity Conservation* (BC) *Act 2016* and *Environmental Protection Biodiversity Conservation* (EPBC) *Act 1999*
- Significant habitat features
- Opportunistic sightings of threatened flora and fauna species; and
- Potential and high-quality habitat to the four umbrella species as identified in the Biodiversity Strategy:

Scientific Name	Common Name	BC Act	EPBC Act
Phascolarctos cinereus	Koala	E	E
Myuchelys georgesi	Bellinger River Snapping Turtle	CE	CE
Pteropus poliocephalus	Grey -headed Flying Fox	V	V
Nannoperca oxleyana	Oxyleyan Pygmy Perch	*E	E

*Endangered under the NSW Fisheries Management Act

A vegetation map and maps for each Council reserve illustrating vegetation communities have been produced based on the above information. Vegetation communities meet revised Eastern NSW PCT

names. Mapping layers have been provided in an ESRI File Geodata base in MGA Zone 56 (GDA 2020) projection.

1.3. Fire Management

This project is funded by Bellingen Shire Council through Bushfire Recovery and Resilience Funding as a response to community concerns after the 2019/21 bushfire season that there was not enough emphasis on protection of assets of high biodiversity value. Since that time, as a part of the bushfire review, RFS has partnered with DPE to redefine the way areas of high environmental value are managed for fire. This project will complement that work.

Objectives:

- To improve land management responses on Council owned and managed land and ensure they are cognisant of threatened species.
- To provide private landowners with improved spatial information to plan for the protection of environmental assets on their property from future bushfire events
- To ensure that bushfire risk is properly considered in land use planning decision making processes

Different vegetation communities are subject to different fire regimes. Some vegetation communities require fire to be excluded to maintain their ecological values while others are best served by the introduction of fire.

The BSC HEV project will:

- Provide baseline data on the ecological communities within the Study Areas which will allow scientifically supported fire management programs to be implemented.
- Support on-ground fire management that is informed by up-to-date vegetation mapping
- Provide recommendations on management of biodiversity values and mitigation measures that can be incorporated into site/reserve bushfire management plans.

The mapping information will be provided to the RFS to include in their new data for management of areas of high environmental value and the new draft Mid North Coast Bush Fire Risk Management Plan (2023-2028).

Mapping on private land has been issued separately to the individual landowners.

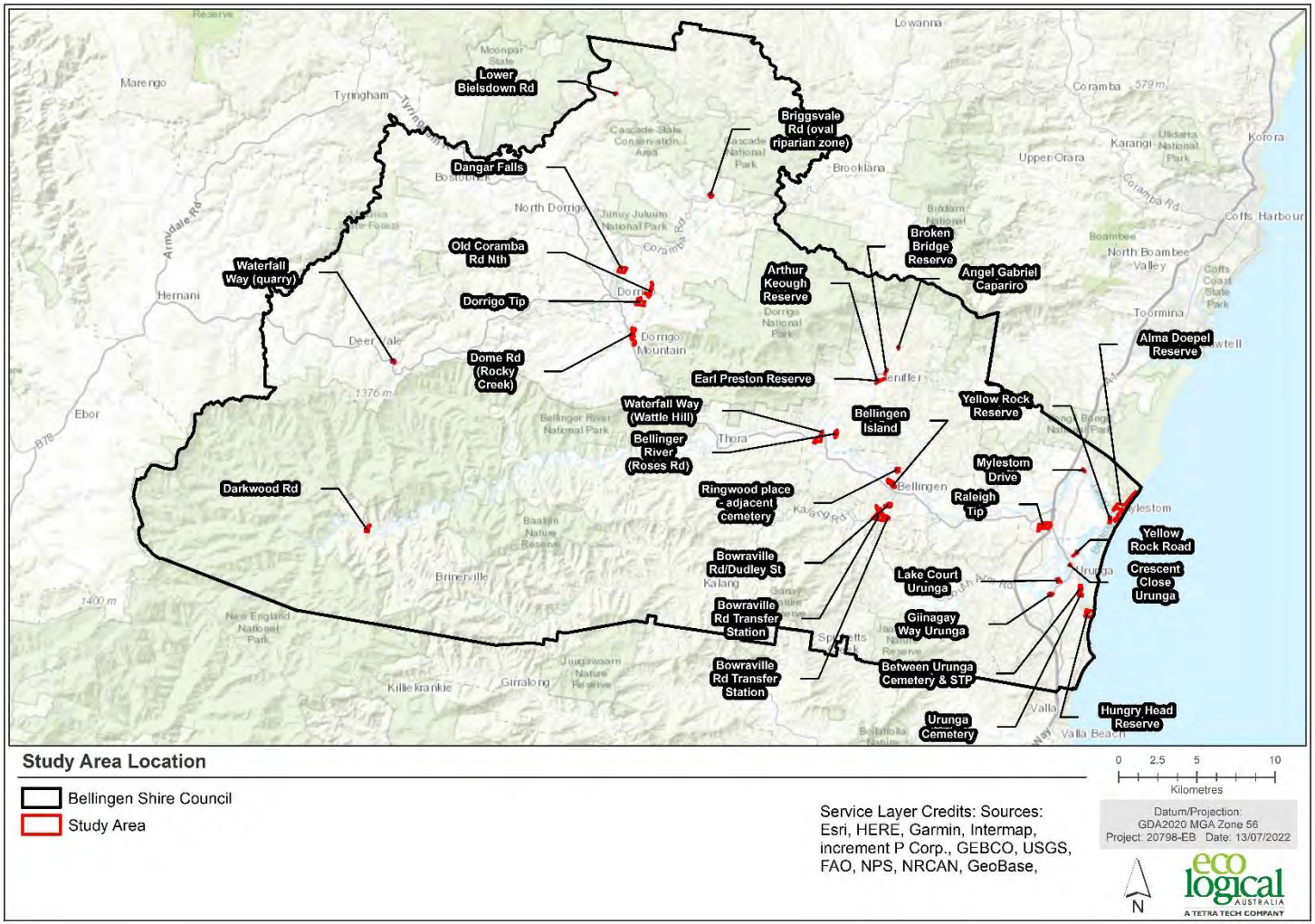

Figure 1 Study Area Locations

1.4. Existing environmental values

1.4.1. Landscape and topography

Bellingen Shire LGA is located on the North Coast of NSW; the Study Area covers a total area of 257.61ha shown in Figure 1. The Study Area rises from sea level to elevations >1100m on the Dorrigo Plateau along the New England Escarpment. The landscape covers three broad topographical areas, namely Dorrigo Plateau, Bellinger Valley, and Coastal (Mylestom, Raleigh and Urunga). Each landscape type has unique geophysical attributes which influence vegetation types. The Study Area falls within the NSW North Coast and New England Tablelands Bioregions, including the Coffs Coast and Escarpment, Macleay-Hastings and Chaelundi Sub IBRA regions, with seven Mitchell Landscapes identified in Table 1. Maps of Mitchell Landscapes and topography are shown in Figure 2.

Table 1 Study Area and Mitchell Landscapes

Dorrigo Plateau (Sub IBRA: Chaelundi)	Bellinger and Kalang Valleys (Sub IBRA: Coffs Coast and Macleay Hasting)	Coastal (Mylestom, Raleigh and Urunga) (Sub IBRA Coffs Coast and Escarpment)
Dorrigo Basalts	Bellinger Channels and Floodplains	Bellinger Channels and Floodplains
Nymboida Meta-sediments	Ingalba Coastal Hills	Brooms Head – Kempsey Coastal Ramp
	Macleay Escarpment Foothills	Ingalba Coastal Hills
		Manning – Macleay Barriers and Beaches

1.4.2. Geology and soils

Geology, soils and landscapes across the Bellingen Shire are provided in Figure 3.

1.4.2.1. Dorrigo Plateau

The Dorrigo Plateau is a remnant of the Ebor volcano and associated basaltic outcrops. The plateau is comprised mainly of Carboniferous metamorphic rocks such as argillite and slates. Soils at higher elevations of the plateau are more acidic due to the chemical interaction between soils and climatic conditions such as high rainfall, cooler temperatures and low humidity. It is mapped as mafic extrusive, mafic intrusive and felsic intrusive parent geologies. The Study Area predominately sits on 'Dorrigo Basalts' on an elongate ridge top plateau on Tertiary basalt flows, and eastern extension of the Ebor Tops landscape at lower elevation. The Dorrigo area consists of a tract of metamorphosed fine grained sediments, which have been intruded by granite. Both granite and sediments are overlain by unknown amounts of Tertiary sediments and large quantities of Tertiary basalt. Where streams flow over the edge of the basalt, falls are common and cliffs, often of columnar basalt, are associated with the waterfalls. General elevation 800 to 900m, with local relief 50m. Deep, red and red-brown well structured loams with high organic content in the topsoil and high fertility.

The geology gives rise to lithosols and brown podzolic soils on the higher elevations and alluvial soils in the river beds.

1.4.2.2. Bellinger and Kalang River Valleys

The soil landscapes in the Bellinger and Kalang River valleys are highly susceptible to erosion. Bellinger River Slates are dominated by Tertiary Basaltic Volcanics on some escarpment areas. The predominant soil landscape unit is 'Ingalba Coastal Hills', located on slopes on lower Permian slate, phyllite, schistose and sandstone. General elevation 0 to 830 m, with a local relief 350 m. Thin, stony gradational loam and sandy loam on the slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. Other soil landscape units include 'Bellinger Channels and Floodplains'. The valleys within the Shire are steeply sloped, with over 50 % of slopes in the Bellinger River National Park over 30°. They are mapped as overlying a parent geology of metasediments and clastic sediments.

1.4.2.3. Coastal (Mylestom, Raleigh and Urunga)

The coastal areas of the Shire support low ranges, wide valleys, channels, floodplains, swamps, estuaries and terraces of the Bellinger and Kalang Rivers. These occur on Quaternary alluvium, with a general elevation from 0 to 450 m, and local relief of 300 m. Dark organic loams and silty clay soils occur on the floodplain, with gradational brown loams and yellow-brown texture-contrast soils on terraces, and organic silty mud in the swamp and estuary area. Thin, stony gradational loam and sandy loam occur on the slopes grading to yellowbrown texture-contrast soils on lower slopes and in valleys. A narrow strip of Holocene dune sands occurs along the coast between Mylestom and Wenonah Head associated with beaches, fore-dunes, hind-dunes and swales. Limited development occurs within these areas (DPIE 2014).

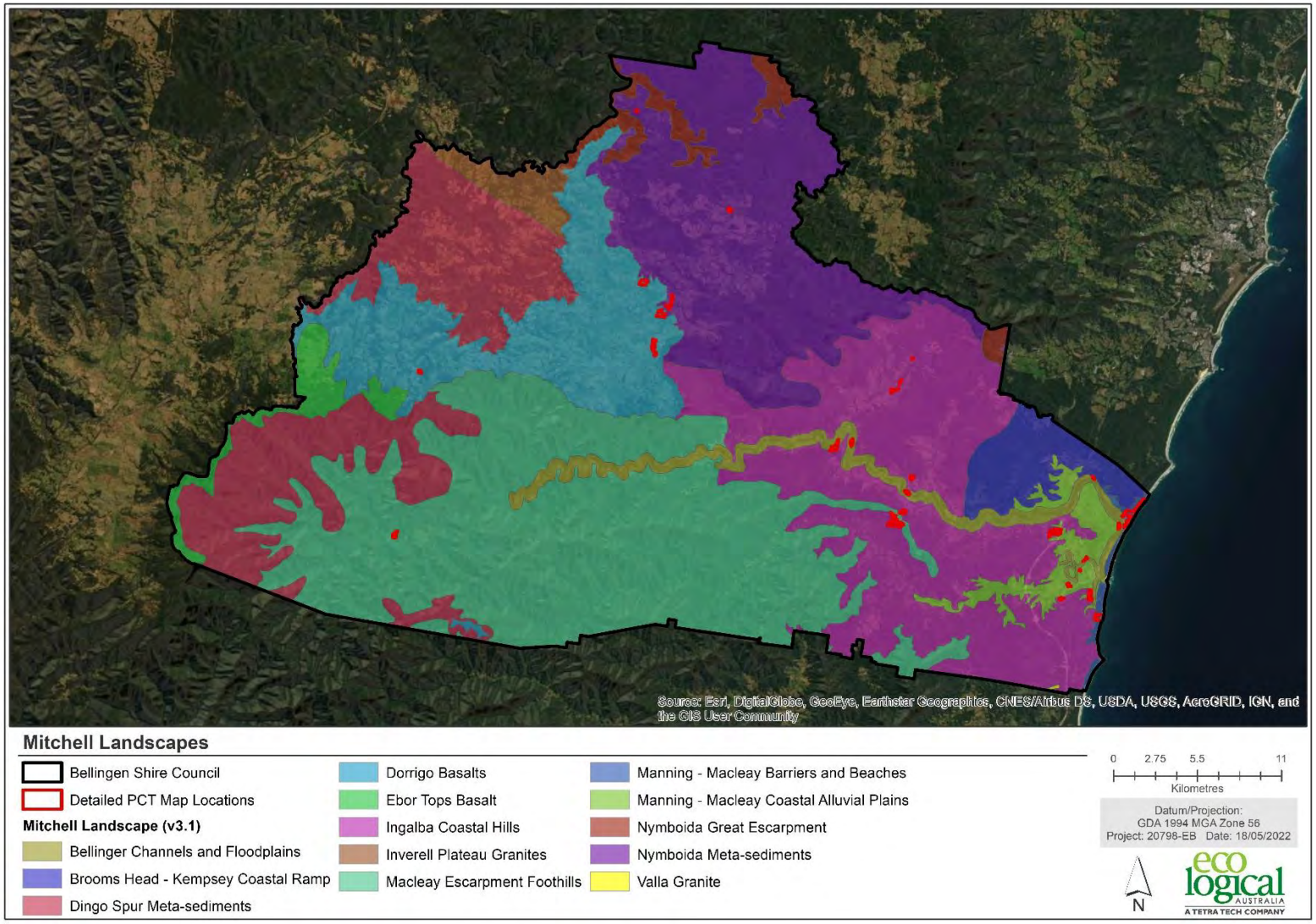

Figure 2 Mitchell Landscapes

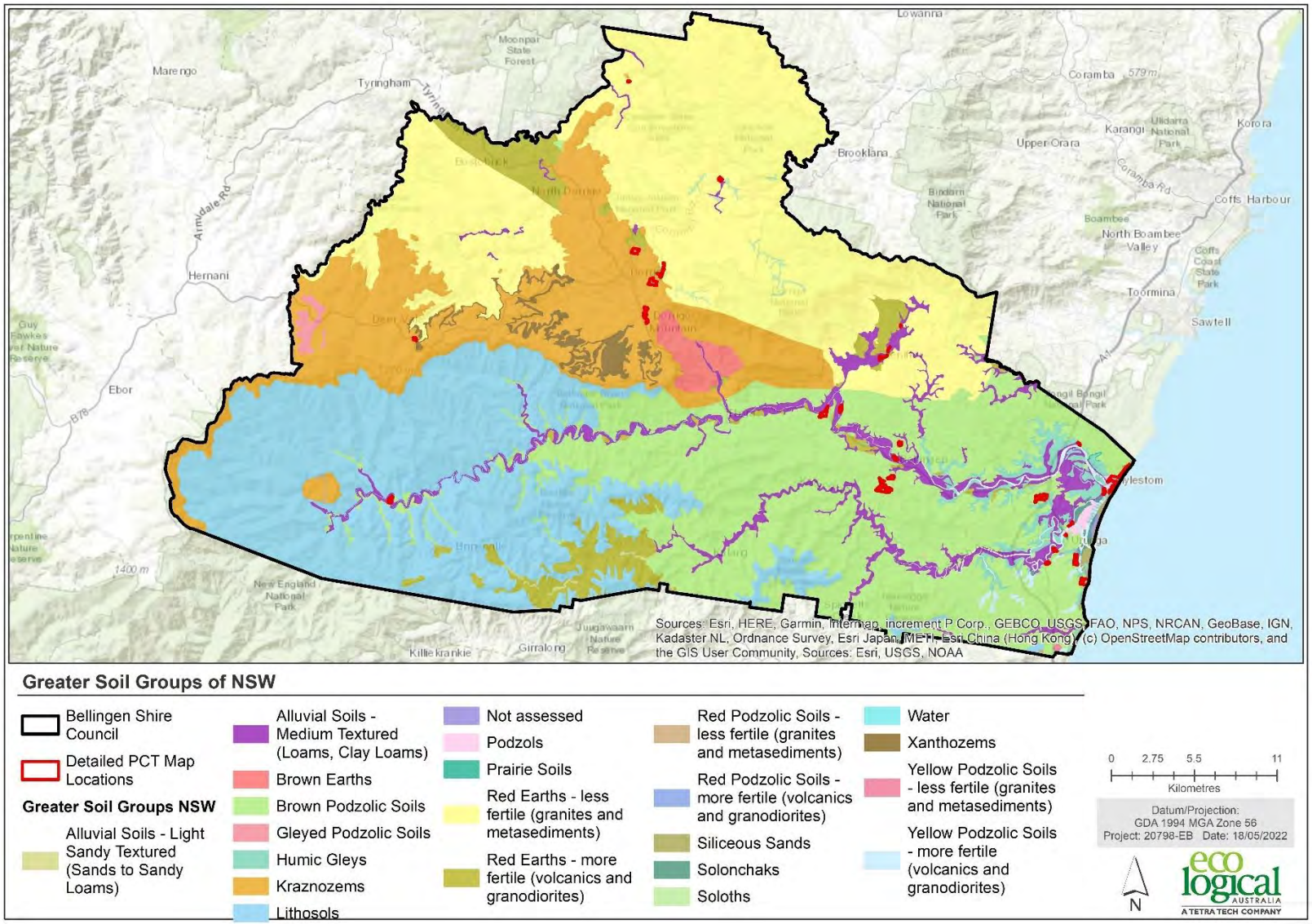

Figure 3 Great Soil Groups of NSW

1.4.3. Climate

The Bellingen Shire is located in sub-tropical and temperate regions with a dominant summer rainfall. The climate of the Bellingen valley and coastal areas is subtropical, whilst Dorrigo Plateau is temperate. Both areas record warm wet humid summers and mild dry winters. The nearest weather station for the Dorrigo Plateau recorded an annual mean rainfall of 1915.4 mm, whilst the Coastal and Bellinger valley areas recorded 1496.4mm both with the majority of rainfall occurring in the summer and early autumn period. The mean monthly maximum and minimum temperatures recorded 20 °C and 10 °C respectively for Dorrigo Plateau and 24.3°C and 11.9°C respectively for the Coastal and Bellingen valley (Bureau of Meteorology 2022).

1.4.4. Previous Vegetation Mapping

Fine-scale vegetation mapping was undertaken over part of the Bellingen LGA was undertaken by OEH (now DPE) in 2014 as a collaborative project with BSC. The study area covered 24,326 ha of the Bellingen Shire inclusive of 22 of the 29 Council Reserves mapped in this report (Dorrigo Plateau was not included). A total of 49 vegetation communities were mapped across the Bellingen Shire LGA. The study found nine communities to be wet sclerophyll forests, nine forested wetlands, seven dry sclerophyll forests, seven freshwater wetlands, six rainforests, six saline wetlands, four heathlands and one grassland.

The 2014 study assessed each vegetation community for its equivalency to Endangered Ecological Communities (EECs) or Threatened Ecological Communities (TECs) under State and Federal legislation (Table 7). Nine TECs are listed under the BC Act and five TECs listed under the EPBC Act. Note that since the 2014 study additional TECs have been listed under the EPBC Act (Table 2).

Table 2 Threatened Ecological Communities mapped in the Bellingen Shire LGA by OEH 2014

Threatened Ecological Communities	BC Act	Listing (**)	EPBC Act	Listing (*, **, ***)
Coastal Saltmarsh	Coastal Saltmarsh in NSW North Coast, Sydney Basin and SE Corner Bioregions	EEC	Subtropical and Temperate Coastal Saltmarsh	VEC
Freshwater Wetlands	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner	EEC	N/A	N/A
Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	EEC	Lowland Rainforest of Subtropical Australia	CEEC
	Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions	EEC		CEEC
	Littoral Rainforest in the NSW North Coast,	EEC	Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	CEEC

Threatened Ecological Communities	BC Act	Listing (**)	EPBC Act	Listing (*, **, ***)
	Sydney Basin and SE Corner Bioregions			
Forested Wetlands	Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion	EEC	N/A	N/A
	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions	EEC	Coastal Swamp Sclerophyll Forest of NSW and SE QLD	EEC
	Swamp Oak Floodplain Forest of the NSW North Coast, sydney Basin and SE Corner Bioregions	EEC	Coastal Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community	EEC
Grassy Headlands	Themeda Grassland on Seacliffs and Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	EEC	N/A	N/A

*VEC = Vulnerable Ecological Community, **EEC = Endangered Ecological Community, ***CEEC=Critically Endangered Ecological Community

1.5. Significant Threatened Fauna Species (Four Umbrella Species)

The Bellingen Biodiversity Strategy (BBS) (ELA 2021) identified four umbrella species within the Bellingen Shire where habitat for each of these species within the HEV mapping has been identified as either potential or high quality.

1.5.1. Oxyleyan Pygmy Perch

The Oxleyan Pygmy Perch is listed as Endangered under the NSW and Federal legislation. Protection of remaining habitat is a priority to ensure survival of these species. Current threats include sedimentation, poor water quality, predation, competition from introduced and loss of riparian vegetation.

1.5.2. Grey-headed Flying Fox

The Grey-headed Flying-fox is listed as Vulnerable under BC and EPBC Acts. The Bellingen Island GHFF camp is a nationally important roosting camp which has been deemed critical to the species' survival. The Bellingen Island GHFF Camp Management Plan was developed to manage current and potential issues associated with this camp and to ensure the conservation of the GHFF. There are three GHFF camps in the Bellingen Shire.

1.5.3. Koala

The Bellingen Shire supports significant Koala populations, and the BSC Coastal Area Koala Management Strategy (BSC, 2017) and Comprehensive Koala Plan of Management Bellingen Shire Council Coastal Area (BSC 2015) were developed to manage the long-term sustainability and recovery of Koalas and their

habitat. Koala populations and habitat across many areas of NSW are in decline and similarly in the Bellingen LGA there is evidence of a decline in habitat range. However, areas exist where Koalas have persisted over the last six generations in the Bellingen Shire. Threats to Koalas include clearing and fragmentation of habitat, attacks from domestic animals such as dogs, vehicle strikes, extreme weather events and disease. Mapping of Koala habitat on the Dorrigo plateau area is a data gap. Koala is now listed as Endangered under both ethe BC and EPBC Acts largely symptomatic of the 2019-2020 bushfires.

1.5.4. Bellinger River Snapping Turtle

The Bellinger River Snapping Turtle is Critically Endangered and is endemic to the Bellinger Catchment, being known only from this single river catchment. Very few adults remain in the wild and are subjected to threats such as disease, hybridisation, feral animal predation and riparian zone degradation. The Bellinger River Snapping Turtle has been assigned to the site-managed species management stream under the Saving our Species program with captive breeding and release of turtles occurring as part of the program in accordance with the Bellinger River Snapping Turtle Management Program (NSW DPI, 2015).

2. Methods

The High Environmental Mapping was carried out in four main stages:

- Preliminary vegetation mapping and Aerial Photography Interpretation (API)
- Field survey - Vegetation validation and floristic data collection
- Information management and revised Eastern NSW PCT association
- Draft High Environmental Values mapping

2.1. Preliminary vegetation mapping and Aerial Photography Interpretation

Preliminary vegetation mapping and API was undertaken prior to field work using the existing, most accurate mapped datasets, i.e. the NSW State Vegetation Type Map and Fine Scale Vegetation Map for the Bellingen Shire LGA (DPIE 2014). NearMap imagery supplied by Bellingen Shire Council was used to map the vegetation extent within the Study Area. Additionally, 2 - 10 m contours were used to delineate communities.

2.2. Field Survey – Vegetation validation and rapid data points (RDPs)

Ground truthing surveys consisted of API site survey where dominant species and the vegetation community were recorded. Rapid Data Points (RDP) were carried out in order to interpret the vegetation patterns for a particular locality. Field validation and fine scale mapping (at 1:500 scale) based on the new NSW PCTs, observed threatened flora and fauna species, significant habitat features, threatened ecological communities, and potential and high-quality habitat for 4 umbrella fauna species within the Study Area were undertaken by ELA Ecologists, Phoebe Smith, Brian Hawkins and Samantha Patch.

RDPs were used to validate previous vegetation mapping and refine PCT boundaries. Extensive ground-truthing of mapped polygons and attribution with vegetation communities was also undertaken. At each RDP the following was recorded:

- Three dominant canopy, midstorey and groundcover species;
- Vegetation structure;
- Vegetation community;
- Priority or environmental weed species and cover;
- Threatened species and count;
- Fire history;
- Vegetation condition;
- Landform element and pattern;
- Notes;
- Photo number;
- Surveyor; and
- Date.

Field data was collected using ArcGIS software Collector with an iPhone and/or tablet and was recorded at 5–10 metre accuracy (Figure 4).

2.3. Information Management and new NSW PCT association

Department of Planning and Environment (DPE) have recently pre-released revised PCT's for Eastern NSW PCT Classification and State Vegetation Type Maps (SVTM). Keith Vegetation Formation and Class Types, as well PCT descriptions provided by DPE were used to refine RDP's and previous vegetation mapping to associate vegetation communities with the revised Eastern NSW PCT names and descriptions. 'PCT of best fit' was utilised in areas of high degradation particularly on the Dorrigo Plateau.

NSW Threatened Biodiversity Data Collection (TBDC) (DPIE 2021b), Species Profiles and Threats Database (SPRAT) (DAWE 2022b) and National Recovery Plans and determinations for the four umbrella species (DAWE 2021, 2022; DPE 2005 and NSW Scientific Committee 2016) was used to associate the four umbrella species with mapped PCT's. Such PCT's were refined further based on ground truthing of each PCT within the Study Area where suitable habitat such as Koala feed trees, fleshy fruit trees and nectar food trees for GHFF, freshwater, and sandy banks were noted. Such refinements were also based on literature review and local knowledge of the area. More detail is provided in Section 3.5.

2.4. Draft vegetation mapping

Mapping layers were provided at fine scale mapping (at 1:500 scale) in an ESRI File Geodata base in MGA Zone 56 (GDA 2020) projection utilizing 2D ADS40 imagery.

Mapping includes:

- Revised Eastern NSW PCT names and associated TEC extent
- High quality Koala habitat
- High quality Grey Headed Flying Fox habitat (foraging and roosting)
- Potential Bellingen River Snapping Turtle nesting habitat
- Potential Oxleyan Pygmy Perch habitat
- Observed threatened species
- Significant habitat features; and
- Strahler streams

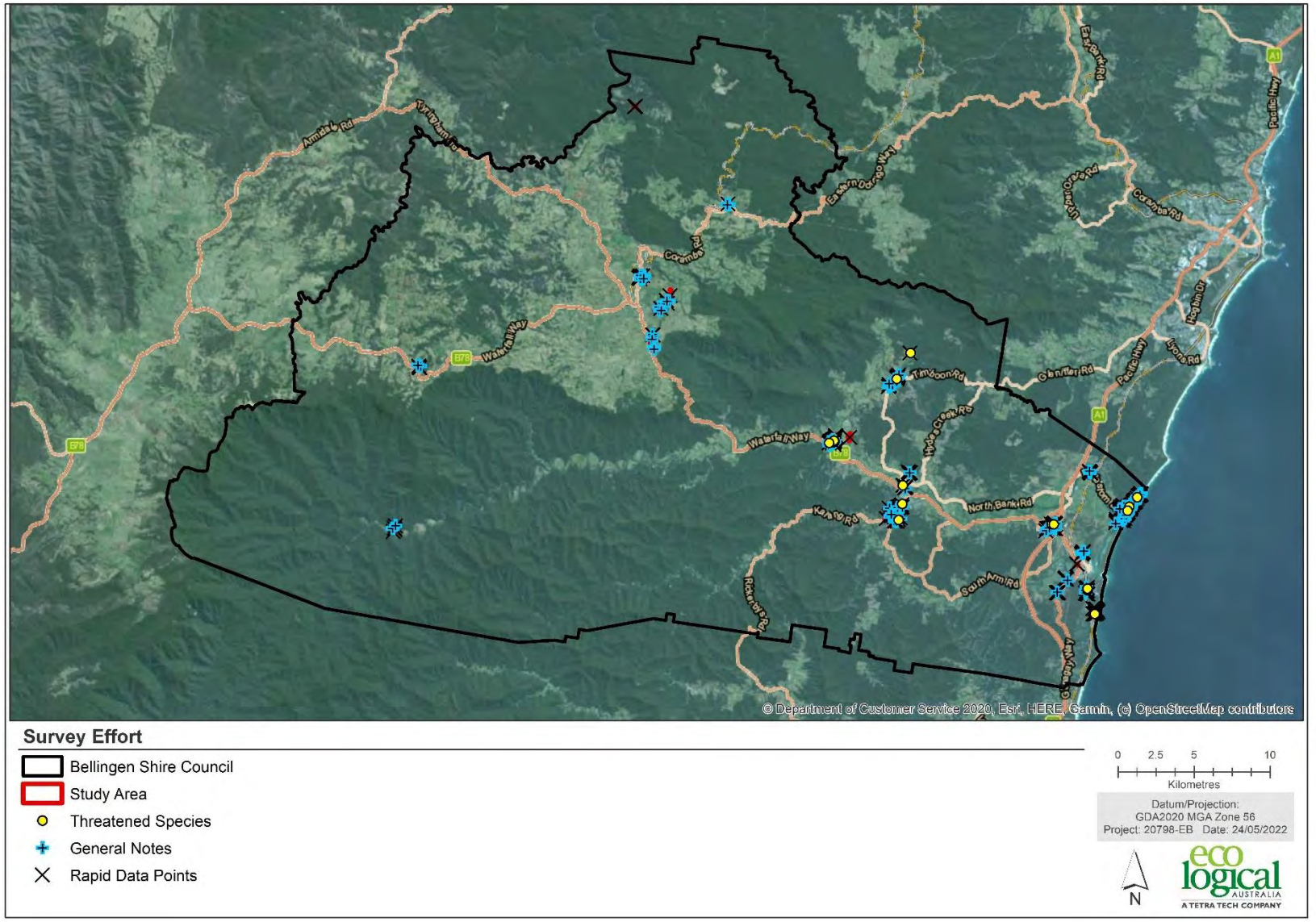

Figure 4 Survey effort overview

3. Results

3.1. Vegetation Extant

The study area covers approximately 258 ha, of this 179 ha is mapped as extant native vegetation.

3.2. Vegetation Mapping

A total of 268 ha and 44 PCT's were mapped across the study area (Table 3). Wet Sclerophyll Forests (Shrubby sub-formation) (44.21 ha, 8 PCT's) dominated the study area followed by; Forested Wetlands (38.46ha, 11 PCT's); Rainforests (32.99ha, 7 PCT's); Wet Sclerophyll Forests (Grassy sub-formation) (28.20 ha, 7 PCT's); Dry Sclerophyll Forests (Shrubby sub-formation) (24 ha, 4 PCT's); Grasslands (6.11ha, 2 PCT's); Heathlands (2.55ha, 3 PCT's); Saline Wetlands (2.46ha, 3 PCT's); and Freshwater Wetlands (0.03ha, 1 PCT).

