Koala Management Strategy 2021

Nambucca Coastal Area



PO Box 119
Lennox Head NSW 2478
T 02 6687 7666

PO Box 1446
Coffs Harbour NSW 2450
T 02 6651 7666

PO Box 1267
Armidale NSW 2350
T 02 6772 0454

PO Box 229
Lismore NSW 2480
T 02 6621 6677

info@geolink.net.au

Prepared for: Nambucca Valley Council

Certification

	Name	***Signature***	***Date***
Prepared by	Ian Colvin		01/07/2021
Reviewed by	David Andrighetto		01/07/2021

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3547-1003	First issue (draft)	02/07/2021	Ian Colvin
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1. Introduction

1.1 Background

On the 24th September 2015 Nambucca Shire Council endorsed the '*Koala Habitat Study for the Nambucca Shire Council Coastal Area*' which was prepared by the NSW Office of Environment and Heritage (OEH) and funded under the NSW State Government 'Saving Our Species' program. The aim of the Koala Habitat Study (KHS) was to:

- Examine the historical and recent distribution of koalas in the coastal part of the Nambucca Shire Council Local Government Area (Nambucca LGA), through an analysis of historical records and field surveys.
- Assess key threats to Koalas within the LGA Coastal Area.

It was the intention of the KHS that the results, outcomes and recommendations of the study would inform Council's regional and strategic planning and contribute to the preparation of a Comprehensive Koala Plan of Management (CKPoM) for the coastal area of the Nambucca LGA.

Since preparation and endorsement of the KHS, NVC has used the KHS as a reference document, which may be referred to by staff if requesting additional information relating to any development applications.

The CKPoM has not progressed since 2015, which impacts upon the revised Koala Management Strategy 2021 to update the KHS and provide additional baseline information which will inform a future CKPoM prepared in accordance with the requirements of State Environmental Planning Policy (Koala Habitat Protection) 2021 ('Koala SEPP 2021').

1.2 Findings of the 2015 Koala Habitat Study

Key findings of the 2015 KHS included:

- A total of 498 Koala records from the Nambucca LGA were used to analyse trends in distribution and persistence over time.
- Field surveys were undertaken at 126 sites across the coastal Koala habitat study area (36 301 ha), with Koala activity recorded at 15 sites. Opportunistic searches also identified an additional four active Koala sites.
- The study area was divided into three Koala management precincts, with Koalas only recorded within two of these (precincts 1 and 2). No Koalas were recorded south of the Nambucca River and east of the Pacific Highway, and no reliable records of Koalas have been reported from this precinct since the 1990's.
- Two tree species (Tallowwood *Eucalyptus microcorys*, Small-fruited Grey Gum *E. propinqua*) were significantly more utilised by Koalas and are Preferred Food Trees (PFT's). Forest Red Gum (*E. tereticornis*) and Swamp Mahogany (*E. robusta*) are recognised as PFTs but are limited in distribution within the coastal study area. Sydney Blue Gum (*E. salignus*), Flooded Gum (*E. grandis*) and Forest Oak (*Allocasuarina torulosa*) showed lower levels of Koala use where they occurred adjacent to or as part of a vegetation community that contained PFTs.
- Thirteen Nambucca vegetation community types were identified as being of significance as habitat for Koalas in the study area. These mapped units were ranked into Primary, Secondary (Class A)

and Secondary (Class B) Koala habitat and verified against historical records and the location of field-survey sites where Koala activity was recorded.

- The study found Koalas resident in many forested areas in the study area, particularly in areas to the north and north-west of Nambucca Heads where there is evidence of Koalas persisting over 3–4 Koala generations (18–24 years).
- A decline in Koala persistence was observed in some parts of the study area, particularly in the area south and east of the township of Macksville, to the west of Scotts Head and to the north of Warrell Creek.
- Koala occupancy rates were estimated as likely to be below optimal levels (50%).

A summary of Koala habitat (based on vegetation mapping) within each of the three koala management precincts (KMPs) is shown at **Table 1.1**. Thirteen vegetation communities which comprises Koala habitat were identified and are shown at **Table 1.2**.

Table 1.1 Koala habitat classes in each precinct and proportion (%) of total area of mapped Koala habitat

Preferred Koala habitat class	*Precinct*	*Area (ha)*	*% of total area of Koala habitat*
Primary Habitat	1	80	0.9
	2	5	0.1
	3*	129	1.4
Secondary (Class A) Habitat	1	3162	35.2
	2	2239	24.9
	3*	1035	11.5
Secondary (Class B) Habitat	1	1047	11.6
	2	708	7.9
	3*	586	6.5
TOTAL AREA		**8991**	**100**

*Koalas absent; habitat unoccupied

Table 1.2 Koala habitat categories and mapping areas

Nambucca vegetation community type	*Area of preferred koala habitat class (ha)*			
	Primary	*Secondary (Class A)*	*Secondary (Class B)*	*Total*
Brush Box – Tallowwood – Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges (NAM_WSF02)	520	-	-	520
Flooded Gum moist open forest of sheltered lower slopes and gullies	-	-	904	904
Forest Red Gum – Pink Bloodwood – Grey Ironbark open forest to woodland near coastal hills (NAM_DOF05)	41	-	-	41
Spotted Gum – Small-fruited Grey Gum tall open forest with dense Brown Myrtle mid-story on coastal foothills (NAM_WSF06)	-	17	-	17
Spotted Gum – Tallowwood – Thick-leaved	-	483	-	483

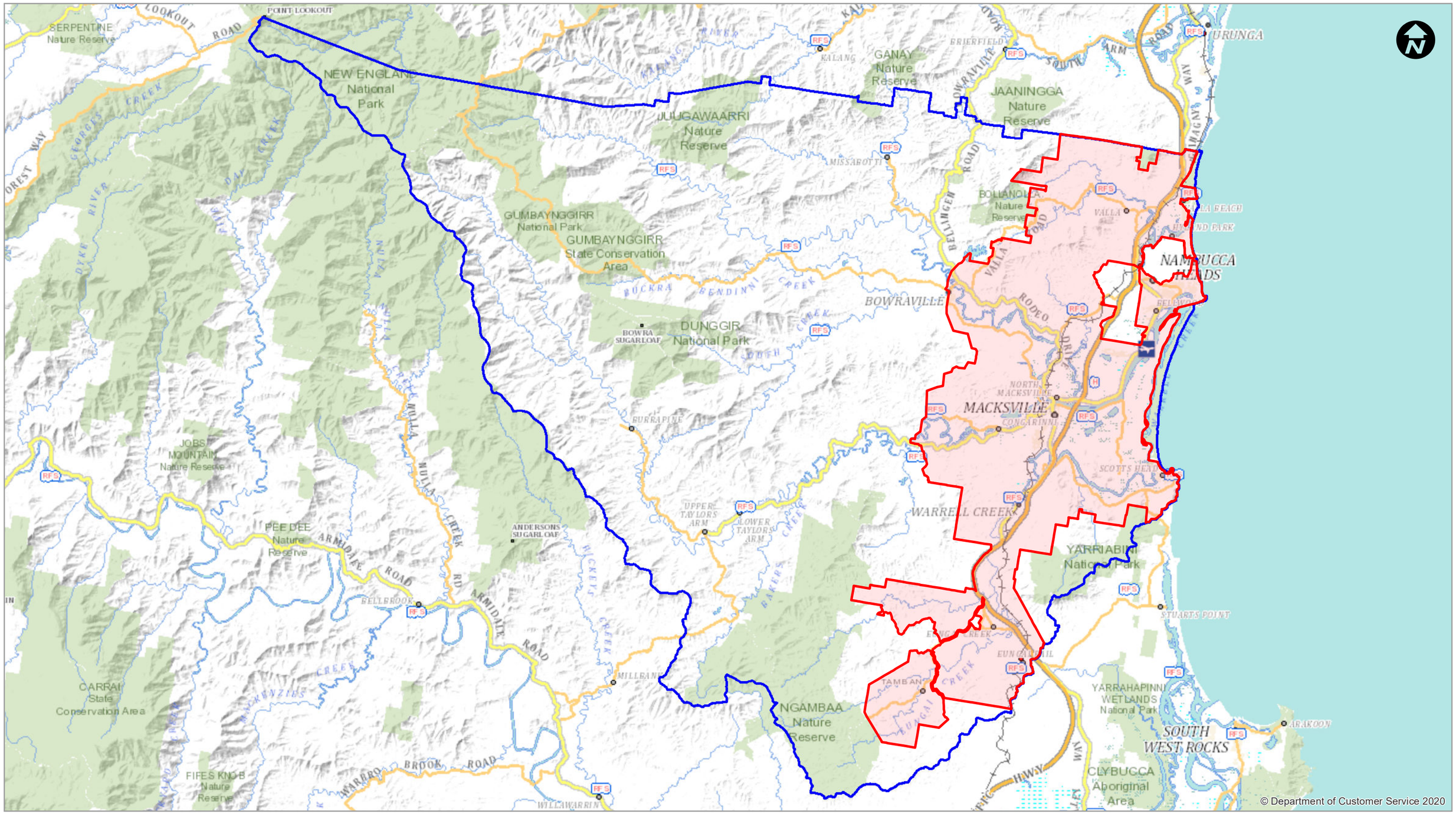
Nambucca vegetation community type	*Area of preferred koala habitat class (ha)*			
	Primary	*Secondary (Class A)*	*Secondary (Class B)*	*Total*
Mahogany – Small-fruited Grey Gum – Grey Ironbark grassy open forest on shallow sedimentary soils (NAM_DOF12)				
Spotted Gum – Tallowwood – Thick-leaved Mahogany – Small-fruited Grey Gum – Grey Ironbark wet shrubby open forest on sheltered slopes (NAM_WSF09)	-	115	-	115
Swamp Mahogany – Melaleuca sieberi shrub/sedge swamp forest on low lying sandy areas (NAM_ForW12)	2	-	-	2
Swamp Mahogany – tea-tree – Tassell Rush forested wetland of waterlogged wallum soils (NAM_ForW13)	69	-	-	69
Swamp Mahogany – Willow Bottlebrush – Broad-leaved Paperbark forested wetland (NAM_ForW08)	101	-	-	101
Tallowwood – Blackbutt moist shrubby tall open forest of the hinterland ranges (NAM_WSF07)	-	2165	-	2165
Tallowwood – Small-fruited Grey Gum – Ironbark – Forest Oak dry sclerophyll forest (NAM_DOF11)	-	536	-	536
Tallowwood – Small-fruited Grey Gum – Ironbark – Forest Oak wet sclerophyll forest (NAM_WSF05)	-	2600	-	2600
Turpentine – Brush Box – Flooded Gum – Blackbutt shrubby moist forest of sub-coastal lowlands (NAM_WSF04)	-	-	1438	1438
TOTAL (ha)	**213**	**6436**	**2342**	**8991**

1.3 The Study Area

The Study Area for this KMS is the same as for the 2015 Study, the coastal portion of the Nambucca Shire. The Study Area covers an area of 36 324 ha, representing approximately 24.35% of the LGA (refer to **Illustration 1.1**). The Study Area excludes areas of State Forest and National Park estate which are well established in other parts of the LGA and comprises private land (with several scattered areas of Crown Land totalling ~ 535 ha). While much of the Study Area comprises cleared rural land, there is connectivity with areas of consolidated forest; examples include Jagun and Valla Nature Reserves, Yarriabini National Park and Nambucca, Gladstone, Viewmont and Ingalba State Forests and Nunguu Mirral Aboriginal Area (refer **Illustration 1.2**).

Land within the Study Area comprises various zonings in the Nambucca Local Environmental Plan (LEP) 2010, (refer (refer **Illustration 1.3**) with the majority of land being rural land (RU1 Primary Production, RU2 Rural Landscape). Areas of residential and industrial/commercial land are concentrated around the townships of Valla, Nambucca Heads, Macksville and Scotts Head. A detailed description of the Study Area can be found in the 2015 KHS.

The majority of the Study Area lies within the Macleay Hastings subregion of the NSW North Coast Region of the Interim Biogeographic Regionalisation for Australia (IBRA, v7.0). The most northerly portion of the Study Area (north of Nambucca Heads) occurs within the Coffs Coast and Escarpment subregion.



GDA 1994 MGA Zone 56

LEGEND

- Nambucca LGA
- Study area

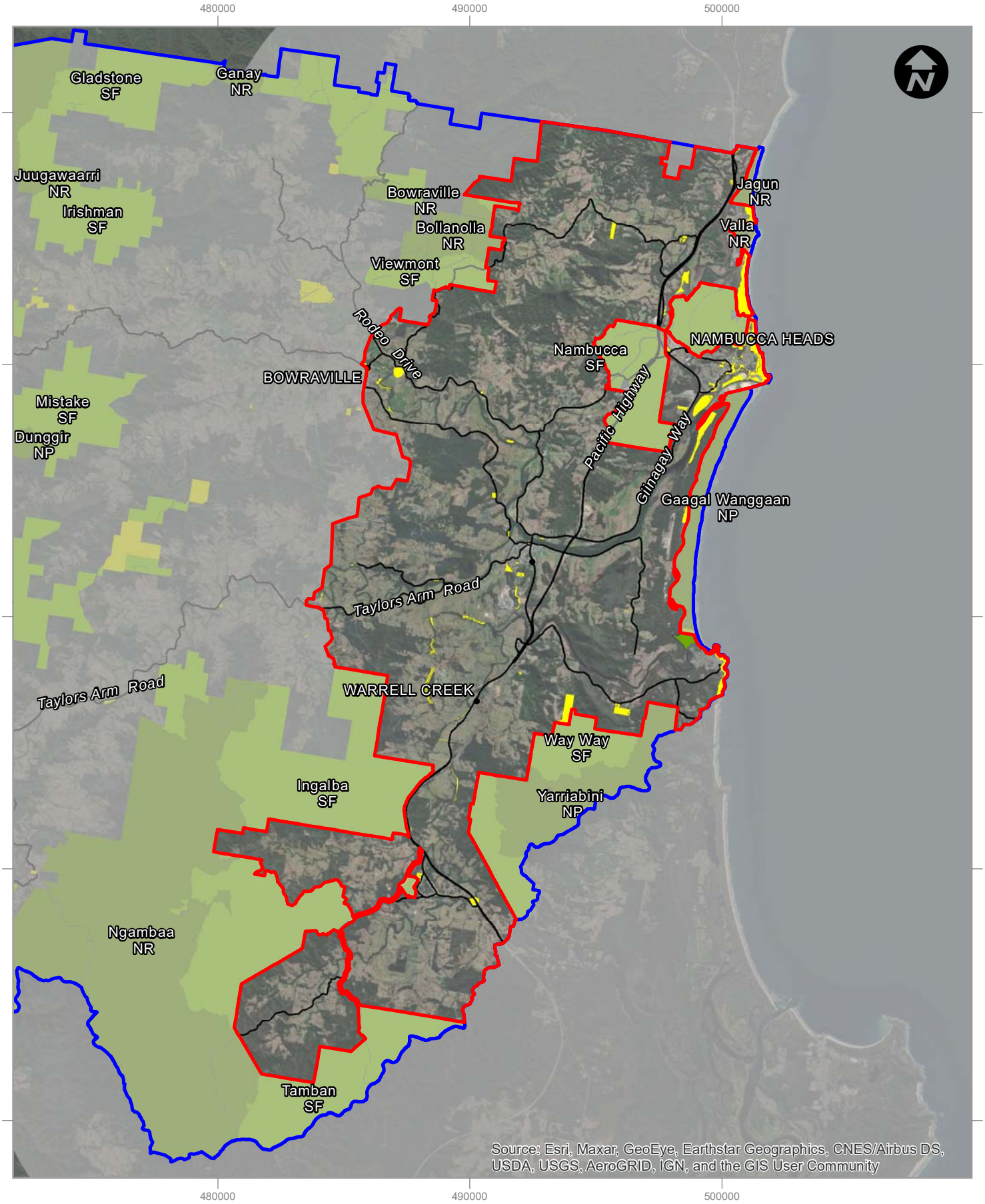
0 4,500 Metres

Nambucca LGA and Coastal Study Area - Illustration 1.1

GeoLINK environmental management and design

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1004

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 25/06/2021



LEGEND

- Nambucca LGA
- Study area
- Crown land
- State Forest
- National Park Estate
- Major road

GDA 1994 MGA Zone 56

0 4 Km

The Study Area - Illustration 1.2

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1005

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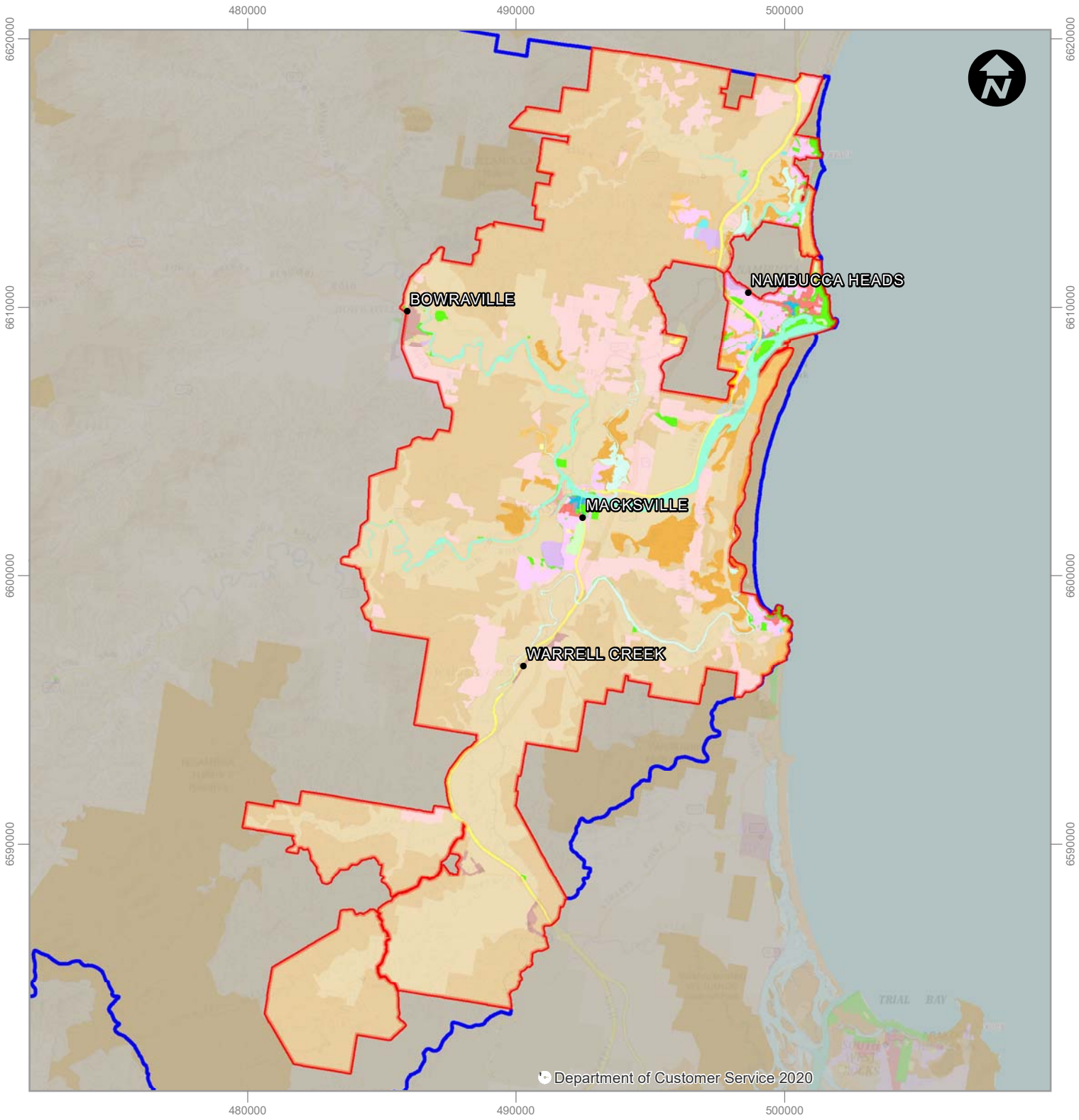
Drawn by: AB Checked by: RE Reviewed by: ILC
Source of base data: ESRI World Imagery
Date: 25/06/2021



LEGEND

- Nambucca LGA
- Study area
- B1 Neighbourhood Centre
- B2 Local Centre
- B3 Commercial Core
- B4 Mixed Use
- B7 Business Park
- E1 National Parks and Nature Reserves
- E2 Environmental Conservation
- E3 Environmental Management
- E4 Environmental Living
- IN1 General Industrial
- IN2 Light Industrial
- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- R5 Large Lot Residential
- RE1 Public Recreation
- RE2 Private Recreation
- RU1 Primary Production
- RU2 Rural Landscape
- RU3 Forestry
- RU5 Village
- SP1 Special Activities
- SP2 Infrastructure
- SP3 Tourist
- W1 Natural Waterways
- W2 Recreational Waterways

0 4 Km

The Study Area - Zoning - Illustration 1.3

Information shown is for illustrative purposes only
Drawn by: AB Checked by: RE Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 25/06/2021

2. Legislative Review

2.1 Introduction

The Koala is protected by several environmental planning instruments, as detailed in the following sections.

2.2 NSW Legislation

2.2.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) commenced in August 2016, replacing the former *Threatened Species Conservation Act 1995* (TSC Act). The Koala is listed as a threatened species in Schedule 1 of the BC Act, where it is listed as 'Vulnerable' on the basis of the species being at a high risk of extinction.

2.2.2 State Environmental Planning Policy (Koala Habitat Protection) 2021

State Environmental Planning Policy [SEPP] (Koala Habitat Protection) 2021 commenced on 17 March 2021. The principles of the Koala SEPP 2021 are to:

- Help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process.
- Provide a process for councils to strategically manage koala habitat through the development of koala plans of management.

In areas of NSW outside Metropolitan Sydney and the Central Coast LGA, the Koala SEPP 2021 does not apply to land zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry. Rather, the provisions of Koala SEPP 2020 continue to apply to these lands. This is an interim measure while new land management and private native forestry codes are developed.

The Koala SEPP 2021 only applies to development applications under part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) where the size of the subject land, including any adjoining parcels of land, is more than 1 hectare. The Koala SEPP 2021 does not apply to NPWS estate or State Forests.

Note: while it was the intention that the 2015 KHS would inform a CKPOM under the former SEPP 44 Koala Habitat Protection policy (since repealed), no further progress has occurred. As noted, it is intended that information in this KMS will be utilised to prepare a CKPoM to address the criteria for CKPoMs (currently in preparation) under Koala SEPP 2021.

2.3 Commonwealth Legislation

2.3.1 Environment Protection and Biodiversity Conservation Act 1999

The Koala was listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in April 2012 to protect Australia's most at-risk populations of Koalas in Queensland, New South Wales and the Australian Capital Territory. Referral Guidelines (DoE, 2014) have been developed to help proponents proposing development actions to avoid significant impacts to Koala habitats. If an action is deemed to have a significant impact on the koala it must be referred to the Commonwealth for consideration. The Referral Guidelines guide proponents on the information expected to support a referral, survey planning, standards for mitigating impacts and other matters.

3. Rationale and Aims

3.1 Introduction

This 2021 Koala Management Strategy aims to build on the baseline findings of the 2015 KHS and update matters with regard to:

- Koala records in the past six years.
- Identifying any expanded (or contracted) Koala habitats, based on migration, habitat loss, bushfire etc.
- Predicted development and land use intensification within the Study Area.
- Reviewing known threats.
- Planning for Koala protection in development situations and establishing a consistent framework for assessment, mitigation and compensation.

While the majority of the findings and conclusions of the 2015 KHS are still relevant, several matters are particularly relevant for this study:

- Increased knowledge of Koala habitat occupation in NSW as a whole, with the 2020 Parliamentary Koala findings that Koalas are predicted to become extinct in the wild by 2050 without intervention. (NSW Legislative Council 2020).
- The 2019 bushfires, which affected substantial areas of land within Nambucca LGA, with approximately 37,236 ha burnt, of which 1,217 ha were within the Study Area. While impacts on Koalas within the LGA are not known with confidence, it may be that mortality would have been high within burnt areas and some populations may have been significantly affected. Research by Forestry Corporation suggests that the metapopulation of koalas in north-eastern NSW has been resilient to the 2019 wildfires at a regional scale, with 70% of habitat remaining unburnt. Where habitat did burn, there was typically a mosaic of fire severity and extent, including unburnt refuges. While particular local populations of koalas were severely impacted (especially where higher severity fires were more extensive), post-fire surveys suggest that this rarely resulted in local extinction in hinterland forests with high connectivity. Post-fire Koala surveys by DPIE (2020) in north-east NSW found that whilst the 2019/20 bushfires had a significant impact on Koalas with large areas of habitat burnt and the loss of many individual animals; the results show that Koalas have persisted to varying levels in all the study areas.
- Changes in legislation. Since the 2015 KHS was completed the TSC Act has been repealed and replaced by the BC Act. As part of the Biodiversity Assessment Method (BAM) in the BC Act, new Koala habitat survey requirements are being developed. Additionally, State Environmental Planning Policy (SEPP) 44 - Koala Habitat Protection has been repealed and replaced by SEPP (Koala Habitat Protection) 2021. Koala assessment guidelines are currently in preparation for the new Koala SEPP.
- Increased development pressure from growing coastal development (refer to **Section 6**).

On this basis, this Strategy provides an updated review of the status of the Koala in the landscape and seeks to predict and mitigate future threats in a strategic sense.

3.2 Methods

This Strategy has used a desktop-based approach only and no field assessment has been completed. Data sources used to determine Koala records and habitats include:

- NSW BioNet Atlas.
- WIRES Nambucca Heads.
- Bushfire burnt areas mapping (NPWS).
- Nambucca LGA Vegetation mapping (OEH 2015).
- Monitoring reports from the Warrell Creek to Nambucca Heads Pacific Highway Upgrade (Roads and Maritime Services).

The methods used for data deployment are similar to that used in the 2015 KHS in terms of:

- Identifying Koala records within the Study Area and identifying any key populations.
- Identifying 'black spots' where roadkill incidents occur.
- Determining the extent of habitat affected in the 2019 bushfires.

4. Koala Habitat Assessment

4.1 Desktop Review

4.1.1 Recorded Observations

BioNet holds 78 koala records within the Study Area from 1979 - 2021 (refer to **Illustration 4.1**). The vast majority of records fall within Koala Management Precinct (KMP) 1 in the north of the Study Area as per the 2015 KHS, where 1,600 ha of core Koala habitat was identified (refer **Illustration 4.1**).

Consistent with the 2015 KHS, BioNet records have been allocated into Koala generations, with a 'standard' generation being six years (refer to **Illustration 4.2**). Significant numbers of Koala records within and adjacent to the Study Area are evident from the last two Koala generations (12 year period). In the north of the Study Area (KMP 1) there are a number of recent Koala records from Valla Headland, associated with Valla Nature Reserve, in addition to numerous records from Nambucca State Forest along the alignment of the newly constructed Pacific Highway (Warrell Creek to Nambucca Heads ['WC2NH'] Upgrade). Records are sparse within the central and southern portions of the Study Area (KMP2 & 3), however numerous recent Koala records are noted from adjacent Tamban State Forest which adjoins Ngaamba Nature Reserve, where Koala records from the 2009 - 2015 period are substantial. These records are from recent pre-operations surveys completed by State Forests; similar numbers of records would be expected throughout State Forest estate in the southern portion of the Study Area (pers. comm. Matt Dobson [State Forests] 18/06/2021). On this basis, these records should be treated with caution and are unlikely to represent a 'new' population, rather, the absence of records within State Forest land is reflective of any targeted koala survey. It would be expected that as pre-operational assessment is completed for future forestry operations, additional koala records will be supplied to BioNet.

It is expected that animal's resident within State Forests which adjoin the Study Area would also roam within adjacent forest habitat on private land, however the extent to which this occurs is unknown

BioNet records support the findings of the 2015 KHS that Koalas are absent from the area south Nambucca River and east of the Pacific Highway (KMP 3), and that Koalas occur at low densities in KMP 2, with adjacent populations within Tamban State Forest. Other recent Koala records of relevance include scat detection in the eastern portion of Way Way State Forest immediately south of the Nambucca Valley LGA (John Turbill, pers. comm. 9/07/2021) and a health juvenile male Koala at Nambucca Beach north of the surf club on 30 August 2020 (John Turbill, pers. comm. 10/09/2021).

On a spatial level, the extent of koala records is very similar to that in the 2015 KHF and the area of occupancy for the species is unlikely to have substantially changed within the Study Area.

4.1.2 Other Studies

An assessment within Nambucca SF for the Pacific Highway Upgrade (GeoLINK 2014) recorded very low numbers of koalas and concluded that the southern parts of Nambucca SF are subject to low level usage by a small number of Koalas. These findings were consistent with several previous surveys.

Monitoring surveys for Pacific Highway Upgrade have recorded koalas at several locations utilising designated fauna underpasses (refer **Section 5.3**).

Under the Saving our Species (SOS) project, the Department of Planning, Industry and Environment (DPIE) have prepared the *Framework for the spatial prioritisation of koala conservation actions in NSW* (DPIE 2020). The 'Framework' identifies Areas of Regional Koala Significance ('ARKS') across NSW, with ARKS #30 (North Macleay – Nambucca) overlying the Study Area (specifically KMP1 and KMP2), generally west of the Pacific Highway. By applying various data filters, each ARKS was evaluated with regard to several criteria. Koala habitat within the North Macleay – Nambucca ARKS was noted to have moderate resilience and moderate security (from a three-tier ranking of high, moderate or low). Threats to Koala habitat within the ARKS (which includes neighbouring land in Bellingen and Kempsey Shires) were modelled as follows (refer **Figure 4.1**):

- Fragmentation: High
- Wildfire: Moderate
- Vehicle strike: Moderate
- Heat stress: Moderate
- Disease: Moderate
- Dog attack: High
- Climate change: Moderate.

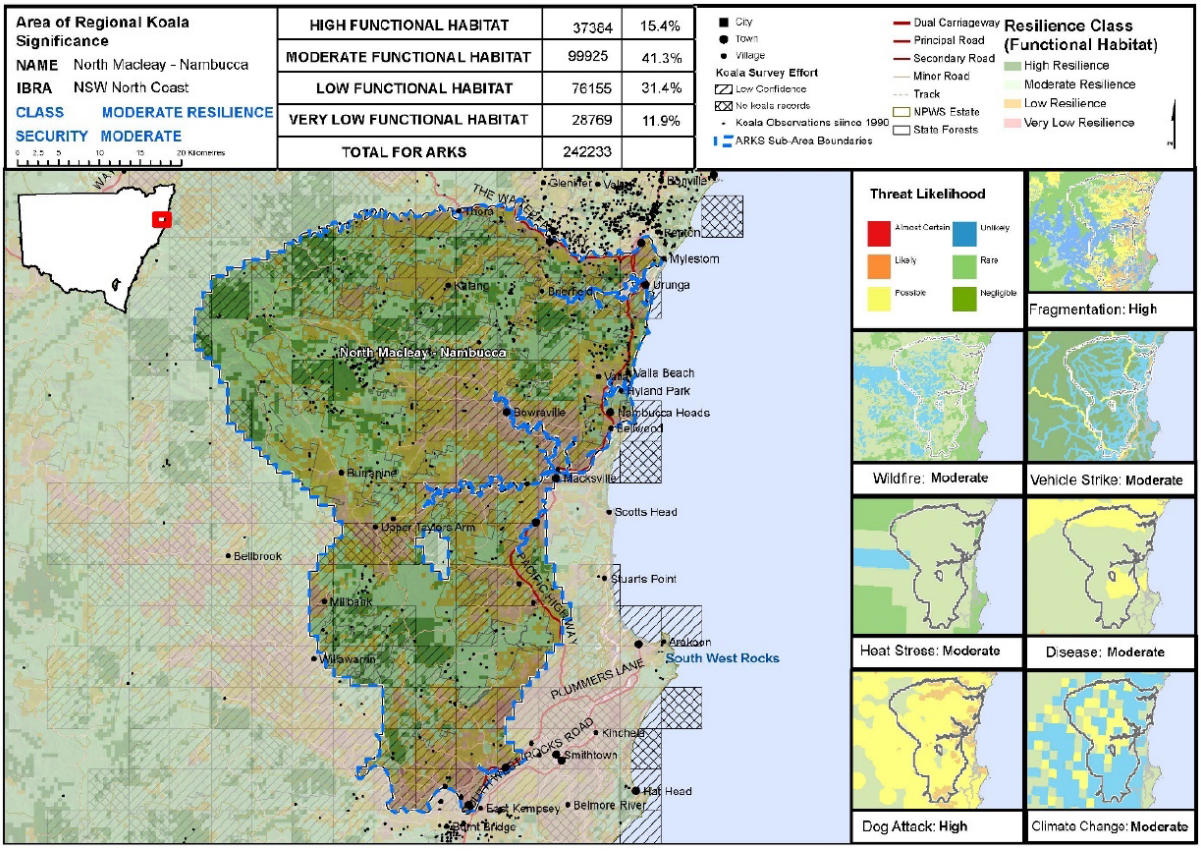


Figure 4.1 Area of Regional Koala Significance Profile Map North Macleay – Nambucca

Source: Framework for the spatial prioritisation of koala conservation actions in NSW (DPIE 2020).