Table 3 Plant Community Types by Vegetation Formation mapped in the Study Area

Vegetation Formation	Vegetation Class	PCT ID	PCT Name	Total Area (ha)
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3167	Northern Hinterland Blackbutt-Forest Oak Wet Forest	4.63
		3248	Northern Blackbutt-Turpentine Shrubby Forest	5.84
		3250	Northern Foothills Blackbutt Grassy Forest	8.94
		3252	Northern Hinterland Grey Gum-Mahogany Grassy Forest	0.33
		3254	Northern Hinterland Tallowwood-Forest Oak Grassy Forest	5.01
	Northern Tableland Wet Sclerophyll Forests	3146	Dorrigo Red Gum Grassy Forest	2.73
		3287	Northern Escarpment Messmate Cool Wet Forest	0.73
			Total	**28.21**
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3160	Lower North Turpentine-Tallowwood-Grey Gum Forest	2.38
		3161	Mid North Hinterland Wet Forest	15.4
		3162	Mid North Lowland Flooded Gum-Palm Wet Forest	0.21
		3165	Northern Brush Box Subtropical Wet Forest	1.59
		3166	Northern Escarpment Brush Box-Tallowwood-Maple Wet Forest	1.01
		3169	Northern Hinterland Tallowwood-Brush Box Wet Forest	17.04
		3174	Northern Turpentine-Brush Box Wet Forest	0.10

Vegetation Formation	Vegetation Class	PCT ID	PCT Name	Total Area (ha)
	Northern Escarpment Wet Sclerophyll Forests	3207	Northern Escarpment Layered Blackbutt Fern Forest	6.48
			Total	**44.21**
Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	3551	Northern Sands Blackbutt-Red Mahogany forest	0.78
		3553	Northern Sands Bloodwood-Swamp Turpentine Forest	2.29
		3554	Northern Sands Tea-tree-Banksia Littoral Scrub	18.14
	North Coast Dry Sclerophyll Forests	3574	Northern Lowland Sandstones Dry Open Forest	2.79
			Total	**24**
Forested Wetlands	Coastal Floodplain Wetlands	4026	Estuarine Sea Rush Swamp Oak Forest	2.54
		4034	Far North Swamp Oak-Tuckeroo Swamp Fringe Forest	0.60
		4045	Northern Lowland Swamp Turpentine-Paperbark Forest	9.46
		4048	Northern Swamp Oak-Paperbark Forest	0.97
	Coastal Swamp Forests	4000	Northern Estuarine Paperbark Sedge Forest	0.48
		4001	Northern Floodplain Paperbark Fern Swamp Forest	0.14
		4003	Northern Lowland Swamp Turpentine-Mahogany Forest	0.77
		4004	Northern Melaleuca quinquenervia Swamp Forest	5.62
		4005	Northern Paperbark Banksia Littoral Forest	3.82
		4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	5.86
	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	8.19
			Total	**38.45**
Rainforests	Dry Rainforests	3089	Lower North Waterhousea Riparian Rainforest	1.82
	Littoral Rainforests	3127	Mid North Headland Brush Box Littoral Rainforest	0.41
		3130	Mid North Tuckeroo-Paperbark Littoral Wet Forest	0.81

Vegetation Formation	Vegetation Class	PCT ID	PCT Name	Total Area (ha)
		3132	Northern Sands Tuckeroo-Banksia Forest	12.44
	Northern Warm Temperate Rainforests	3052	Northern Escarpment Antarctic Beech Rainforest	4.2
	Subtropical Rainforests	3017	Mid North Lowland Floodplain Rainforest	2.68
		3021	Northern Lowland Subtropical Rainforest	10.64
			Total	**33.18**
Saline Wetlands	Mangrove Swamps	4091	Grey Mangrove-River Mangrove Forest	1.73
	Saltmarshes	4095	Paspalum vaginatum-Samphire Saltmarsh	0.03
		4103	Sporobolus virginicus Saltmarsh	0.70
			Total	**2.43**
Heathlands	Coastal Headland Heaths	3788	Coastal Foredune Wattle Scrub	0.94
	Northern Montane Heaths	3795	Mid North Swamp Oak Headland Scrub	0.39
		3823	Cascades Cypress-Tea-tree Riparian Forest	1.21
			Total	**2.54**
Grasslands	Maritime Grasslands	3408	Northern Headland Grassland	0.01
		3410	Spinifex Strandline Grassland	6.10
			Total	**6.11**
Freshwater Wetlands	Coastal Freshwater Lagoons	3967	Northern Lower Floodplain Eleocharis Wetland	0.03
			Total	**0.03**

3.3. PCT and TEC Associations

The study area contains a total of 179.20 ha of native vegetation of which 9 Threatened Ecological Communities (TEC's) were mapped under the BC Act and 5 under the EPBC Act (Table 4).

A total of 10.64 ha of Lowland Rainforest, and 4.44 ha of Lowland Floodplain Rainforest was mapped in the study area. Followed by 13.66 ha of Littoral Rainforest, 12.11 ha of Swamp Sclerophyll Forests, 14.05 ha of Subtropical Coastal Floodplain Forests, 4.12 ha of Swamp Oak Floodplain Forest, 0.73 ha of Coastal Saltmarsh, 0.01 ha of Themeda Grassland and only 0.03 ha of Freshwater Wetland.

Table 4 TEC's and total area mapped within the Study Area

Threatened Ecological Communities	BC Act	Listing*	EPBC Act	Listing*	Total Area (ha)
Grassland	**Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and SE Croner Bioregions**	EEC	N/A	N/A	0.01
Coastal Saltmarsh	**Coastal Saltmarsh in NSW North Coast, Sydney Basin and SE Corner Bioregions**	EEC	**Subtropical and Temperate Coastal Saltmarsh**	VEC	0.73
Freshwater Wetlands	**Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner**	EEC	N/A	N/A	0.03
Rainforest	**Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions**	EEC	**Lowland Rainforest of Subtropical Australia**	CEEC	10.64
	Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions	EEC		CEEC	4.44
	Littoral Rainforest in the NSW North Coast, Sydney Basin and SE Corner Bioregions	EEC	**Littoral Rainforest and Coastal Vine Thickets of Eastern Australia**	CEEC	13.66
Forested Wetlands	**Subtropical Coastal Floodplain Forest of the NSW North Coast Bioregion**	EEC	N/A	N/A	14.05
	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions	EEC	**Coastal Swamp Sclerophyll Forest of NSW and SE QLD**	EEC	12.11
	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions	EEC	**Coastal Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community**	EEC	4.12

*VEC = Vulnerable Ecological Community, EEC = Endangered Ecological community, CEEC = Critically Endangered Ecological Community

Twenty PCT's were assessed as being equivalent to TEC's under the BC Act and 17 under the EPBC Act (Refer to Table 5 and Figure 5). Rainforests and Subtropical Forested Floodplain Forests represent the largest vegetation formations by area and PCT types.

Table 5 Total Area (ha) of PCT and TEC Association under both the BC and EPBC Acts.

BC Act	EPBC Act	PCT ID	PCT Name	Total Area (ha)
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions	**Coastal Swamp Oak (*C. glauca*) forest of NSW and SE QLD ecological community**		**Total**	**4.11**
		4026	Estuarine Sea Rush Swamp Oak Forest	2.54
		4034	Far North Swamp Oak-Tuckeroo Swamp Fringe Forest	0.60
		4048	Northern Swamp Oak-Paperbark Forest	0.97
Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion	N/A		**Total**	**14.05**
		4003	Northern Lowland Swamp Turpentine-Mahogany Forest	0.77
		4005	Northern Paperbark Banksia Littoral Forest	3.82
		4045	Northern Lowland Swamp Turpentine-Paperbark Forest	9.46
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions	**Coastal Swamp Sclerophyll Forest of New South Wales and Southeast Queensland**		**Total**	**12.11**
		4000	Northern Estuarine Paperbark Sedge Forest	0.48
		4001	Northern Floodplain Paperbark Fern Swamp Forest	0.14
		4004	Northern Melaleuca quinquenervia Swamp Forest	5.62
		4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	5.86
Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions	**Lowland Rainforest of Subtropical Australia**		**Total**	**4.44**
		3017	Mid North Lowland Floodplain Rainforest	2.62
		3089	Lower North Waterhousea Riparian Rainforest	1.82
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	**Lowland Rainforest of Subtropical Australia**		**Total**	**10.64**
		3021	Northern Lowland Subtropical Rainforest	10.64
Littoral Rainforest in the NSW North Coast, Sydney Basin and SE Corner Bioregions	**Littoral Rainforest and Coastal Vine Thickets of Eastern Australia**		**Total**	**13.66**
		3127	Mid North Headland Brush Box Littoral Rainforest	0.41
		3130	Mid North Tuckeroo-Paperbark Littoral Wet Forest	0.81
		3132	Northern Sands Tuckeroo-Banksia Forest	12.44
			Total	**0.73**

BC Act	EPBC Act	PCT ID	PCT Name	Total Area (ha)
Coastal Saltmarsh in NSW North Coast, Sydney Basin and SE Corner Bioregions	**Subtropical and Temperate Coastal Saltmarsh**	4095	Paspalum vaginatum-Samphire Saltmarsh	0.03
		4103	Sporobolus virginicus Saltmarsh	0.70
Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner	N/A		**Total**	**0.03**
		3967	Northern Lower Floodplain Eleocharis Wetland	0.03
Themeda grassland on seacliffs and coastal headlands in the NSW North Coat, Sydney Basin and SE Corner Bioregions	N/A		**Total**	**0.01**
		3408	Northern Headland Grassland	0.01

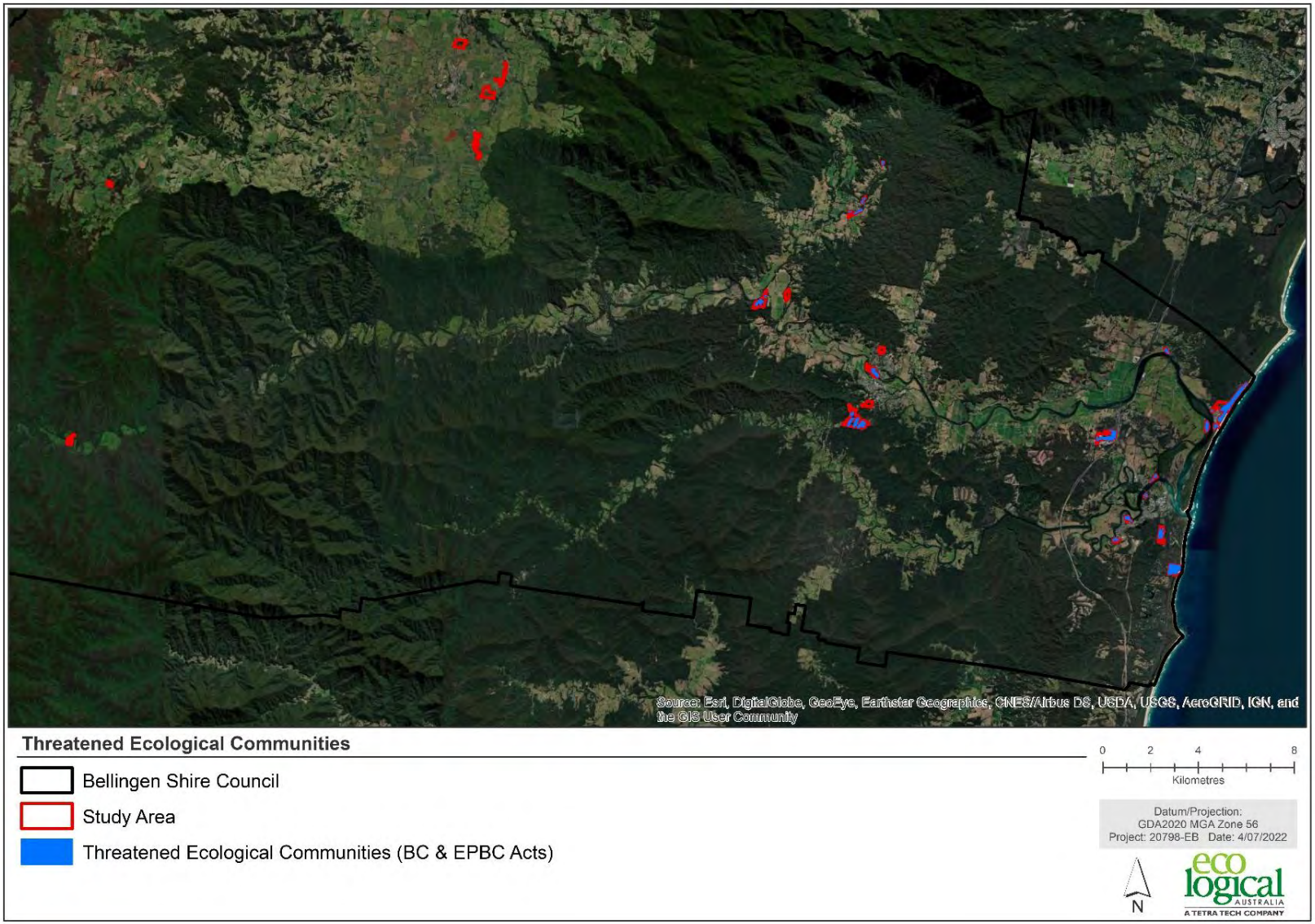

Figure 5 Overview of Threatened Ecological Communities on Council Reserves

3.4. Threatened Species

During the fieldwork component opportunistic observations of threatened flora and fauna species were recorded. Notably many individuals of *Niemeyera whitei* (Rusty Plum), *Hicksbeachia pinnatifolia* (Red Boppel Nut) and *Rhodomyrtus psidioides* (Native Guava) were recorded within the Study Area (Table 6).

Table 6 Threatened Species found within Council Reserves

Scientific Name	Common Name	BC Act	EPBC Act	Comments
Flora				
Acronychia littoralis	Scented Acronychia	E	E	At least 2 definite individuals but potentially many more (could not confidently be distinguished from *Acronychia imperforata*) – found within Alma Doepel Reserve between Myelstom and Tuckers Rock Beach
Hicksbeachia pinnatifolia	Red Boppel Nut	V	V	Found at numerous sites
Macadamia tetraphylla	Macadamia	V	V	Planted near Broken Bridge Reserve
Niemeyera whitei	Rusty Plum	V	-	Many individuals found at Wattle Hill and planted on Bellingen Island
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Found at Wattle Hill
Rhodomyrtus psidioides	Native Guava	CE	-	Many individuals found at Alma Doepel Reserve
Senna acclinis	Rainforest Cassia	E	-	Hungry Head
Fauna				
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Urunga STP
Glossopsitta pusilla	Little Lorikeet	V	-	Hungry Head
Lophoictinia isura	Square-tailed Kite	V	-	Raleigh Waste Management Centre
Daphoenositta chrysoptera	Varied Sitella	V	-	Raleigh Waste Management Centre

3.5. Habitat mapping for BSC 4 umbrella species

3.5.1. Oxleyan Pygmy Perch

The historical distribution of the Oxleyan Pygmy Perch is considered to include the Bellingen LGA (NSW DPI 2016), although the species has not specifically been recorded from the BSC LGA. Oxleyan Pygmy Perch typically occur in swamps, creeks and lakes of 'wallum' country (Banksia-dominated coastal heath), preferring slow-moving or still waters with plenty of in-stream aquatic vegetation or root-filled banks fringed with riverbank vegetation (NSW DPI 2016). However, Oxleyan Pygmy Perch have also been found at several atypical sites downstream from areas of wallum heath. For example, they have been recorded from an intermediate eucalypt forest/heath community, from littoral rainforest/melaleuca swamp, and from among rushes in an estuarine creek (NSW DPI 2005). Most waterbodies that support the species are located within 8 km of the coast and at elevations of less than 30 m above sea level (NSW DPI 2016.

True wallum vegetation does not occur in the Bellingen LGA, but potential peripheral habitat is available in the form of swampy Paperbark or eucalypt forest in the estuaries and coastal floodplains of the Bellinger-Kalang River systems. We have taken a conservative approach to mapping Oxleyan Pygmy Perch habitat, including all PCT patches that were considered to have any potential habitat value for the species. Although the likeliest potential habitat is in areas of slow-moving or still water (e.g. backwater swamps such as at the Raleigh Transfer Station), we have also included several sites adjacent to the main river channels. It should be stressed that, as the Oxleyan Pygmy Perch has not been recorded from the Bellingen Shire, the mapping shows potential rather than actual habitat for the species. A total area of 16.24 ha of potential habitat for this species was mapped within the Study Area (Figure 6).

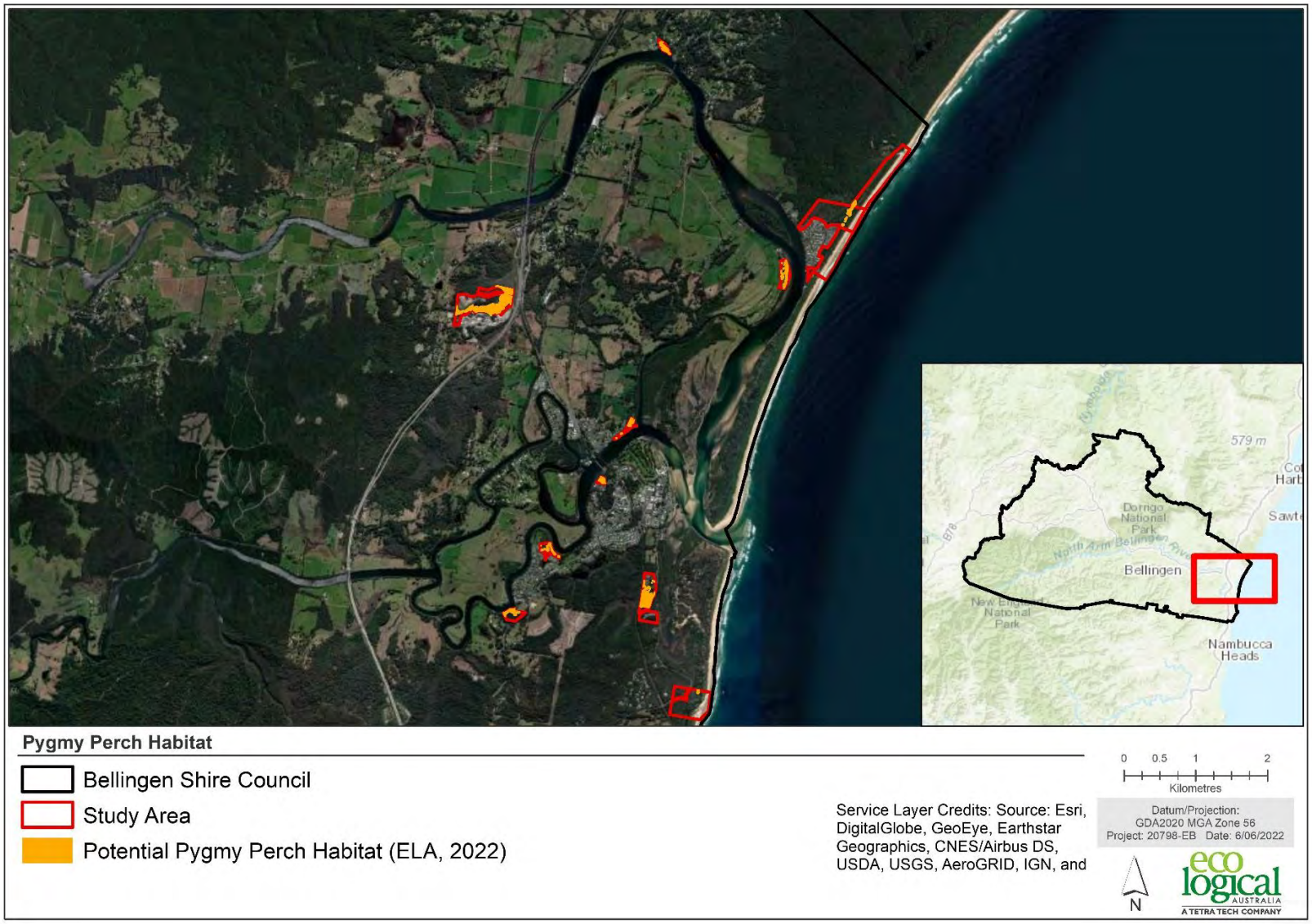

Figure 6 Oxleyan Pygmy Perch Mapped Habitat

3.5.2. Grey-headed Flying Fox

The Grey-headed Flying-fox is a common and widespread species in the Bellingen LGA, where there are several Flying-fox camps (Urunga, Thora and Bellingen), most notably the important, permanently-occupied maternity camp on Bellingen Island; other camps are occupied seasonally according to the availability of resources. Grey-headed Flying-foxes feed mostly on eucalypt nectar and fruit, and most of the treed parts of the LGA, including gardens and plantings, which contain some potential habitat in the form of nectar-producing or fleshy-fruited tree species. Particularly important are habitats that provide food in winter, a season of scarcity across most of the Grey-headed Flying-fox's range (Eby and Law 2008); key sources of winter fruit and nectar are subtropical rainforests, especially on floodplains (Hawkins 2014), and coastal or floodplain forests with species such as *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Eucalyptus robusta* (Swamp Mahogany), *E. tereticornis* (Forest Red Gum), *E. pilularis* (Blackbutt) and *Banksia integrifolia* (Coast Banksia) (Eby and Law 2008, Hawkins 2014).

In associating PCTs with Grey-headed Flying-fox habitat, we considered the PCT's listed within the TBDC as well as any PCT that had a substantial presence of one or more of the significant Grey-headed Flying-fox food plants listed in Table 4.1 (page 26) of Eby and Law (2008), or of *E. grandis* (Flooded Gum – a locally important nectar-producing species [Brian Hawkins, personal observation]) to be high quality Flying-fox habitat; we also considered subtropical rainforest PCTs to be high quality habitat. Additionally, the locations of local camps were checked using the National Flying Fox Monitor viewer (DAWE 2022c).

High quality Grey-headed Flying-fox foraging habitat is present in many of the Council reserves, especially in the eastern half of the LGA; sites with coastal or floodplain forests (e.g. between Urunga Cemetery and STP; Raleigh Tip and Alma Doepel Reserve) are particularly important. A total area of 3.04 ha of core roosting habitat was mapped within the Study Area, and 138.66 ha of high-quality foraging habitat (Figure 7).

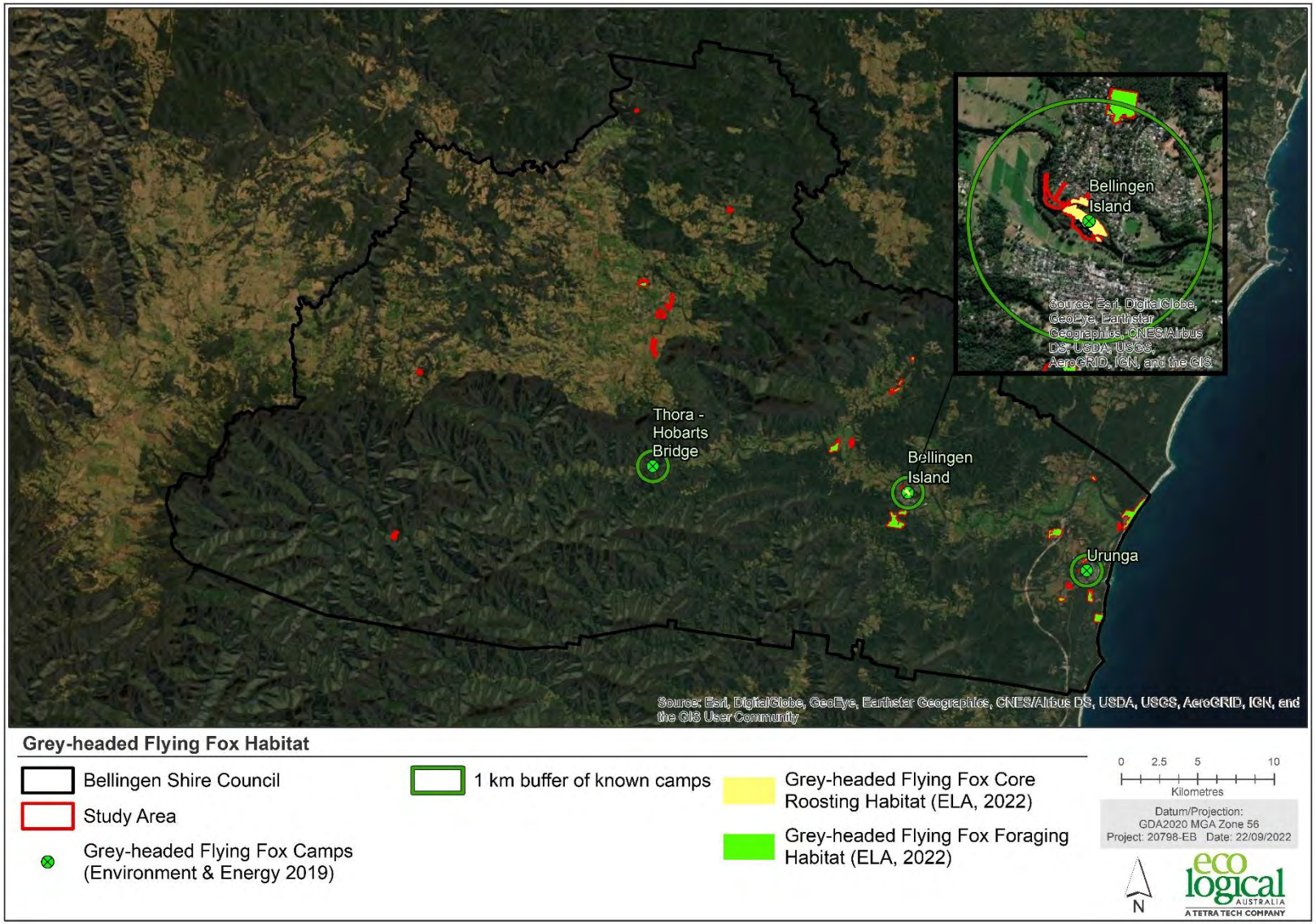

Figure 7 Grey-headed Flying Fox Mapped Habitat

3.5.3. Koala

Koala habitat of varying quality is widespread across the Bellingen LGA, and Koalas have been recorded from forested areas in every part of the shire. In crude terms, Koala habitat consists of vegetation that contains Koala food trees. The primary Koala food tree in the Coffs-Bellingen area is *Eucalyptus microcorys* (Tallowwood) (BSCKPOM); other tree species with documented high use in the Bellingen LGA are *Eucalyptus robusta* (Swamp Mahogany), *E. propinqua* (Small-fruited Grey Gum) and *E. tereticornis* (Forest Red Gum) (OEH 2018). Species with documented high or significant use in the North Coast more broadly include *E. grandis* (Flooded Gum), *E. saligna* (Sydney Blue Gum), *E. resinifera* (Red Mahogany), *E. siderophloia* (Grey Ironbark), *E. acmenoides* (White Mahogany), *E. carnea* (Thick-leaved Mahogany), *E. pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine), *Angophora costata* (Smooth-barked Apple), *Allocasuarina torulosa* (Forest Oak) and *Melaleuca quinquenervia* (Broad-leaved Paperbark) (OEH 2018). Apart from the presence/abundance of food trees, Koala habitat quality is also a function of habitat configuration and vegetation structure: Koalas are more commonly recorded in larger trees and in larger, well-connected habitat blocks (OEH 2018). Factors such as leaf chemistry, soil nutrients and tree genetics are also important influences on Koala habitat (OEH 2018).

In associating PCTs with Koala habitat, we considered the PCT's listed as vegetation associations within the TBDC, and then refined those PCT's that that had a substantial presence of one or more of the high or significant use tree species listed in Table 3 (page 16) of OEH (2018) as well as the NSW Government (2021) Schedule 2 of the Koala Habitat SEPP 2021 (North Coast food trees) to be high quality Koala habitat.

Because important Koala food trees such as *E. microcorys, E. tereticornis E. propinqua* and *E. robusta* are common throughout the LGA, high quality Koala habitat is present in many of the Council reserves. A total area of 98.27 ha of high-quality foraging habitat for this species was mapped within the Study Areas (Figure 8).

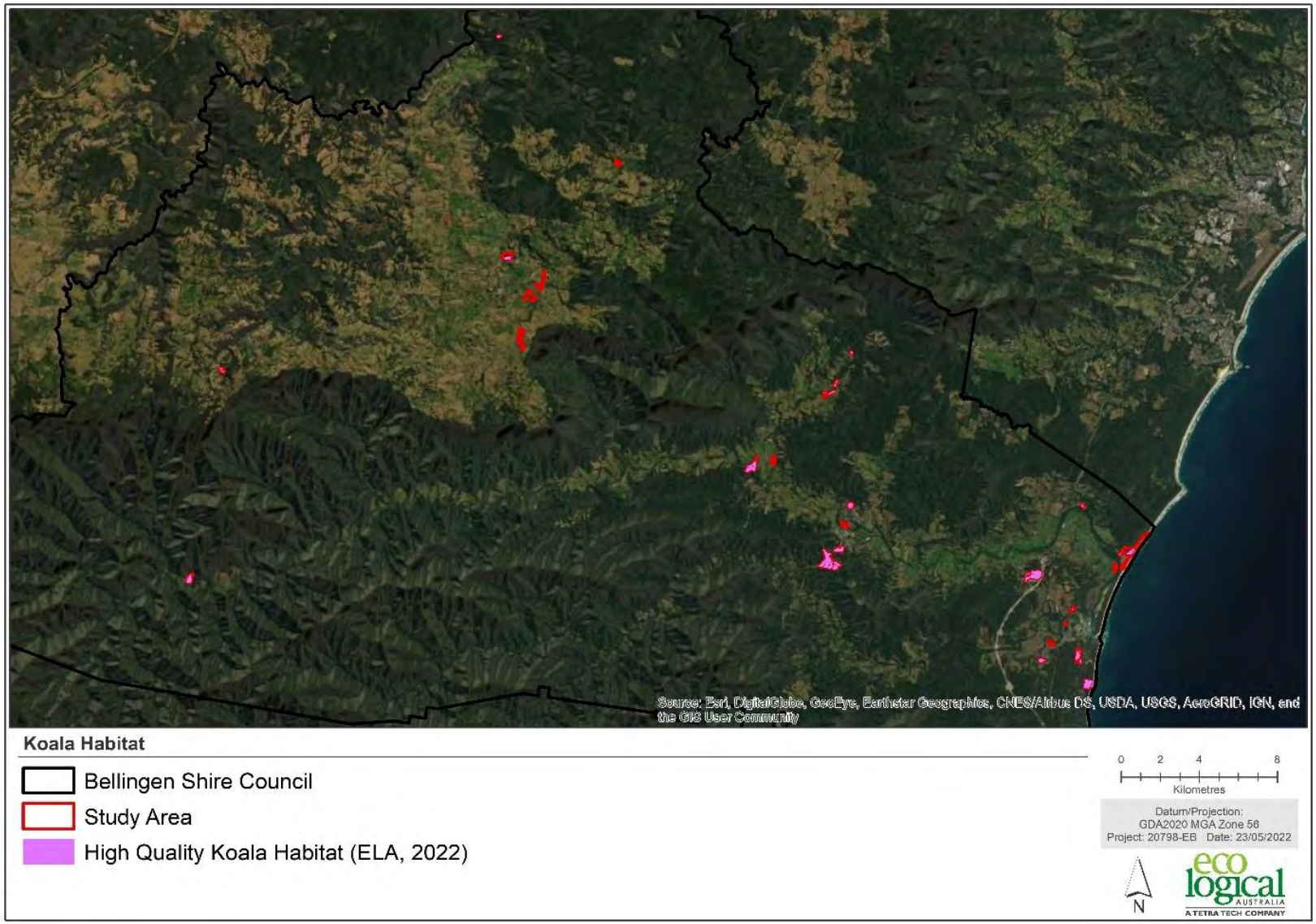

Figure 8 Koala Mapped Habitat

3.5.4. Bellinger River Snapping Turtle

The Bellinger River Snapping Turtle (*Myuchelys georgesi*) is restricted to the Bellinger River catchment. It has been recorded from the Bellinger River from Bellingen upstream to near Brinerville, and in the lower 600 m of the Rosewood River (NSW Scientific Committee 2016). It has not been recorded from the Never Never River, and its status in the Kalang is uncertain; recent surveys in the Kalang found no Bellinger River Snapping Turtles but did find several turtles which were genetically confirmed as hybrids between *M*. *georgesi* and *Emydura macquarii*, a species which appears to have been introduced into the Bellinger-Kalang system (NSW Scientific Committee 2016).