4.1.3 Koala Habitat Suitability

Under the NSW Koala Strategy 2018-2021 the DPIE has developed a Koala Habitat Information Base (KHIB); resource to help government agencies, local councils and private land holders make decisions about koala conservation. The KHIB includes a dataset for predicting koala habitat suitability. The Koala Habitat Suitability Model (KHSM) predicts the spatial distribution of potential koala habitat across NSW using a value between 0 and 1 (i.e. a higher value represents a higher probability that a specific location will contain habitat suitable for koalas). The KHSM suitability model provides an indication of where koalas have the potential to reside but are not necessarily currently occupied. The KHSM has been applied to the Study Area and is shown at **Illustration 4.3**.

4.2 Vegetation Mapping

Vegetation mapping by OEH (2015) is the most current available vegetation mapping for the Nambucca LGA. DPIE have completed detailed vegetation mapping and allocation of communities into plant community types (PCTs) for eastern NSW; however only the pre-release version of this mapping is available on the NSW Sharing and Enabling Environmental Data (SEED) portal.

The OEH 2015 vegetation mapping dataset identifies a number vegetation communities within the Study Area. Vegetation communities were nominated as Primary, Secondary (A) and Secondary (B) habitat in the 2015 KHS (refer **Table 4.1**); an equivalent PCT (based on the current PCT classifications for the NSW North Coast subregion) has been provided where relevant. Note that current PCTs are coarse and do not allow for finer scale attribution of vegetation communities as per the OEH classification.

Vegetation mapping is attached at **Appendix B**.

Table 4.1 Preferred Koala Vegetation Types

Koala Habitat Type	*Vegetation Community (OEH 2015)*	*Equivalent PCT*
Primary	Brush Box – Tallowwood – Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges (NAM_WSF02)	PCT 747 Brush Box - Tallowwood - Sydney Blue Gum tall moist forest of the ranges of the central NSW North Coast Bioregion
	Forest Red Gum – Pink Bloodwood – Grey Ironbark open forest to woodland near coastal hills (NAM_DOF05)	PCT 834 Forest Redgum - Pink Bloodwood open forest of the foothills and ranges of the NSW North Coast Bioregion
	Swamp Mahogany – Melaleuca sieberi shrub/sedge swamp forest on low lying sandy areas (NAM_ForW12)	PCT 1230 Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
	Swamp Mahogany – tea-tree – Tassell Rush forested wetland of waterlogged wallum soils (NAM_ForW13)	PCT 1230 Swamp Mahogany swamp forest on coastal lowlands of the NSW North Coast Bioregion and northern Sydney Basin Bioregion
	Swamp Mahogany – Willow Bottlebrush – Broad-leaved Paperbark forested wetland (NAM_ForW08)	PCT 1230 Swamp Mahogany swamp forest on coastal lowlands of the NSW North

Koala Habitat Type	*Vegetation Community (OEH 2015)*	*Equivalent PCT*
		Coast Bioregion and northern Sydney Basin Bioregion
Secondary (A)	Spotted Gum – Small-fruited Grey Gum tall open forest with dense Brown Myrtle mid-story on coastal foothills (NAM_WSF06)	PCT 1215 Spotted Gum - Grey Ironbark open forest of the Macleay Valley lowlands of the NSW North Coast Bioregion
	Spotted Gum – Tallowwood – Thick-leaved Mahogany – Small-fruited Grey Gum – Grey Ironbark grassy open forest on shallow sedimentary soils (NAM_DOF12)	PCT 1215 Spotted Gum - Grey Ironbark open forest of the Macleay Valley lowlands of the NSW North Coast Bioregion
	Spotted Gum – Tallowwood – Thick-leaved Mahogany – Small-fruited Grey Gum – Grey Ironbark wet shrubby open forest on sheltered slopes (NAM_WSF09)	PCT 1215 Spotted Gum - Grey Ironbark open forest of the Macleay Valley lowlands of the NSW North Coast Bioregion
	Tallowwood – Blackbutt moist shrubby tall open forest of the hinterland ranges (NAM_WSF07)	PCT 695 Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion
	Tallowwood – Small-fruited Grey Gum – Ironbark – Forest Oak dry sclerophyll forest (NAM_DOF11)	PCT 1262 Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
	Tallowwood – Small-fruited Grey Gum – Ironbark – Forest Oak wet sclerophyll forest (NAM_WSF05)	PCT 1262 Tallowwood - Small-fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
Secondary (B)	Flooded Gum moist open forest of sheltered lower slopes and gullies	PCT 826 Flooded Gum - Brush Box moist forest of the coastal ranges of the North Coast
	Turpentine – Brush Box – Flooded Gum – Blackbutt shrubby moist forest of sub-coastal lowlands (NAM_WSF04)	PCT 1285 Turpentine moist open forest of the coastal hills and ranges of the NSW North Coast Bioregion

4.3 Preferred Food Trees

In 2018, OEH commissioned a report into Koala tree use across NSW. The report analysed tree use data across seven Koala Management Areas (KMAs) in NSW. Nambucca LGA lies within the North Coast KMA. The review identified evidence of koala use for 137 tree species across NSW, with 103 of the tree species (75%) from the genus Eucalyptus (OEH 2018). A total of 50 tree species and three generic groups (Acacia species, Banksia species, Rainforest species) were identified as Koala feed trees, with the highest ranked use species ('regional high use') being Tallowwood, Swamp Mahogany, Small-fruited Grey Gum and Forest Red Gum. These results generally reflect the findings of the 2015 KHS.

The list of Koala food trees identified in the study has since been adopted in Schedule 2 of SEPP Koala Habitat Protection 2021, with 42 trees broadly identified as 'Koala use tree species' (refer to **Appendix C**). It should be noted that many of these species do not naturally occur within the Koala Study Area. In this regard Schedule 2 of Koala SEPP 2021 provides an 'over reach' in terms of actual

preferred koala food tree species within the LGA, and the findings of the 2015 KHS (refer **Section 1.2**) should be adopted as per **Table 4.2**.

Table 4.2 Koala Feed Trees in the Study Area (from OEH 2015)

Scientific name	*Common name*	*Status*
Allocasuarina torulosa	Forest Oak	secondary food tree
Eucalyptus grandis	Flooded Gum	secondary food tree
Eucalyptus microcorys	Tallowwood	primary food tree (PFT)
Eucalyptus propinqua	Small-fruited Grey Gum	PFT when in association with Tallowwood on better nutrient soils; secondary food tree elsewhere
Eucalyptus robusta	Swamp Mahogany	primary food tree (PFT)
Eucalyptus salignus	Sydney Blue Gum	secondary food tree
Eucalyptus tereticornis	Forest Red Gum	primary food tree (PFT)

4.4 Koala Habitat Classification

The koala habitat classification developed in the 2015 KHS is retained in this Strategy for consistency and is based on koala habitat ranking as per the NSW Koala recovery Plan (refer **Table 4.3**).

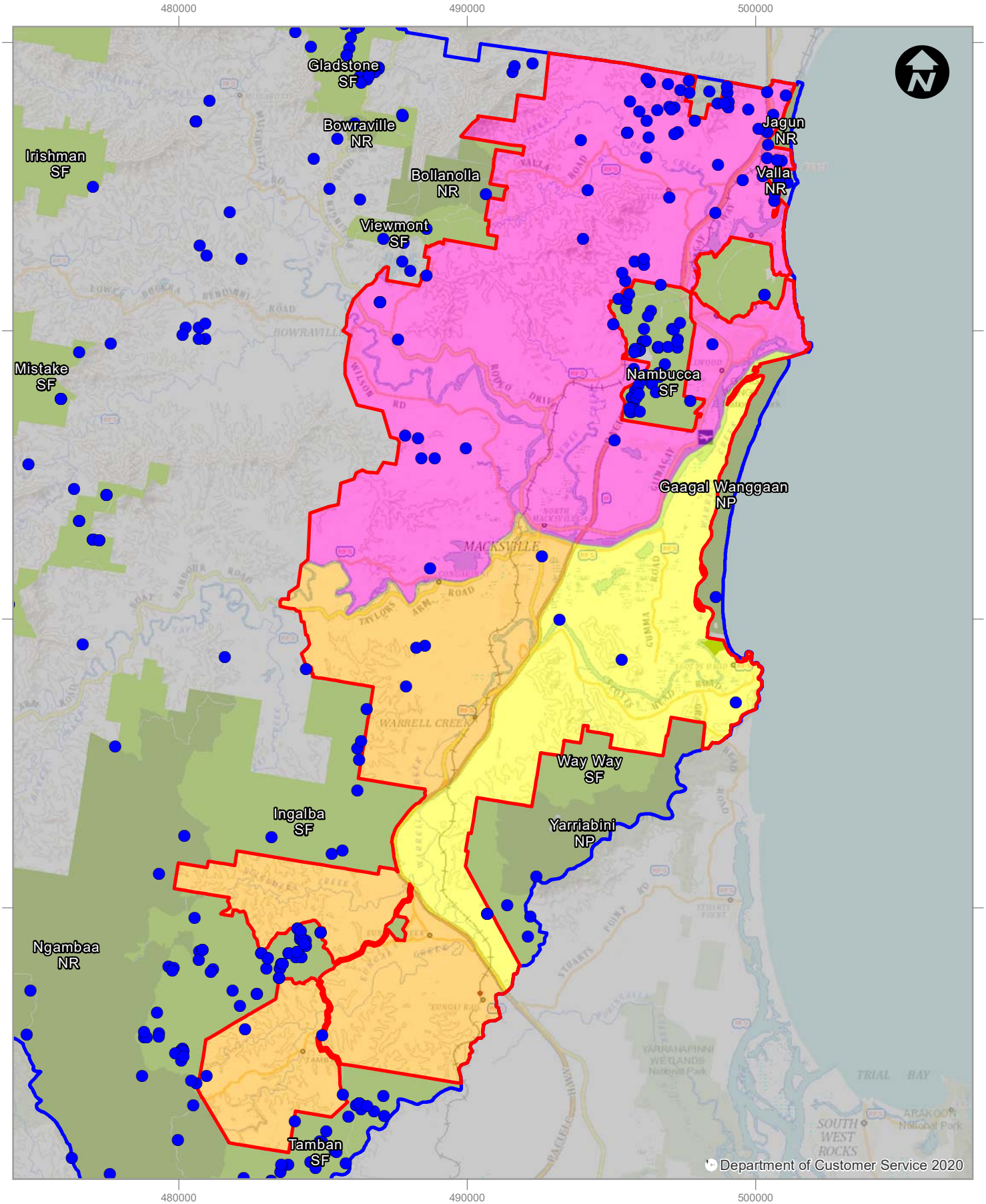
Table 4.3 Koala Habitat Classification

Habitat type	*Definition*
Primary	Vegetation associations and/or communities in which primary food-tree species form ≥50% of the canopy.
Secondary (Class A)	Vegetation associations and/or communities in which: ■ primary food-tree species form 30–50% of the canopy or ■ primary and secondary species combine to form ≥50% of the canopy.
Secondary (Class B)	Vegetation associations and/or communities in which secondary food-tree species form ≥50% of the canopy.

Koala habitat types within the Study Area (based on the 2015 KHS) are shown at **Illustration 4.4**.

4.5 Wildlife Corridors

Modelled fauna corridor mapping (Scotts, 2003) occurs throughout the southern and coastal parts of the Nambucca LGA, however, is absent from large parts of the Study Area (refer **Illustration 4.5**). The absence of modelled fauna corridors is reflective of the highly fragmented nature of forested areas within the Study Area, where mosaics or patchworks of habitat are poorly connected within large areas of cleared land (particularly on the Nambucca River floodplain). A corridor is modelled at the 'bottleneck' between Way Way SF in the east (including Yarriabini NP) and Ingalba SF in the west (where historic koala records occur), in addition to along the coastal strip south of Nambucca heads and at Valla. The Way Way SF corridor may provide some connectivity for animals moving between habitats in the southern portion of the Study Area.



LEGEND

- Nambucca LGA
- Study area
- State Forest
- National Park Estate
- Precinct 1
- Precinct 2
- Precinct 3
- Koala Bionet record

0 3.5 Km

Koala Records - Illustration 4.1

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1007

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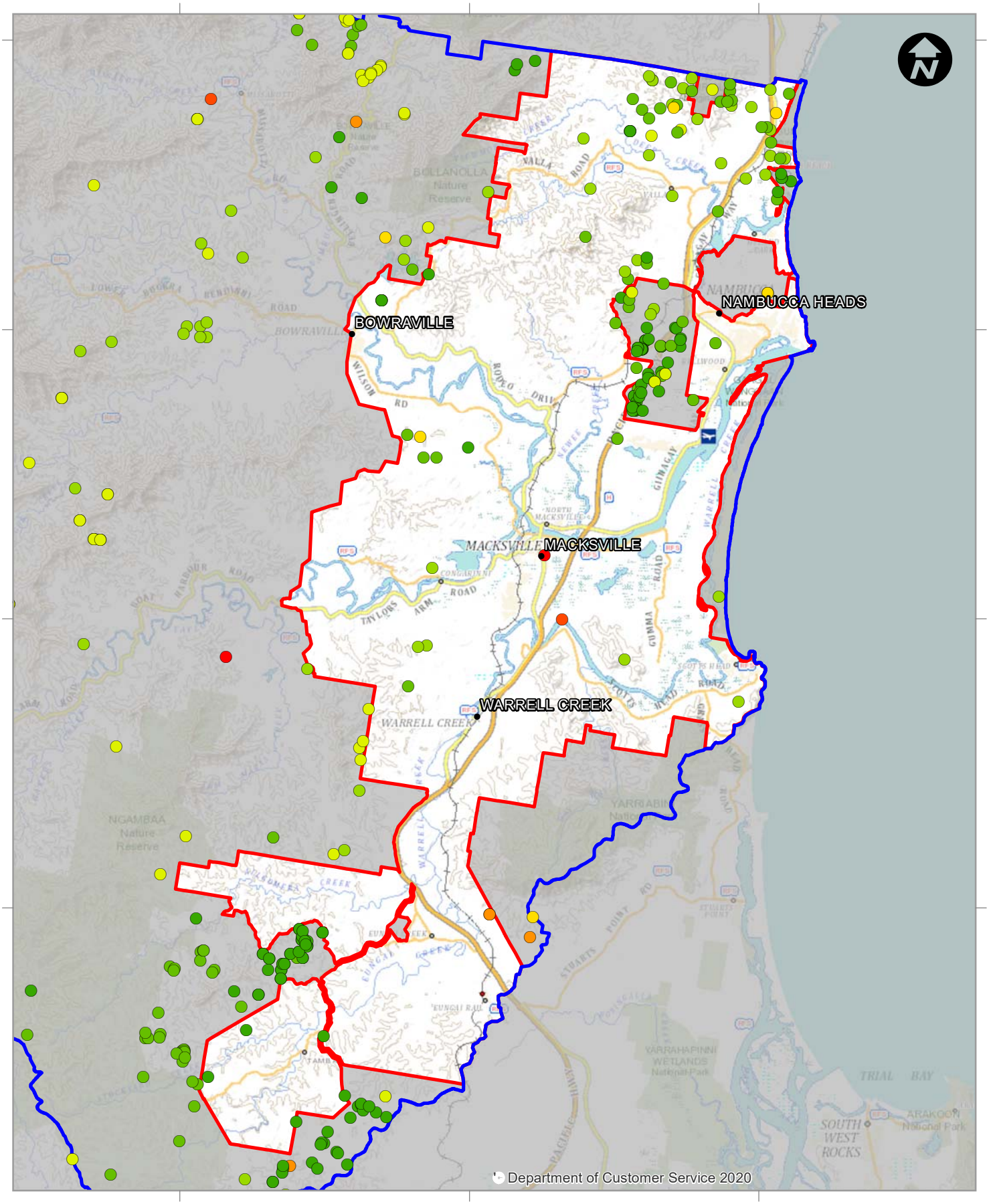

LEGEND

- Nambucca LGA
- Study area

Koala Generational Records

- 2021-2015
- 2015-2009
- 2009-2003
- 2003-1997
- 1997-1991
- 1991-1985
- 1985-1979
- 1979-1973

0 3.5 Km

Koala Generational Records - Illustration 4.2

Koala Management Strategy 2021 - Nambucca Coastal Area
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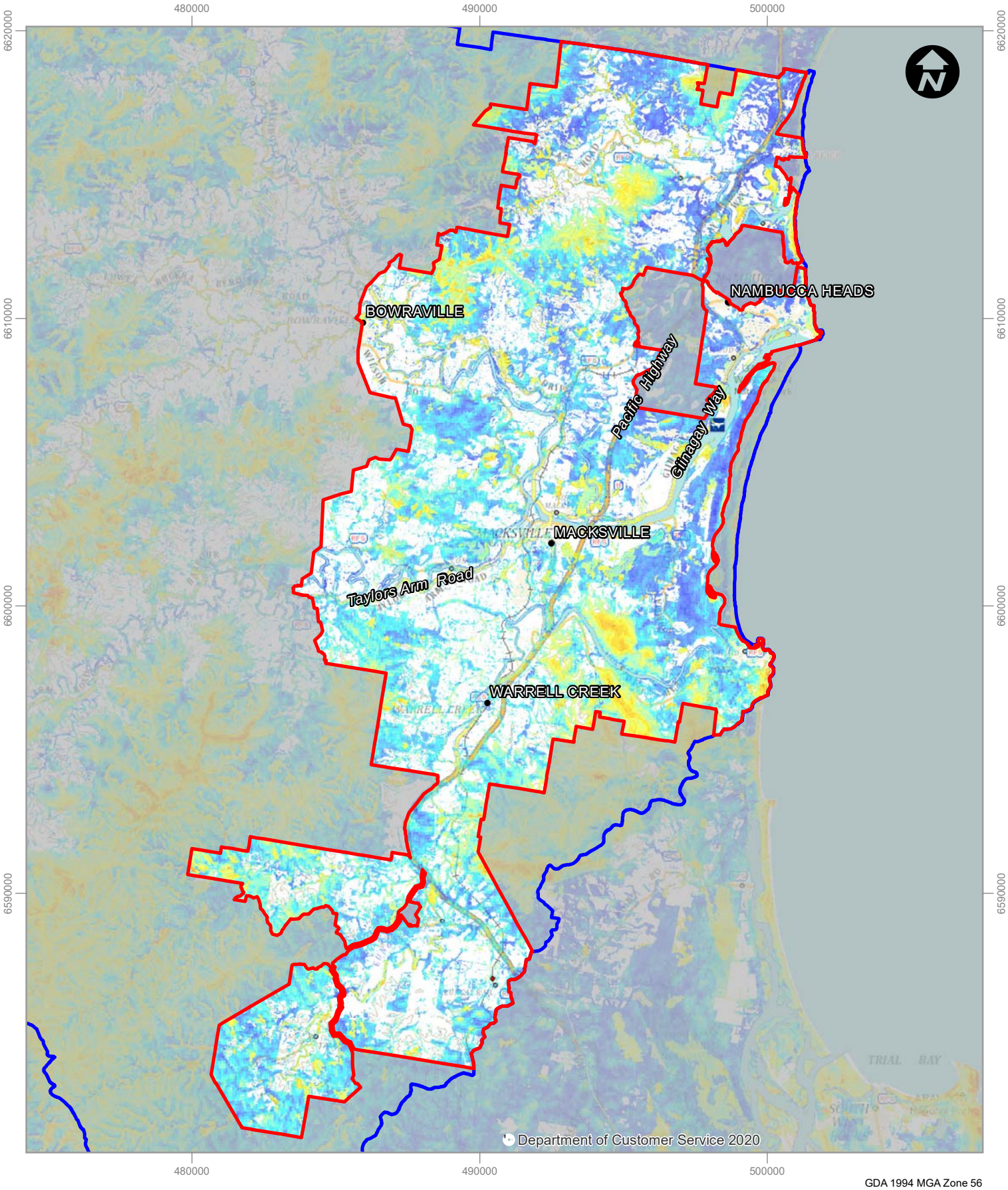

GDA 1994 MGA Zone 56

LEGEND

- Nambucca LGA
- Study area

Koala habitat suitability

- High
- Low

0 3.5 Km

Koala Habitat Suitability Mapping - Illustration 4.3

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3547-1009

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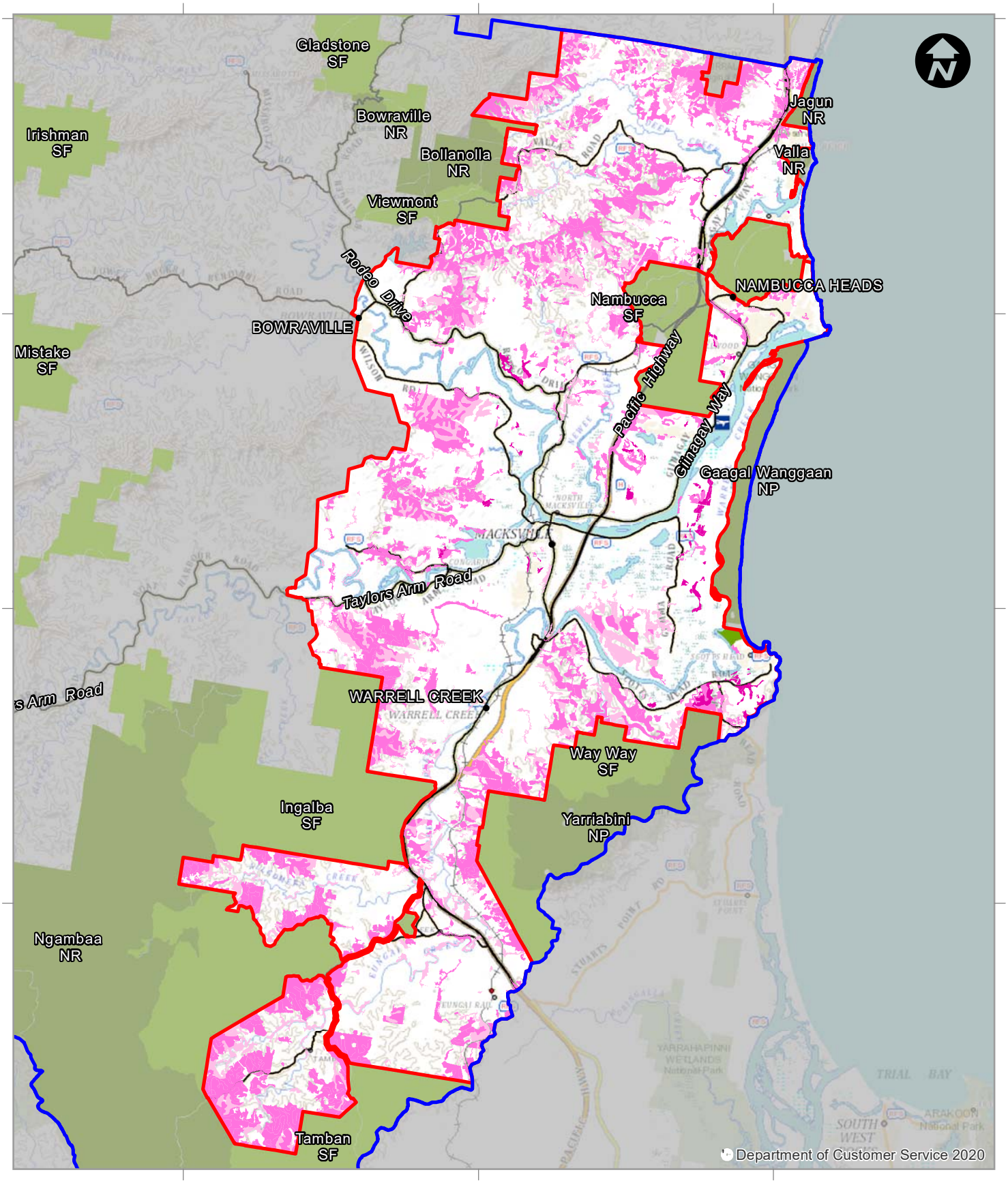

GDA 1994 MGA Zone 56

LEGEND

- Nambucca LGA
- Study area
- State Forest
- National Park Estate

Koala Habitat

- Primary
- Secondary A
- Secondary B

0 3.5 Km

Koala Habitat 2015 - Illustration 4.4

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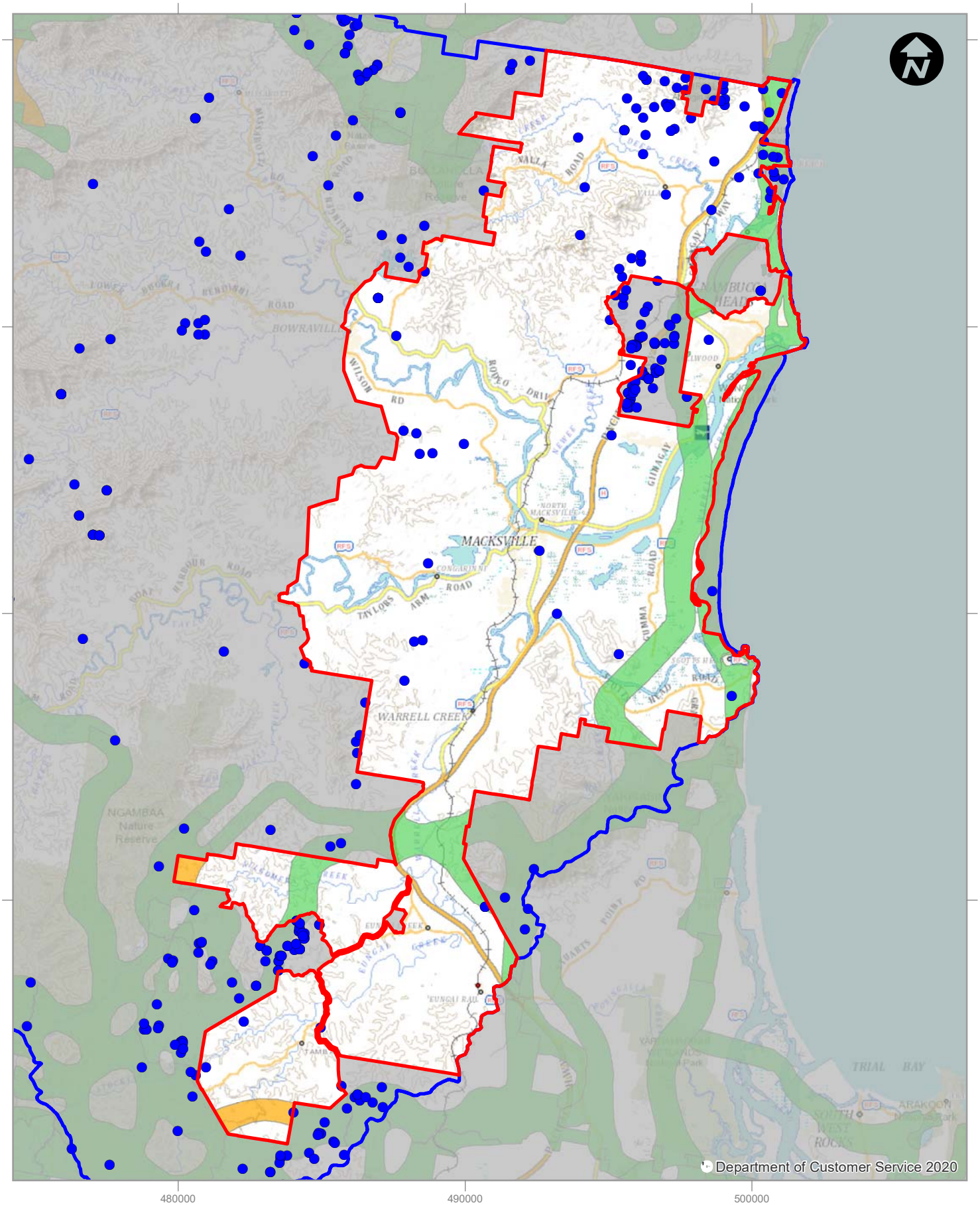

LEGEND

- Nambucca LGA
- Study area
- Regional fauna corridor
- Subregional fauna corridor
- Koala Bionet record

0 3.5 Km

Regional Wildlife Corridors (Scotts 2003) - Illustration 4.5

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1012

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5. Threats

5.1 Introduction

Threats to koalas have been well documented in the scientific literature and are documented in the 2015 KHS. Threats to koalas and their habitats in the Nambucca LGA include habitat loss, habitat fragmentation, barriers effects (limiting dispersal opportunities), roadkill, dog attack, bushfire, disease and (in the longer term) climate change. These threats are discussed in the following sections.

5.2 Habitat Loss

Habitat loss is a key threat to koalas, with substantial areas of land within the Study Area having been historically cleared for agriculture and forestry. Urban and infrastructure development has also significantly contributed to the loss of koala habitat and remains ongoing. Most recently, various upgrades of the Pacific Highway (Warrell Creek to Nambucca Heads [WC2NH], Nambucca Heads to Urunga [NH2U], Frederickton to Eungai [F2E]) have resulted in impacts to forested areas, some of which comprise koala habitat.

While works for the Pacific Highway are now completed, the primary activities likely to impact on koala habitat through habitat removal is urban and rural residential development, agricultural activities, forestry (within State Forests) and Private Native Forestry (PNF). State Forests are exempt from the Study Area and are not covered in this Strategy, however PNF which occurs on private land has capacity to impact on koala habitats and PNF occurs to some extent within the Study Area and the LGA more broadly.

PNF has the capacity to impact koala habitat via clearing operations - which reduce habitat availability (and connectivity) and has potential to impact animals directly from injury or mortality during harvesting. Harvesting operations must be completed in accordance with the PNF Code of Practice for Northern NSW (EPA 2016), with specific prescriptions for koala protection. It is understood the Code of Practice will be amended in the future to align with changes in the Land Management (Native Vegetation) Code 2018 and Koala SEPP 2021. Until these changes are finalised the protections available top Koalas and their habitat in the Code of Practice remains unknown.

5.3 Habitat Fragmentation and Barrier Effects

Fragmentation of koala habitat may result in the loss of connectivity between forest patches, making dispersing animals more vulnerable to predation or roadkill as they move between habitats. Additionally, habitat fragmentation of habitat has the potential to limit koala dispersal as animals need to roam further to access resources.

Barrier effects can similarly limit koala dispersal and may include natural barriers (such as rivers) or structures/installations such as major roads. Recent upgrades to the Pacific Highway have resulted in significant fragmentation of forested habitats within the Study Area. As part of the various Pacific Highway upgrades, a combination of exclusion fencing, and fauna underpasses were installed to limit the potential for koalas being killed by vehicle strike and to allow koalas to move between habitats east and west of the new highway alignment. Various measures to limit barriers effects include:

- Installation of ~18 km of chainmesh fence (1.8 m tall with floppy top feature) designed to exclude koalas (in addition to a range of other fauna species) as part of the WC2NH highway upgrade.
- Installation of 13.6 km of fauna fence as part of the Frederickton to Eungai highway upgrade.
- Design and construction of 18 fauna underpasses (typically concrete culverts, supplemented with timber 'furniture') within the Study Area:

    - Two dedicated fauna underpasses installed as part of the NH2U upgrade (Burkes Lane, Railway).
    - Sixteen dedicated fauna underpasses installed as part of the WC2NH upgrade.

Monitoring of fauna underpasses is a requirement of the various highway upgrade approvals and provides some insights into the functionality and adequacy of these structures. Monitoring for WC2NH in the 2018 - 2019 period (Sandpiper Ecological Surveys 2019) detected koalas using underpasses on numerous occasions. In spring/summer, cameras detected koalas making 15 complete crossings of the carriageway across four sites. In winter, cameras detected a koala making a complete crossing at one site. One underpass was the most regularly used underpass with 11 complete crossings recorded in year one of the operational phase of the highway. Koalas were recorded moving both east and west.

Monitoring data for the 2019 - 2020 period for the NH2U recorded a koala on the western side of the Burkes Lane underpass in spring of 2019, following a complete crossing of the structure using installed fauna furniture (Sandpiper Ecological Surveys 2020).

Monitoring data to date is encouraging and indicates that koalas readily use constructed underpasses within the Study Area. Giinagay Way in the north-east of the Study Area (part of the old Pacific Highway connecting Nambucca Heads to North Macksville) represents a larger road which may present barrier effects, however the extent of these on koalas are unknown. Other roads within the Study Area are significantly smaller in scale and likely to result in reduced barrier effects.