Bellinger River Snapping Turtles prefer moderate to deep pools (> 2 m) above a rocky substrate, moving readily between pools under normal river flow conditions (NSW Scientific Committee 2016). The species rarely, if ever, disperses over land but will bask on the riverbank and on fallen trees (NSW Scientific Committee 2016). Eggs are laid during late spring and early summer in excavations on riverbanks; the few nests that have been studied were in heavily vegetated areas within 10 m of the water's edge (NSW Scientific Committee 2016).

In mapping Bellinger River Snapping Turtle habitat, we considered BioNet Atlas records (DPI 2022) area within 10 m of the water's edge on the Bellinger River between Bellingen and Brinerville, or on the lower 600 m of the Rosewood River, or on the Kalang River upstream of the tidal limit (estimated to be near the mouth of Spicketts Creek) to be potential nesting habitat. The Roses Road and Bellingen Island sites both contain potential Bellinger River Snapping Turtle nesting habitat; whether the species actually does nest at these sites is unknown. A total of 0.73 ha of high-quality nesting habitat for this species was mapped within the Study Area (Figure 9).

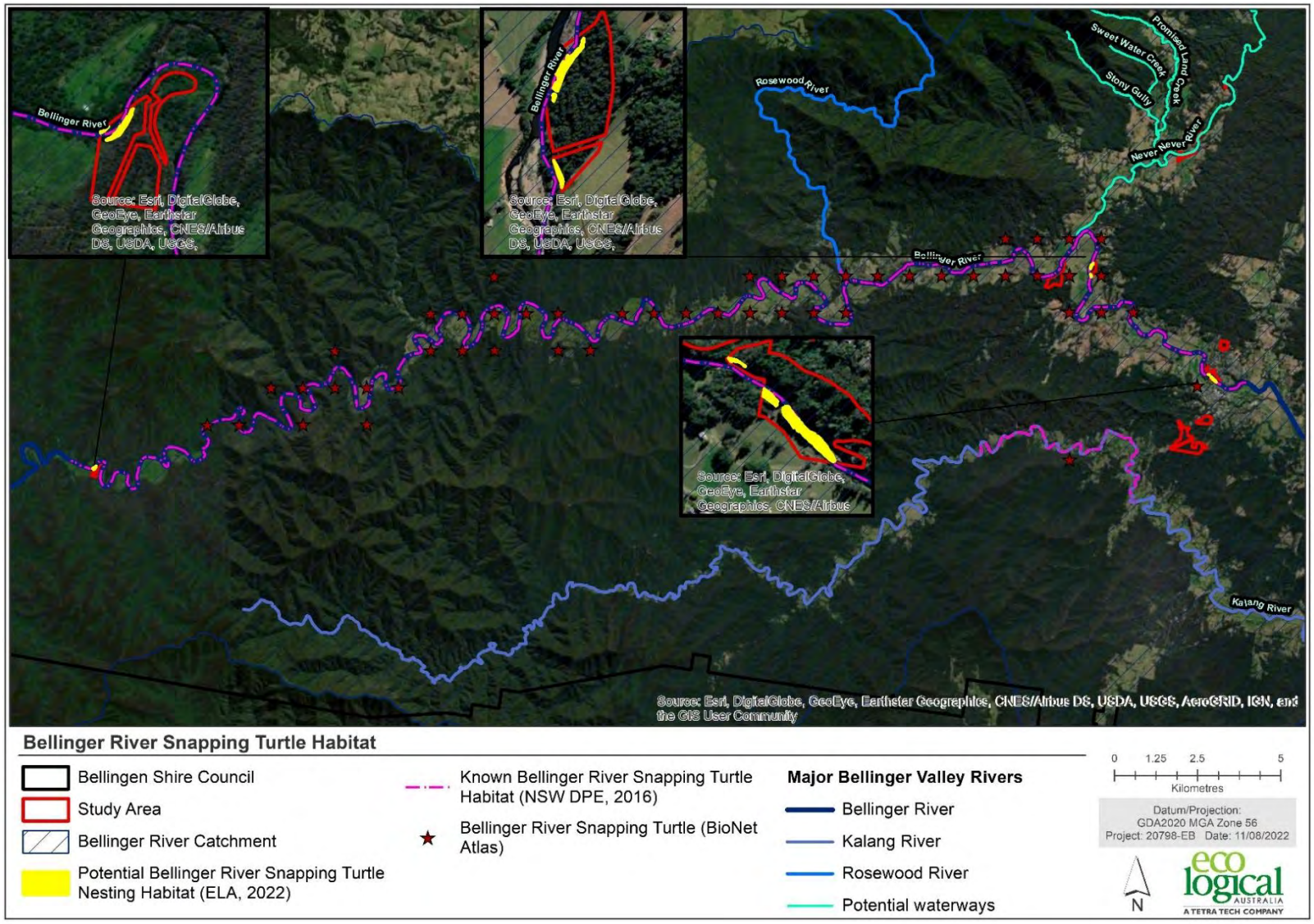

Figure 9 Bellinger River Snapping Turtle Mapped Habitat

3.6. Study Area Site Descriptions and PCT Allocation

The following site descriptions have been categorised into regional areas; Bellinger Valley, Dorrigo Plateau and Coastal (Mylestom, Raleigh and Urunga) for reader easy referencing. It should be noted the revised Eastern NSW PCTs used for the Study Area PCT allocations have not formally been released for public viewing during the production of this report.

3.6.1. Bellinger Valley

3.6.1.1. Darkwood Rd, Brinerville

- **Lot number:** Lot 7002 DP1056994, Lot 44 DP755555 and Lot 7003 DP1056994
- **Area:** 7.1 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site is located south-west of Brinerville on the Bellinger River, surrounded by the Bellinger River National Park with an elevation of approximately 170 – 200 m a.s.l. The site sits entirely within the Macleay Escarpment Foothills Mitchell Landscape within the escarpment ranges. It occurs on clay-rich sedimentary or meta-sedimentary substrates, on the lower slope, containing exposed and sheltered areas, with signs of recent fire activity. The site sits within a well-vegetated landscape with some areas of historic agricultural land use. The Bellinger River meanders around the site hugging all but the southern boundary. Two Keith Classes were mapped within this site including Eastern Riverine Forest and Northern Hinterland Wet Sclerophyll. Important foraging habitat for the GHFF and Koala was mapped within the site as well as potential nesting habitat for the Bellinger River Snapping Turtle (Table 7, Figure 10 and **Photo 1** - **Photo 2**).

Table 7 Darkwood Rd, Brinerville PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Forested Wetlands	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	N/A	Upper: *Casuarina cunninghamiana (River Oak)* Mid: *Ficus coronata* (Sandpaper Fig), *Claoxylon australe* (Brittlewood), *Acacia fimbriata* (Fringe Wattle), *Melia azedarach* (White cedar), *Parsonsia straminea* (Silkpod*)* Ground: *Lomandra hystrix*	Potential nesting habitat for the Bellinger River Snapping Turtle on the sandy beaches.	This PCT is fire affected. Could also be associated with PCT 4078 or 4079.
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3254	Northern Hinterland Tallowwood-Forest Oak Grassy Forest	N/A	Upper: *Eucalyptus microcorys* (Tallowwood), *Eucalyptus saligna* (Sydney Blue Gum), *Lophostemon confertus* (Brushbox) and *Corymbia intermedia* (Pink Bloodwood) Mid: *Allocasuarina torulosa* (Forest Oak), *Trochocarpa laurina* (Tree Heath), *Synoum glandulosum* (Scentless Rosewood), *Ozothamnus* spp. Ground: *Entolasia marginata* (Bordered Panic), *Lobelia purpurascens* (Whiteroot), *Lomandra longifolia* (Spiny-headed Mat rush), *Oplismenus aemulus* (Basket Grass) and *Pteridium esculentum* (Bracken Fern).	High-quality foraging habitat for GHFF and Koala.	This PCT is fire affected.

Figure 10 Darkwood Rd PCT Map

Photo 1: PCT 3020 (Darkwood Rd)

Photo 2*:* PCT 3254 (Darkwood Rd)

3.6.1.2. Bellingen Waste Management Transfer Station, Bowraville Rd

- **Lot number:** Lot 7007 DP1054045, Lot 7025 DP1053963 and Lot 10 DP1272083
- **Area:** 41 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site includes several ridges and gullies in the catchment of Bests Gulley, Kalang River; elevation ranges from approximately 35 m -130 m a.s.l. The site is part of the Ingalba Coastal Hills Mitchell landscape; soils in this landscape are metasedimentary in origin and consist of thin, stony gradational loams and sandy loams on the slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. Three Keith Class types were mapped within this site; Subtropical Rainforest and two types of Northern Wet Sclerophyll Forests. The vegetation at the site ranges from subtropical rainforest in the gullies to drier Blackbutt-dominated forest on the ridgetops; the rainforest qualifies as a Threatened Ecological Community under both the BC and EPBC Acts (*Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions/Lowland Rainforest of Subtropical Australia*) and contains many fleshy-fruited species that are food sources for the Grey-headed Flying-fox. Parts of the site have been heavily disturbed by activities associated with waste management, and most of the site has likely been historically selectively logged; however, some impressive old growth trees remain (e.g. a stand of large hollow-bearing Blackbutts south of the roundabout on Bowraville Road). The eucalypt forest at the site is potential Koala habitat, with Koala feed trees (e.g. Tallowwood, Flooded Gum, Blackbutt etc.) common throughout; the prevalence of important nectar-producing species such as Pink Bloodwood, Flooded Gum and Blackbutt also means that the eucalypt forest is high quality habitat for nectar-feeding species such as the Grey-headed Flying-fox. Several Scrub Turpentines (*Rhodamnia rubescens*) were observed at the site during fieldwork; this species, which was common a decade ago, has been decimated by the Myrtle Rust fungus and is now listed as Critically Endangered (Table 8, Figure 11 - Figure 14 and Photo 3 - Photo 6).

Table 8 Bellingen Waste Management Transfer Station (WMTS), Bowraville Rd PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Rainforests	Subtropical rainforests	3021	Northern Lowland Subtropical Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (EEC under NSW BC Act) & Lowland Rainforest of Subtropical Australia (CEEC under Commonwealth EPBC Act)	Upper: *Dendrocnide excelsa* (Giant Stinging Tree), *Lophostemon confertus* (Brush Box), *Diploglottis australis* (Native Tamarind), *Ficus watkinsiana* (Giant Strangler-fig)	Grey-headed Flying-fox	The rainforest at this site is mostly young and appears to be regenerating after historic disturbance (clearing/logging), but at least one large Strangler-fig is present.

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
					Mid: *Archontophoenix cunninghamiana* (Bangalow Palm), *Linospadix monostachya* (Walking-stick Palm), *Polyscias murrayi* (Pencil Cedar) Ground: *Alocasia brisbanensis* (Cunjevoi), ferns		
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3167	Northern Hinterland Blackbutt-Forest Oak Wet Forest	No	Upper: *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine), *Corymbia intermedia* (Pink Bloodwood) Mid: *Archirhodomyrtus beckleri* (Rose Myrtle), *Polyscias sambucifolia* (Elderberry Panax), *Trochocarpa laurina* (Tree Heath) Ground: *Pteridium esculentum* (Bracken), *Imperata cylindrica* (Blady Grass), Lobelia *purpurascens* (Whiteroot)	Koala, Grey-headed Flying-fox	Drier, grassier forest characteristic of the Scotchman Range
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3169	Northern Hinterland Tallowwood-Brush Box Wet Forest	No	Upper: *Eucalyptus microcorys* (Tallowwood), *E. saligna* (Sydney Blue Gum), *Lophostemon confertus* (Brush Box)	Koala, Grey-headed Flying-fox	There are some large hollow-bearing eucalypts in places in this community; these are potential nest sites for species such as forest owls (the sustained presence of juvenile Powerful Owls a few hundred metres away in Bellingen over the summer

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
					Mid: *Synoum glandulosum* (Scentless Rosewood), *Cryptocarya rigida* (Rose Maple), *Alphitonia excelsa* (Red Ash) Ground: *Blechnum cartilagineum* (Gristle Fern), *Oplismenus aemulus* (Basket Grass), *Calochlaena dubia* (False Bracken)		and Autumn of 2022 [records on eBird] suggests that the species may nest nearby)
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3248	Northern Blackbutt-Turpentine Shrubby Forest	No	Upper: *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine), *C. intermedia* (Pink Bloodwood) Mid: *Archirhodomyrtus beckleri* (Rose Myrtle), *Elaeocarpus reticulatus* (Blueberry Ash), *Acacia melanoxylon* (Black Wattle) Ground: *Pteridium esculentum* (Bracken), *Calochlaena dubia* (False Bracken)	Koala, Grey-headed Flying-fox	There are some huge hollow-bearing Blackbutts in this community near the roundabout; these are potential nest sites for species such as forest owls (the sustained presence of juvenile Powerful Owls a few hundred metres away in Bellingen between February and April 2022 [records on eBird] suggests that the species may nest nearby)

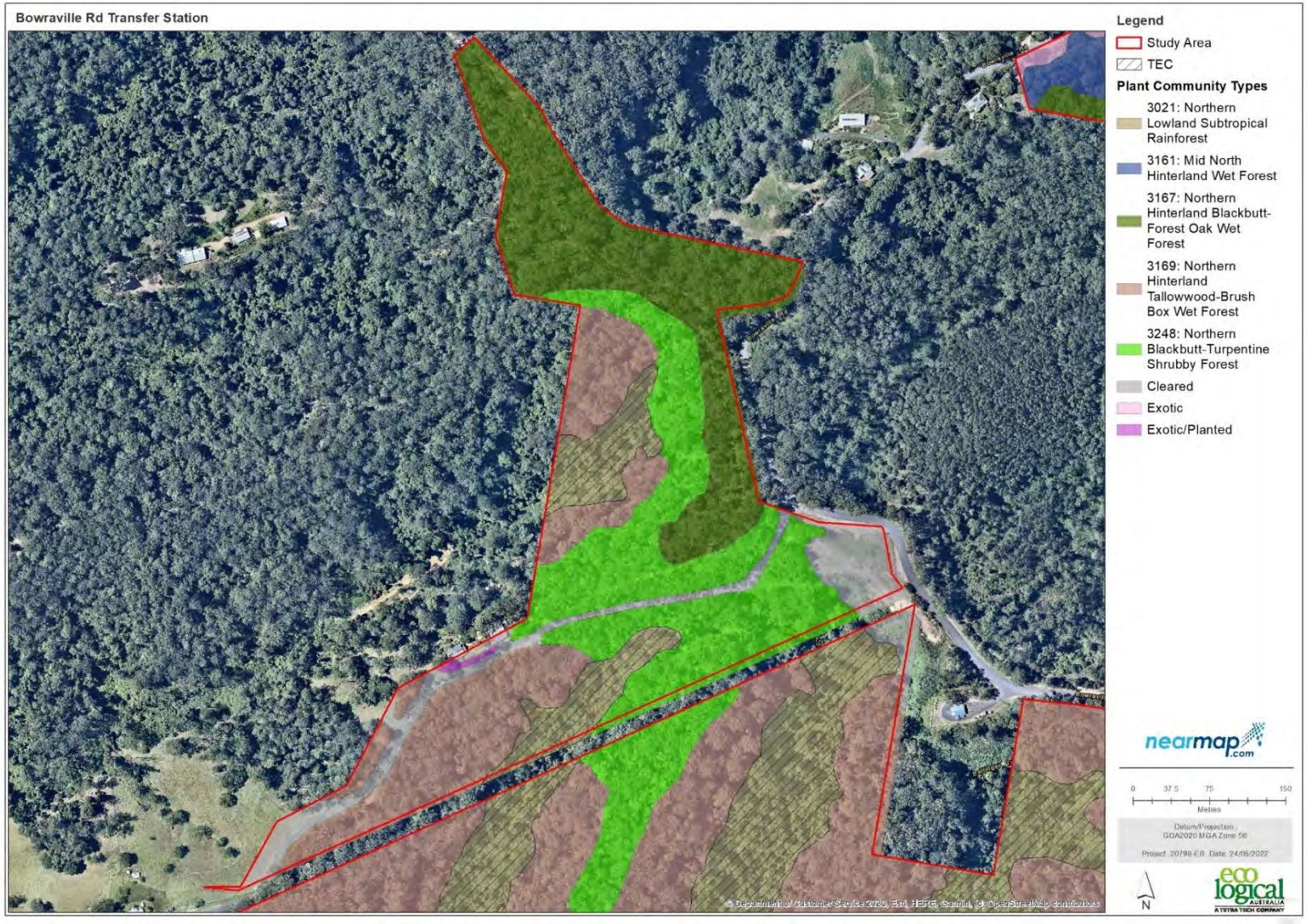

Figure 11 Bellingen WMTS, Bowraville Rd PCT Map (Part 1)

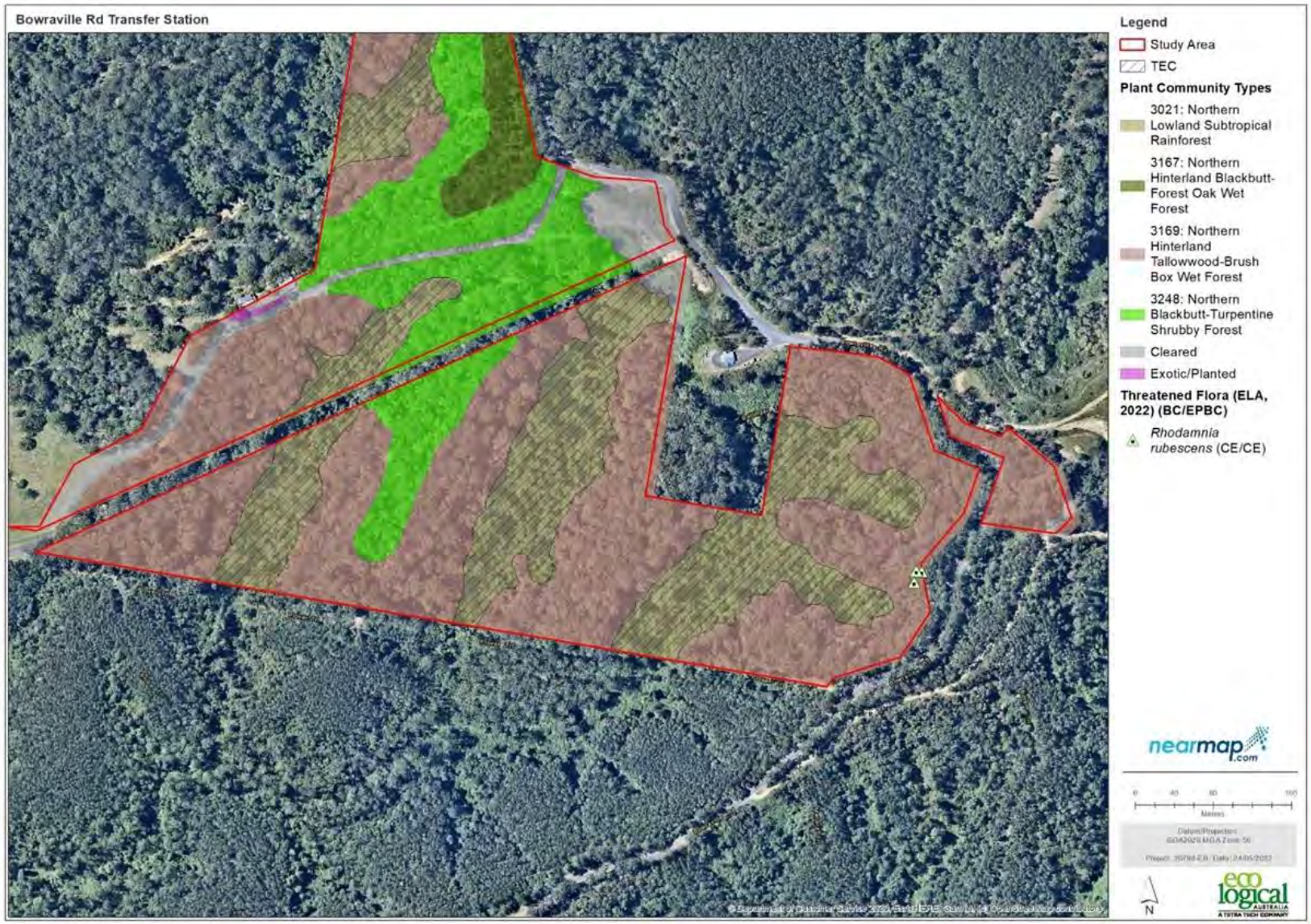

Figure 12 Bellingen WMTS, Bowraville Rd PCT Map (Part 2)

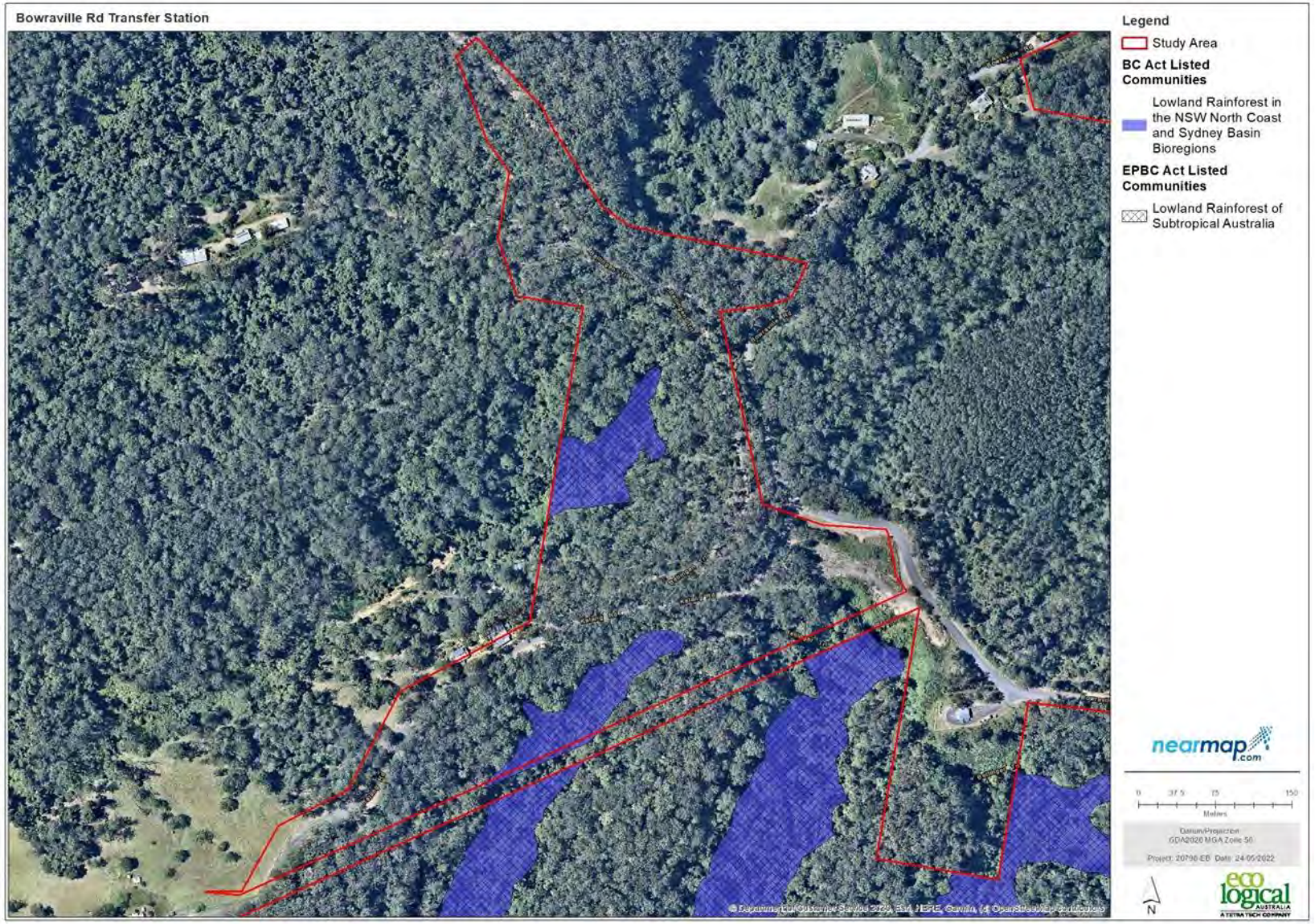

Figure 13 Bellingen WMTS, Bowraville Rd TEC Map (Part 1)

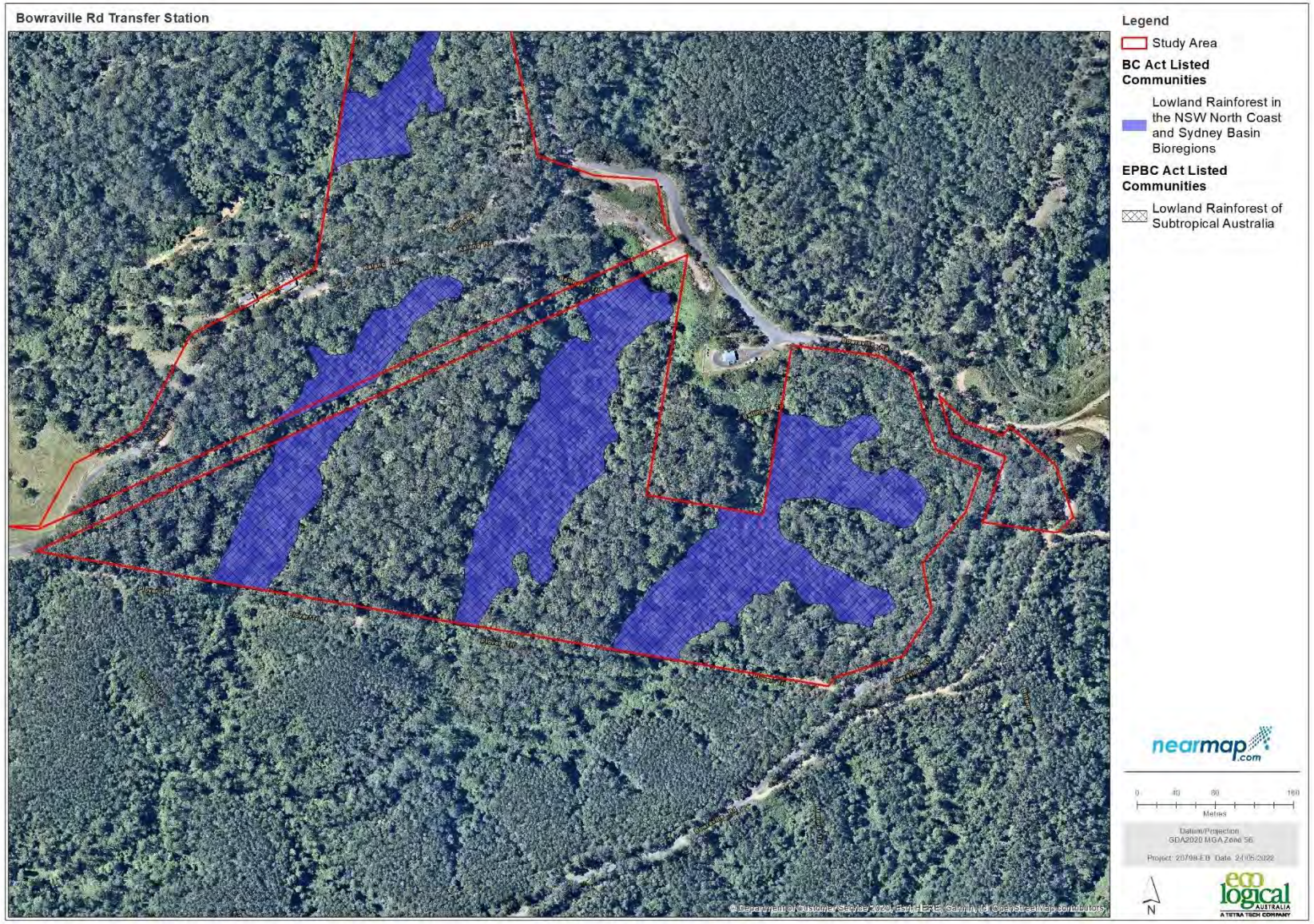

Figure 14 Bellingen WMTS, Bowraville Rd TEC Map (Part 2)

Photo 3*:* PCT 3021 (Bellingen WMTS)

Photo 4: PCT 3167 (Bellingen WMTS)

Photo 5: PCT 3169 (Bellingen WMTS)

Photo 6*:* PCT 3248 (Bellingen WMTS)

3.6.1.3. Waterfall Way (Wattle Hill)

- **Lot number:** Part Lot 161 DP755557
- **Area:** 12.7 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION:

This site includes several ridges and gullies just south of the Bellinger River near Gordonville Cutting; elevation ranges from approximately 15 m above sea level to approximately 80 m a.s.l. Apart from some small areas of floodplain by the river, the site is part of the Ingalba Coastal Hills Mitchell landscape; soils in this landscape are metasedimentary in origin and consist of thin, stony gradational loams and sandy loams on the slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. Four Keith Class vegetation types occur within the site; Subtropical Rainforest, Eastern Riverine Forests and two types of Northern Wet Sclerophyll Forest. The vegetation at the site ranges from rich subtropical rainforest in the gullies to drier eucalypt forest on the ridgetops; the rainforest qualifies as a Threatened Ecological Community under both the BC and EPBC Acts (*Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions/Lowland Rainforest of Subtropical Australia*) and contains many fleshy-fruited species that are food sources for the Grey-headed Flying-fox. The gullies at the site appear to have been at least partly cleared in the past, and most of the site has probably been selectively logged; however, much of the vegetation is in high condition. The eucalypt forest at the site is potential Koala habitat, with Koala feed trees (e.g. Tallowwood and Sydney Blue Gum) common throughout; the prevalence of important nectar-producing species such as Pink Bloodwood and Sydney Blue Gum means that the eucalypt forest is also high quality habitat for nectar-feeding species such as the Grey-headed Flying-fox. The vegetation on the floodplain within 10 m of the river provides potential nesting sites for the Bellinger River Snapping Turtle. Several Rusty Plums (*Niemeyera whitei*), including mature trees, were recorded in and near the rainforest gullies at the site during fieldwork; the Rusty Plum is listed as Vulnerable under the BC Act (Table 9, Figure 15 - Figure 17 **Error! Reference source not found.** and Photo 7 - Photo 10).

Table 9 Waterfall Way (Wattle Hill)

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Forested Wetlands	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	N/A	Upper: *Casuarina cunninghamiana* (River Oak), Mid: *Diploglottis australis* (Native Tamarind), *Melia azedarach* (White Cedar) Ground: *Paspalum mandiocanum** (Broad-leaved Paspalum), *Setaria palmifolia** (Palm grass)	Areas within 10 m of the river provide potential nesting sites for the Bellinger River Snapping Turtle.	The vegetation on the floodplain within 10 m of the river provides potential nesting sites for the Bellinger River Snapping Turtle
Rainforests	Subtropical Rainforests	3021	Northern Lowland Subtropical Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (EEC under NSW BC Act) & Lowland Rainforest of Subtropical Australia (CEEC under Commonwealth EPBC Act)	Upper: *Eucalyptus. saligna* (Sydney Blue Gum) (emergent), *Flindersia schottiana* (Cudgerie), *Diploglottis australis* (Native Tamarind), *Dendrocnide excelsa* (Giant Stinging-tree) Mid: *Archontophoenix cunninghamiana* (Bangalow Palm), *Linospadix monostachya* (Walking-stick Palm) Ground: *Gymnostachys anceps*, *Oplismenus aemulus* (Basket Grass)	Grey-headed Flying-fox	Most of the rainforest at the site is significantly disturbed (although recovering well), but there is at least one extremely diverse, high-quality remnant.
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3161	Mid North Hinterland Wet Forest	No	Upper: *Eucalyptus saligna*, *Corymbia intermedia* (Pink Bloodwood), *E. microcorys* (Tallowwood), *Syncarpia glomulifera* (Turpentine) Mid: *Allocasuarina torulosa* (Forest Oak), *Synoum glandulosum* (Scentless	Koala, Grey-headed Flying-fox	Much of this vegetation is in high condition.

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
					Rosewood), *Cryptocarya microneural* (Murrogun) Ground: *Calochlaena dubia* (False Bracken), *Oplismenus aemulus*, *Blechnum cartilagineum* (Gristle Fern)		
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3252	Northern Hinterland Grey Gum-Mahogany Grassy Forest	No	Upper: *Eucalyptus microcorys*, *E. propinqua* (Small-fruited Grey Gum), *Corymbia intermedia* Mid: *Allocasuarina torulosa*, *Guioa semiglauca* (Guioa) *Psychotria loniceroides* (Hairy Psychotria) Ground: *Calochlaena dubia Oplismenus aemulus, Blechnum cartilagineum*	Koala, Grey-headed Flying-fox	Two small patches of this community occur on drier ridge-tops

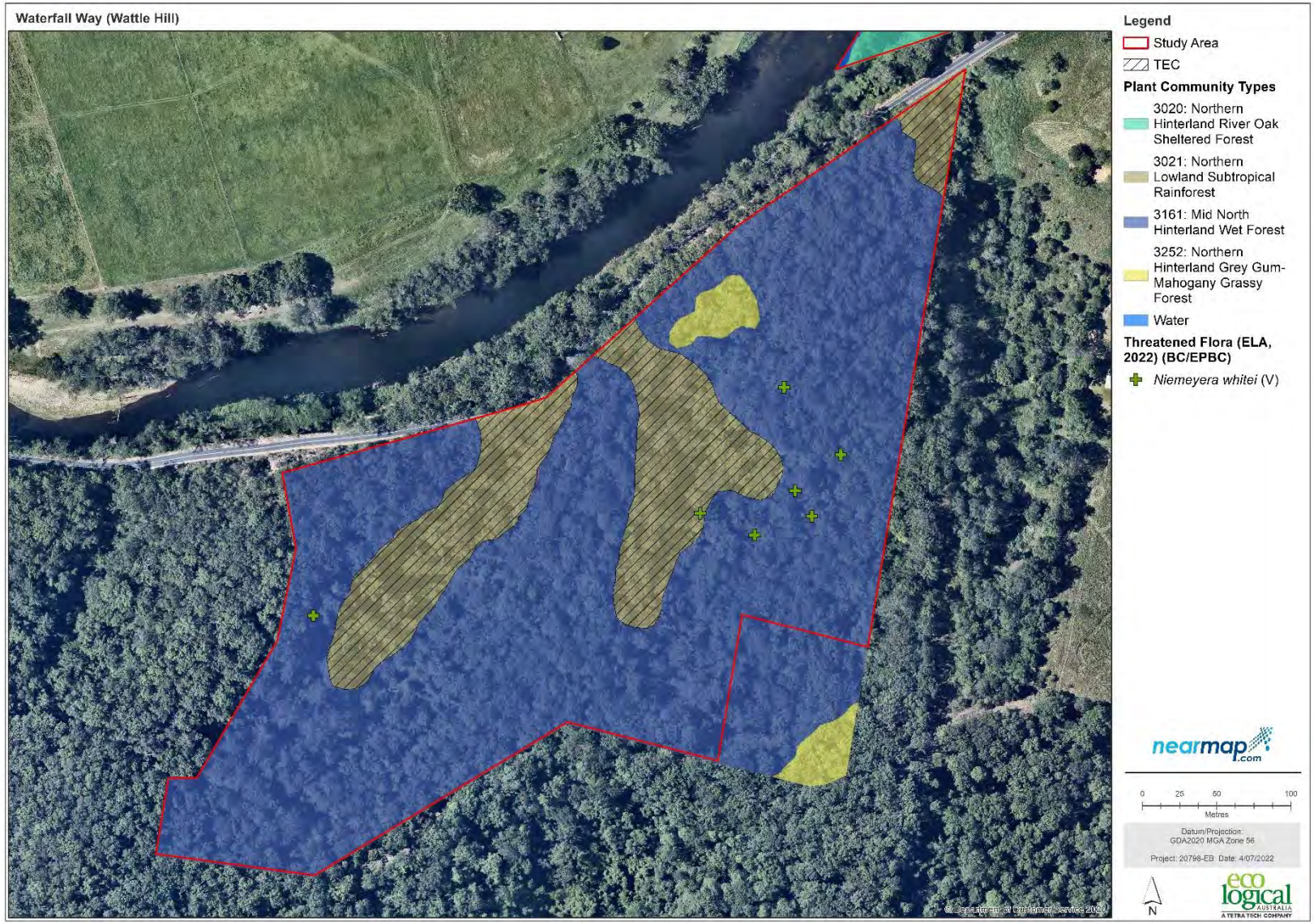

Figure 15 Water Fall Way (Wattle Hill) PCT Map (Part 1)

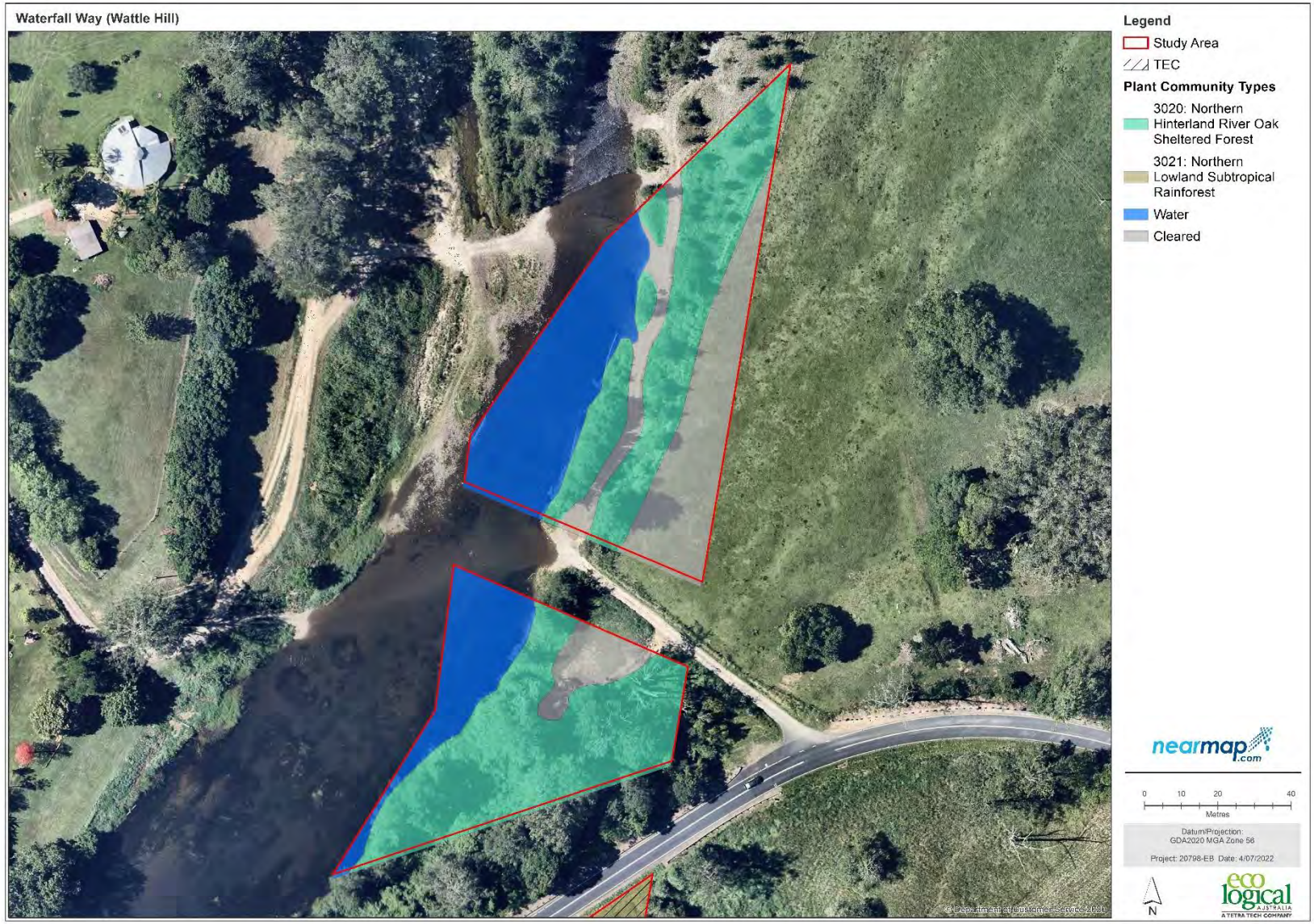

Figure 16 Waterfall Way (Wattle Hill) PCT Map (Part 2)

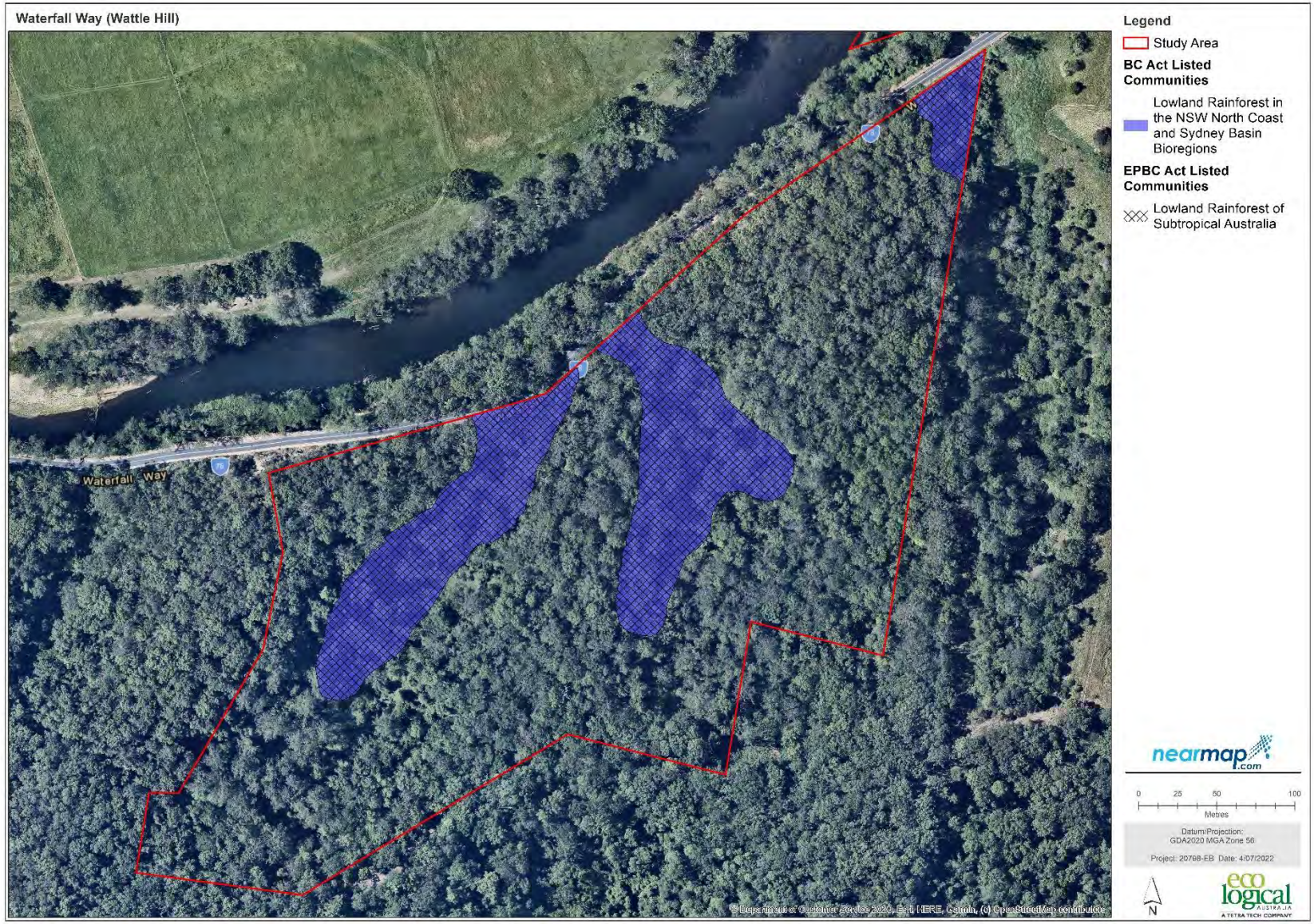

Figure 17 Waterfall Way (Wattle Hill) TEC Map (Part 1)

Photo 7 PCT 3020 (Wattle Hill)

Photo 8 PCT 3021 (Wattle Hill)

Photo 9 PCT 3161 (Wattle Hill)

Photo 10 PCT 3252 (Wattle Hill)

3.6.1.4. Bowraville Rd/Dudley St

- **Lot number/s:** Lot 328 DP755557, Lot 329 DP755557, Lot 285 DP755557 and Lot 286 DP755557
- **Area:** 7.6 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION:

This site occupies the slopes of a low ridge on the south-western outskirts of Bellingen; elevation ranges from about 13 m above sea level to about 27 m a.s.l. The site is part of the Ingalba Coastal Hills Mitchell landscape; soils in this landscape are metasedimentary in origin and consist of thin, stony gradational loams and sandy loams on slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. Both North Coast and Northern Hinterland Wet Sclerophyll Forest occur within the site. The site includes a patch of exotic forest as well as areas of wet sclerophyll forest, some in moderate to high condition, and contains Koala feed trees such as Tallowwood. The prevalence of important nectar-producing species such as Turpentine and Sydney Blue Gum also means that the forest is high quality habitat for nectar-feeding species such as the Grey-headed Flying-fox. One record of *Hicksbeachia pinnatifolia* (Red Boppel Nut) was found just outside of the site adjacent to Bowraville Rd, the individual was juvenile and located on the edge of the Wet Sclerophyll Forest community. During February and March 2022, juvenile Powerful owls were recorded feeding on Grey-headed Flying-foxes and roosting in dense exotic vegetation on or close to this site (Brian Hawkins, personal observation: records on eBird); presumably the owls nested nearby, perhaps in one of the large hollow-bearing trees near Bellingen Waste Transfer Station. Threatened Rose-crowned and Wompoo Fruit-doves have also been seen feeding on fruiting Camphor Laurels on or close to this site (Brian Hawkins, personal observation: records on eBird) (Table 10, Figure 18 and **Photo 11** - **Photo 13**).

Table 10 Bowraville Rd/Dudley St PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3161	Mid North Hinterland Wet Forest	No	Upper: *Eucalyptus microcorys* (Tallowwood), *E. grandis* (Flooded Gum), Sydney Blue Gum (*E. saligna*) Mid: *Synoum glandulosum* (Scentless Rosewood), *Archirhodomyrtus beckleri* (Rose Myrtle), *Guioa semiglauca* (Guioa)	Koala, Grey-headed Flying-fox	Threatened Powerful owls were recorded roosting in or near this patch February and March 2022 (see text above).

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
					Ground: *Blechnum cartilagineum* (Gristle Fern), *Calochlaena dubia* (False Bracken), *Lomandra longifolia* (Spiny-headed Mat-rush)		
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3162	Mid North Lowland Flooded Gum-Palm Wet Forest	No	Upper: *Eucalyptus grandis* (Flooded Gum), *Toona ciliata* (Red Cedar) Mid: *Cryptocarya glaucescens* (Jackwood), *Pittosporum undulatum* (Pittosporum) Ground: *Calochlaena dubia* (False Bracken), *Oplismenus aemulus* (Basket Grass)	Koala, Grey-headed Flying-fox	Threatened Powerful owls were recorded roosting in or near this patch February and March 2022 (see text above).
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3167	Northern Hinterland Blackbutt-Forest Oak Wet Forest	No	Upper: *Eucalyptus pilularis* (Blackbutt), *E. microcorys* (Tallowwood), *Syncarpia glomulifera* (Turpentine) Mid: *Cryptocarya glaucescens* (Jackwood), *Neolitsea dealbata* (White Bolly Gum) Ground: *Blechnum cartilagineum* (Gristle Fern), *Oplismenus aemulus* (Carpet Grass), *Lomandra longifolia* (Spiny-headed Mat-rush)	Koala, Grey-headed Flying-fox	Threatened Powerful owls were recorded roosting in or near this patch February and March 2022 (see text above).
NA	NA	NA	Exotic	No	*Pinus radiata* (Radiata Pine), *Cinnamomum camphora* (Camphor Laurel)		Although this community is dominated by exotic species, it has habitat value for Threatened fauna such as Powerful owls (which were recorded roosting in exotic vegetation in or near this patch in February and March 2022 [see text above] and Fruit-doves, for which the Camphor laurel is an important food.

Figure 18 Bowraville Rd/Dudley St PCT Map

Photo 11 PCT 3161 (Bowraville Rd/Dudley St)

Photo 12 PCT 3162 (Bowraville Rd/Dudley St)

Photo 13 PCT 3167 (Bowraville Rd/Dudley St)

3.6.1.5. Angel Gabriel Capararo Reserve

- **Lot number:** Lot 11 DP805052
- **Area:** 0.54 ha
- **Land Tenure:** Bellingen Shire Council (BSC) owned and managed

SITE DESCRIPTION

This site occupies the riparian zone of the Never Never River and adjacent lower slopes; elevation ranges from about 30 m above sea level to about 43 m a.s.l. The Never Never River runs from its headwaters on the Dorrigo plateau through Gleniffer and the Promised Land situated north west of Bellingen township. The portion of the Never Never River that runs along the northerly boundary of this site is a 5th order Strahler stream (Strahler 1957). The site is part of the Ingalba Coastal Hills Mitchell landscape; soils in this landscape are metasedimentary in origin and consist of thin, stony gradational loams and sandy loams on the slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. The site adjoins the Tuckers Nob State Forest (SF) to the north. This site is managed under the Gleniffer Reserves – Plan of Management (POM) (ELA 2018) and was followed by the Gleniffer Reserves - Vegetation Management Plan (VMP) (ELA 2019). The overall objectives of the POM and VMP were to establish native species cover and density along the riparian corridor through revegetation and natural regeneration including weed control works. Improve ecological health and integrity along the riparian corridor and maintain and enhance habitat values. Recent native revegetation of the area is evident. One Keith Class Type; Dry Rainforest occupies the site. The vegetation of the site is dominated by Waterhousea riparian rainforest in moderate condition; this community qualifies as a TEC under both the BC and EPBC Acts (*Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions/Lowland Rainforest of Subtropical Australia*). The presence of Koala food trees (Flooded Gum and Sydney Blue Gum) and important nectar-producing species (Sydney Blue Gum and Flooded Gum) makes the site high quality habitat for both Koala and Grey-headed Flying-fox. One threatened flora species *Hicksbeachia pinnatifolia* (Red Boppel Nut) listed as Vulnerable under both the BC and EPBC Acts was recorded just east of the lot boundary (Table 11, Figure 19 - Figure 20 and Photo 14 - Photo 15).

Table 11 Angel Gabriel Capararo Reserve PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Rainforests	Dry Rainforests	3089	Lower North Waterhousea Riparian Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (EEC under NSW BC Act) & Lowland Rainforest of Subtropical Australia (CEEC under Commonwealth EPBC Act)	Upper: *Waterhousea floribunda* (Weeping Lilly Pilly). Emergents of *Eucalyptus grandis* (Flooded Gum) and *E. saligna* (Sydney Blue Gum). Mid: *Tristaniopsis laurina* (Water Gum), *Ficus coronata* (Sandpaper Fig), *Callicoma serratifolia* (Blackwattle) and *Glochidion ferdinandi* (Cheese Tree) Ground: *Lomandra hystrix* (Mat-rush), *Oplismenus aemulus* (Basket Grass)	Koala, Grey-headed Flying-fox	One threatened flora species *Hicksbeachia pinnatifolia* was identified just outside of the eastern lot boundary. A cleared area occurs within the centre of this reserve containing exotic grass species *Paspalum mandiocanum* (Broad-leafed Paspalum). Small *Cinnamomum camphora* (Camphor Laurel) trees are common in this patch. Other species present but not dominant include; *Archontophoenix cunninghamiana* (Bangalow Palm), *Pittosporum undulatum* (Sweet Daphne), *Elaeocarpus obovatus* (Hard Quandong) and *Eucalyptus microcorys* (Tallowwood).

Figure 19 Angel Gabriel Capararo Reserve PCT Map

Figure 20 Angel Gabriel Capararo Reserve TEC Map

Photo 14 PCT 3089 (Angel Gabriel Caparao Reserve)

Photo 15 PCT 3089 (Angel Gabriel Caparao Reserve)

3.6.1.6. Arthur Keough Reserve

- **Lot number:** Lot 52 DP589109
- **Area:** 0.44 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site is in the riparian zone of the Never Never River; elevation ranges from about 28 m above sea level to about 30 m a.s.l. The Never Never River runs from its headwaters on the Dorrigo plateau through Gleniffer and the Promised Land situated northwest of Bellingen township. The Never Never River links this reserve with Earl Preston Reserve. The portion of the Never Never River that runs along the southerly boundary of this reserve area is a 5th order Strahler stream (Strahler 1957). This site is managed under the Gleniffer Reserves POM (ELA 2018) and was followed by the Gleniffer VMP (ELA 2019). The overall objectives of the POM and VMP were to establish native species cover and density along the riparian corridor through revegetation and natural regeneration including weed control works. Improve ecological health and integrity along the riparian corridor and maintain and enhance habitat values. Recent native revegetation of the area is evident. Two Keith Class vegetation types occur within the site; Eastern Riverine Forest and Dry Rainforest. The vegetation of the site is dominated by Northern Hinterland River Oak Sheltered Forest, and Lower North Waterhousea Riparian Rainforest in low to moderate condition which qualifies as a TEC under the BC and EPBC Acts (*Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions/ Lowland Rainforest of Subtropical Australia*). The presence of Koala food trees (Flooded Gum and Sydney Blue Gum) and important nectar-producing species (Sydney Blue Gum and Flooded Gum) makes the site high quality habitat for both Koala and Grey-headed Flying-fox (Table 12, Figure 21 - Figure 22 and Photo 16 - Photo 17).

Table 12 Artur Keough Reserve PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Forested Wetlands	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	N/A	Upper: *Casuarina cunninghamiana* (River Oak), Mid: *Waterhousea floribunda* (Weeping Lilly Pilly), *Cryptocarya spp., Guioa semiglauca* (Guioa), *Ficus coronata* (Sandpaper Fig), Ground: *Lomandra hystrix* (Mat-rush), *Oplismenus aemulus* (Basket Grass)	No	Other species present but not dominant include *Alphitonia excelsa* (Red Ash), *Tristaniopsis laurina* (Water Gum), *Grevillea robusta* (Silky Oak) and *Archontophoenix cunninghamiana* (Bangalow Palm)
Rainforests	Dry Rainforests	3089	Lower North Waterhousea Riparian Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (EEC under NSW BC Act) & Lowland Rainforest of Subtropical Australia (CEEC under Commonwealth EPBC Act)	Upper: *Waterhousea floribunda* (Weeping Lilly Pilly), *Tristaniopsis laurina* (Water Gum), *Ficus coronata* (Sandpaper Fig), Ground: *Lomandra hystrix* (Mat-rush), *Oplismenus aemulus* (Basket Grass)	Koala, Grey-headed Flying-fox	Juvenile and mature *Cinnamomum camphora* (Camphor Laurel) trees are common in this patch
			Exotic/Planted				This patch contains some large *Melia azedarach* (White Cedar) trees, which are an important food source for the threatened Wompoo Fruit-dove in Autumn

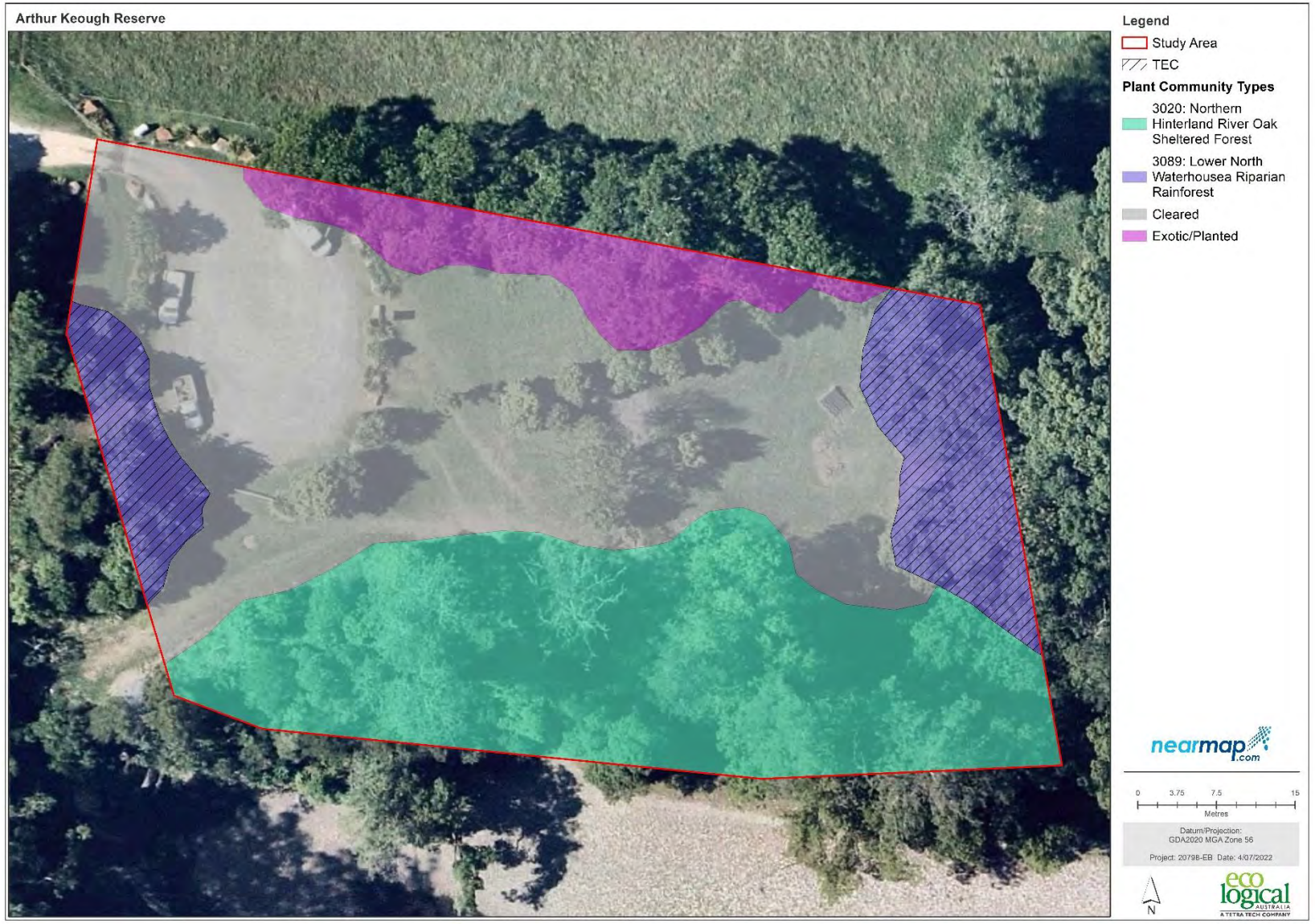

Figure 21 Arthur Keough Reserve PCT Map

Figure 22 Arthur Keough Reserve TEC Map

Photo 16 PCT 3020 (Arthur Keough)

Photo 17 PCT 3089 (Arthur Keough)

3.6.1.7. Broken Bridge Reserve

- **Lot number:** Lot 53 DP589109
- **Area:** 0.57 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site is in the riparian zone of the Never Never River; elevation is about 30 m above sea level. The Never Never River runs from its headwaters on the Dorrigo plateau through Gleniffer and the Promised Land situated northwest of Bellingen township. The main portion of the Never Never River that runs through this reserve area is a 5th order Strahler stream (Strahler 1957), with 1st and 2nd order tributaries branching off the river. This site is managed under the Gleniffer Reserves POM (ELA 2018) and was followed by the Gleniffer VMP (ELA 2019). The overall objectives of the POM and VMP were to establish native species cover and density along the riparian corridor through revegetation and natural regeneration including weed control works. Improve ecological health and integrity along the riparian corridor and maintain and enhance habitat values. Recent native revegetation of the area is evident. Two Keith Class vegetation types occur within the site; Eastern Riverine Forest and Dry Rainforest. The vegetation is dominated by River Oak riparian forest, and Waterhousea riparian rainforest in low to moderate condition which qualifies as a TEC under the BC and EPBC Acts (*Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions/ Lowland Rainforest of Subtropical Australia*). The presence of Koala food trees (Flooded Gum and Sydney Blue Gum) and important nectar-producing species (Sydney Blue Gum and Flooded Gum) makes the site high quality habitat for both Koala and Grey-headed Flying-fox. One planted *Macadamia tetraphylla* listed as Vulnerable under the BC and EPBC Acts was observed just south west of the site (Table 13, Figure 23 - Figure 24 and Photo 18 - Photo 19).