5.4 Roadkill

WIRES data was obtained from the period of January 2017 to April 2019, with a total of 77 carer call out records during this time. Of the 77 records, eight were confirmed as roadkill ('hit by car'). However all these incidents occurs within Coffs Harbour LGA. In previous WIRES datasets reviewed for the original Strategy (July 2005 – March 2013), only one roadkill Koala was recorded. These results (in total) more likely reflective of low reporting records combined with the high possibility that roadkill animals are not found.

Koala monitoring reports completed for the WC2NH Pacific Highway upgrade for the period 2017 - 2020 did not record any roadkill Koalas, presumably due to the substantial installation of fauna exclusion fencing along much of the highway alignment (RMS 2019, RMS 2019, TfNSW 2020).

Giinagay Way poses a roadkill risk to koalas, particularly as Macksville and Nambucca grow and vehicle movements between towns increase. A koala roadkill was recorded on this road during the W2NH construction period and the road occurs in close proximity to habitat within Nambucca SF.

On the basis of this information, it appears that roadkill may be a relatively low- moderate risk for Koalas in the Study Area, however this is speculative, and data is poor.

5.5 Dog Attack

Koalas may be attacked by both domestic and roaming/wild dogs, causing injury or death. As noted, the potential for vulnerability to dog attack may be increased by factors such as habitat fragmentation where koalas need to cross open ground to move between habitats. WIRES data (to April 2019) does not list dog attack as a cause for injury or death. However, it is likely that dog attacks on koalas may be unreported and injured or killed animals are not found or observed. While the extent of the threat of dog attack on koalas in the Study Area is unknown, it remains a risk best addressed via enforcement of the requirements of the *Companion Animals Act 1998* and through education of the community on issues of responsible pet ownership. Where new developments are proposed adjacent to or within areas of known koala habitat, alternative solutions such as a prohibition on dogs could be considered, or development design could use wildlife fencing to separate koala habitat from development areas.

5.6 Bushfire

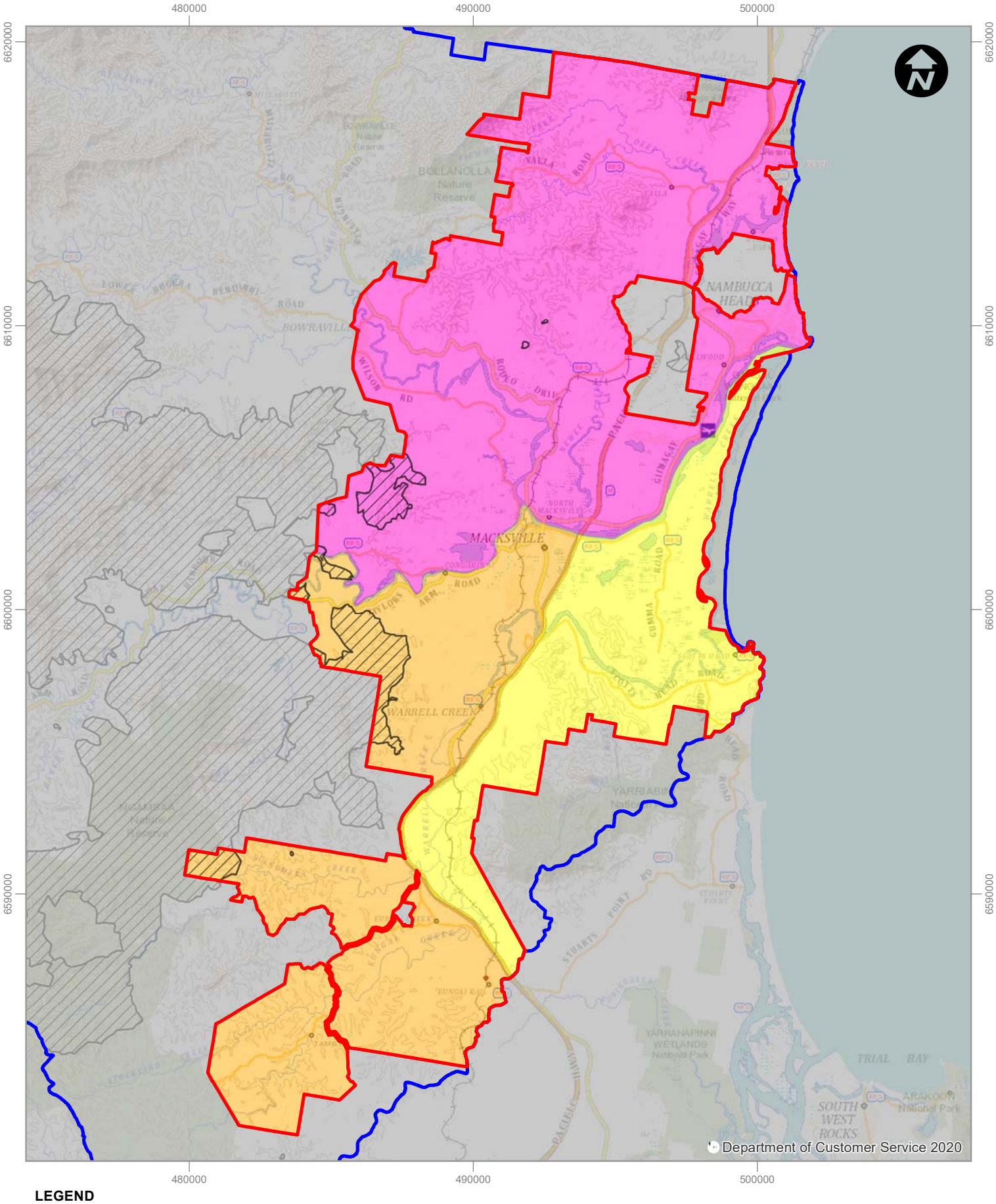
Bushfires (whether wildfires or hazard reduction burns) can significantly affect koala habitat from destruction and fragmentation, reducing availability of food and shelter resources and affecting animals directly via death, smoke inhalation, dehydration and injury. The 2019 bushfires significantly affected large areas of forest in the central portion of Nambucca LGA, where 37,236 ha of State Forest, NPWS reserve and private land were affected. It is likely that significant areas of koala habitat were affected by the fires and that many animals may have been killed. While the specific impacts of the fires on various koala populations within the Nambucca LGA is not known, DPIE (2020) post-fire Koala surveys in north-east NSW found that Koalas persisted to varying levels in all their target study areas.

Within the Study Area, bushfire impacts were relatively low, affecting approximately 1,217 ha, mostly associated with Ingalba SF and some areas of private land in the western portions of KMP 1 and 2 (refer **Illustration 5.1**). Burnt areas generally correspond with fragmented areas of Secondary (A) Koala habitat, with areas of core koala habitat unaffected. The impacts of the 2019 bushfires on areas of koala habitat within the Study Area is unknown.

While wildfires are unpredictable and can have catastrophic consequences, hazard reduction activities within State Forests, NPWS estate and private land may also pose a bushfire risk where fires can jump property boundaries and impact neighbouring land.

5.7 Disease

Disease, particularly chlamydia, is currently a serious threat to certain koala populations across New South Wales (NSW Legislative Council 2020). Chlamydia causes infertility (and eventually death) in koalas and may disproportionately affect some koala populations. For example, in Lismore LGA, the single greatest cause of koala deaths is due to disease. WIRES data (January 2017 - April 2019) confirmed 23 Koalas (of 77 call outs) affected by chlamydia, with the majority of these animals having to be euthanased. Disease is likely linked to Koala stress with may be caused by environmental and anthropogenic stressors (such as habitat disturbance, noise, lighting and dogs) associated with forestry and urban development.



LEGEND

- Nambucca LGA
- Study area
- Precinct 1
- Precinct 2
- Precinct 3
- Bushfire extent

0 3.5 Km

2019 Bushfire Impact Area - Illustration 5.1

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Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1013

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5.8 Summary

A summary table showing the various existing threats to koalas and their habitat is provided at **Table 5.1**. Threats are noted in terms of risk probability and opportunities for mitigating risk are also nominated. It should be noted that future development which reduces koala habitat, or the viability/connectivity of habitat may have a cumulative impact over time and increase threats at a local scale.

Table 5.1 Summary of Existing Threats to Koalas

Threat	*Risk within Study Area*	*Mitigation*	*NVC Role in Regulation/Enforcement?*
Habitat loss	High (urban/rural development and PNF)	Development controls for DAs.	Yes
Habitat fragmentation/barrier effects	Moderate	Existing mitigation as part of the Pacific Highway Upgrade. Development controls for DAs.	Yes (DAs only)
Roadkill	Low - Moderate (in certain locations on higher traffic roads)*	Existing mitigation as part of the Pacific Highway Upgrade. Traffic control along Giinagay Way (subject to investigation). Development controls for DAs.	Yes (DAs only)
Dog attack	Low (possibly higher in peri-urban areas and not reported)*	Public education, particularly for new residential estates. New estate designs to avoid conflicts; prohibitions on dogs in new subdivisions within or adjacent to occupied koala habitat.	Yes (DAs only); enforcement of *Companion Animals Act 1998*
Bushfire	Moderate	Strategic bushfire hazard reduction planning.	No
Disease	Low (?)*	Research and care facilities.	No

* data lacking

6. Future Development

6.1 Introduction

NVC have prepared a Local Strategic Planning Statement (LSPS) to provide a future vision for the Nambucca Valley. The LSPS has been prepared to comply with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), which requires that all NSW councils must prepare a local strategic planning statement. The LSPS addresses land use planning on matters such as housing, employment and environmental management and sets out the strategic basis for Council's land use planning in the coming 20 years to 2040. Some of the Planning Priorities in the LSPS relating to the environment and which are of relevance to this Strategy include:

- *The vegetation, biodiversity and habitats of the Nambucca Valley will be protected and enhanced to support sustainable, diverse and abundant wildlife populations.*
- *Access to environmental areas will be managed to provide safe, peaceful and beautiful places to learn and enjoy for current and future generations.*
- *Landscaping in built environments and public domain which promote visual relief, comfort, shade and urban habitat.*

A number of environmental actions are prescribed in the LSPS (including the preparation of this Koala Management Strategy). Actions relevant to this Strategy include:

- *Prepare and implement a Biodiversity Management Strategy to ensure the strategic management of the natural environment of the Nambucca Valley.*
- *Support reserve development, acquisition and protection of sensitive natural areas and support landholders to protect or rehabilitate natural areas, including promotion of the various mechanisms to encourage protection of biodiversity values on private tenure, such as 'land for wildlife' or 'biobanking'.*
- *Review and implement responses to Bushfire Management and Planning for Bushfire Protection as required by the state government.*
- *Monitor and survey sensitive ecosystems and species. As necessary prepare more specific management actions or programs for these sensitive landscapes, habitats or species.*

6.2 Nambucca Valley - Future Growth

As noted in the LSPS, the Estimated Resident Population (ERP) of the Nambucca Valley LGA at the 2016 census was 19,212 people; an increase of approximately 0.6% per annum since the previous census in 2011. In the 20 years from 2016 – 2036, the average rate of growth in the LGA is expected to slow slightly to approximately 0.2% per annum (approx. 50 additional people/annum). The North Coast Regional Plan (NCRP) 2036 projects a population of 20,850 residents within the LGA, with a projected 11,150 dwellings.

As noted in the LSPS, areas of residential and village zoned land includes many vacant land parcels which have subdivision or development potential. NVC has identified urban release areas totalling approximately 405 ha of potential residential land with capacity for approximately 4500 dwellings (based on a density of around 11 dwellings/ha). Urban growth areas identified in the NCRP are shown at **Figure 6.1**.

Unsurprisingly, future urban growth is closely associated with the main townships in the LGA - Nambucca Heads and Macksville. Coastal areas including Valla, Valla Beach and Scotts Head are also designated growth areas, however some of these areas have already been substantially developed (e.g. Valla Beach).

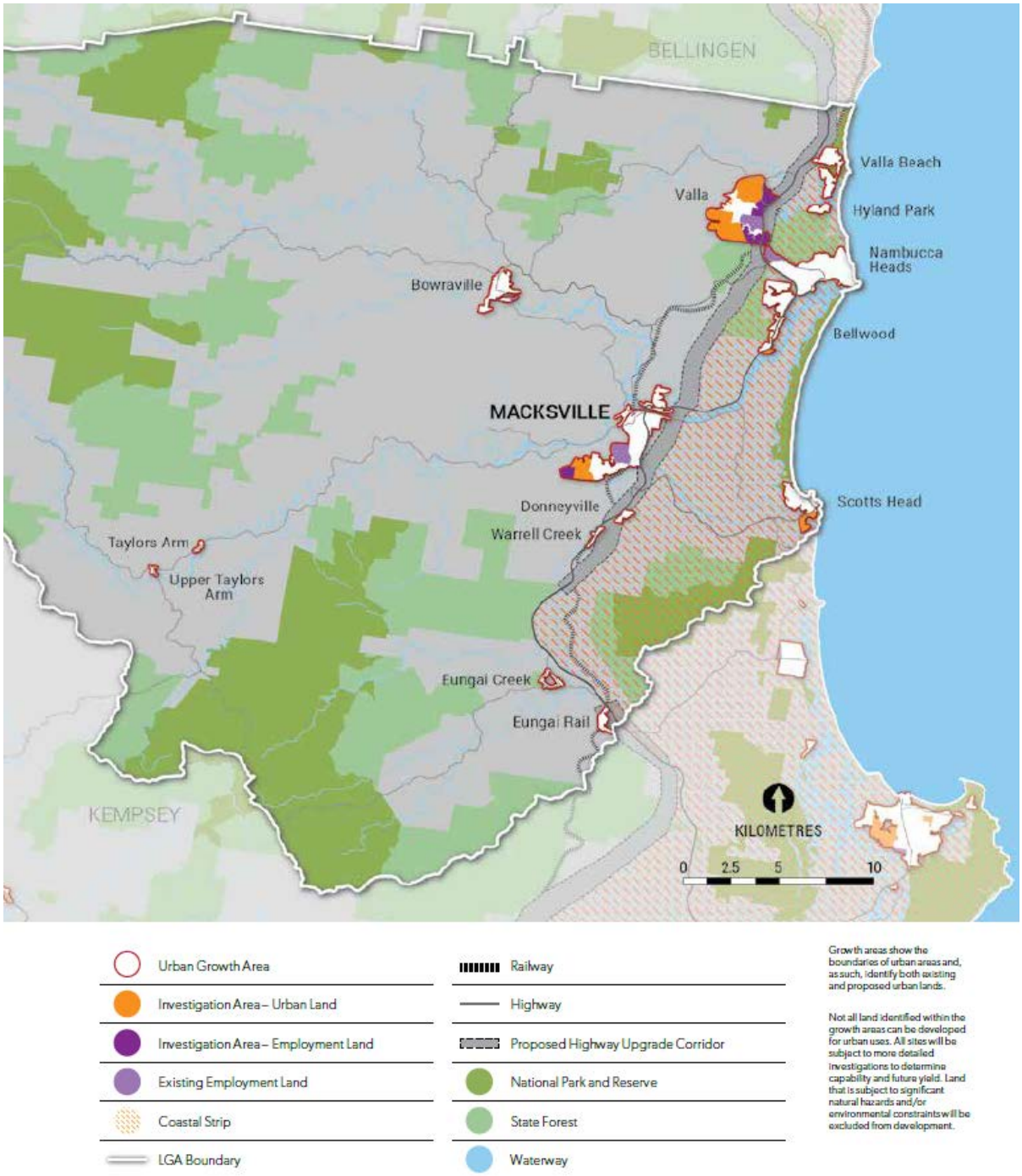


Figure 6.1 Urban Growth Areas in Nambucca Valley LGA

(Source: North Coast Regional Plan 2026)

West of the Pacific Highway, urban growth is also projected to a lesser degree at Bowraville Eungai Creek/ Eungai Rail and Taylors Arm/Upper Taylors Arm.