Table 13 Broken Bridge Reserve PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Forested Wetlands	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	N/A	Upper: *Casuarina cunninghamiana* (River Oak), *Waterhousea floribunda* (Weeping Lilly Pilly), Mid: *Tristaniopsis laurina* (Water Gum), *Ficus coronata* (Sandpaper Fig), *Glochidion ferdinandi* (Cheese Tree) Ground: *Lomandra hystrix* (Mat-rush), *Oplismenus aemulus* (Basket Grass), *Alocasia brisbanensis* (Cunjevoi)	No	Small *Cinnamomum camphora* (Camphor Laurel) trees are common in this patch. Other species present but not dominant include: *Diploglottis cunninghamii* Native Tamarind, *Guioa semiglauca* (Guioa) and vines such as *Cissus antarctica* Water Vine and *Parsonsia straminea* (Common Silkpod). Many epiphytes are found in the trees such as *Platycerium superbum* (Staghorn) and *Pyrrosia confluens* (Horseshoe Felt Fern).
Rainforests	Dry Rainforests	3089	Lower North Waterhousea Riparian Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (EEC under NSW BC Act) & Lowland Rainforest of Subtropical Australia (CEEC under Commonwealth EPBC Act)	Upper: *Casuarina cunninghamiana* (River Oak) (infrequent/emergent), *Eucalyptus grandis* (Flooded Gum) (infrequent/emergent) Mid: *Waterhousea floribunda* (Weeping Lilly Pilly), *Callicoma serratifolia* (Black Wattle), *Guioa semiglauca, Tristaniopsis laurina* (Water Gum), *Ficus coronata* (Sandpaper Fig), Ground: *Lomandra hystrix* (Mat-rush), *Oplismenus aemulus* (Basket Grass)	Koala, Grey-headed Flying-fox	One threatened flora species *Macadamia tetraphylla* was observed just south west of the site, however likely planted. Small *Cinnamomum camphora* (Camphor Laurel) trees are common in this patch. Other species present but not dominant include *Dysoxylum mollissimum* subsp. moll (Red Bean), *Pittosporum undulatum* (Sweet Daphne), *Archontophoenix cunninghamiana* (Bangalow Palm), *Alphitonia excelsa* (Red Ash), *Syzygium australe* (Bush Cherry), *Elaeocarpus obovatus* (Hard Quandong) and *Cryptocarya glaucescens*. Groundcover species *Viola hederacea* (Ivy-leaved Violet), *Lobelia trigonocaulis* (Forest Lobelia) and *Dichondra repens* (Kidney Weed)

Figure 23 Broken Bridge Reserve PCT Map

Figure 24 Broken Bridge Reserve TEC Map

Photo 18 PCT 3020 (Broken Bridge Reserve)

Photo 19 PCT 3089 (Broken Bridge Reserve)

3.6.1.8. Earl Preston Reserve

- **Lot Number:** Lot 1 DP311752
- **Area:** 3.53 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site occupies the riparian zone of the Never Never River and adjacent lower slopes; elevation ranges from about 28 m above sea level to about 30 m a.s.l. The Never Never River runs from its headwaters on the Dorrigo plateau through Gleniffer and the Promised Land situated northwest of Bellingen township. The Never Never River links this reserve with Arthur Keough Reserve. The portion of the Never Never River that runs through this reserve area is a 5th order Strahler stream (Strahler 1957). Recent native revegetation of the area is evident. The site is part of the Ingalba Coastal Hills Mitchell landscape; soils in this landscape are metasedimentary in origin and consist of thin, stony gradational loams and sandy loams on the slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. This site is managed under the Gleniffer Reserves POM (ELA 2018) and was followed by the Gleniffer VMP (ELA 2019). The overall objectives of the POM and VMP were to establish native species cover and density along the riparian corridor through revegetation and natural regeneration including weed control works. Improve ecological health and integrity along the riparian corridor and maintain and enhance habitat values. Recent native revegetation of the area is evident. Two Keith Class vegetation types occur within the site; Eastern Riverine Forest and Dry Rainforest. The vegetation of the site is dominated by River Oak riparian forest, and Waterhousea riparian rainforest in low to moderate condition and qualifies as a TEC under the BC and EPBC Acts (*Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions/ Lowland Rainforest of Subtropical Australia*). The presence of Koala food trees (Flooded Gum and Sydney Blue Gum) and important nectar-producing species (Sydney Blue Gum and Flooded Gum) makes the site high quality habitat for both Koala and Grey-headed Flying-fox (Table 14. Figure 25 - Figure 26 and Photo 20 - Photo 21).

Table 14 Earl Preston Reserve PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Forested Wetlands	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	N/A	Upper: *Casuarina cunninghamiana* (River Oak), Mid: *Waterhousea floribunda* (Weeping Lilly Pilly), *Euroschinus falcata* (Ribbonwood), *Ficus coronata* (Sandpaper Fig), Ground: *Lomandra* spp. (Mat-rush)	No	Other species present include *Guioa semiglauca* (Guioa), *Acacia maidenii* (Maiden's Wattle), *Archontophoenix cunninghamiana* (Bangalow Palm) and *Parsonsia straminea* (Common Silkpod).
Rainforests	Dry Rainforests	3089	Lower North Waterhousea Riparian Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (EEC under NSW BC Act) & Lowland Rainforest of Subtropical Australia (CEEC under Commonwealth EPBC Act)	Upper: *Casuarina cunninghamiana* (River Oak) (infrequent), *Eucalyptus grandis* (Flooded Gum) Mid: *Waterhousea floribunda* (Weeping Lilly Pilly), *Ficus coronata* (Sandpaper Fig), *Backhousia* spp., and *Melia azedarach* (White Cedar) Ground: *Lomandra hystrix* (Mat-rush)	Koala, Grey-headed Flying-fox	

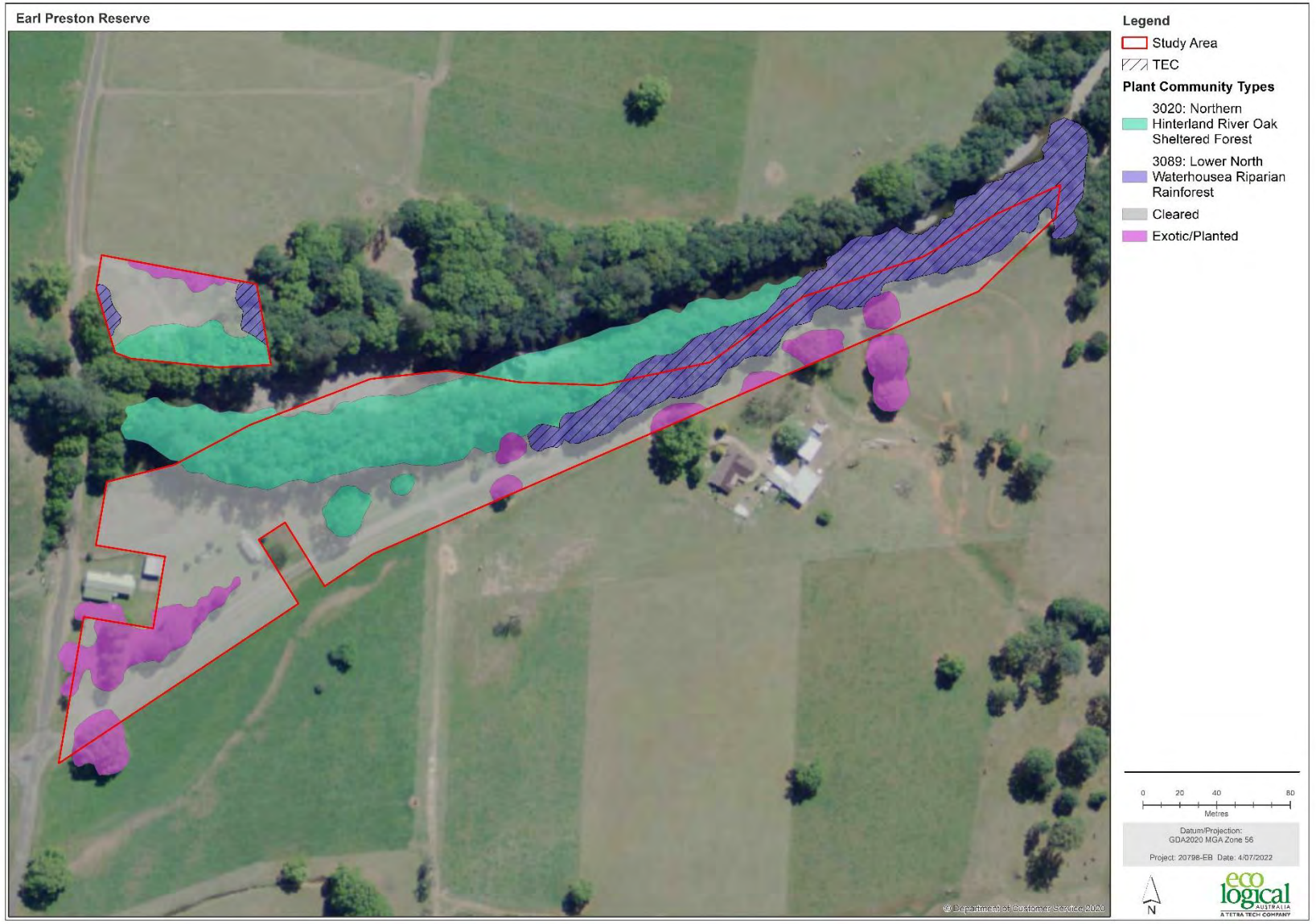

Figure 25 Earl Preston Reserve PCT Map

Figure 26 Earl Preston Reserve TEC Map

Photo 20 PCT 3020 (Earl Preston)

Photo 21 PCT 3089 (Earl Preston)

3.6.1.9. Bellinger River (Roses Road)

- **Lot Number:** Lot 11 DP 583356
- **Area:** 6.1 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site is on the floodplain of the Bellinger River about 4.5 km NW of Bellingen; elevation is about 9 m above sea level. The site is part of the Bellinger Channels and Floodplains Mitchell landscape; floodplain soils in this landscape are dark organic loams and silty clays. The vegetation was highly disturbed with high weed infestations from Balloon Vine and Madeira vine. One Keith Class vegetation type; Eastern Riverine Forests occurs within the site. The vegetation of the site is dominated by riparian River Oak Forest and is not commensurate with a TEC. Vegetation on the floodplain within 10 m of the river provides potential nesting sites for the Bellinger River Snapping Turtle (Table 15, Figure 27 and Photo 22 - Photo 23).

Table 15 Bellinger River Roses Rd)

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Forested Wetlands	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	N/A	Upper: River Oak (*Casuarina cunninghamiana*), *Waterhousea floribunda* (Weeping Lilly Pilly) Mid: *Ficus coronata* (Sandpaper Fig), *Melia azedarach* (White Cedar), *Dicksonia antarctica* (Tree fern) Ground: *Lomandra* spp. (Mat-rush)	Areas within 10 m of the river provide potential nesting sites for the Bellinger River Snapping Turtle.	This patch is heavily infested with weeds such as *Cardiospermum grandiflorum* (Balloon Vine) and *Anredera cordifolia* (Madeira Vine)

Figure 27 Bellinger River (Roses Rd) PCT Map

Photo 22 PCT 3020 (Roses Rd)

Photo 23 PCT 3020 (Roses Rd)

3.6.1.10. Integrated Reserves of Bellingen Island

- **Lot Number**. Various
- **Area**: 9 ha
- **Land Tenure:** Lot 7 DP877059 "The Point": BSC own and managed. Remaining Lots: Crown Land, managed by BSC.

SITE DESCRIPTION

This site is in the riparian zone of the Bellinger River; elevation ranges from about 2 m above sea level to about 8 m a.s.l. The site is part of the Bellinger Channels and Floodplains Mitchell landscape; soils are dark organic loams and silty clays. The Reserve primarily consists of Holocene Alluvium developed predominantly from fluvial erosion and deposition processes (Telfer and Cohen 2010) and overlays an older meta-sediment substrate. The island is a large point-bar like formation lying between two channels of the Bellinger River at the approximate limit of the Bellinger's upper tidal influence.

Bellingen Island itself consists of a recent alluvial deposit less than 2000 years old. Two Keith Class vegetation types occur within the site; Subtropical Rainforest and Eastern Riverine Forest. The vegetation of the site is dominated by lowland subtropical rainforest, and qualifies as a TEC under the BC and EPBC Acts (*Lowland Rainforest on Floodplain in the NSW North Coast and Sydney Basin Bioregions/ Lowland Rainforest of Subtropical Australia*).

A Plan of Management – Bellingen Island Integrated Reserve (ELA 2012) was developed in order to manage the significant biodiversity values within the site, this was soon followed by the Vegetation Management Plan (Coffs Harbour Bushland Regeneration Group Pty Ltd 2010). The main objectives under the VMP included all works opposed are in accordance with the Flying Fox Camp Management Policy (DECCW 2007), expand existing rainforest vegetation through revegetation, reduce weed incursion and establish vegetation that provide for roosting Flying Foix colonies. Parts of the site have been the focus of bush regeneration for many years and are in high condition. The rainforest on Bellingen Island is an important maternity camp for the Grey-headed Flying-fox, and vegetated areas within 10 m of the river provide potential nesting sites for the Bellinger River Snapping Turtle. The Rusty Plum (*Niemeyera whitei*), which is listed as Vulnerable under the BC Act, was recorded on the island during fieldwork. During Winter 2021 the BC Act listed Sooty Owl (Tyto tenebricosa) was observed roosting here in large Ficus spp (Tom Schmidt, personal observation: records on eBird) (Table 16, Figure 28 - Figure 29 and Photo 24 - Photo 25).

Table 16 Bellingen Island PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Rainforests	Subtropical Rainforests	3017	Mid North Lowland Floodplain Rainforest	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (EEC under NSW BC Act) & Lowland Rainforest of Subtropical Australia (CEEC under Commonwealth EPBC Act)	Upper: *Dendrocnide excelsa* (Giant Stinging Tree), *Ficus macrophylla* (Moreton Bay Fig), *Heritiera trifoliolata* (White Booyong), *Cryptocarya obovata* (Pepperberry). Mid: *Ficus coronata* (Sandpaper Fig), *Guioa semiglauca* (Guioa), *Neolitsea dealbata* (White Bolly Gum), *Archontophoenix cunninghamiana* (Bangalow Palm), Ground: *Alocasia brisbanensis* (Cunjevoi), *Adiantum formosum* (Giant Maidenhair)	Grey-headed Flying-fox; areas within 10 m of the river provide potential nesting sites for the Bellinger River Snapping Turtle.	Bellinger Island is key habitat for several additional threatened species, including Fruit-doves, Sooty Owl, the Pink Underwing Moth, and the Rusty Plum (which was recorded on site during fieldwork for this project). NB: the Sooty Owl was observed roosting here (see text above). Other species present but not dominant incudes; *Dysoxylum mollissimum* subsp. *molle* (Red Bean), *Syzygium australe* (Bush Cherry), *Endiandra pubens* (Hairy Walnut) and ground fern species *Christella dentata* (Binung).
Forested Wetlands	Eastern Riverine Forests	3020	Northern Hinterland River Oak Sheltered Forest	N/A	Upper: River Oak (Casuarina cunninghamiana), *Toona ciliata* (Red Cedar) Mid: *Waterhousea floribunda* (Weeping Lilly Pilly), *Ficus coronata* (Sandpaper Fig), *Archontophoenix cunninghamiana* (Bangalow Palm) Ground: *Lomandra hystrix* (Mat-rush)	Areas within 10 m of the river provide potential nesting sites for the Bellinger River Snapping Turtle	

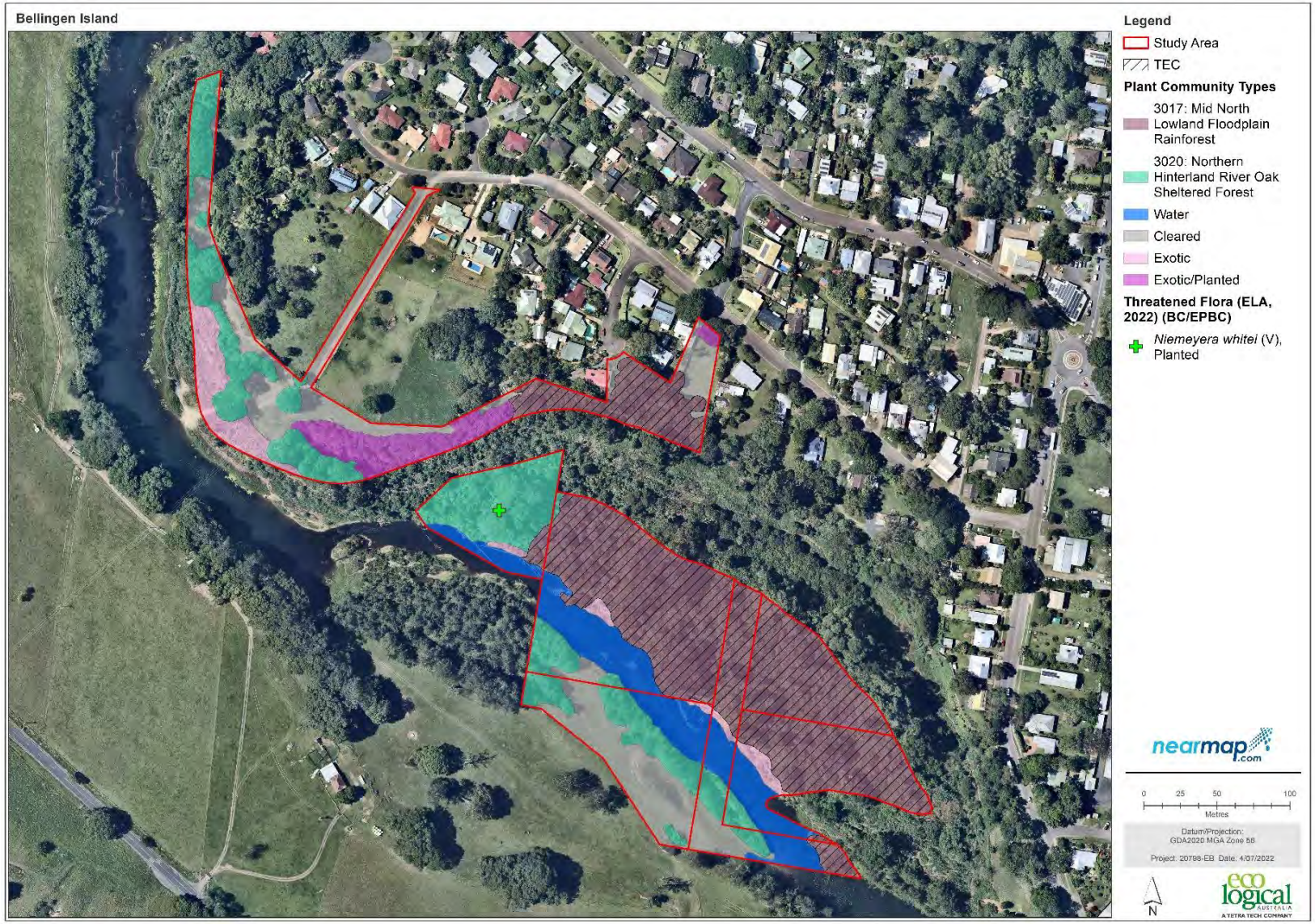

Figure 28 Bellingen Island PCT Map

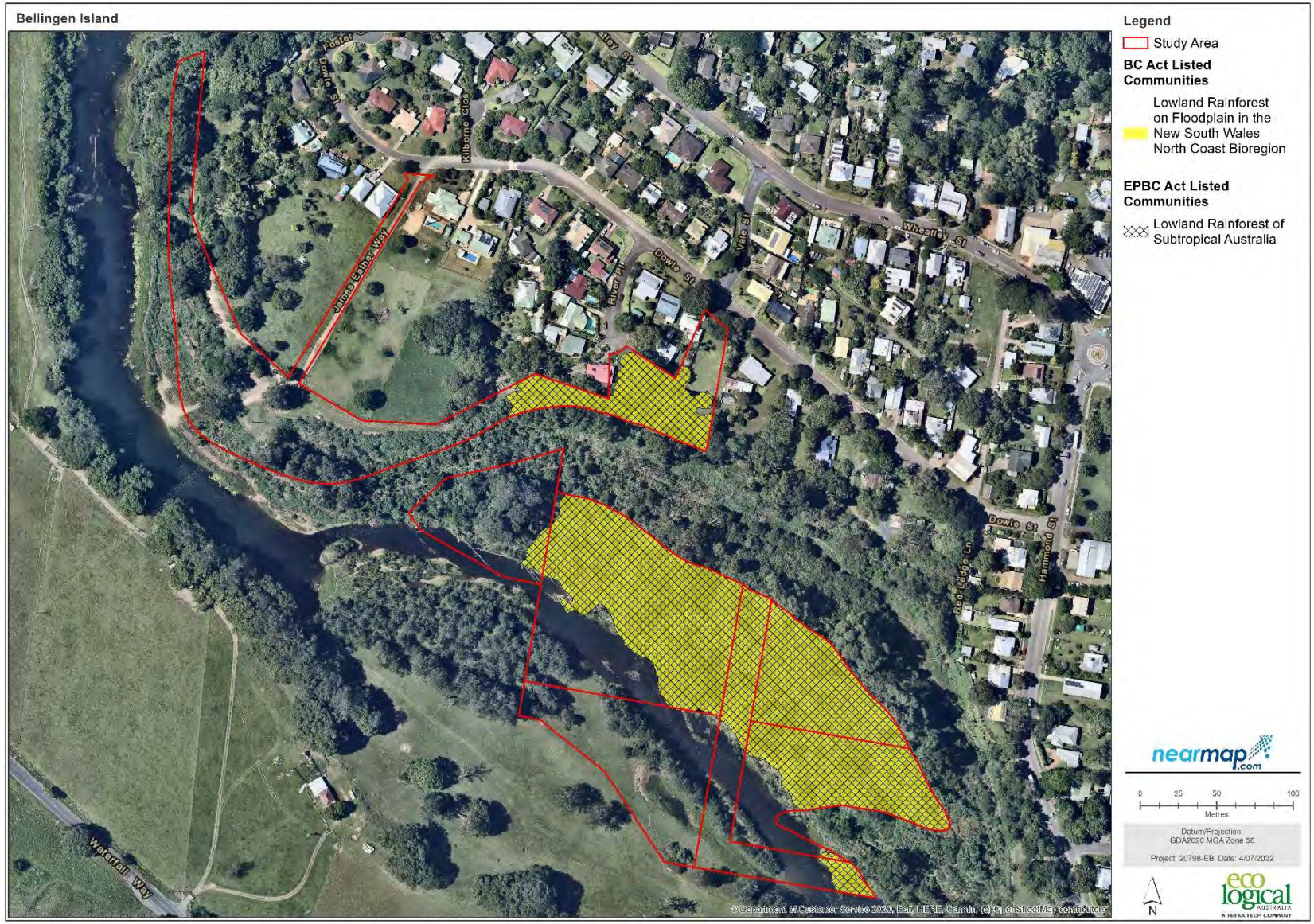

Figure 29 Bellingen Island TEC Map

Photo 24 PCT 3017 (Bellingen Island)

Photo 25 PCT 3020 (Bellingen Island)

3.6.1.11. Ringwood Place, Bellingen

- **Lot Number/s** Lot 216 DP755553 and Lot 38 DP252940
- **Area:** 3.8 ha
- **Land Tenure:** Lot 216: Crown Land managed by Council. Lot 38: BSC owned and managed

SITE DESCRIPTION

This site occupies the lower slopes of a ridge adjacent to Bellingen Cemetery; elevation ranges from about 15 m above sea level to about 46 m a.s.l. The site is part of the Ingalba Hills Mitchell landscape; soils in this landscape are metasedimentary in origin and consist of thin, stony gradational loams and sandy loams on slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. The vegetation at the site is North Coast Wet Sclerophyll Forest in mostly moderate condition, and constitutes high quality habitat for the Grey-headed Flying-fox and Koala (Table 17, Figure 30 and Photo 26 -Photo 27).

Table 17 Ringwood Place, Bellingen

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3160	Lower North Turpentine-Tallowwood-Grey Gum Forest	No	Upper: *Eucalyptus propinqua* (Small-fruited Grey Gum), *E. microcorys* (Tallowwood) Mid: *Wilkiea huegeliana* (Veiny Wilkiea), *Pittosporum multiflorum* (Orange Thorn), *Tabernaemontana pandacaqui* (Banana Bush) Ground: *Blechnum cartilagineum* (Gristle Fern), *Calochlaena dubia* (False Bracken), *Oplismenus aemulus* (Basket Grass)	Grey-headed Flying-fox, Koala	
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3165	Northern Brush Box Subtropical Wet Forest	No	Upper: *Eucalyptus microcorys* (Tallowwood), *Lophostemon confertus* (Brush Box) Mid: *Cryptocarya rigida* (Forest Maple), *Trochocarpa laurina* (Tree Heath), *Allocasuarina torulosa* (Forest Oak) Ground: *Blechnum cartilagineum* (Gristle Fern), *Lomandra longifolia* (Spiny-headed Mat-rush), *Oplismenus aemulus* (Basket Grass)	Grey-headed Flying-fox, Koala	Exotic species such as *Cinnamomum camphora* (Camphor Laurel), *Lantana camara* (Lantana), *Senna pendula* var *glabrata* (Cassia) and *Ligustrum sinense* (Small-leaved Privet) is common throughout this area.

Figure 30 Ringwood Place PCT Map

Photo 26: PCT 3160 (Ringwood place, Bellingen)

Photo 27: PCT 3165 (Ringwood place, Bellingen)

3.6.2. Coastal (Mylestom, Raleigh and Urunga)

3.6.2.1. Alma Doepel Reserve

- **Lot Number/s**: Lot 7004/DP1107437 and Lot 7006 DP1054334
- **Area**: 49 ha
- **Land Tenure**: Crown Land managed by Council

SITE DESCRIPTION

This site occurs on the coastal dunes and coastal lowlands between Mylestom and Tuckers Rock beach; elevation ranges from approximately 2-9 m ASL. The site sits within three Mitchell landscapes; mainly Manning-Macleay Barriers and Beaches, as well as Brooms Head-Kempsey Coastal Ramp and Bellinger Channels and Floodplains. Landforms predominately contain beaches, dunes, swamps and lagoons on Quaternary coastal sands. Soils are predominately sand, with sandy loam soils occurring in forested areas behind the dunes. The vegetation is diverse of which 7 PCT's and 7 Keith Class vegetation types were identified, ranging from Maritime Grasslands occurring on the beach foredunes, Coastal Dune Dry Sclerophyll Forests occurring on the dunes, and Littoral rainforest and Coastal Floodplain Forests occurring along the hind dunes and dune swales, as well as a small area of disjointed Coastal Swamp Forests community. Dense patches of exotic species *Chrysanthemoides monilifera* subsp. *rotundifolia* (Bitou Bush) were surveyed and mapped as 'exotic'. Four PCT's qualify as Threatened Ecological Communities within the site (Refer to Table 18). A small area containing Forest Red Gum is potential koala habitat, whilst the remaining forested areas containing nectar food trees such as Pink Bloodwood and Coastal Banksia, as well as littoral rainforest areas containing fleshy fruit trees qualify as high-quality foraging habitat for the Grey-headed Flying Fox. Both Forested Wetland communities provide potential habitat for the Oxyelen Pygmy Perch. Several records of the BC Acted listed Critically Endangered *Rhodomyrtus psidioides* were identified within the site. Additionally, many records of the BC & EPBC Act Critically Endangered flora species *Acronychia littoralis* occur nearby within the Littoral Rainforest, and potential records were identified within the site (Table 18, Figure 31 - Figure 36 and Photo 28 - Photo 34).

Table 18 Alma Doepel PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
Grasslands	Maritime Grasslands	3410	Spinifex Strandline Grassland	N/A	Upper: N/A Mid: *Acacia longifolia* subsp. *sophorae* (Coastal Wattle) (infrequent) Ground: *Spinifex sericeus* (Coastal Spinifex), *Carpobrotus glaucescens* (Pigface), *Ipomoea brasiliensis* (Beach Morning Glory).	N/A	Occurs on beach foredunes for most part of this coastline.
Coastal Headland Heaths	Heathlands	3788	Coastal Foredune Wattle Scrub	N/A	Upper: *Banksia integrifolia* subsp. *integrifolia* (Coastal Banksia) Mid: *Acacia longifolia* subsp. *sophorae* Ground: *Imperata cylindrica* (Blady Grass), *Ficinia nodosa* (Club Rush), *Spinifex sericeus*	N/A	Often invaded by Bitou Bush. *Banksia integrifolia* occurs very infrequently. This PCT is characterised by dense bushes of *Acacia longifolia* subsp. *sophorae.* This PCT occurs between the Spinifex and Banksia shrubland communities.
Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	3554	Northern Sands Tea-tree-Banksia Littoral Scrub	N/A	Upper: *Banksia integrifolia* subsp. *integrifolia, Cupaniopsis anacardioides* (Tuckeroo) Mid: *Acronychia imperforata* (Logan Apple) Ground: *Imperata cylindrica, Lomandra longifolia* (Spiny-headed	Flowering Banksia's provide important foraging habitat for Grey Headed Flying-fox	Closest PCT association. Too open and dry for PCT 3132.

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
					Mat-rush) and *Oplismenus imbecillis* (Basket Grass)		
Rainforests	Littoral Rainforests	3132	Northern Sands Tuckeroo-Banksia Forest	Littoral Rainforest in the NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under the BC Act) & Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (CEEC under the EPBC Act)	Upper: *Cupaniopsis anacardioides*, *Alectryon coriaceus* (Bird's-eye Alectryon) and *Acronychia imperforata* Mid: *Cryptocarya triplinervis* (Three-veined Laurel), *Synoum glandulosum* (Scentless Rosewood), *Cordyline stricta* (Palm lily). Ground: *Dianella caerulea* (Blue-flax Lily), *Commelina cyanea*, *Ottochloa gracillima*	Fleshy fruit trees such as *Acronychia imperforata, Cryptocarya triplinervis, Endiandra* spp., *Litsea australis,* and *Syzygium* spp. provide important foraging habitat for GHFF	Predominately good condition. Occurs within dune swales. Some areas contain garden escapes and exotic grasses from neighbouring caravan park, vehicle tracks and easement. Potential individuals of the BC & EPBC Act listed Endangered *Acronychia littoralis* occur within this PCT. Many records (20+ individuals) of the BC Act listed *Rhodomyrtus psidioides* was found within the northern portion of this PCT near Tuckers Rock car park.
Forested Wetlands	Coastal Swamp Forests	4005	Northern Paperbark Banksia Littoral Forest	Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion (EEC under the BC Act)	Upper: *Corymbia intermedia* (Pink Bloodwood), *Banksia integrifolia subsp. integrifolia*, *Guioa semiglauca* (Guioa), *Cupaniopsis anacardioides, Eucalyptus tereticornis* (Forest Red Gum) (infrequent) Mid: *Synoum glandulosum* (Scentless Rosewood), *Smilax australis* Lawyer Vine), *Glochidion sumatranum*	Both fleshy fruit trees (*Cryptocarya triplinervis* and *Acronychia* spp.) and nectar food trees (*Corymbia intermedia*, *Eucalyptus tereticornis* and *Banksia integrifolia*) occur within this PCT providing important foraging habitat for GHFF and potential habitat for Oxleyan Pygmy Perch when inundated.	Closest PCT association. No *Melaleuca quinquenervia* occurs within this area. Several records of the BC Act listed *Rhodomyrtus psidioides* occur within this PCT.

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella species habitat	Comments
					Ground: *Lomandra longifolia, Pteridium esculentum, Imperata cylindrica*		
Forested Wetlands	Coastal Floodplain Wetlands	4048	Northern Swamp Oak-Paperbark Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions & Coastal Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community (Both EEC's)	Upper: *Casuarina glauca* (Swamp Oak) and *Callistemon salignus* (Willow Bottlebrush) Mid: *Cupaniopsis anacardioides, Glochidion ferdinandi* (Cheese Tree), *Parsonsia straminea* Ground: *Crinum pedunculatum* (River Lily)	Potential habitat for Oxleyan Pygmy Perch	Groundcover is predominately exotic and area was inundated with water during survey.
Saline Wetlands	Saltmarshes	4095	Paspalum vaginatum-Samphire Saltmarsh	Coastal Saltmarsh in NSW North Coast, Sydney Basin (EEC under the BC Act) and SE Corner Bioregions & Subtropical and Temperate Coastal Saltmarsh) (VEC under the EPBC Act)	Upper: *Casuarina glauca* Mid: *Phragmites australis* (Common Reed), *Crinum pedunculatum, Juncus kraussii* subsp. *australiensis* (Sea Rush) Ground: *Paspalum vaginatum* (Saltwater Couch)	N/A	Located within an Intermittent Closed/Open Lake/Lagoon (ICOLL) sitting just south of Tuckers Rock Beach carpark in moderate condition

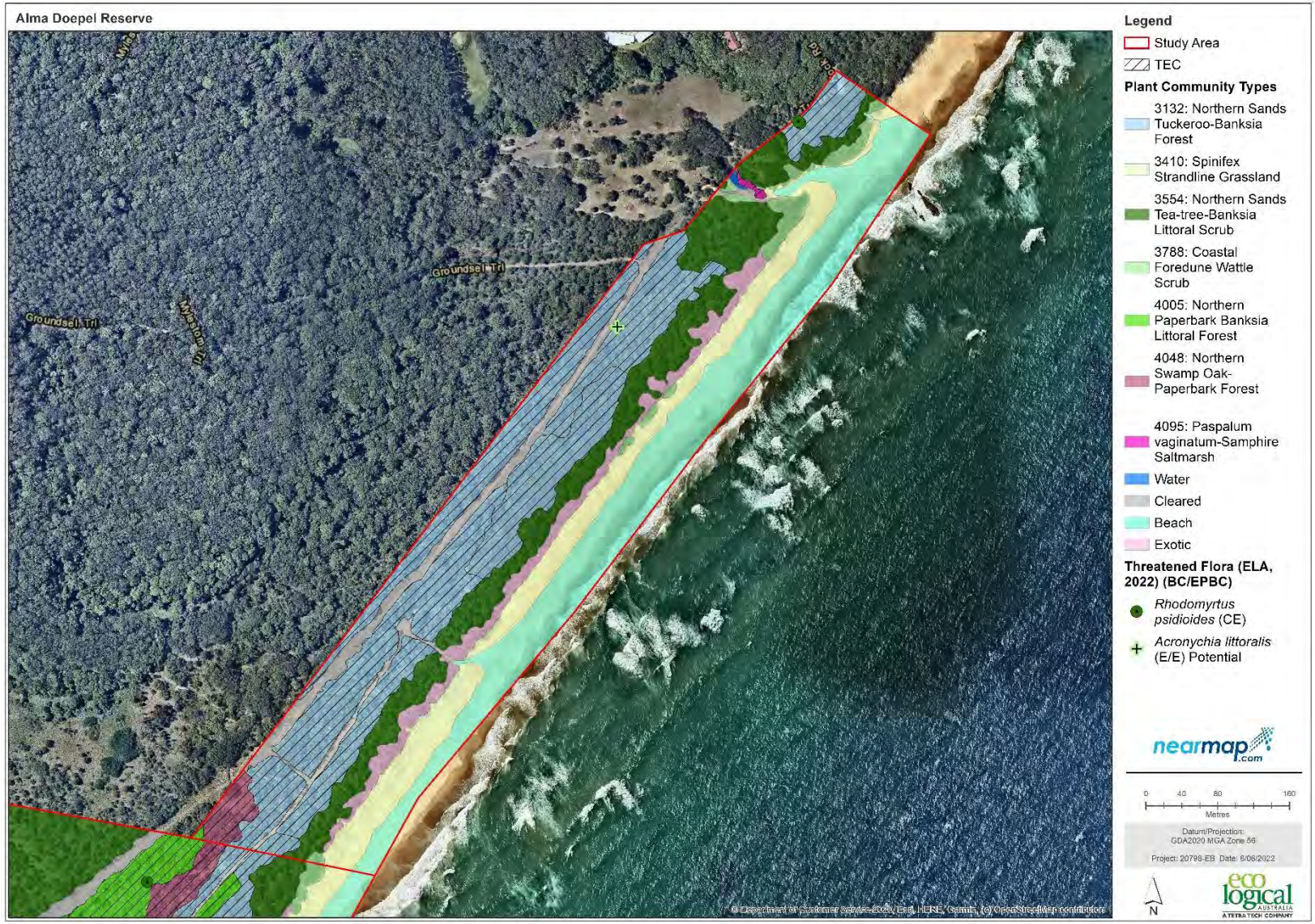

Figure 31 Alma Doepel Reserve PCT Map (Part 1)

Figure 32 Alma Doepel Reserve PCT Map (Part 2)

Figure 33 Alma Doepel Reserve PCT Map (Part 3)

Figure 34 Alma Doepel Reserve TEC Map (Part 1)

Figure 35 Alma Doepel Reserve TEC Map (Part 2)

Figure 36 Alma Doepel Reserve TEC Map (Part 3)

Photo 28 PCT 3410 (Alma Doepel)

Photo 29 PCT 3788 (Alma Doepel)

Photo 30 PCT 3554 (Alma Doepel)

Photo 31 PCT 3132 (Alma Doepel)

Photo 32 PCT 4005 (Alma Doepel)

Photo 33 PCT 4048 (Alma Doepel)

Photo 34 PCT 4096 (Alma Doepel)

3.6.2.2. Council Reserve Name: Mylestom Drive

- **Lot Number/s:** Lot 1042 DP566198 and Lot 316 DP755553
- **Area:** 1.1 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION:

This site is in the riparian zone of the lower reaches and tidal zone of the Bellinger River near Repton; elevation ranges from sea level to about 2 m above sea level. The site is part of the Bellinger Channels and Floodplains Mitchell landscape; soils are organic sand and silty mud. Three Keith Class Types occur within this site including; Coastal Freshwater Lagoons, Coastal Floodplain Wetlands and Mangrove Swamps. The vegetation of the site is highly disturbed and in low to moderate condition; it is dominated by estuarine vegetation, including some Swamp Oak forest, and Freshwater Wetlands, which qualify as TECs under the BC and EPBC Acts. The site contains some important nectar-producing tree species (Blackbutt and Grey Ironbark) which provide potential habitat for the Grey-headed Flying-fox (Table 19, Figure 37 - Figure 38 and Photo 35 - Photo 37).

Table 19 Mylestom Dr PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Freshwater Wetlands	Coastal Freshwater Lagoons	3967	Northern Lower Floodplain Eleocharis Wetland	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner (BC Act) (EEC under the BC Act)	Upper: - Mid: - Ground: *Eleocharis equisetina* (a sedge), *Typha orientalis* (Broad-leaf Cumbungi)	Potential Oxleyan Pygmy Perch habitat	Occurs as a very small area
Forested Wetlands	Coastal Floodplain Wetlands	4034	Far North Swamp Oak-Tuckeroo Swamp Fringe Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coast Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community (EPBC Act) (both EEC's)	Upper: *Eucalyptus tereticornis* (Forest Redgum), *E. siderophloia* (Grey Ironbark) (infrequent), *Casuarina glauca* (Swamp Oak), *Cupaniopsis anacardioides* (Tuckeroo), *Guioa semiglauca* (Guioa) Mid: *Pittosporum undulatum* (Pittosporum), *Callistemon salignus* (Weeping Bottlebrush), *Maclura cochinchinensis* (Cockspur Vine), *Parsonsia straminea* (Common Silkpod). Ground: *Oplismenus aemulus* (Basket Grass), *Commelina cyanea* (Commelina), *Crinum pedunculatum* (Swamp Lily)	Koala, Grey-headed Flying-fox; potential Oxleyan Pygmy Perch habitat	
Saline Wetlands	Mangrove Swamps	4091	Grey Mangrove-River Mangrove Forest	No	Upper: *Avicenna marina* (Grey Mangrove) Mid: - Ground: -	No	Saline Wetlands

Figure 37 Mylestom Dr PCT Map

Figure 38 Mylestom Dr TEC Map

Photo 35 PCT 3967 (Myelstom Dr)

Photo 36 PCT 4034 (Myelstom Dr)

Photo 37 PCT 4091 (Myelstom Dr)

3.6.2.3. Yellow Rock Reserve

- **Lot Number:** Lot 7017 DP 1054011
- **Area:** 4.25 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION:

This site is in the riparian zone of the lower reaches of the Bellinger River; elevation ranges from sea level to about 2 m above sea level. The site is part of the Bellinger Channels and Floodplains Mitchell landscape; soils are organic sand and silty mud. Three Keith Class vegetation types occur within the site including; Mangrove Swamps, Coastal Floodplain Wetlands and Saltmarshes. The vegetation of the site is dominated by estuarine vegetation, including some Swamp Oak forest; the Swamp Oak forest qualifies as a TEC under the BC and EPBC Acts (*Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions / Coast Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community*). The site also includes small patches of saltmarsh, which also constitutes a TEC under the BC and EPBC Acts: *Coastal Saltmarsh in NSW North Coast, Sydney Basin and SE Corner Bioregions / Subtropical and Temperate Coastal Saltmarsh* (Table 20, Figure 39 - Figure 42 and Photo 38 - Photo 39).

Table 20 Yellow Rock Reserve PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Saline Wetlands	Mangrove Swamps	4091	Grey Mangrove-River Mangrove Forest	No	Upper: *Avicenna marina* (Grey Mangrove) Mid: - Ground: *Sporobolus virginicus* (Saltwater Couch)	No	
Forested Wetlands	Coastal Floodplain Wetlands	4026	Estuarine Sea Rush Swamp Oak Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coast Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community (EPBC Act) (Both EEC's)	Upper: *Casuarina glauca* (Swamp Oak) Mid: *Cupaniopsis anacardioides* (Tuckeroo) Ground: *Zoysia macrantha* (Saltwater Couch)	Potential Oxleyan Pygmy Perch habitat	This patch is in low condition, with high abundance of weeds such as *Ipomoea* spp. (Morning Glory)
Saline Wetlands	Saltmarshes	4103	Sporobolus virginicus Saltmarsh	Coastal Saltmarsh in NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under the BC Act) & Subtropical and Temperate Coastal Saltmarsh (VEC under the EPBC Act)	Upper: - Mid: - Ground: *Sporobolus virginicus* (Saltwater Couch)	No	

Figure 39 Yellow Rock Reserve PCT Map

Figure 40 Yellow Rock Reserve TEC Map

Photo 38 PCT 4026 (Yellow Rock Reserve)

Photo 39 PCT 4091 (Yellow Rock Reserve)

3.6.2.4. Yellow Rock Road

- **Lot Number:** Lot 7016 DP 1053987
- **Area:** 1.43 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site is in the riparian zone of the lower reaches of the Bellinger River; elevation ranges from sea level to about 2 m above sea level. The site is part of the Bellinger Channels and Floodplains Mitchell landscape; soils are organic sand and silty mud. Four Keith Class vegetation types occur within the site; Littoral Rainforest, Northern Hinterland Sclerophyll Forest, Mangrove Swamps and Coastal Floodplain Wetlands. The vegetation of the site is highly disturbed and mostly in low to moderate condition; it is dominated by estuarine vegetation, including some Swamp Oak forest and Littoral Rainforest, which qualify as TECs under the BC and EPBC Acts. The site contains some important nectar-producing tree species (Blackbutt and Grey Ironbark) which provide potential habitat for the Grey-headed Flying-fox; fleshy-fruited species in the littoral rainforest may also provide food for the Grey-headed Flying-fox (Table 21, Figure 41 - Figure 42 and Photo 40 - Photo 43).

Table 21 Yellow Rock Rd PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Rainforests	Littoral Rainforests	3132	Northern Sands Tuckeroo-Banksia Forest	Littoral Rainforest in the NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under the BC Act) & Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (CEEC under the EPBC Act)	Upper: *Cupaniopsis anacardioides* (Tuckeroo), *Guioa semiglauca* (Guioa), *Elaeocarpus obovatus* (Hard Quandong) Mid: *Pittosporum undulatum* (Pittosporum), *Glochidion ferdinandi* (Cheese Tree), *Linospadix monostachya* (Walking-stick Palm) Ground: *Doodia aspera* (Rasp Fern), *Adiantum formosum* (Giant Maidenhair)	Grey-headed Flying-fox	

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3250	Northern Foothills Blackbutt Grassy Forest	No	Upper: *Eucalyptus pilularis* (Blackbutt), *E. siderophloia* (Grey Ironbark) Mid: *Allocasuarina torulosa* (Forest Oak), *Cupaniopsis anacardioides* (Tuckeroo), *Pittosporum undulatum* (Sweet Daphne) Ground: *Imperata cylindrica* (Blady Grass), *Pteridium esculentum* (Bracken), *Themeda triandra* (Kangaroo Grass)	Koala, Grey-headed Flying-fox	
Saline Wetlands	Mangrove Swamps	4091	Grey Mangrove-River Mangrove Forest	No	Upper: *Avicenna marina* (Grey Mangrove) Mid: - Ground: *Sporobolus virginicus* (Saltwater Couch)	No	
Forested Wetlands	Coastal Floodplain Wetlands	4026	Estuarine Sea Rush Swamp Oak Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coast Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community (EPBC Act) (both EEC's)	Upper: *Casuarina glauca* (Swamp Oak) Mid: *Cupaniopsis anacardioides* (Tuckeroo) Ground: *Machaerina juncea* (Bare Twig-rush), *Fimbristylis* ferruginea (a sedge)	Potential Oxleyan Pygmy Perch habitat	

Figure 41 Yellow Rock Rd PCT Map

Figure 42 Yellow Rock Rd TEC Map

Photo 40 PCT 3132 (Yellow Rock Rd)

Photo 41 PCT 3250 (Yellow Rock Rd)

Photo 42 PCT 4026 (Yellow Rock Rd)

Photo 43 PCT 4091 (Yellow Rock Rd)

3.6.2.5. Raleigh Waste Management Centre

- **Lot Number/s:** Lot no. Lot 86 DP630914 and Lot 3 DP1073517
- **Area:** 25 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site includes a ridge and an extensive swampy floodplain in the catchment of Boggy Creek, lower Kalang River; elevation ranges from about 2 m above sea level to about 25 m a.s.l. The site straddles the Ingalba Coastal Hills and Manning-Macleay Coastal Alluvial Plains Mitchell landscapes; soils are metasedimentary in origin on the ridge and slopes, and organic loams and mud on the floodplain. Two Keith Class vegetation types occur within the site including; Northern Wet Sclerophyll Forest and varying Coastal Swamp Forest. The vegetation is diverse, ranging from Paperbark-dominated swamp forest in low-lying areas to drier Blackbutt-dominated forest on the ridge, and mostly in moderate to high condition. The floodplain vegetation in the south and east of the site qualifies as a Threatened Ecological Community under both the BC and EPBC Acts (*Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions/ Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland).* The native vegetation at the site is potential Koala habitat, with Koala feed trees (e.g. Tallowwood, Flooded Gum, Broad-leaved Paperbark, Red Mahogany etc.) common throughout; the prevalence of important nectar-producing species such as Broad-leaved Paperbark, Swamp Mahogany, Pink Bloodwood, Flooded Gum and Blackbutt means that the site is high quality habitat for nectar-feeding species such as the Grey-headed Flying-fox. The swampy Paperbark forest at the site is also potential habitat for the Oxleyan Pygmy-perch. Two threatened fauna species were detected during fieldwork at the site: a Square-tailed kite was seen hunting at treetop height, and a group of Varied sittellas was observed foraging in the crown of a Blackbutt. Both these species are encountered reasonably frequently in the forests and woodlands of the Bellinger Valley (Table 22, Figure 43 - Figure 44 and Photo 44 - Photo 47).

Table 22 Raleigh Waste Management Centre PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	3250	Northern Foothills Blackbutt Grassy Forest	No	Upper: *Eucalyptus pilularis* (Blackbutt), *E. microcorys* Tallowwood, *Corymbia intermedia* (Pink Bloodwood) Mid: *Allocasuarina torulosa* (Forest Oak) Ground: *Calochlaena dubia* (False Bracken), *Imperata cylindrica* (Blady Grass)	Grey-headed Flying-fox, Koala	Appears to be regenerating after historic clearing/logging – large hollow-bearing trees or stags are uncommon
Forested Wetlands	Coastal Swamp Forests	4004	Northern Melaleuca quinquenervia Swamp Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coastal Swamp Sclerophyll Forest of NSW and SE QLD (EPBC Act) (both EEC's)	Upper: *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Casuarina glauca* (Swamp Oak), *Eucalyptus robusta* (Swamp Mahogany) Mid: *Callistemon salignus* (Willow Bottlebrush), *Melaleuca linariifolia* (Flax-leaved Paperbark) Ground: *Blechnum indicum* (Swamp Water Fern), *Gahnia clarkei* (Tall Saw-sedge), *Baumea* spp. (Sedge)	Grey-headed Flying-fox, Koala. Potential habitat for Oxleyan Pygmy Perch when inundated	Winter-flowering trees such as Broad-leaved Paperbark and Swamp Mahogany are crucial habitat for the Grey-headed Flying-fox and other threatened species (e.g. Swift Parrot).
Forested Wetlands	Coastal Swamp Forests	4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) &	Upper: *Melaleuca quinquenervia*, *Eucalyptus robusta*, and *E. grandis* Flooded Gum	Grey-headed Flying-fox, Koala. Potential habitat	Very diverse and ecologically valuable. Winter-flowering trees such as Broad-leaved Paperbark and Swamp Mahogany are crucial

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
				Coastal Swamp Sclerophyll Forest of NSW and SE QLD (EPBC Act) (both EEC's))	Mid: *Lophostemon suaveolens* (Swamp Turpentine), *Glochidion ferdinandi* (Cheese Tree), *Livistona australis* (Cabbage-tree Palm) Ground: *Gahnia clarkei*	for Oxleyan Pygmy Perch	habitat for the Grey-headed Flying-fox and other threatened species (e.g. Swift Parrot)
Forested Wetlands	Coastal Swamp Forests	4003	Northern Lowland Swamp Turpentine-Mahogany Forest	Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion (EEC under the BC Act)	Upper: *Corymbia intermedia, Eucalyptus robusta, E. pilularis* Mid: *Lophostemon suaveolens, Allocasuarina torulosa* Ground: *Calochlaena dubia* and *Imperata cylindrica*	Grey-headed Flying-fox, Koala	Winter-flowering trees such as Swamp Mahogany and some coastal populations of Blackbutt are crucial habitat for the Grey-headed Flying-fox and other threatened species (e.g. Swift Parrot)

Figure 43 Raleigh Waste Management Centre PCT Map

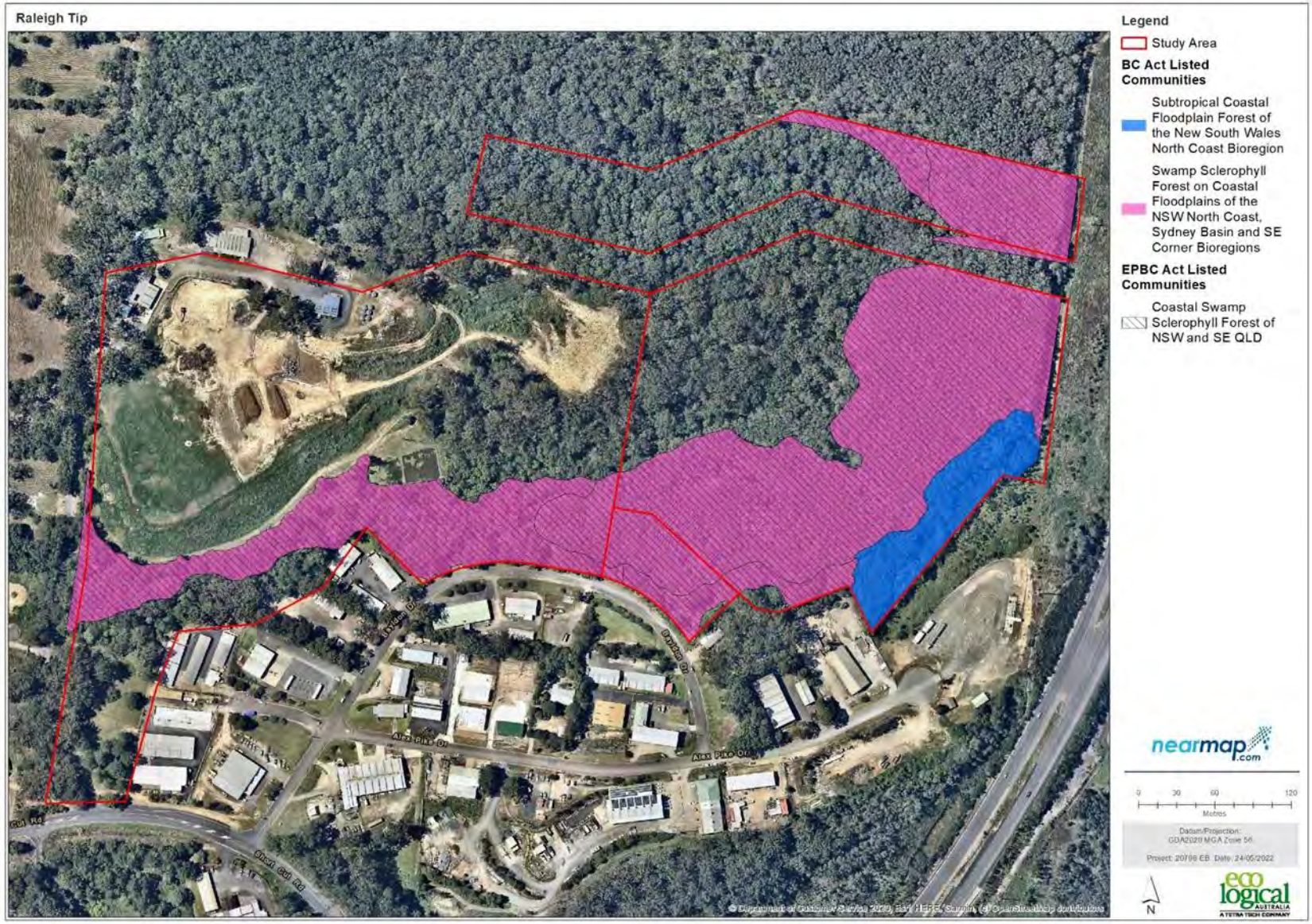

Figure 44 Raleigh Waste Management Centre TEC Map

Photo 44 PCT 3250 (Raleigh Waste Management Centre)

Photo 45 PCT 4004 (Raleigh Waste Management Centre)

Photo 46 PCT 4006 (Raleigh Waste Management Centre)

Photo 47 PCT 4003 (Raleigh Waste Management Centre)

3.6.2.6. Crescent Close, Urunga

- **Lot Number:** Lot 204 DP755552
- **Area:** 0.5 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site is in the riparian zone of the lower reaches of the Bellinger River in Urunga; elevation ranges from sea level to about 5 m above sea level. The site is part of the Bellinger Channels and Floodplains Mitchell landscape; soils are organic sand and silty mud. The vegetation at the site is dominated by one Keith Class vegetation type Coastal Floodplain Wetlands; Swamp Oak forest, which is a TEC under the BC and EPBC Acts, and includes some potential (marginal) habitat for the Oxleyan Pygmy Perch. Although Swamp Oak Floodplain Forest is not mapped as Grey-headed Flying-fox habitat, the presence of *E. robusta* (Swamp Mahogany) and *M. quinquenervia* (Broad-leaved Paperbark) suggests that Flying-foxes and other nectarivores are likely to forage at the site, particularly in winter (Table 23, Figure 45 - Figure 46 and Photo 48 - Photo 49).

Table 23 Crescent Close Urunga PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Forested Wetlands	Coastal Floodplain Wetlands	4026	Estuarine Sea Rush Swamp Oak Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coast Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community (EPBC Act) (both EEC's)	Upper: *Casuarina glauca* (Swamp Oak), *Melaleuca quinquenervia* (Broad-leaved Paperbark), *E. robusta* (Swamp Mahogany) Mid: *Glochidion ferdinandi* (Cheese Tree), *Archontophoenix cunninghamiana* (Bangalow Palm) Ground: *Hermarthria uncinata* (Matgrass)	Potential Oxleyan Pygmy Perch habitat	This patch is in low condition; weeds include *Ipomoea cairica* (Coastal Morning Glory), *Senna* pendula(Senna) and *Cinnamomum camphora* (Camphor Laurel)

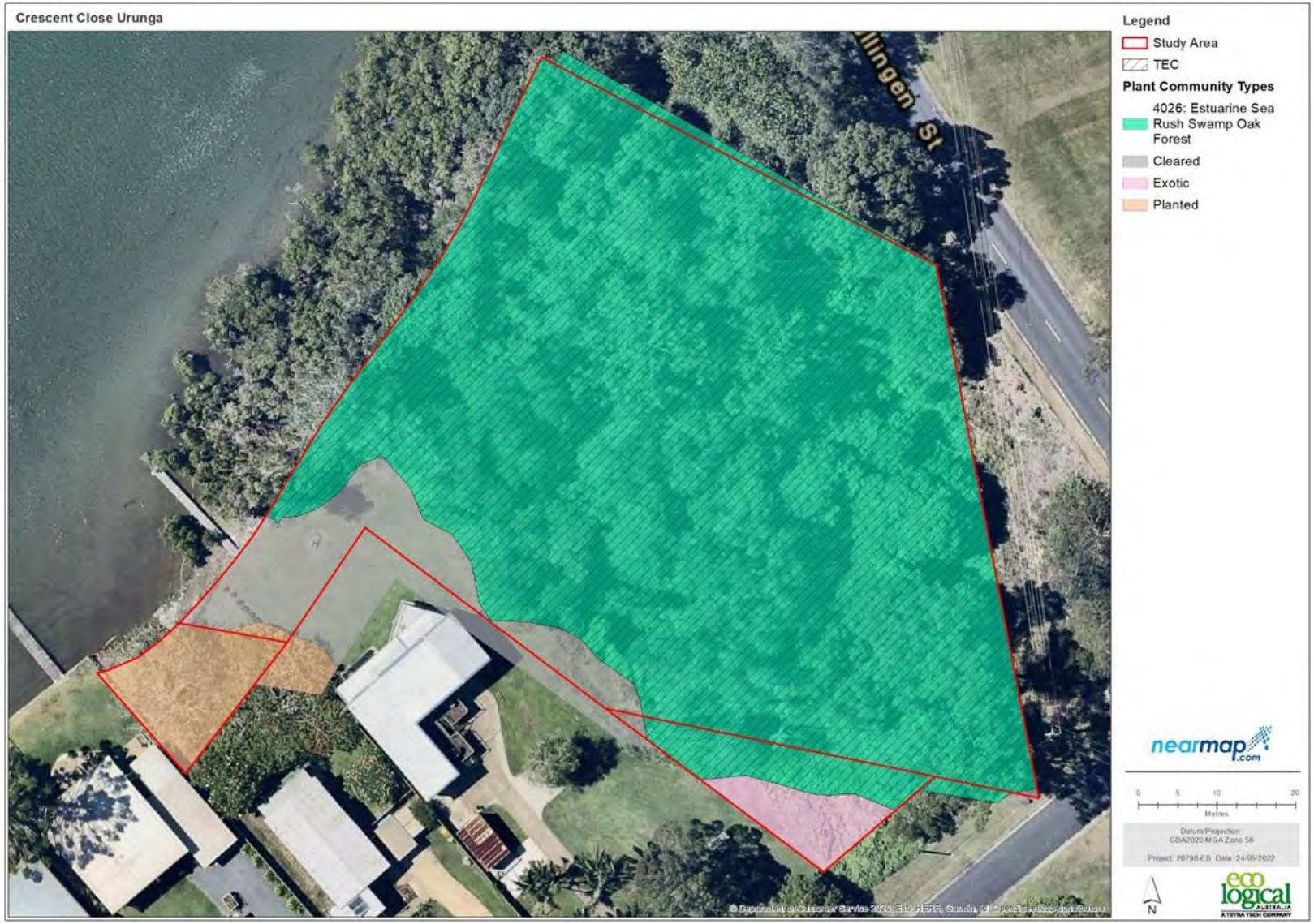

Figure 45 Crescent Close Urunga PCT Map

Figure 46 Crescent Close Urunga TEC Map

Photo 48 PCT 4026 (Crescent Cl)

Photo 49 PCT 4026 (Crescent Cl)

3.6.2.7. Lake Court, Urunga

- **Lot Number:** Lot 21 DP1049458
- **Area**: 1.7 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site is in the riparian zone of the lower reaches of the Bellinger River in Urunga; elevation ranges from sea level to about 3 m above sea level. The site is part of the Bellinger Channels and Floodplains Mitchell landscape; soils are organic sand and silty mud. Three Keith Class Types are mapped within the site and is dominated by estuarine communities including Coastal Floodplain Wetlands; Mangrove Swamps and Saltmarshes. The Swamp Oak forest and Saltmarsh communities, which are TECs under the BC and EPBC Acts, and includes some potential (marginal) habitat for the Oxleyan Pygmy Perch (Table 24, Figure 47 - Figure 48 and Photo 50 - Photo 52).

Table 24 Lake Court Urunga PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Forested Wetlands	Coastal Floodplain Wetlands	4026	Estuarine Sea Rush Swamp Oak Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coast Swamp Oak (C. glauca) forest of NSW and SE QLD ecological community (EPBC Act) (both EEC's)	Upper: *Casuarina glauca* (Swamp Oak) Mid: *Ficus sp.* (Fig) Ground: *Hermarthria uncinata* (Matgrass), *Juncus kraussii* (Sea Rush)	Potential Oxleyan Pygmy Perch habitat	This patch is in low condition; weeds include *Ipomoea cairica* (Coastal morning glory) and *Senna* spp. (Senna)
Saline Wetlands	Mangrove Swamps	4091	Grey Mangrove-River Mangrove Forest	No	Upper: *Avicenna marina* (Grey Mangrove) Mid: - Ground: -	No	
Saline Wetlands	Saltmarshes	4103	Sporobolus virginicus Saltmarsh	Yes: Coastal Saltmarsh in NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under the BC Act), Subtropical and Temperate Coastal Saltmarsh (VEC under the EPBC Act)	Upper: - Mid: - Ground: *Sporobolus virginicus* (Saltwater Couch), *Sarcocornia quinqueflora* (Glasswort)	No	

Figure 47 Lake Court Urunga PCT Map

Figure 48 Lake Court Urunga TEC Map

Photo 50 PCT 4026 (Lake Court)

Photo 51 PCT 4091 (Lake Court)

Photo 52 PCT 4103 (Lake Court)

3.6.2.8. Giinagay Way, Urunga

- **Lot Number:** Lot 25 DP755552
- **Area:** 2.6 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site in Urunga occupies the riparian zone of the Bellinger River estuary and adjacent lower slopes; elevation ranges from sea level to about 18 m above sea level. The site is part of the Manning-Macleay Coastal Alluvial Plains Mitchell landscape; soils are dark organic loams and silty clays. The vegetation at the site is a mixture of swamp forest (which qualifies as a TEC under the BC and EPBC Acts) and drier eucalypt forest. Two Keith Class Types occur within the site; North Coast Dry Sclerophyll Forest and Coastal Swamp Forest. The site contains high quality habitat for the Grey-headed Flying-fox and Koala, as well as potential habitat for the Oxleyan Pygmy Perch (Table 25, Figure 49 - Figure 50 and Photo 53 - Photo 54).