Low-density housing occurs within several existing rural residential subdivisions in the Nambucca Valley, including land at Valla, Bowraville, Nambucca Heads, Macksville, Newee Creek, Scotts Head and Eungai. The LSPS notes that the existing supply of rural residential land is substantial and releasing additional rural residential land is not a matter of priority. In this regard, the Nambucca Shire Rural-Residential Land Release Strategy (2009) noted that 7,150 hectares of land identified for rural residential purposes occurred within the Shire (as at 2009), with a further 1,237 ha identified for potential rural residential purposes in the future. The Rural-Residential Land Release Strategy notes that:

> *Sea changers and tree changers are likely to change the demand for rural residential allotments over coming years. In addition, the increasing lack of small rural allotments will see a slight increase in the demand for rural residential allotments as these rural allotments are built on, however this is expected to be negligible.*

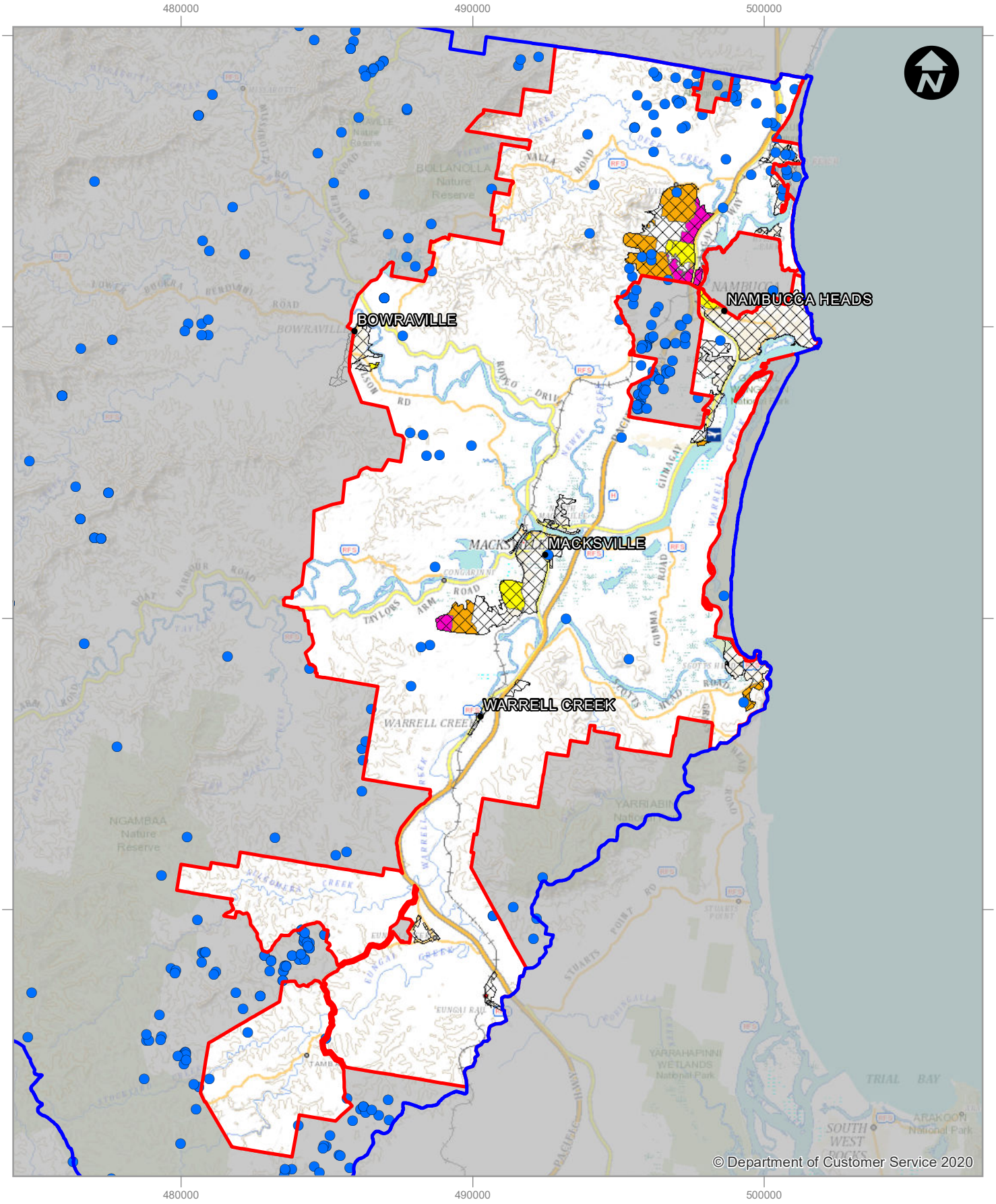
In summary, future growth within the LGA may include:

- Capacity for 2500+ lots in existing zoned residential land (including part of the Valla Urban Growth Area);
- Capacity for 4 500 dwellings in Future Growth Areas; and
- ~3500 ha of Potential Rural Residential land (Note: based on 2011 data; some of this land has since been developed/ released).

Illustration 6.1 shows BioNet koala records and urban growth areas and indicates future urban growth in the north of the Study Area (KMP 1) around Nambucca Heads and Valla is where koala activity is most concentrated. Koala habitat mapping for urban growth areas has been completed for Precincts 1 and 2 (refer **Illustration 6.2**) and indicates the presence of koala habitat in various sites (refer to summary at **Table 6.1**). Scotts Head growth area in KMP 3 is not mapped or discussed further due to there not being an active koala population east of the Pacific Highway.

Table 6.1 Koala Habitat within Urban Growth Areas - KMP 1 & 2

Urban Growth Area	*Precinct*	*Koala habitat*
Valla Beach (north)	KMP 1	Small area of primary habitat, Secondary A habitat in west and adjacent to railway line
Valla Beach (south)	KMP 1	Isolated area of Secondary A habitat in west
Hyland Park	KMP 1	Small and isolated area of Secondary A habitat
Valla	KMP 1	Scattered and fragmented patches of Secondary A and B habitat, particularly in the north-west and south
Nambucca Heads	KMP 1	Small area of primary habitat, Scattered and fragmented patches of Secondary A and B habitat
Bellwood	KMP 1	Several fragmented areas of area of primary habitat, two well connected patches of patches of Secondary A and habitat, minor area of Secondary B habitat
Bowraville	KMP 1	Small area of Secondary B habitat
North Macksville	KMP 1	Small area of Secondary B habitat
Macksville	KMP 2	Small area of primary habitat, Scattered and fragmented patches of Secondary A and B habitat, with a substantial area of Secondary B habitat in the south
Warrell Creek/Donnellyvile	KMP 2	Mapped habitat absent
Eungai Creek/Eungai Rail	KMP 2	Mapped habitat absent



LEGEND

- Nambucca LGA
- Study area
- Urban growth area
- Existing employment land
- Investigation area - employment land
- Investigation area - urban land
- Koala Bionet record

0 3.5 Km

Urban Growth Areas and Koala Records - Illustration 6.1

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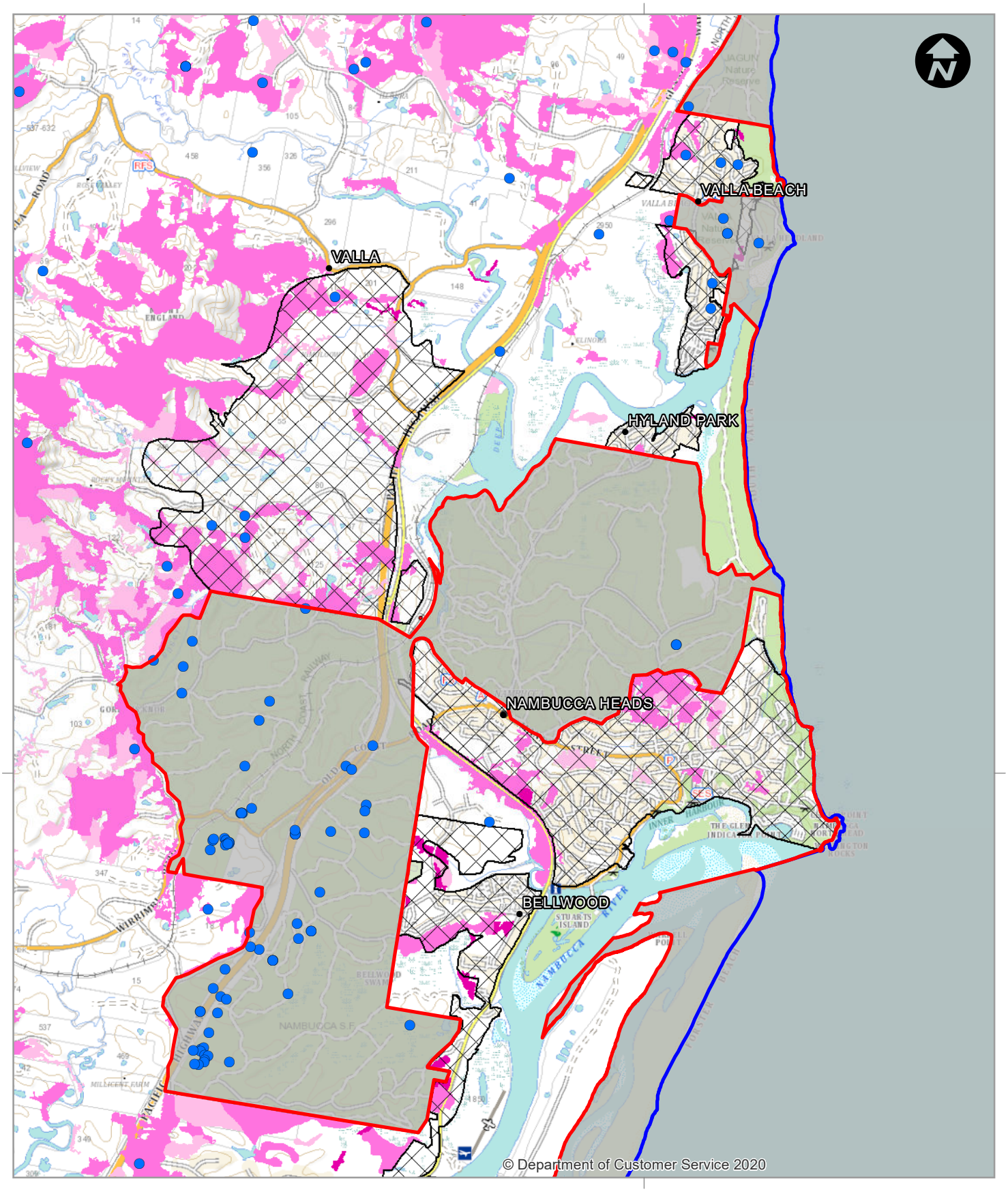

LEGEND

- Nambucca LGA
- Study area
- Urban growth area

Koala Habitat

- Primary
- Secondary A
- Secondary B

- Koala Bionet record

0 1 Km

Urban Growth Areas and Koala Habitat Mapping
Nambucca / Valla Area - Illustration 6.2.1

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Koala Management Strategy 2021 - Nambucca Coastal Area
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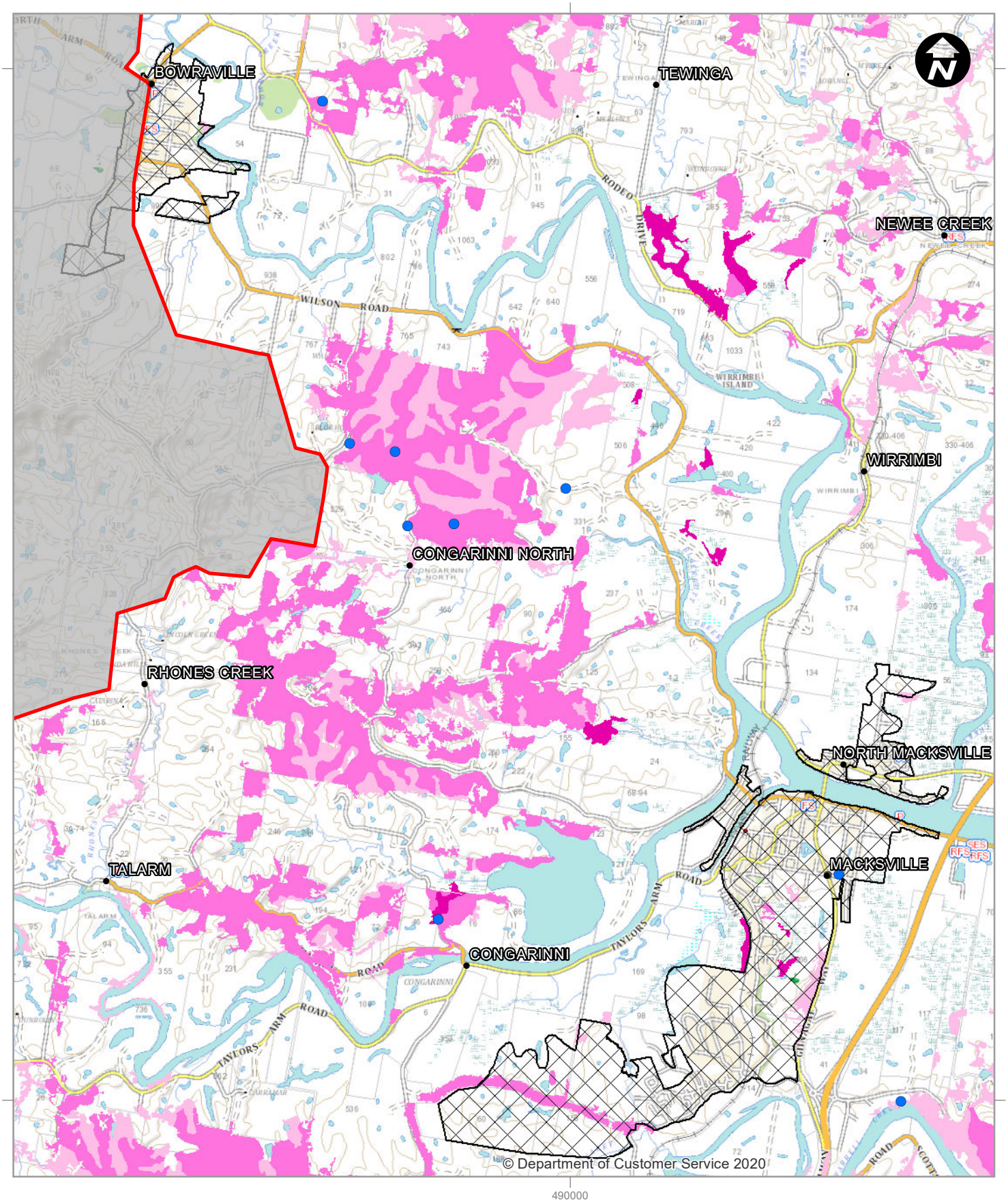

LEGEND

- Nambucca LGA
- Study area
- Urban growth area

Koala Habitat

- Primary
- Secondary A
- Secondary B

- Koala Bionet record

0 1 Km

Urban Growth Areas and Koala Habitat Mapping
Bowraville / Macksville Area - Illustration 6.2.2

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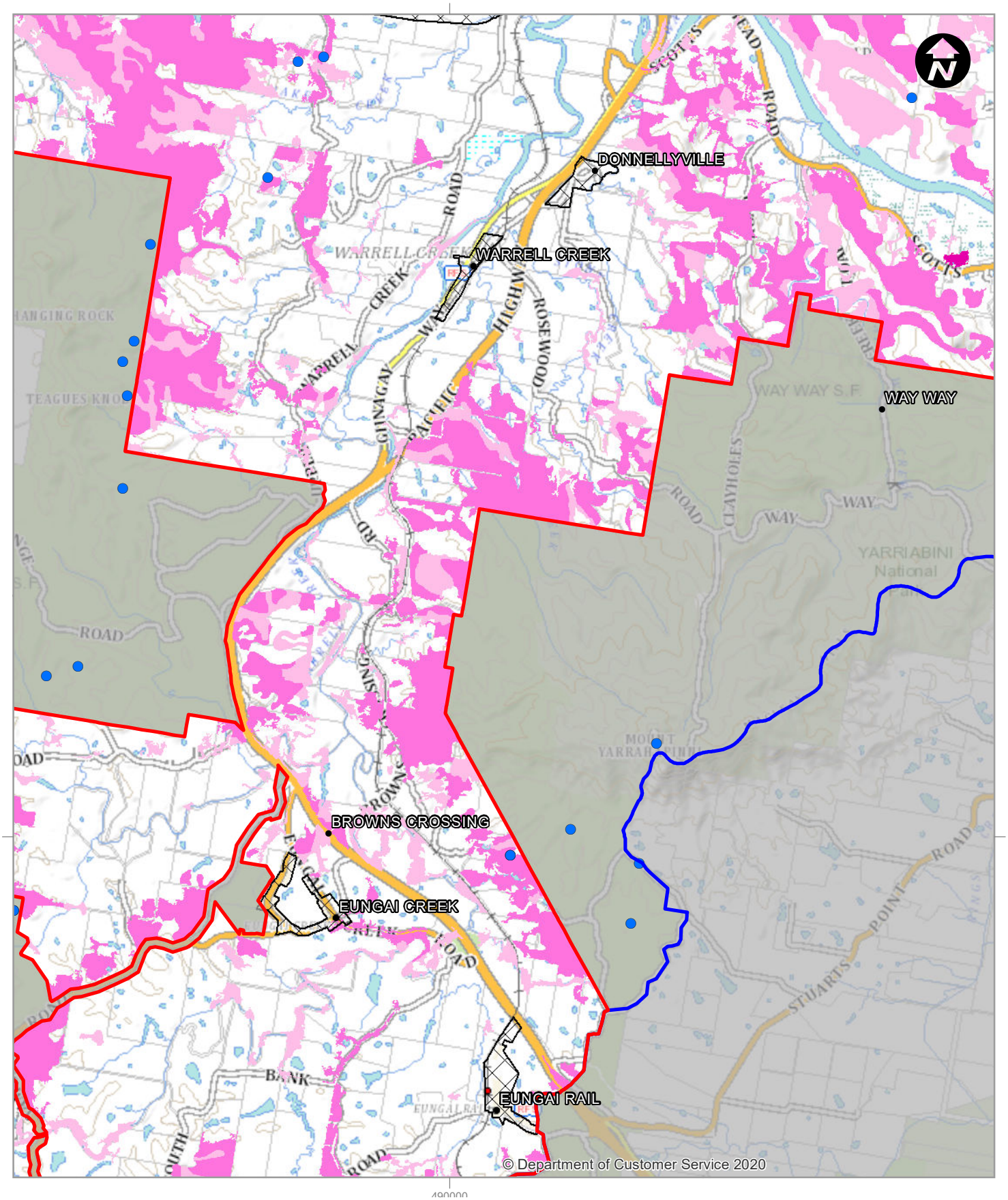

LEGEND

- Nambucca LGA
- Study area
- Urban growth area

Koala Habitat

- Primary
- Secondary A
- Secondary B

- Koala Bionet record

0 1 Km

Urban Growth Areas and Koala Habitat Mapping
Warrell Creek Area - Illustration 6.2.3

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Date: 30/06/2021

7. Development Assessment

7.1 Introduction

Currently there are no Council instruments, policies or guidelines which 'call up' the 2015 KHS and require any development applications to consider its findings. On this basis, Koala impacts which may be incurred via the development process are only addressed under existing NSW legislation - principally the *Biodiversity Conservation Act 2016* and SEPP Koala Habitat Protection 2021.