Table 25 Giinagay Way, Urunga PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Dry Sclerophyll Forests (Shrubby sub-formation)	North Coast Dry Sclerophyll Forests	3574	Northern Lowland Sandstones Dry Open Forest	No	Upper: *Eucalyptus pilularis* (Blackbutt), *E. resinifera* (Red Mahogany), *Corymbia intermedia* (Pink Bloodwood) Mid: *Guioa semiglauca* (Guioa), *Cupaniopsis anacardioides* (Tuckeroo), *Allocasuarina littoralis* (Black She-oak) Ground: *Imperata cylindrica* (Blady Grass), *Oplismenus aemulus* (Basket Grass), *Pteridium esculentum* (Bracken)	Grey-headed Flying-fox; Koala	Moderate-high condition
Forested Wetlands	Coastal Swamp Forests	4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coastal Swamp Sclerophyll Forest of NSW and SE QLD (EPBC Act) (both EEC's)	Upper: *Eucalyptus robusta* (Swamp Mahogany), *Casuarina glauca* (Swamp Oak), *Callistemon salignus* (Willow Bottlebrush Mid: *Glochidion ferdinandi* (Cheese Tree), *Ficus coronata* (Sandpaper Fig), *Archontophoenix cunninghamiana* (Bangalow Palm) Ground: *Gahnia clarkei* (Tall Saw-sedge), *Oplismenus aemulus* (Basket Grass)	Grey-headed Flying-fox, Koala; potential habitat for Oxleyan Pygmy Perch	Moderate condition

Figure 49 Giinagay Way, Urunga PCT Map

Figure 50 Giinagay Way, Urunga TEC Map

Photo 53 PCT 3574 (Giinagay Way)

Photo 54 PCT 4006 (Giinagay Way)

3.6.2.9. Urunga Cemetery

- **Lot Number:** Lot 7016 DP 1054344
- **Area:** 3.39 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site occupies the summit and slopes of a low hill just west of Urunga Lagoon; elevation ranges from about 20 m above sea level to about 8 m a.s.l. The site is part of the Ingalba Coastal Hills Mitchell landscape; soils in this landscape are metasedimentary in origin and consist of thin, stony gradational loams and sandy loams on the slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. Two Keith Class types occur over the site including Coastal Dune Dry Sclerophyll Forest and North Coast Wet Sclerophyll Forest. The vegetation at occurs in moderate to high condition and contains Koala feed trees such as Red Mahogany and Forest Red Gum. The prevalence of important nectar-producing species such as Pink Bloodwood and Forest Red Gum also means that the eucalypt forest is high quality habitat for nectar-feeding species such as the Grey-headed Flying-fox (Table 26, Figure 51 and Photo 55 - Photo 56).

Table 26 Urunga Cemetary PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	3553	Northern Sands Bloodwood-Swamp Turpentine Forest	No	Upper: *Corymbia intermedia* (Pink Bloodwood), *Eucalyptus resinifera* (Red Mahogany), *Eucalyptus tereticornis* (Forest Red Gum) Mid: *Lophostemon suaveolens* (Swamp Turpentine), *Melaleuca quinquenervia* (Broad-leafed Paperbark), *Synoum glandulosum* (Scentless Rosewood) *Persoonia stradbrokensis* (Geebung), *Guoia semiglauca* (Guioa), *Allocasuarina littoralis* (Black She-oak) Ground: *Entolasia stricta, Gahnia clarkei*, *Dianella* spp., Shallow depressions occasionally include a high cover of Schoenus brevifolius.	Koala and Grey-headed Flying-fox	The Black She-oak in this community are potential feed trees for the threatened Glossy Black-cockatoo, which was recorded on the adjacent property during surveys and for which the coastal strip around Urunga and Mylestom is prime habitat. This community also contains Pink Bloodwood and Red Mahogany, which are important sources of nectar for threatened species such as the Grey-headed Flying-fox.
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3169	Northern Hinterland Tallowwood-Brush Box Wet Forest	No	Upper: *Lophostemon confertus* (Brush Box) (infrequent), *Corymbia intermedia* E*ucalyptus resinifera* Mid: *Allocasuarina littoralis Callistemon salignus* (Willow Bottlebrush), Ground: *Gahnia clarkei, Entolasia stricta* and *Lomandra longifolia* (Spiny-headed Mat-rush)	Koala, Grey-headed Flying-fox	This area occurs on a more sheltered south easterly aspect and is an ecotone – PCT of best fit.

Figure 51 Urunga Cemetery PCT Map

Photo 55 PCT 3169 (Urunga Cemetery)

Photo 56 PCT 3553 (Urunga Cemetery)

3.6.2.10. Urunga Sewage Treatment Plant (STP)

- **Lot Number:** Lot 188 DP755552
- **Area:** 3.6 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site encompasses a broad swampy flat and adjacent slope just west of Urunga Lagoon; elevation ranges from about 3 m above sea level to about 9 m a.s.l. The lower lying areas of the site are part of the Bellinger Channels and Floodplains Mitchell landscape; soils in this landscape consist of dark organic loams and silty clays. Two Keith Class Types occur within the site including Coastal Swamp Forests and Coastal Dune Dry Sclerophyll Forest. The vegetation is dominated by paperbark swamp forest, with eucalypt forest in better drained areas; Koala feed trees such as Broad-leaved Paperbark and Swamp Mahogany are common throughout. The swamp forest at the site qualifies as a Threatened Ecological Community under both the BC and EPBC Acts (*Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions/ Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland).* Broad-leaved Paperbark and Swamp Mahogany are also important winter-flowering species and the site is high quality habitat for nectar-feeding fauna such as the Grey-headed Flying-fox. Two Threatened fauna species were recorded during fieldwork at this site: a Little Lorikeet was seen flying overhead (probably in transit from one flowering tree to another), and a small group of Glossy Black-Cockatoos was observed flying towards the site from the direction of Urunga Lagoon. The Glossy Black-Cockatoos appeared to be about to land in the forest at the site, but flew onwards towards the cemetery when they became aware of their observers. The coastal strip around Urunga and Mylestom, with its abundance of food trees (particularly *Allocasuarina littoralis*), is prime habitat for the Glossy Black-Cockatoo (Table 27, Figure 52 - Figure 53 and Photo 57 - Photo 59).

Table 27 Urunga STP PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Forested Wetlands	Coastal Swamp Forests	4000	Northern Estuarine Paperbark Sedge Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coastal Swamp Sclerophyll Forest of NSW and SE QLD (EPBC Act) (both EEC's)	Upper: *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Casuarina glauca* (Swamp Oak) Mid: mostly absent Ground: *Phragmites australis* (Common Reed)	Grey-headed Flying-fox, Koala; also potential habitat for Oxleyan Pygmy Perch	Winter-flowering trees such as Broad-leaved Paperbark are crucial habitat for the Grey-headed Flying-fox and other threatened species (e.g. Little Lorikeet, which was observed flying over this site during surveys, and Swift Parrot)

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Forested Wetlands	Coastal Swamp Forests	4006	Northern Paperbark-Swamp Mahogany Saw-sedge Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions (BC Act) & Coastal Swamp Sclerophyll Forest of NSW and SE QLD (EPBC Act) (both EEC's)	Upper: *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Eucalyptus robusta* (Swamp Mahogany) Mid: *Casuarina glauca* (Swamp Oak), *Melicope elleryana* (Pink-flowered Doughwood) Ground: *Gahnia clarkei* (Saw Sedge)	Grey-headed Flying-fox, Koala; and potential habitat for Oxleyan Pygmy Perch	Winter-flowering trees such as Broad-leaved Paperbark and Swamp Mahogany are crucial habitat for the Grey-headed Flying-fox and other threatened species (e.g. Little Lorikeet, which was observed flying over this site during surveys, and Swift Parrot)
Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	3553	Northern Sands Bloodwood-Swamp Turpentine Forest	No	Upper: *Corymbia intermedia* (Pink Bloodwood), *Eucalyptus resinifera* (Red Mahogany) Mid: *Lophostemon suaveolens* (Swamp Turpentine), *Guioa semiglauca* (Guioa), *Allocasuarina littoralis* (Black She-oak)	Grey-headed Flying-fox	The Black She-oak in this community are potential feed trees for the threatened Glossy Black-cockatoo, which was recorded on site during surveys and for which the coastal strip around Urunga and Mylestom is prime habitat. This community also contains Pink Bloodwood and Red Mahogany, which are important sources of nectar for threatened species such as the Grey-headed Flying-fox.

Figure 52 Urunga STP PCT Map

Figure 53 Urunga STP TEC Map

Photo 57 PCT 4000 (Urunga STP)

Photo 58 PCT 4006 (Urunga STP)

Photo 59 PCT 3553 (Urunga STP)

3.6.2.11. Hungry Head

- **Lot Number:** Lot 102 DP755552
- **Area:** 18.8 ha
- **Land tenure:** Crown Land managed by Council

SITE DESCRIPTION:

This site occurs on Hungry Head (headland) Reserve located south of Urunga. Hungry Head Beach forms part of a sandy barrier dune system that extends from Wenonah Headland in the south to Hungry Head (headland) to the north; elevation ranges from approximately 2-29 m ASL . The coastal dunes are backed by back-barrier flats and the intermittently open/closed lake/lagoon (ICOLL) Dalhousie Creek which is deflected to the north. Subtropical floodplain forests dominate the headland while littoral rainforests fringe the front of the headland. The local coastal landscape is largely undeveloped and well-vegetated.. The site sits within three Mitchell landscapes; mainly Manning-Macleay Barriers and Beaches, and skimming the Ingalba Coastal Hills. Landforms predominately contain rocky outcrops on the headland, beaches, dunes, swamps and lagoons on Quaternary coastal sands. Soils are predominately siliceous sands with sandy loam soils occurring in forested areas. This site is managed under the Dalhousie to Hungry Head VMP (Bellingen Bush Regenerators 2019). The overall objectives of the VMP were to establish and improve native species cover and improve the resilience and condition of vegetation communities and to assist the natural regeneration by weed control works. Improve ecological health and integrity of coastal vegetation communities, and maintain and enhance habitat values. The site contains a high diversity of vegetation classes. Eight Keith Class Types occur within the site (Refer to Table 28). PCTs 4045 and 3551 contain high-quality Koala foraging with primary feed trees Forest Red Gum and Broad-leaved Paperbark. Whilst PCTs 3130, 4001. 3551 and 4045 contain important nectar food trees, as well as littoral rainforest areas containing fleshy fruit trees qualify as high-quality foraging habitat for the Grey-headed Flying Fox. The Forested Wetland community 4001 provides potential habitat for the Oxyelen Pygmy Perch. Records of the BC & EPBC Act Endangered flora species *Acronychia littoralis* to the north of the site within the Littoral Rainforest, however no individuals were observed (Table 28, Figure 54 - Figure 55 and Photo 60 - Photo 68).

Table 28 Hungry Head PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Grasslands	Maritime Grasslands	3410	Spinifex Strandline Grassland	N/A	Upper: N/A Mid: *Acacia longifolia* subsp. *sophorae* (Coastal Wattle) (infrequent) Ground: *Spinifex sericeus* (Coastal Spinifex), *Carpobrotus glaucescens* (Pigface), *Ipomoea brasiliensis* (Beach Morning Glory).	N/A	Occurs as scattered patches (north and south) on beach foredunes.
Grasslands	Maritime Grasslands	3408	Northern Headland Grassland	Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions (EEC under BC Act)	Upper: N/A Mid: N/A Ground: *Themeda triandra* (Kangaroo Grass)	N/A	Occurs on the eastern tip of Hungry Head headland, (east of the carpark) and is in poor condition due to weed invasion in the form of exotic grasses (*Axonopus fissifolius* and *Paspalum urvelli*), and land management/land use in the form of access tracks and erosion along the cliff face. It is one of only two patches of this PCT in the Bellingen Shire (the second patch occurring at Wenonah Head), and is at high risk of extinction.
Heathlands	Coastal Headland Heaths	3788	Coastal Foredune Wattle Scrub	N/A	Upper: *Banksia integrifolia* subsp. *integrifolia* (Coastal Banksia) (infrequently) Mid: *Acacia longifolia* subsp. *sophorae* Ground: *Imperata cylindrica* (Blady Grass), *Ficinia nodosa* (Club Rush), *Spinifex sericeus*	N/A	*Banksia integrifolia* occurs very infrequently. This PCT is characterised by dense bushes of *Acacia longifolia* subsp. *sophorae.* This PCT occurs between the Spinifex and Banksia shrubland communities.

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Dry Sclerophyll Forests (Shrubby sub-formation)	Coastal Dune Dry Sclerophyll Forests	3554	Northern Sands Tea-tree-Banksia Littoral Scrub	N/A	Upper: *Banksia integrifolia* subsp. *integrifolia, Cupaniopsis anacardioides* (Tuckeroo) Mid: *Acronychia imperforata* (Logan Apple) Ground: *Imperata cylindrica, Lomandra longifolia* (Spiny-headed Mat-rush)	Flowering Banksia's provide important foraging habitat for GHFF	Closest PCT association. Too open and dry for PCT 3132.
Rainforests	Littoral Rainforests	3132	Northern Sands Tuckeroo-Banksia Forest	Littoral Rainforest in the NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under BC Act) & Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (CEEC under BC Act)	Upper: *Cupaniopsis anacardioides*, *Alectryon coriaceus* (Bird's-eye Alectryon), *Acronychia imperforata* and *Lophostemon confertus* (infrequently) Mid: *Cryptocarya triplinervis* (Three-veined Laurel), *Ficus coronata (Sandpaper Fig), Smilax australis (Lawyer Vine), Wilkiea huegeliana* (Veiny Wilkiea) Ground: *Doodia aspera, Viola hederacea (Native Violet)*	Fleshy fruit trees such as *Acronychia imperforata, Cryptocarya triplinervis and Ficus coronata* provide important foraging habitat for GHFF	Predominately good condition with some weed incursion such as Broad-leaf Paspalum, Bitou Bush and Glory Lily. Occurs on rocky outcrops on the eastern edge of the headland and dune swales behind the headland.
Rainforests	Littoral Rainforests	3130	Mid North Tuckeroo-Paperbark	Littoral Rainforest in the NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under BC Act) & Littoral	Upper: *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Cupaniopsis anacardioides,*	Nectar feed trees *Melaleuca quinquenervia* occur within this PCT providing	Occurs on steep slopes and a sheltered gully adjacent to the headland between similar Littoral Rainforest community PCT

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
			Littoral Wet Forest	Rainforest and Coastal Vine Thickets of Eastern Australia (CEEC under BC Act)	*Archontophoenix cunninghamiana, Lophostemon suaveolens* (infrequently) Mid: *Synoum glandulosum* (Scentless Rosewood), *Glochidion ferdinandi, Dysoxylum mollissimum* (Red Bean) Ground: Doodia aspera, Lomandra longifolia.	important foraging habitat for GHFF.	3132 and swamp sclerophyll forest PCT 3045. Groundcover is very sparse.
Rainforests	Littoral Rainforests	3127	Mid North Headland Brush Box Littoral Rainforest	Littoral Rainforest in the NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under BC Act) & Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (CEEC under BC Act)	Upper: *Lophostemon confertus* (Brush Box), Mid: *Synoum glandulosum* (Scentless Rosewood), *Cupaniopsis anacardioides.* Ground: *Doodia aspera*, *Lomandra longifolia.*	No habitat identified for the four umbrella species	Occurs on steep slopes and a sheltered gully adjacent to the headland between similar Littoral Rainforest communities.
Forested Wetlands	Coastal Swamp Forests	4001	Northern Floodplain Paperbark Fern Swamp Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and SE Corner Bioregions & Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland (both EEC's)	Upper: *Lophostemon suaveolens, Melaleuca quinquenervia* Mid: *Melaleuca styphelioides, Glochidion ferdinandi* Ground: Inundated at time of survey – *Carex appressa* (Tall Sedge)	Important nectar feed trees *Melaleuca quinquenervia* occur within this PCT providing high-quality foraging habitat for GHFF. *M. quinquenervia* is also an important foraging tree for the Koala. Potential habitat for Oxleyan Pygmy Perch	Occurs on an alluvial flat behind the headland

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Forested Wetlands	Coastal Floodplain Wetlands	4045	Northern Lowland Swamp Turpentine-Paperbark Forest	Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion (EEC under BC Act)	Upper: *Lophostemon suaveolens, Eucalyptus tereticornis* (Forest Red Gum), *Melaleuca quinquenervia, Corymbia intermedia* (Pink Bloodwood) and *Eucalyptus robusta* (infrequent) Mid: *Allocasuarina littoralis* (Black Sheoak), *Glochidion sumatran* (Coastal Cheese Tree), *Guioa semiglauca, Synoum glandulosum* and *Austromyrtus dulcis* (Midyim) Ground: *Lomandra longifolia, Gahnia clarkei* (Tall Saw-sedge), *Entolasia stricta* (Wiry Panic), *Imperata cylindrica* (Blady grass)	Nectar feed trees *Melaleuca quinquenervia* occur within this PCT providing important foraging habitat for Grey Headed Flying Fox. *M. quinquenervia, Eucalyptus tereticornis* and *Eucalyptus robusta* are also important foraging trees for the Koala.	Occurs as the dominant vegetation mapped on the mid to upper slopes of Hungry Head nature Reserve, fringing the alluvial lowlands, can occur as a drier or seasonal swamp forest.
Forested Wetlands	Coastal Floodplain Wetlands	4048	Northern Swamp Oak-Paperbark Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and SE Corner Bioregions (EEC under the BC Act)	Upper: *Casuarina glauca* (Swamp Oak) and *Melaleuca quinquenervia* (Broad-leaved Paperbark) Mid: *Crinum pedunculatum* (Swamp Lily)	N/A	This area occurs as an isolated stand of Swamp Oak trees over exotic grass adjacent to the ICOLL. This area does not meet criteria thresholds for the EPBC Act listed EEC Coastal Swamp Oak.
Dry Sclerophyll	Coastal Dune Dry	3551	Northern Sands	N/A	Upper: *Corymbia intermedia, Lophostemon*	N/A	This PCT occurs on an alluvium sand deposits and back barrier flat adjacent to

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Forests (Shrubby sub-formation	Sclerophyll Forests		Blackbutt-Red Mahogany forest		*confertus* and *Melaleuca quinquenervia* Mid: *Acronychia imperforata, Guioa semiglauca* and *Austromyrtus dulcis* Ground: *Lomandra longifolia, Imperata cylindrica, Gahnia clarkei* and *Hibbertia scandens*		the ICOLL. One individual of the BC Act listed *Senna acclinis (E)* was found here.
Saline Wetlands	Mangrove Swamps	4091	Grey Mangrove-River Mangrove Forest	N/A	Upper: *Avicennia marina* subsp. *australasica* (Grey Mangrove) Mid: N/A Ground: *Sporobolus virginicus* (Saltwater Couch)	N/A	Mangroves narrowly fringe both banks immediately upstream of the mouth entrance.

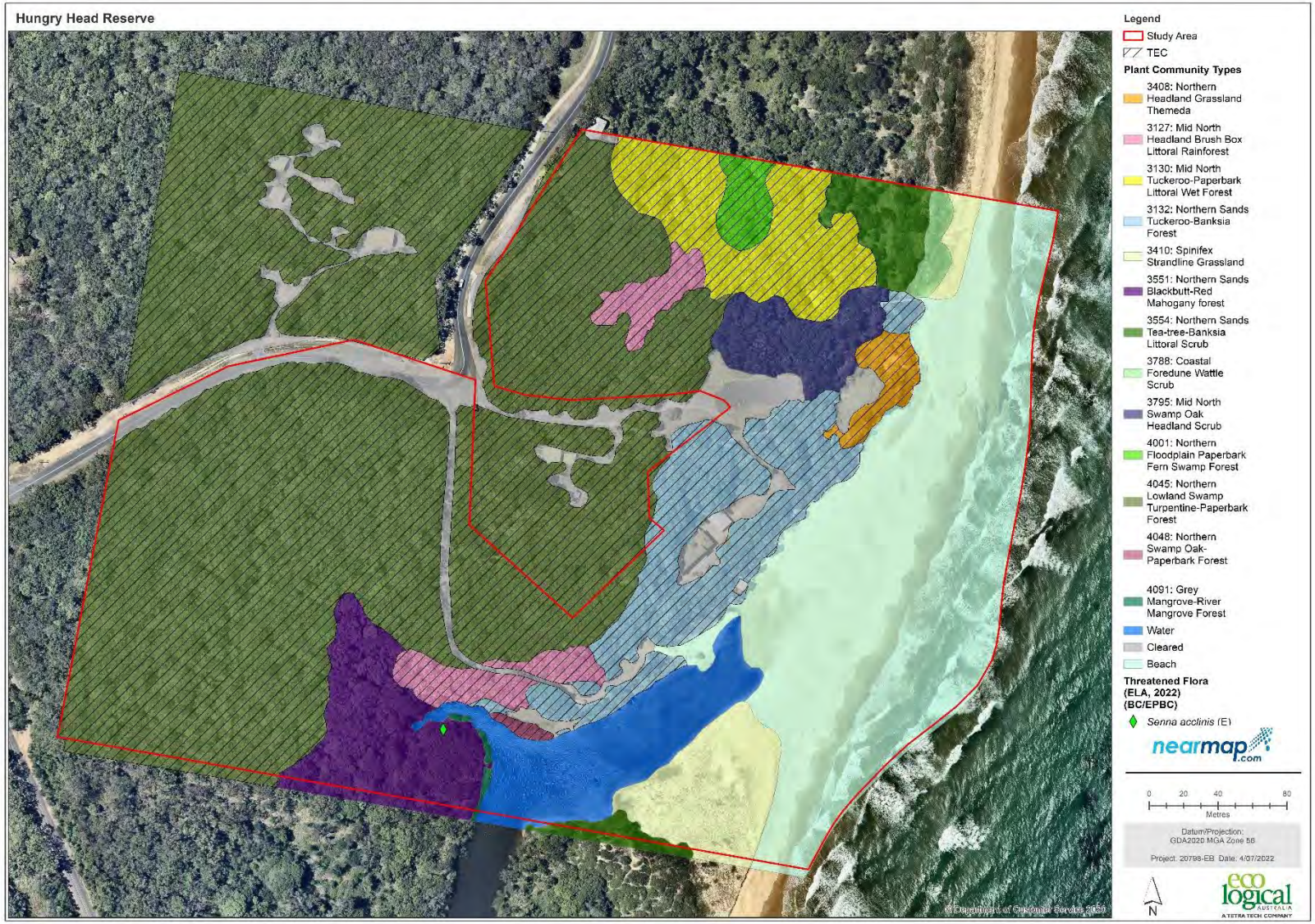

Figure 54 Hungry Head Reserve PCT Map

Figure 55 Hungry Head TEC Map

Photo 60 PCT 3408 (Hungry Head)

Photo 61 PCT 3554 (Hungry Head)

Photo 62 PCT 3132 (Hungry Head)

Photo 63 PCT3130 (Hungry Head)

Photo 64 PCT 3127 (Hungry Head)

Photo 65 PCT 4001 (Hungry Head)

Photo 66 PCT 4045 (Hungry Head)

Photo 67 PCT 4048 (Hungry Head)

Photo 68 PCT 3551 (Hungry Head)

3.6.3. Dorrigo Plateau

3.6.3.1. Dangar Falls

- **Lot number:** Lot 7004 DP1052130
- **Area:** 12.14 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site is located within the Dangar Fall Reserve on basalt-derived landscape of the Dorrigo Plateau with an elevation around 730 m a.s.l. situated northwest of Dorrigo township. The site sits within two Mitchell Landscapes of Nymboida Meta-Sediments and Dorrigo Basalts. The topography of the site consists of contrasting landforms, including gentle to moderate gradient sloping to the east along the boundary of the site and steep escarpment of Dangar Falls and the Bielsdown River. The Bielsdown River dissects the site, entering at the southern boundary and leaving the eastern boundary, eventually flowing into the Nymboida River. Four Keith Class Types occur within the site including; Cool Temperate Rainforest; Northern Tableland Wet Sclerophyll Forests; Coastal Dune Dry Sclerophyll Forests; and Northern Montane Heathlands Four vegetation communities were mapped within this site including Cool Temperate rainforest – a remnant of the Gondwanan vegetation that previously formed the main vegetation community along creek banks and sheltered slopes on the Dorrigo Plateau prior to clearing. Additionally, a unique occurrence of Port Jackson Pine community is considered to have high conservation value as it typically occurs in sclerophyll forests along the coastline (Geo Link 2015). Dangar Falls Plan of Management (GeoLink 2015) outlines the important value, of significant flora species such as Antarctic Beech and Port Jackson Pine. Protection of these species should be a key focus in the management of this site with particular focus on weed management and sensitive track construction. None of these vegetation communities were considered important habitat for any of the listed Umbrella species, however, the site is likely to be a refuge for other threatened fauna species within a much broader foraging range. Ongoing management actions, including weed control and revegetation works, would result in long-term positive gains to the habitat value of the site for these threatened species (Geo Link 2015) (Table 29, Figure 56 and Photo 69 - Photo 72).

Table 29 Dangar Falls PCT allocations

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Rainforest	Cool Temperate Rainforest	3052	Northern Escarpment Antarctic Beech Rainforest	N/A	Upper: *Nothofagus moorei* (Antarctic Beech), *Doryphora sassafras* and *Cryptocarya meisneriana* (Thick-leaved Laurel) (infrequent) Mid: *Acacia melanoxylon* (Blackwood), *Lomatia fraseri* (Silky Lomatia), *Dicksonia antarctica* (Soft-tree-fern) Ground: *Blechnum spp., Entolasia marginata, Commelina cyanea and Lomandra spp.*	N/A	This PCT likely retained due to its location on steep slopes of Dangar Falls. Mainly occurs on the northern side of Bielsdown River, on the steep slopes with a southerly aspect. A smaller patch also occurs on the southern side within the river gorge. Exotic weeds are present including Ligustrum sinense (Small-leaved Privet) and Solanum mauritianum (Tobacco Bush). Epiphyte fern species *Asplenium australasicum* (Birds Nest Fern) and *Microsorum scandens* (Fragrant Fern) also occur throughout this area attached to the Antarctic Beech.
Wet Sclerophyll Forests (Grassy sub-formation)	Northern Tableland Wet Sclerophyll Forests	3146	Dorrigo Red Gum Grassy Forest	N/A	Upper: *Eucalyptus amplifolia* (Cabbage Gum), *Eucalyptus dorrigoensis* (Dorrigo White Gum). Mid: *Leptospermum polygalifolium, Allocasuarina littoralis* (Black Sheoak) Ground: *Pteridium esculentum, Geranium solanderi* (Native Geranium), *Themeda triandra* (Kangaroo Grass), *Dichondra repens* (Kidney Weed), *Rubus parviflorus* (Native Raspberry)	N/A	'PCT of best fit'. This area is predominately planted. PCT of best fit. This area occurs on the southern side of Bielsdown River (drier aspect). The exotic pasture grass *Cenchrus clandestinus* (Kikuyu) forms a dense carpeted groundcover (from neighbouring pasture and historic landuse). This area also supports Small-leaved Privet infestations occurring on the steeper slopes. Previous attempts at restoration resulted in only limited success. Much of this area is still predominantly open and grassy with only minor tree growth, and hence is subject to significant weed infestation pressures.
Dry Sclerophyll Forests	Coastal Dune Dry	3207	Northern Escarpment Layered	N/A	Upper: *Eucalyptus nobilis, Eucalyptus nitens*	N/A	PCT of best fit. Some of this area has been planted/landscaped. This community occurs on the edge of the Cool Temperate

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
(Shrubby sub-formation)	Sclerophyll Forests		Blackbutt Fern Forest		Mid: *Banksia integrifolia* subsp. *monticola* (Mountain Banksia), *Acacia melanoxylon, Persoonia media,* Ground: *Commelina cyanea, Lomandra longifolia, Entolasia marginata* (Bordered Panic*)*		Rainforest. Some weed incursion including Small-leaved Privet, Japanese Honeysuckle (*Lonicera japonica*), and Tobacco Bush.
Heathlands	Northern Montane Heathlands	3823	Cascades Cypress-Tea-tree Riparian Forest	N/A	Upper: *Callitris rhomboidea* (Port Jackson Pine. Mid: *Leptospermum polygalifolium, Banksia integrifolia* subsp. *montana, Acacia melanoxylon, Denhamia moorei* (Mountain Denhamia), *Lomatia arborescens* (Tree Lomatia) Ground: *Entolasia marginata, Lomandra spicata, Poa* spp. and *Commelina cyanea*	N/A	Predominately good condition with moderate weed incursion from edge effects such as Carpet Grass *(Axonopus fissifolius),* Tobacco Bush, Japanese Honey suckle and Small-leaved Privet.

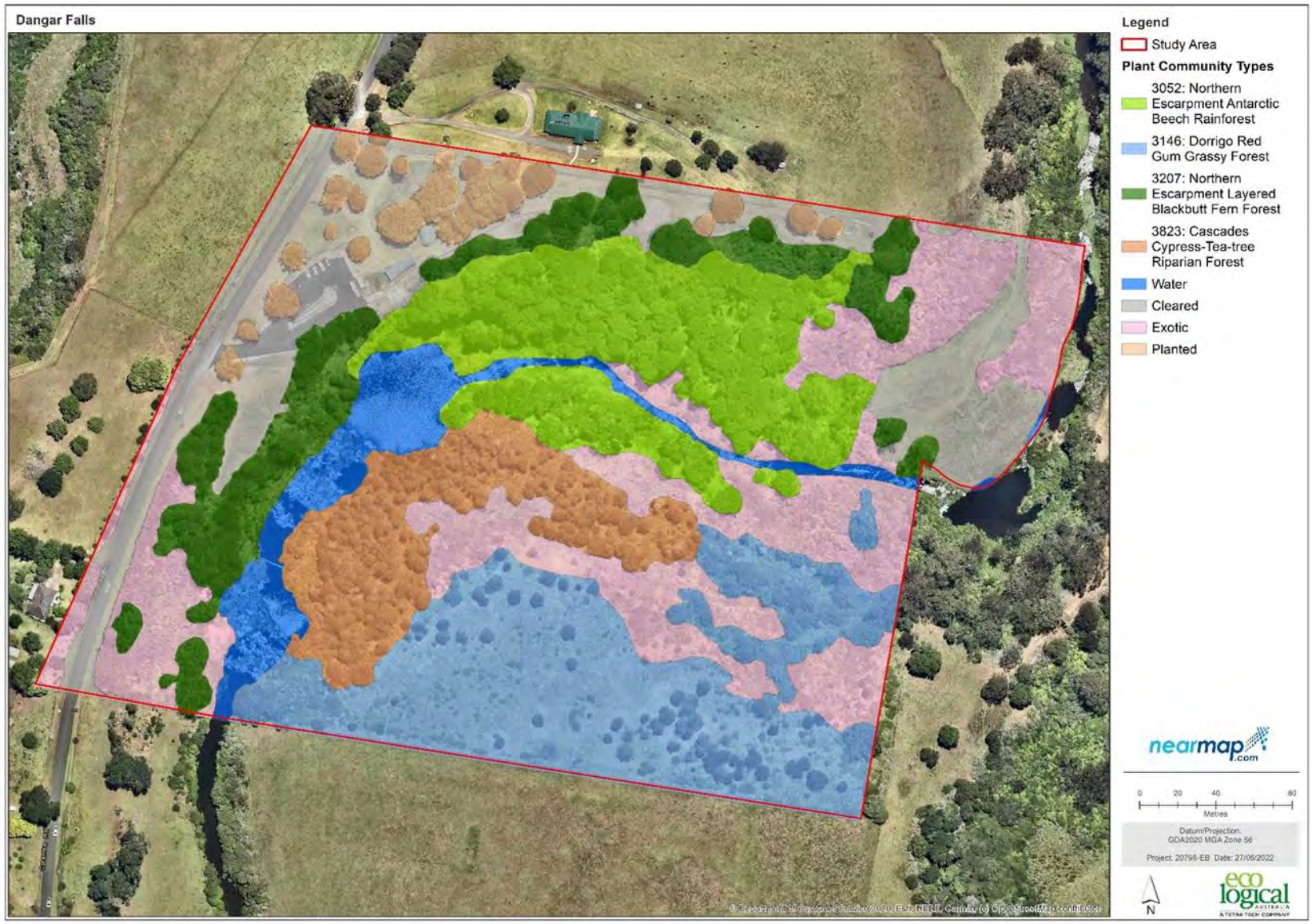

Figure 56 Dangar Falls PCT Map

Photo 69 PCT 3052 (Dangar Falls)

Photo 70 PCT 3146 (Dangar Falls)

Photo 71 PCT 3207 (Dangar Falls)

Photo 72 PCT 3823 (Dangar Falls)

3.6.3.2. Dome Road, Rocky Creek

- **Lot Number/s:** Lot 1 DP441216 and Lot 2 DP441216
- **Area:** 13.7 ha
- **Land tenure:** BSC owned and managed

SITE DESCRIPTION

This site is located east of Dorrigo township on the edge of the Dorrigo Escarpment Rainforest at an elevation of approximately 750 m a.s.l within the riparian corridor of Rocky Creek. The site sits entirely within the Dorrigo Basalts Mitchell Landscape on the Dorrigo Plateau. It occurs on deep, red and red-brown well structured loams with high organic content in the topsoil and high fertility. Originally a major area of mixed warm temperate and cool temperate rainforest now mostly cleared. Over the past 25 years the site has endured regenerative and restorative activities by the local Landcare groups. Rows of *Eucalyptus* spp. have been planted here. Although prior to clearing the site was likely characterised by Cool Temperate to Warm Temperate Rainforests, and would have likely been associated with PCTs 3031 and/or 3052. The recent survey recorded species not associated with these communities, as such the following Northern Escarpment Wet Sclerophyll Forest Keith Class was chosen based on the naturally occurring species found, the mapping only shows naturally regenerating native tree and shrub species. No important habitat for any of the four Umbrella species was mapped here (Table 30, Figure 57 and Photo 73 - Photo 74).

Table 30 Dome Rd, Rocky Creek PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Wet Sclerophyll Forests (Shrubby sub-formation)	Northern Escarpment Wet Sclerophyll Forests	3207	Northern Escarpment Layered Blackbutt Fern Forest	N/A	Upper: *Eucalyptus campanulata* (New England Blackbutt), *Eucalyptus dorrigoensis* (Dorrigo White Gum) Mid: *Acacia melanoxylon* (Blackwood), *Leptospermum polygalifolium* (Tantoon), *Hakea salicifolia* (Willow-leaved Hakea), *Persoonia media,* Ground: *Imperata cylindrica (Blady Grass), Pteridium esculentum* (Bracken Fern), *Entolasia marginata* (Bordered Panic) and *Microlaena stipoides* subsp. *stipoides* (Weeping Grass).	N/A	PCT of best fit. Only a few individuals of the listed canopy species were observed (naturally occurring). One mature New England Blackbutt which resembled a remnant tree was recorded. The majority of the site was planted out with an unknown Eucalyptus spp. by the local LandCare group , however likely being to be a White Gum species potentially *Eucalyptus dunnii* (Dunn's White Gum) or Eucalyptus dorrigoensis (Dorrigo White Gum) which are known to be commonly planted on the Dorrigo Plateau. Very dense thickets of *Ligustrum sinense* (Small-leaved Privet) occur within this area.

Figure 57 Dome Rd, Rocky Creek PCT Map

Photo 73 Dome Rd, Rocky Creek (looking to the west)

Photo 74 Dome Rd, Rocky Creek (looking to the south)

3.6.3.3. Waterfall Way (Quarry)

- **Lot Number:** Part Lot 4 DP774798
- **Area:** 3.1 ha
- **Land Tenure:** Bellingen Shire Council owned and managed

SITE DESCRIPTION

This site is an old Quarry located south-west of Dorrigo township towards Ebor at an elevation of approximately 1100 m a.s.l. The site sits entirely within the Dorrigo Basalts Mitchell Landscape on the Dorrigo Plateau. It occurs primarily on basalts but also adjacent sedimentary, acid volcanic and granitoid geologies. The site occurs on the southeast rim of the New England Tableland south of Barren Mountain. Eucalyptus spp. plantings occur on the side of the main road entrance. Two Keith Class Types occur here; Cool Temperate Rainforest and Northern Tableland Wet Sclerophyll Forest. Important foraging habitat for the Koala occurs in the Wet Sclerophyll Forest (Table 31, Figure 58 and Photo 75 - Photo 76).

Table 31 Waterfall Way (Quarry) PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Rainforests	Cool Temperate Rainforest	3052	Northern Escarpment Antarctic Beech Rainforest	N/A	Upper: *Nothofagus moorei* (Antarctic Beech) Mid: *Pittosporum multiflorus* (Orange thorn) *Acacia melanoxylon* (Blackwood), *Pittosporum undulatum* (Sweet Daphne), Acmena smithii (Lily Pily), *Leptospermum polygalifolium* subsp. *montanum* (Tantoon) Ground: *Oplismenus aemulus* (Basket Grass) and *Drymophila moorei* (Orange Berry)	N/A	This community occurs in the southwest corner of the site abutting a creekline on a sheltered slope. Area is disturbed from neighbouring quarry. Climbing epiphytic fern species *Microsorum scandens* is present as well as vine species Pandorea pandorana, *Hibbertia scandens* (Climbing Guinea Flower) and *Smilax glyciphylla* (Sweet sarsaparilla)
Wet Sclerophyll Forest (Grassy-sub formation)	Northern Tableland Wet Sclerophyll Forests	3287	Northern Escarpment Messmate Cool Wet Forest	N/A	Upper: *Eucalyptus fastigata* (Brown Barrel), *Eucalyptus obliqua* (Messmate) *Eucalyptus nobilis* (Ribbon Gum) *Eucalyptus campanulata* (Dorrigo Blackbutt) (infrequent – possibly planted) Mid: *Trochocarpa montana, Acacia melanoxylon, Banksia integrifolia subsp. monticola* (Coastal Banksia), *Nothofagus moorei* (Antarctic Beech), *Persoonia media*, *Leptospermum polygalifolium* subsp. *montanum Dicksonia antarctica* (Tree Fern), *Polyscias sambucifolia* (Elderberry Panax), *Tasmannia stipitata* (Northern Pepperbush) Ground: *Xerochrysum bracteatum* (Golden Everlasting), *Oplismenus spp.* (Basket Grass), *Hydrocotyle laxiflora* (Stinking Pennywort) and *Pteridium esculentum* (Bracken Fern)	Important foraging habitat for the Koala in the form of *Eucalyptus nobilis* and *Eucalyptus obliqua.*	This area occurs on the southern and north-eastern sheltered slopes of the site. The northeastern area is possibly a result of historic plantings. Vines *Smilax australis, Geitonoplesium cymosum, Parsonsia brownii* (Mountain Silkpod) were also recorded as well as herbs *Wahlenbergia gracilis* and *Vernonia cinerea*.

Figure 58 Waterfall Way (Quarry) PCT Map

Photo 75 PCT 3052 (Waterfall Way (Quarry)

Photo 76 PCT 3287 (Waterfall Way (Quarry)

3.6.3.4. Dorrigo Waste Centre

- **Lot Number/s:** Lot 115 DP752813 and Lot 167 DP752813
- **Area:** 11.7 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site is situated within the Dorrigo Waste Centre and adjacent lands including dairy farming paddocks situated north of Dorrigo Township at approximately 747 m a.s.l. The site sits within the Dorrigo Basalts Mitchell Landscape, skimming the edge of Nymboida Meta-Sediments on the Dorrigo Plateau. It occurs on deep, red and red-brown well structured loams with high organic content in the topsoil and high fertility. The site is highly disturbed, the riparian corridors along the creeklines and the patches of temperate rainforest are predominately characterised by dense thickets of *Ligustrum sinense* (Narrow-leaved Privet) and *Ligustrum lucidum* (Large-leafed Privet). The riparian corridors were likely once Cool Temperate to Warm Temperate Rainforest – a remnant of the Gondwanan vegetation that previously formed the main vegetation community along creek banks and sheltered slopes on the Dorrigo Plateau prior to clearing. Such rainforest would likely to be associated with PCT's 3031 and/or 3052 (Refer to Appendix 1). The recent survey within the riparian corridors adjacent to the tip recorded species not associated with these communities, as such the following PCT was chosen based on the naturally occurring species found. As such two Keith Class Types of been mapped within the site including scattered remnant patches of Cool Temperate Rainforest within the eastern Lot. No important habitat for any of the four Umbrella species was mapped here (Table 32, Figure 59 and Photo 77 - Photo 78).

Table 32 Dorrigo Waste Centre PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Rainforests	Cool Temperate Rainforest	3052	Northern Escarpment Antarctic Beech Rainforest	N/A	Upper: *Nothofagus moorei* (Antarctic Beech), *Doryphora sassafras* (Sassafras) Mid: *Acacia melanoxylon* (Blackwood), *Callicoma serratifolia* (Black Wattle) Ground: *Pellaea paradoxa, Viola hederacea* (Native Violet) and *Veronica plebeia* (Trailing Speedwell)	N/A	This community occurs on a steep slope with an east to south easterly aspect abutting Rocky Creek. The area is infested with *Ligustrum* spp. and sits adjacent to high-use dairy farming. Very few mature trees were observed,
Wet Sclerophyll Forests (Shrubby sub-formation)	Northern Escarpment Wet Sclerophyll Forests	3207	Northern Escarpment Layered Blackbutt Fern Forest	N/A	Upper: N/A Mid: *Acacia melanoxylon* (Blackwood), *Leptospermum polygalifolium* (Tantoon), *Persoonia media, Banksia integrifolia* (Coastal Banksia), *Tasmannia insipida* (Dorrigo Pepper) Ground: *Imperata cylindrica (Blady Grass), Pteridium esculentum* (Bracken Fern), *Sigesbeckia*	N/A	PCT of best fit. Likely cool temperate to warm temperate rainforest prior to clearing. No canopy trees occur within this area. PCT association based on midstory and groundcover species. Very dense thickets of *Ligustrum sinense* (Small-leaved Privet) occur within this area.

Figure 59 Dorrigo Waste Centre PCT Map

Photo 77 PCT 2052 (Dorrigo Waste Centre)

Photo 78 PCT 3207 (Dorrigo Waste Centre)

3.6.3.5. Old Coramba Rd, North

- **Lot Number/s:** Lot 179 DP752813, Lot 263 DP 752830 and Lot 235 DP752813
- **Area:** 8 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION

This site is situated along the riparian corridor of Rocky Creek extending into the Sheridan's Hard Rock Quarry (east of Dorrigo township) and within cleared unused farmlands. Access was restricted within the Quarry site, as such previous vegetation mapping and mapping within the remaining riparian corridor was used to decipher the PCT within this area. The site sits at approximately 670-700 m a.s.l entirely within the Nymboida Meta-Sediments Mitchell Landscape on the Dorrigo Plateau. It occurs on deformed steep dipping Carboniferous siliceous indurated mudstone, slate, chert and jasper. Soils are generally thin, stony and of low fertility. The site is disturbed, the riparian corridor along Rocky Creek is characterised by very limited canopy and predominately native midstory species. Thickets of *Ligustrum sinense* (Narrow-leaved Privet) and *Ligustrum lucidum* (Large-leafed Privet) also persist in the area. Unlike the adjacent Dorrigo Basalts Mitchell Landscape soils are less fertile, and therefore temperate rainforest PCT's are more unlikely to persist within this corridor prior to clearing. PCT of best fit was used based on native midstory and groundcover species. No important habitat for any of the four Umbrella species was mapped here (Table 33, Figure 60 - Figure 62 and Photo 79 - Photo 80).

Table 33 Old Coramba Rd, North PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Wet Sclerophyll Forests (Shrubby sub-formation)	Northern Escarpment Wet Sclerophyll Forests	3207	Northern Escarpment Layered Blackbutt Fern Forest	N/A	Upper: *Acacia melanoxylon* (Blackwood) Mid: *Leptospermum polygalifolium* (Tantoon), *Persoonia media, Banksia integrifolia* (Coastal Banksia), *Tasmannia insipida* (Dorrigo Pepper) and *Polyscias sambucifolia* (Elderberry Panax). Ground: *Imperata cylindrica* (Blady Grass), *Pteridium esculentum* (Bracken Fern), *Sigesbeckia, Blechnum* spp.	N/A	PCT of best fit. Very limited canopy trees occur within this area. PCT association based on midstory and groundcover species. Very dense thickets of Small-leaved Privet (*Ligustrum sinense*) occur within this area. The remaining areas mapped exotic predominately contain exotic pasture species including *Cenchrus clandestinus* (Kikuyu), *Paspalum urvillei* (Paspalum), *Lonicera japonica* (Japanese Honeysuckle) and *Verbena bonariensis* (Purple Top).

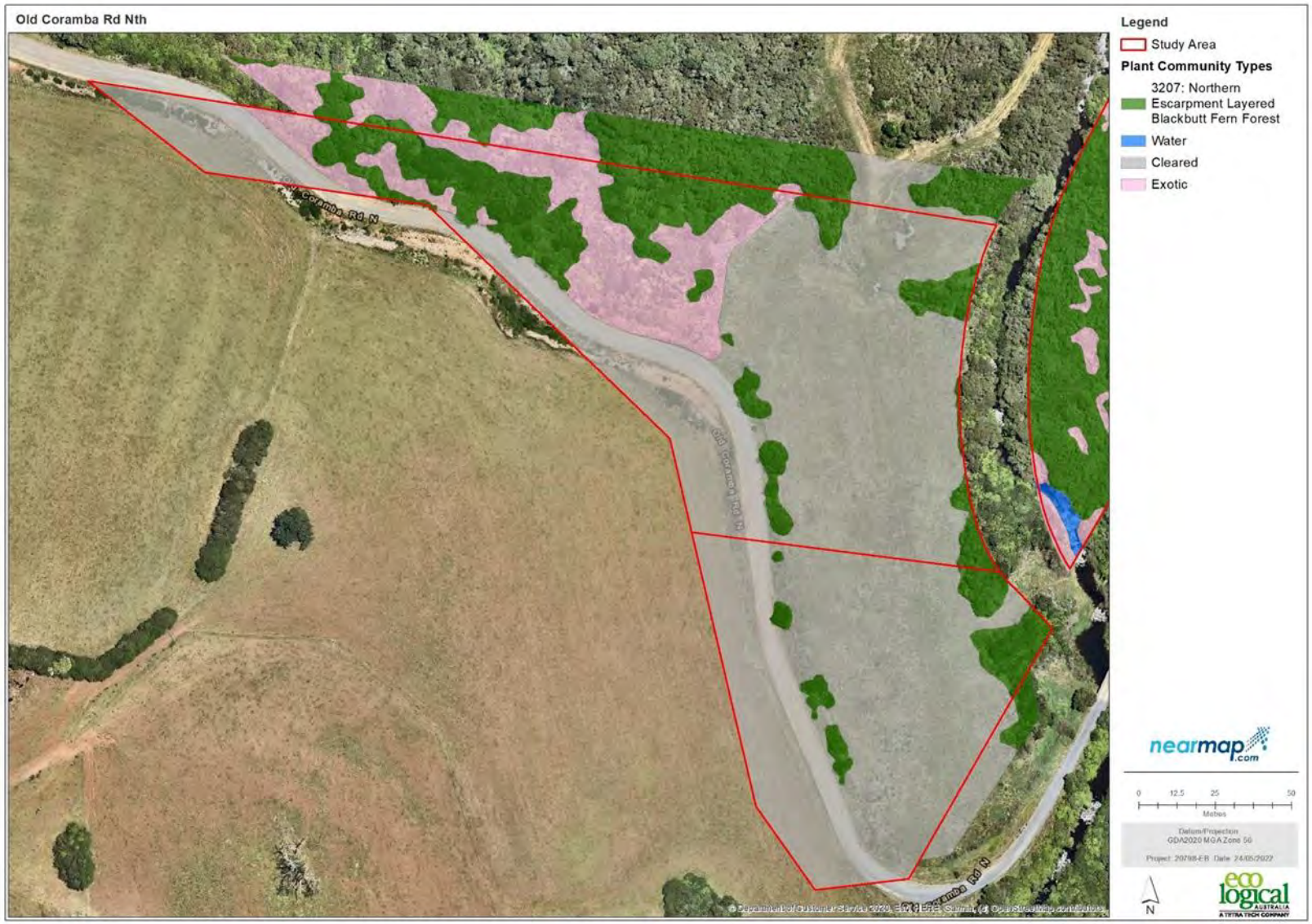

Figure 60 Old Coramba Rd, North PCT Map (Part 1)

Figure 61 Old Coramba Rd, North PCT Map (Part 2)

Figure 62 Old Coramba Rd, North PCT Map (Part 3)

Photo 79 PCT 3207 (Old Coramba Rd, North)

Photo 80 PCT 3207 (Old Coramba Rd, North)

3.6.3.6. Lower Bielsdown Rd, Tallowwood Ridge

- **Lot Number:** Lot 8 DP716228
- **Area:** 1 ha
- **Land Tenure:** BSC owned and managed

SITE DESCRIPTION

This site is situated at Tibb's Tree Reserve on Tallowwood Ridge at approximately 674 m a.s.l. The site sits entirely within the Nymboida Meta-sediments Mitchell Landscape on a vegetated ridge between Cascade State Conservation Area and Nymboida River. The soils are moderate to high fertility derived mostly from clay-rich sediments and metasediments. It occurs along the eastern slopes of the escarpment north of Dorrigo. The site is known for the presence of the giant Tallowwood known as Tibb's Tree. The entire site is characterised by one Keith Class Type; North Coast Wet Sclerophyll Forest characterised by a rainforest understory. This community has a diverse mid-stratum which includes small to medium-sized trees with soft dense foliage, vines and ferns. The vegetation is in good condition with very limited weed incursion. Important foraging habitat for both the Koala and GHFF is mapped here (Table 34, Figure 63 and Photo 81 - Photo 82).

Table 34 Lower Bielsdown Rd, Tallowwood Ridge PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC/ EPBC Acts)	Dominant Species	Umbrella Species Habitat	Comments
Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	3166	Northern Escarpment Brush Box-Tallowwood-Maple Wet Forest	N/A	Upper: *Lophostemon confertus* (Brushbox), *Eucalyptus microcorys* (Tallowwood) and *Eucalyptus saligna* (Sydney Blue Gum) Mid: *Dicksonia antarctica* (Soft Tree Fern) *Callicoma serratifolia* (Black Wattle), *Guioa semiglauca* (Guioa), *Cryptocarya glaucescens* (Jackwood) *Cryptocarya rigida,* and *Trochocarpa laurina* (Tree Heath) Ground: *Blechnum* spp., *Gynochthodes jasminoides* (Sweet Morinda)	Important foraging habitat for the Koala and GHFF in the form of Tallowwood and Sydney Blue Gum.	Mature *Myrtaceae* spp. trees occur within the canopy. However, this site is transitioning into rainforest if left undisturbed. Walking tracks occur within the site. Other species observed include *Cissus spp., Smilax australis* and *Pandorea pandorana* (Wonga Wonga Vine), *Eupomatia laurina* (Bolwarra), *Tabernaemontana pandacaqui* (Banana bush)

Figure 63 Lower Bielsdown Rd PCT Map

Photo 81 PCT 3166 (Lower Bielsdown Rd, Tallowwood Ridge)

Photo 82 PCT 3166 (Lower Bielsdown Rd, Tallowwood Ridge)

3.6.3.7. Briggsvale Rd (oval riparian zone), Megan

- **Lot Number:** Part Lot 7301 DP1130690
- **Area:** 3.96 ha
- **Land Tenure:** Crown Land managed by Council

SITE DESCRIPTION:

This site occupies the riparian zone of a tributary of Wild Cattle Creek and adjacent lower slopes in the village of Megan; elevation ranges from about 683 m above sea level to about 705 m a.s.l. The site is part of the Nymboida Meta-sediments Mitchell landscape; soils in this landscape are generally thin, stony and of low fertility. One Keith Class Type Northern Escarpment Wet Sclerophyll Forests occur within the site. The site is mostly cleared, but includes a riparian zone dominated by Small-leaved Privet as well as a small area of native wet sclerophyll forest (Table 35, Figure 64 and Photo 83 - Photo 84).

Table 35 Briggsvale Rd, PCT allocation

Keith Formation	Keith Class	PCT #	PCT Name	TEC (BC & EPBC Acts)	Dominant Species	Core Habitat	Comments
Wet Sclerophyll Forests (Shrubby sub-formation)	Northern Escarpment Wet Sclerophyll Forests	3207	Northern Escarpment Layered Blackbutt Fern Forest	No	Upper: *Eucalyptus campanulata* (New England Blackbutt), *E. saligna* (Sydney Blue Gum) Mid: *Acacia melanoxylon* (Black Wattle), *Hakea* sp. (Hakea), *Banksia integrifolia* (White Mountain Banksia) Ground: *Oplismenus aemulus* (Basket Grass), *Microlaena stipoides* (Weeping Grass), *Poa* sp.	No	-

Figure 64 Briggsvale Rd (oval riparian zone) PCT Map

Photo 83 PCT 3207 (Briggsvale Rd)

Photo 84 PCT 3207 (Briggsvale Rd (oval riparian zone))

4. Recommendations

GENERAL VEGETATION MANAGEMENT

Management activities such as weed control should be targeted at sites with:

- Threatened ecological communities;
- Vegetation in good condition;
- Threatened flora species;
- High quality fauna habitat; and
- Community interest.

Management actions for state priority weeds and/or Weeds of National Significance (WoNs) found within the Study Area should also be prioritised. Such weeds include but are not limited to.

WoNs:

- *Anredera cordifolia* (Madeira Vine);
- *Chrysanthemoides monilifera* spp. *rotundata* (Bitou Bush);
- *Dolichandra unguis-cati* (Cat's Claw Creeper)
- *Lantana camara* (Lantana);
- *Rubus fruticosus agg.* (Blackberry)

State Priority Weeds:

- *Ageratina adenophora* (Crofton Weed)
- *Cardiospermum grandiflorum* (Balloon Vine);
- *Cinnamomum camphora* (Camphor Laurel)
- *Ipomoea indica* (Morning Glory)
- *Ipomoea cairica* (Coastal Morning Glory)
- *Ligustrum lucidum* (Broad-leaved Privet)
- *Ligustrum sinense* (Narrow-leaved Privet)
- *Lonicera japonica* (Japanese Honeysuckle)
- *Ludwigia peruviana* (Ludwigia)
- *Ochna serrulata* (Mickey Mouse Plant)
- Pinus elliottii (Slash Pine)

Management actions for such weeds can be found in a number of VMP's produced for various sites within the Study Area including Hungry Head (Bellingen Bush Regenerators 2019); Bellingen Island (Coffs Harbour Bushland Regeneration Group 2010), and the four Gleniffer Reserves (EcoLogical Australia 2019), as well as within the North Coast Regional Weed Management Strategy 2017-2022 (North Coast Local Land Services 2017) and WoNs website DAWE 2021. Where possible, investment in management should be ongoing rather than short-term.

FIRE MANAGEMENT

Fire management is a complex issue that often involves balancing ecological considerations with other concerns (e.g. fuel management objectives designed to protect life and property). Although burning within the study area could assist with targeted weed control in specific instances (Graham and Taylor

2018), it also has the potential to facilitate invasion by weeds and pathogens such as Myrtle Rust (Graham and Taylor 2018, Pegg et al. 2021). Species such as *Melaleuca quinquenervia* (Broad-leaved Paperbark), a key source of nectar for the Grey-headed Flying-fox and other threatened fauna, were widely affected by Myrtle Rust in the aftermath of the black summer bushfires of 2019-20 (Pegg at al. 2021).

Recommended fire intervals for each Keith vegetation class are presented in Table 36 these are drawn from guidelines prepared by the NSW Environment Department (DEC 2004) and for the Hotspots Fire Project (Watson 2006). Burning a site more frequently than the recommended minimum fire interval could result in the loss of slow-growing fire-killed species with lengthy juvenile periods, while a fire-free period longer than the maximum recommended interval could see the loss of short-lived species that require fire for the establishment of seedlings.

Table 36 Recommended fire intervals for each Keith Vegetation Class

Keith Class	Recommended fire intervals
Coastal Dune Dry Sclerophyll Forests	Variable fire intervals between 7 and 20 years (Watson 2006)
Coastal Headland Grassland Community	*1-3 years (DEC 2004)
Coastal Floodplain Wetlands	Variable fire intervals from 6-30 years; occasional intervals greater than 30 years may be desirable (DEC 2004)
Coastal Freshwater Lagoons	Variable fire intervals from 6-30 years; occasional intervals greater than 30 years may be desirable (DEC 2004)
Coastal Headland Heaths	Variable fire intervals between 7 and 20 years with an emphasis on the 8-12 year range (Watson 2006)
Coastal Swamp Forests	Variable fire intervals between 7 and 35 years (DEC 2004)
Cool Temperate Rainforests	Fire should be avoided (DEC 2004)
Dry Rainforests	Fire should be avoided (DEC 2004)
Eastern Riverine Forests	Variable fire intervals between 25 and 60 years; crown fires should be avoided in the lower end of the interval range (DEC 2004 – wet sclerophyll forests)
Littoral Rainforests	Fire should be avoided (DEC 2004)
Mangrove Swamps	Fire should be avoided (DEC 2004)
Maritime Grasslands	Variable fire intervals from 2-10 years; occasional intervals greater than 7 years should be included in coastal areas (DEC 2004)
North Coast Dry Sclerophyll Forests	Variable fire intervals between 7 and 20 years (Watson 2006)
North Coast Wet Sclerophyll Forests	Variable intervals from 25-60 years; crown fires should be avoided in the

Keith Class	Recommended fire intervals
	lower end of the interval range (DEC 2004)
Northern Escarpment Wet Sclerophyll Forests	Variable intervals from 25-60 years; crown fires should be avoided in the lower end of the interval range (DEC 2004)
Northern Hinterland Wet Sclerophyll Forests	Variable intervals from 25-60 years; crown fires should be avoided in the lower end of the interval range (DEC 2004)
Northern Montane Heaths	Variable intervals from 7-30 years; occasional intervals greater than 20 years may be desirable (DEC 2004)
Northern Tableland Wet Sclerophyll Forests	Variable intervals from 25-60 years; crown fires should be avoided in the lower end of the interval range (DEC 2004)
Northern Warm Temperate Rainforests	Fire should be avoided (DEC 2004)
Saltmarshes	Fire should be avoided (DEC 2004)
Subtropical rainforests	Fire should be avoided (DEC 2004)

*Most knowledge of grassland dynamics originates from Victoria. Experimental burns of *Themeda grassland on headlands* in the Coffs Harbour area have led to reduced floristic diversity, weed invasion and mortality of threatened flora

Planned burning could be considered at sites with a fire-free interval greater than the recommended maximum. However, the ecological risks and benefits of burning would need to be carefully considered on a case-by-case basis, particularly if it is a mapped threatened ecological community. BSC would also need to ensure post-fire weed control and Myrtle Rust infection is planned for and funded (Graham and Taylor 2018). Only one of the reserves visited appeared to be at risk of losing diversity due to the absence of fire being PCT 3408 - Northern Headland Grassland (commensurate with BC Act listed EEC *Themeda grassland on seacliffs and coastal headlands*) located at Hungry Head (headland) Reserve, categorised as a Coastal Headland Grassland community. This PCT was observed to be in poor condition and is highly vulnerable to extinction due to weed invasion, land use and human activity. Although periodic burning is recommended in Table 36 experimental burns of *Themeda grassland on headlands* in the Coffs Harbour area have led to reduced floristic diversity, weed invasion and mortality of threatened flora. Expert advice should be sought before planning any burns in headland grassland communities. As such, since this community is located in a high use pedestrian area, and the PCT area is very small (0.01 ha), it is likely the ecological risks of planned burning (i.e. facilitating weed and pathogen invasion) would likely outweigh the ecological benefits of promoting the persistence of short-lived species that require fire for seedling establishment, at least in the short term. In the long term PCT's mapped as Keith Class Types; Coastal Dune Dry Sclerophyll Forests, Coastal Headland Heaths and North Coast Dry Sclerophyll Forests could benefit from planned burning to suppress weed invasion and promote seeding establishment if it is determined the ecological benefits outweigh the risks. The majority of these drier communities occur adjacent or near rainforest, wet sclerophyll forest or forested wetland communities which require minimal to no fire (Table 36).

Recommended fire intervals and hazard reduction management for listed threatened species found within the study area are presented in Table 37 these are drawn from guidelines prepared by the NSW Rural Fire Service (NSW RFS 2013a ad 2013b).

Table 37 Recommended fire intervals for Threatened Species.

Scientific Name	Common Name	Species Specific Conditions relating to the use of Fire	Species Specific Conditions relating to Mechanical Forms of Hazard Reduction
Flora			
Acronychia littoralis	Scented Acronychia	No fire	No slashing trittering or tree removal
Hicksbeachia pinnatifolia	Red Boppel Nut	No fire	No slashing trittering or tree removal
Niemeyera whitei	Rusty Plum	No fire	No slashing trittering or tree removal
**Rhodamnia rubescens*	Scrub Turpentine	N/A - The species is able to resprout from rootstock after fire and produce suckers which may develop into thickets (Benson and McDougall 1998).	N/A
**Rhodomyrtus psidioides*	Native Guava	N/A	N/A
^*Parsonsia dorrigoensis*	Milky Silkpod	No fire	No slashing, trittering or tree removal
Senna acclinis	Rainforest Senna	No fire	No slashing trittering or tree removal
Fauna			
Calyptorhynchus lathami	Glossy Black-Cockatoo	No burning of *Allocasuarina* thickets	Yes, but avoid Allocasuarina thicket
Glossopsitta pusilla	Little Lorikeet	No burning around known nesting sites at any time	No slashing, trittering or tree removal of or around known nesting sites
Lophoictinia isura	Square-tailed Kite	No burning around known nesting sites at any time	No slashing, trittering or tree removal of or around known nesting sites
Daphoenositta chrysoptera	Varied Sitella	No burning around known nesting sites at any time	No slashing, trittering or tree removal of or around known nesting sites
**Myuchelys georgesi*	Bellinger River Snapping Turtle	No fire	N/A
**Nannoperca oxleyana*	Oxyleyan Pygmy Perch	No fire	N/A
Ninox strenua	Powerful Owl	No burning around known nesting sites at any time	No slashing, trittering or tree removal of or around known nesting sites

Scientific Name	Common Name	Species Specific Conditions relating to the use of Fire	Species Specific Conditions relating to Mechanical Forms of Hazard Reduction
Phascolarctos cinereus	Koala	Low intensity fire only in areas formally identified as koala core habitat or koala high use habitat	No tree removal
Pteropus poliocephalus	Grey-headed Flying-fox	Avoid known roost sites	Avoid known roost sites
^*Ptilinopus magnificus*	Wompoo Fruit dove	No fire	No slashing, trittering or tree removal
Tyto tenebricosa	Sooty Owl	No burning within 100 m of known roost or nest sites	No slashing, trittering or tree removal

*Not listed in 2013, ^Found on Private Landholder site only

Although one of the threatened flora species recorded in the council reserves can cope with fire to some extent (e.g. *Rhodamnia rubescens*, which can resprout basally after burning), no other threatened flora species is likely to benefit from fire at this stage, and burning should be avoided at all threatened species locations. In the long term (decades into the future), burning of wet sclerophyll forest to promote the establishment of *R. rubescens* seedlings may need to be considered, but in the short term, the stress of recovering from fire and subsequent Myrtle Rust and weed invasion could jeopardise existing populations.

SUMMARY OF RECOMMENDATIONS

- Target management and restoration works at sites with high biodiversity values
- Investment in management should be ongoing rather than short-term
- Exclude fire from rainforest, mangrove and salt marsh communities
- Avoid burning locations of the threatened species recorded for this report (Refer to Table 36).
- Undertake planned “cool” burning in drier communities only where there is a clear ecological benefit (although considerations such as fuel management to protect life and property may necessitate burning in cases where it is not ecologically desirable)
- Sought expert advice before planning burns in coastal headland grassland communities
- Any planned burning should involve planning and funding for post-fire weed control and Myrtle Rust infections

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