In addition, Council's Development Control Plan (DCP) does not have any built in protection mechanisms which may be relevant to koalas such as a Tree Protection/Preservation Order (TPO) which must be addressed via the Development Application (DA) process. Rather, the DCP requires that *"…existing trees and riparian vegetation are to be retained and preserved wherever practicable"* and any proposed clearing of vegetation should have regard to the following principles:

- *prevent land degradation and minimise soil erosion and siltation of waterways*
- *retain mature trees, native vegetation and hollow bearing trees*
- *retain a variety of native species on the site*
- *minimise impact on threatened species and their habitat*
- *maintain the scenic and visual quality of the locality*
- *retain trees on prominent ridgelines and knolls*
- *retain trees and other vegetation in gullies and steeper slopes to prevent erosion*
- *retain a variety of forest tree species that are representative of the area*
- *conserve and maintain stands of remnant mature forests and significant individual trees such as large fig trees and flooded gums, and stands of remnant forest species*
- *maximise use of native and locally occurring native species within new developments.*

The DCP advises that applicants refer to relevant State or Commonwealth legislation that may impact on land clearing.

Council has a policy that addresses removal of trees on public land, enabling members of the public to submit requests to Council for removal of public trees. This is made by completing the application form for Tree Removal/Pruning on Public Land and submitting the application to Council. It is noted that tree removal will not be support by Council for minor matters such as view impacts, interfering with television reception, shading a house or dropping leaves.

This Strategy aims to provide some clarity around consideration of Koalas as part of any development applications, and the information in this Strategy would be incorporated into a revised version of the DCP with clear direction on how potential impacts to Koalas and their habitat are minimised and managed. This information would be underpinned by having reference habitat maps available on Councils website.

The final recommendations in the 2015 KHS are worthy of review to ensure a consistent approach has been completed with regard to koala management (refer to **Table 7.1**). Preparation of this KMS is a step towards addressing many of these issues in terms of incorporating statutory protection measures and examining opportunities for further community education and research.

Table 7.1 Review of Recommendations in the 2015 KHS

Recommendation	*Comment*
KMP 1: Management of this population on private land will require a moderate to high level of intervention, including statutory controls to effectively limit any further habitat clearing or fragmentation, and other measures such as reducing potential threats affecting koalas including control and management of dogs and road strike. It is also important to encourage the establishment and enhancement of koala habitat, including in key corridors. Landholder education, awareness, involvement and support are critical to the long-term viability of the koala population in this area.	Statutory controls to be developed for incorporation into the DCP. Community education resources to be developed and communicated via Council's website. Some resources could be targeted at particular townships where koalas are established (e.g. around Valla).
KMP 2: Management in this mostly rural area requires a coordinated approach from Nambucca Shire Council and other government agencies to promote the recovery of a viable free ranging koala population. Landholder involvement and support will be a critical component of the management of koalas and their habitat in this precinct. Further surveys to identify areas of core koala habitat should be undertaken on lands adjoining public forested lands within the catchments of the Eungai and Allgormera Creeks.	Statutory controls to be developed for incorporation into the DCP. Additional surveys subject to future funding/resources.
KMP 3: Further research and monitoring is required to establish if any isolated koala populations remain in this area. This should include promotion of landholder education and awareness and a community-based koala reporting system to council.	Additional surveys subject to future funding/resources. Community education resources to be developed and communicated via Council's website.
Identify key issues and spatially target koala recovery and management actions in the preparation of a Comprehensive Koala Plan of Management for the coastal part of the Nambucca LGA (the koala habitat study area of this report). The primary objective of this plan should be the recovery and management in perpetuity of a free-ranging koala population across the area by way of habitat protection, rehabilitation and restoration (linkages), reduction of threats, community education and awareness and appropriate management of koala welfare and health.	Partly addressed by the preparation of this KMS.
Subject to funding and resources, further surveys (both community and field surveys) and data analysis should be undertaken in KMPs 2 and 3 to better understand and describe the distribution and status of any koala populations in these areas.	Additional surveys subject to future funding/resources.
Council should work with landholders, government agencies and departments and the general community to promote the protection and management all Primary, Secondary (Class A) and Secondary (Class B) koala habitat mapped in the 2015 KHS.	Community education resources to be developed and communicated via Council's website. Engagement with NVL to promote this recommendation; seek opportunities for future funding/grants.
The areas mapped as core koala habitat within the meaning of State Environmental Planning Policy 44 – Koala Habitat Protection (Map 8) should be a key focus for Nambucca Shire Council in promoting koala habitat protection, management of threats, habitat regeneration and establishment of corridors, including seeking landholder support through targeted awareness, education and funding opportunities.	Future action, depending on the final outcome of Koala SEPP 2021.

7.2 Overview of Development Process

Council is the consent authority for any formal development application within the LGA and may apply any relevant provisions within the DCP or other guidelines/policies. By virtue of Schedule 1 of the Environmental Planning and Assessment Regulation 2000, a Statement of Environmental Effects (SEE) must be submitted indicating the environmental impacts of the development to support a DA and must also address a suite of other relevant legislation. With regard to impacts on Koalas, relevant legislation includes the BC Act, EPBC Act and Koala SEPP 2021.

There are several other activities which may occur within the Study Area which may have impacts on koalas and/or their habitat which do not require Council approval/consent (refer **Table 7.2**). While Council may have no (or little) authority over these matters, it is important to recognise these potential impacts as part of a broader view of threatening process to koalas within and adjacent to the Study Area.

Table 7.2 Potential Activities within the Study Area which may impact Koala Habitat

Activity	*Relevant legislation*	*Council approval required?*
Part 5 Approvals (development permitted without consent)	Part 5 of the *Environmental Planning and Assessment Act 1979* in conjunction with State Environmental Planning Policy (Infrastructure) 2007 and/or another Environmental Planning Instrument	Only where Council is the relevant public authority.
Tree removal for electricity works	*Electricity Supply Act 1995*	No
Private Native Forestry (PNF)	*Local Land Services Act 2013*	Only in instances where PNF is proposed on land where consent is required as per the zoning tables in the Nambucca Local Environmental Plan 2010.
Agricultural activities	*Local Land Services Act 2013*	No – for exempt agricultural activities identified in the legislation in rural zones.
Forestry (within NSW State Forests)	*Forestry Act 2012*	No
Bushfire Hazard Reduction	*Rural Fires Act 1997*	No
Tree Removal/Pruning on Public Land	NVC Policy	Yes – for members of the public seeking removal of trees on public land.
Tree removal in non-rural zones	N/A	Council does not have a Tree Preservation Order and vegetation removal outside rural zones may not require approval of Council.

7.3 DA Requirements

A framework must be developed that requires any Development Applications within the Study Area to consider potential impacts on Koala habitat. Any DAs where Council is the consent authority must consider the following matters:

- Whether the site is within areas supporting an active koala population (i.e. KMP 1 and 2 - refer **Illustration 4.1**) where mapped Koala Habitat occurs.
- Whether the proposal requires the removal of native vegetation
- Whether native vegetation at the site is a preferred vegetation type which comprises koala habitat (as per the 2015 KHS)
- If the proposal may potentially result in threats to koalas or their habitat (either directly or indirectly).

In the event that any of these matters apply, a Koala Assessment Report (KAR) would be required as part of the development application. This development assessment framework is further discussed in **Section 7.4**.

7.4 Development Assessment Framework

7.4.1 Introduction

The development assessment framework for koala assessment will require that proponents submitting development applications consider impacts on koala habitat, strategically plan around impacting koala habitat, and where impacts are not avoided, compensation is provided. Only development applications submitted under part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) will be subject to the development assessment framework requirements.

This approach has been taken with the *Bellingen Coastal Area Koala Management Strategy* (Bellingen Shire Council 2017) in neighbouring Bellingen Shire and is a useful model to apply to the Study Area, particularly as Koala habitats and preferred food trees are consistent, and linkages occur between koala habitats in both shires. The approach for development assessment also broadly aligns with the approach established in SEPP Koala Habitat Protection 2021.

Matters to consider in the framework are discussed in **Table 7.3** and include reference to other strategies and policies where relevant.

For the purpose of the KAR, the following definitions apply:

- 'Preferred koala habitat' refers to mapped koala habitat in the Primary, Secondary (A) or Secondary (B) classes identified in the 2015 KHS (refer to **Illustration 4.1**).
- 'Preferred koala food trees' [PKFT] refers to tree species listed in **Table 4.2** and includes: Forest Oak, Flooded Gum, Tallowwood, Small-fruited Grey Gum, Swamp Mahogany, Sydney Blue Gum and Forest Red Gum.

Table 7.3 Koala Assessment Matters - Development Assessment Framework

Matter	*Response*
Where will the Development Assessment Framework for koalas apply?	Only areas of preferred koala habitat within the Nambucca Coastal Area within KMP 1 and 2 (refer **Illustration 7.1**) require consideration. Preferred koala habitat refers to mapped koala habitat in the Primary, Secondary (Class A) or Secondary (Class B) classes identified in the 2015 KHS. KMP3 in the south east of the Study Area does not support a known koala population and so is exempt from consideration.
What will trigger entry to the koala assessment framework?	Where development proposals impact upon native vegetation within mapped areas of Koala habitat, AND Where the subject allotment is > 1 ha in area (consistent with Koala SEPP 2021).
How will koala habitat be assessed?	By preparation of Koala Assessment Report (KAR) by a person suitably qualified in ecology or koala assessment.
What will a KAR require?	The contents of the KAR will be consistent with those in Koala SEPP 2021 (refer **Appendix D**). The KAR will also require the qualified person to complete suitable field assessment to determine koala usage at the site. The KAR will also require that: ■ A development approach to 'avoid and minimise' impacts to koalas and their habitat has been considered, including both direct (e.g. habitat loss) and indirect impacts (e.g. potential for increased roadkill, inaccessibility of habitat from boundary fencing) ■ Compensation is required where impacts on koala habitat occur.
How will Council determine whether a KAR is adequate?	Council will assess the KAR if satisfied that the proposal: ■ is located, designed, constructed and managed to avoid adverse impacts on koala food trees and/or preferred koala habitat, or ■ if adverse impacts to koala food trees or habitat cannot be avoided, development does not result in any overall net loss of koala food trees and/or preferred koala habitat.

7.4.2 Koala Assessment Requirements

Field assessment to support the KAR will be required to demonstrate investigations of koala habitat are adequate. While various methods of targeted koala field survey are practiced, one standardised methodology is generally prescribed: the 'Spot Assessment Technique' ('SAT'; Phillips & Callaghan 2011). While this methodology is widely practiced and easy to implement, adoption of other scat-based survey methods may also be appropriate (e.g. Woosnam-Merchez et al. 2012). This includes Koala detection dog surveys. Adoption and use of these methods can be based on guidelines to support Koala SEPP 2021 or the BAM 2020. The adopted survey method must be justified and based on scientifically rigour methodologies.

Use of the SAT may be supplemented by other methods (e.g. spotlighting) as additional survey methods at the assessor's discretion. If future survey methods become more widely practiced and adopted (e.g. via methods to support the 'Biodiversity Assessment Method' [BAM]), these may be incorporated into the methodology provided adequate justification is provided.

Field assessment requirements to support the KAR are summarised in **Table 7.4**. As noted, field surveys must be completed by a person experienced in ecological surveys, tree identification and/or koala management or research.

Table 7.4 Field Survey Requirements for KAR

Survey Requirement	*Rationale*
Vegetation assessment	
Accurate vegetation mapping, description and classification to plant community type (PCT)	To determine the suitability of vegetation for koalas
Stadia survey and species identification of any isolated native trees > 100mm dbh within the development footprint	To determine if isolated trees affected by the development are preferred koala food trees
Mapping which clearly shows PCTs and/or isolated trees in the context of the development footprint	To accurately determine any impacts on native vegetation
Koala assessment	
Use of the Regularised, Grid-based SAT (RG-bSAT) approach of Phillips & Callaghan (2011); refer to **Appendix E** (alternatives methods must be justified and based on scientifically rigour methodologies).	To determine the presence and activity levels of koala usage at the site

7.5 Habitat Compensation

An important mechanism as part of the development assessment framework is that habitat compensation is required where developments will result in loss of koala habitat. Compensation schemes have been adopted in several Comprehensive Koala Plans of Management (e.g. Lismore, Bellingen, Kempsey) and serve to ensure there is no net loss of koala habitat and that a consistent compensation method is applied where developments impact upon koala habitat. The compensation methods within the *Bellingen Shire Council Coastal Area Koala Management Strategy* (2017) have largely been adopted for this Strategy.

Note: While Nambucca Valley Council already has an environmental levy in place, this is a rate-based levy and contributes towards a range of environmental initiatives (which may include projects to benefit koalas). This levy could be further enhanced by developer contributions where koala habitat occurs, with funds directed towards mitigation measures such as corridor plantings, traffic calming, fencing etc.

7.5.1 Rationale

Habitat compensation is required where development projects are unable to avoid and minimise impacts to koala habitats. The loss of koala trees and habitats is therefore compensated for by actions to ensure habitat loss is compensated for by one of three methods: protection, rehabilitation or restoration of koala habitat.

Guiding principles for compensation include:

- Compensation proposals are only to be applied once Council is satisfied that the proponent has made justifiable efforts to avoid and minimise impacting koala habitat.

- If clearing of koala habitat is unable to be adequately compensated, Council may refuse approval of a development application.
- Where habitat restoration works are completed (i.e. via tree planting), a net gain in the area of preferred koala habitat provided must be demonstrated.
- Receiving land on which compensation works are proposed must:

    - have preferred koala habitat of the same or a higher class to that being removed,
    - be within, adjoining or as close as possible to the development area,
    - be within the same Koala Management Precinct, and
    - be ecologically appropriate for protection, rehabilitation or restoration of preferred koala habitat.

- Monitoring of habitat compensation activities must be undertaken for a minimum period of five years and demonstrate relevant key performance criteria are met.

7.5.2 Classes of compensation

As noted, compensation may fall into one of three classes: protection, rehabilitation or restoration.

7.5.2.1 Protection

Protection is the primary way of addressing the principle of 'avoid and minimise' and is the preferred compensation strategy to ensure koala habitat is avoided and secured by one of the following measures:

- Transferral of land to council (or the Crown) for dedication as a conservation reserve. This could be completed either as a donation and/or in lieu of Section 94 contributions required under the EP&A Act.
- Entering into a Voluntary Planning Agreement (via the EP&A Act) with Council to protect koala habitat on the land.
- Entering into a Conservation Agreement (via the *National Parks and Wildlife Act 1974*) with Council to protect koala habitat on the land.
- Registering part of the land as a Biodiversity Stewardship Agreement via the Biodiversity Offset Scheme (BC Act).
- Establishing a positive covenant over koala habitat (e.g. via Section 88E of the *Conveyancing Act 1919*).
- Rezoning areas of koala habitat to environmental protection (E2 Environmental Conservation, E3 Environmental Management) or RE1 Public Recreation via an amendment to the LEP.

Protection measures may have limited application depending on the development scenario, the area of land in question and gaining support from relevant agencies. Protection measures would need to be demonstrated as being viable and supported by appropriate correspondence and/or legal advice between parties and agencies before they can be considered by Council.

7.5.2.2 Rehabilitation

Rehabilitation is the second tier in the hierarchy of compensation and focusses on the retention and improvement of land which comprises preferred koala habitat via various management processes (e.g. weed control). Rehabilitation may be proposed via a Management Plan, which is enforced via conditions of consent.

7.5.2.3 Restoration

Restoration is the establishment of koala habitat, when efforts to protect and rehabilitate koala habitat are exhausted. This compensation approach is the least preferable, due to the time lag and uncertainties when creating koala habitat within receiving land. Restoration of preferred koala habitat is subject to a greater multiplier (refer **Section 7.5.3**) so that a net gain in koala habitat is achieved which accounts for the uncertainties and delays which may occur. Proponents must demonstrate sound reasoning for restoration works and demonstrate any measures to create preferred koala habitat utilise suitable species assemblages, are landscape appropriate and link habitat areas or infill gaps.

7.5.3 Calculating compensation

The compensation multipliers in the *Bellingen Shire Council Coastal Area Koala Management Strategy* (2017) have been adopted with regard to compensation classes. Compensation is required when preferred koala habitat or PKFT are impacted by a development. Compensation calculations may be completed for single or scattered trees, where a consolidated area of habitat is impacted, ow in some instances, a combination of the two methods may be used.

7.5.3.1 Single tree compensation

When **restoration** is the proposed compensation method, replacement ratios for any single (or scattered/isolated) PKFT which are affected within a development area of < 0.2 ha are required as per **Table 7.5**. Replacement ratios are divided into three size classes, with mature trees requiring greater compensation.

Table 7.5 Replacement Ratios for PKFT

PKFT size (dbh)*	***Replacement ratio ('restoration') Loss: gain***
< 100mm	1:6
100–300 mm	1:8
>300 mm	1:10

*dbh = diameter at breast height

For example, if three Forest Red Gum of between 100–300 mm dbh and one mature (>300 mm dbh) Tallowwood require removal for a roadway, compensation for restoration would be calculated as follows:

Forest Red Gum	***Tallowwood***
PKFT size class: 100–300 mm	*PKFT size class: >300 mm*
No. of trees impacted: 3	*No. of trees impacted: 1*
Replacement ratio: 1: 8	*Replacement ratio: 1: 10*
No. trees to be replaced: 24	*No. trees to be replaced: 10*
Total trees to be replaced = 34	

Applicants using single tree compensation provisions must demonstrate that there is suitable receiving land to allow for accommodation of compensation plantings and that trees are sited appropriately so they may be accessed by koalas.

7.5.3.2 Area compensation

Where an area of preferred koala habitat of > 0.2 ha is impacted by a development, a compensation multiplier applies based on a conservation value ranking and risk factor. For example, protection mechanisms are a low risk factor due to legal enforceability combined with a high confidence of achievability, while restoration works are a higher risk factor due to the greater difficulty in planting and maintaining PKFT to provide meaningful koala habitat in the long term. Area compensation multipliers are summarised at **Table 7.6**.

Table 7.6 Compensation Multipliers for Impacts on Areas of Preferred Koala Habitat

Koala habitat class impacted	***Compensation Multiplier***		
	Protection	**Rehabilitation**	**Restoration**
Primary	4	8	12
Secondary (Class A)	3	6	9
Secondary (Class A)	2	4	6

A worked example of the area compensation method is provided at **Appendix F**.

7.5.4 Compensation standards

Restoring koala habitat by tree planting must be completed in a considered way to ensure that tree species selection is appropriate, the site is appropriately prepared, and trees are installed and maintained in such a way to achieve the best chances of establishment and persistence. The following guideline produced by DPIE must be used to inform the restoration strategy:

- *Koala habitat revegetation guidelines. A practical guide to identify, connect and revegetate koala habitat in New South Wales* (DPIE 2020).

The *Koala habitat revegetation guidelines* ('the Guidelines') stipulate that:

- At least 30% of canopy trees in a habitat patch or corridor should be PKFT.
- Patches should also contain a range of other native trees and shrubs to provide shelter.
- Local eucalypt species should be planted, including PKFT for the area.
- Plant other local native species consistent with existing vegetation types.

Any restoration of koala habitat must be informed by a Vegetation Management Plan (VMP), prepared by a suitably qualified ecologist or bush regenerator. The VMP must demonstrate that restoration works meet compensation requirements in this KMS and that requirements in the Guidelines have been addressed, including monitoring and aftercare requirements.

8. Opportunities

8.1 Community Education and Data Gathering

The 2015 KMS recommended providing community resources and information as a tool in raising awareness of koala management issues. This approach is worthy and encouraged to inform landowners (particularly new residents to the Shire) about koalas and provide a forum for reporting koala observations.

Information that could be prepared and displayed on Councils website could include:

- A koala species profile, including information about preferred trees species and vegetation types in the shire. The profile should also include information on threats and disease.
- Information on responsible dog management and a link to the recent DPIE (2020) guideline *Protecting wildlife from domestic dogs* *https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Wildlife-management/protecting-wildlife-from-domestic-dogs-guide-to-community-engagement-200128.pdf*
- Koala habitat mapping (as per the 2015 KHS).
- Links to other koala resources, such as those prepared by DPIE relating to koala habitat revegetation https://www.environment.nsw.gov.au/research-and-publications/publications-search/koala-habitat-revegetation-guidelines
- Links to a koala reporting system (refer below).

Providing an online 'Koala Register' is another opportunity to track koala records as they occur and examine data over time. Koala observation portals have been established for a number of north coast Council (inc some instances via the Atlas of Living Australia), including Tweed, Clarence Valley, Coffs harbour, Bellingen), or alternatively residents can be encouraged to utilise the 'I Spy Koala' app (see: https://koala.nsw.gov.au/2019/08/26/new-koala-app-launched-i-spy-koala/).

Providing an online koala 'toolkit' provides both valuable educational resources and encourages data collection by the community.

8.2 Strategic Planning

There are opportunities to plan for future growth areas and biodiversity impacts through measures such as biodiversity certification. Biodiversity certification is enforced through the BC Act and is a streamlined biodiversity assessment process for areas of land that are proposed for development. The process identifies areas that can be developed after they are certified and measures to offset the impacts of development. The biodiversity certification process may be suitable when strategic land use planning at a landscape scale is proposed or underway. As biodiversity certification addresses potential impacts on biodiversity during the early planning stage of changes to land use, it encourages development design which avoids and minimises impacts on land with biodiversity values, with these areas protected from the impacts of future development.

While biodiversity certification is typically practiced in larger growth areas (e.g. western Sydney), further investigation of the merits of the process are warranted.

8.3 On-ground Works

There are several opportunities for increasing and/or linking Koala habitat to protect against future development and threatening processes. Most of these opportunities are speculative and unfunded, however could be valuable to Koalas in the future and are deserving of strategic consideration. Priority locations for koala habitat restoration, revegetation and protection activities include:

- Land supporting or adjoining Koala populations (located within or outside of the study area)
- Land with existing Primary or Secondary (Class A) or Secondary (Class B) Koala habitat (in descending order of priority)
- Land adjoining Primary or Secondary (Class A) Koala habitat
- Land that forms part of a habitat corridor.

Factors to help identify priority locations are shown in **Appendix G**.

Landcare Projects

Nambucca Valley Landcare (NVL) undertakes a range of projects with landholders, volunteer groups, and government agencies including river restoration, farm planning and bush regeneration. One of the most significant projects NVL has completed is the Yarrahapinni to Killiekrankie (Y2K) Bush Connect Project. The Y2K is a five year project working with Macleay Landcare (now in its final year) and was established to increase the extent and condition of native vegetation within priority locations at Hickeys Creek and Taylors Arm. Within Nambucca LGA, the project has mainly focused on riparian corridor restoration via bush regeneration and better stock management. Works in Nambucca include:

- Planting over 4,000 trees (predominately riparian species but also some eucalypts).
- 3 ha of primary and secondary weed control.
- 4 large off-stream watering systems installed.
- 2.5 ha of riparian fencing.
- Strategic erosion control.
- Workshops and field days.

In addition to these works NVL have also completed Koala focussed works such as:

- A Koala action day and planting at Valla Reserve.
- A Koala tree planting day with high school students and volunteers in Valla Rural.
- Giveaway of 100+ koala feed trees.

NVL seek funding for their projects from a range of government agencies. There is potential for targeting of Koala habitat restoration projects by measures such as:

- Partnering with Council to collaboratively create or restore Koala habitat at strategic locations
- Connecting with private landowners who may want to restore or create Koala habitat on their land.

Further examination of these opportunities (including access to funding) would be highly beneficial.

Crown Land

Approximately 535 ha of crown land occurs within the Study Area. There may be opportunities to acquire and reforest areas of crown land to create Koala linkages. A further ‘add on’ to this opportunity may be utilising unformed areas of Council road reserves (‘paper roads’). This opportunity is deserving of further desktop study to determine where crown land and paper roads occur in proximity to koala

population centres and whether any significant advantages could be gained by prioritising these areas for koala habitat improvement.

Great Koala National Park

The Great Koala National Park (GKNP) is a proposed Koala habitat protection area and wildlife corridor encompassing 175,000ha of state forest, much of which occurs within Nambucca Shire (refer **Figure 8.1**). Under the GKNP proposal a number of State Forests would become National Park estate to substantially enlarge conservation reserved land for koala in the broader locality. The initiative for establishment of the GKNP is driven by the National Parks Association of NSW in association with a number of conservation groups. While the GKNP would undoubtedly reserve and protect large areas of additional Koala habitat, it would not address conservation of koala habitat on private land, which is the focus of this KMS.

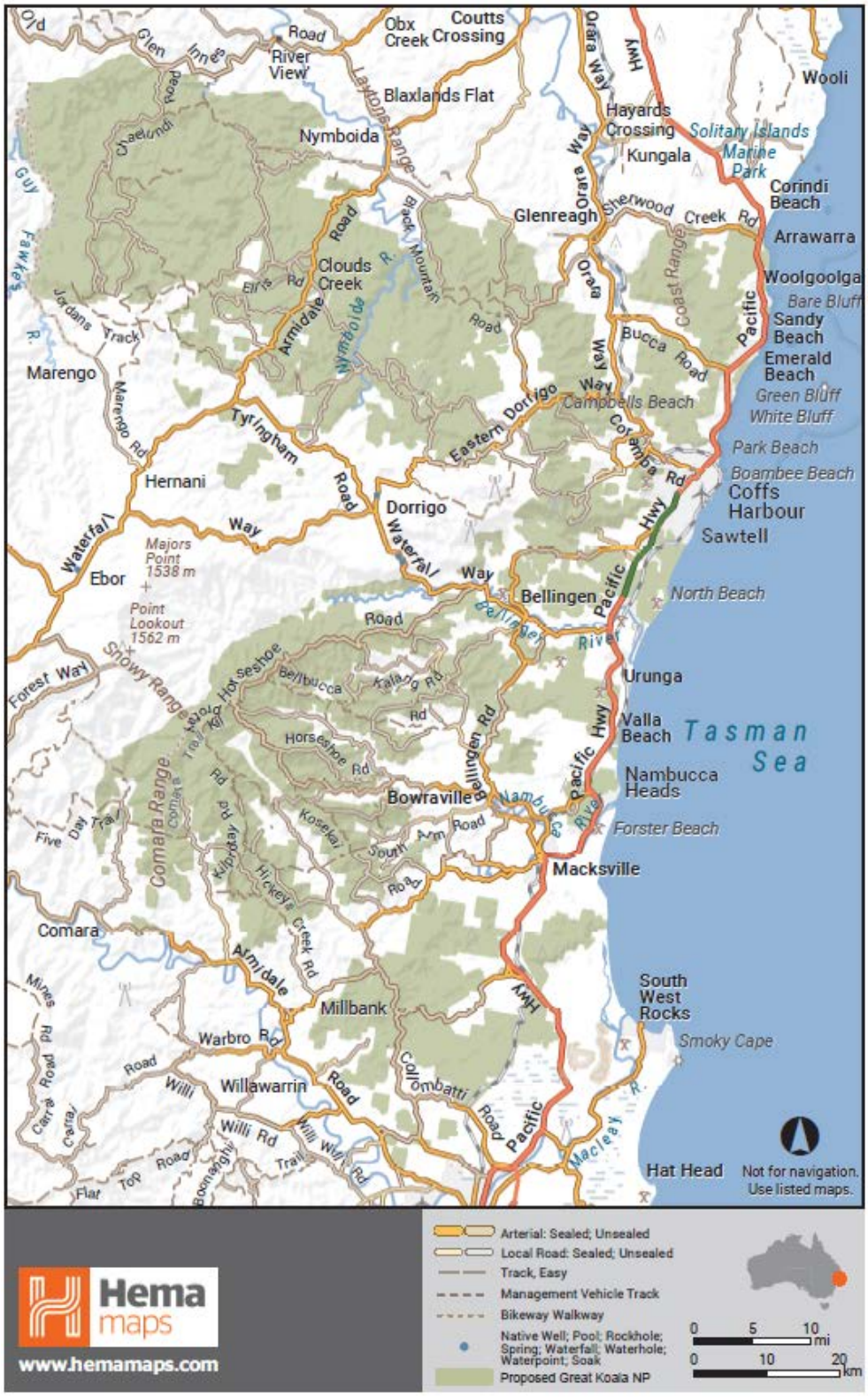

Figure 8.1 Proposed Great Koala National Park

9. Future Actions

To improve conservation outcomes for koalas in the Study Area, a number of future actions are prescribed (refer **Table 9.1**). Data and/or outcomes achieved as actions are implemented can be utilised to improve the existing koala knowledge base and inform future amendments to this Strategy. One aspect of the Strategy is liaison with stakeholders and agencies, whereby feedback can inform amendments to improve the functionality of this document.

Table 9.1 Future Actions

Action	*Implemented by*
1. Stakeholder review and feedback on the Strategy.	NVC
2. Once the KMS is finalised, relevant sections to be included in the Nambucca DCP.	NVC
3. Providing an online koala resources section on Councils website.	NVC
4. Establishing an online Koala Register (e.g. 'I Spy Koala') to collect data from residents and wildlife carers.	NVC
5. Investigating opportunities for strategic revegetation around urban growth areas using Council or Crown land.	NVC
6. Holding koala information sessions to provide community education (including the implementation of measures in this Strategy).	NVC (partnering with NVL)
7. Further koala surveys to fill information gaps (funding dependent)	NVC (partnering with DPIE
8. Allocation of greater funding to strategic koala projects via the environmental levy	NVC
9. Use any collected koala data to determine potential koala 'blackspots' where vehicle strike may be occurring; consider installation of appropriate signage or road design as appropriate.	NVC
10. Seek external funding to target koala related projects into the future.	NVC
11. Create a register of any koala habitat established via compensation measures for tracking and compliance.	NVC
12. Development of standardised guidelines for construction at development sites to minimise the potential for koalas being injured or killed and to minimise potential impacts on adjacent trees and habitats.	NVC

References

Bellingen Shire Council (2017). *Bellingen Shire Council Coastal Area Koala Management Strategy.* Published by Bellingen Shire Council.

Department of Environment and Climate Change (DECC) (2008). *Approved Recovery Plan for the Koala (Phascolarctos cinereus).* Department of Environment and Climate Change, Sydney, NSW.

Department of the Environment (DoE) (2014). *EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory).* Commonwealth of Australia, 2014.

DPIE (2017). *North Coast Regional Plan (NCRP) 2036*. Department of Planning, Industry and the Environment

DPIE (2020). *Saving Our Species. Framework for the spatial prioritisation of koala conservation actions in NSW. Iconic Koala Project.* Published by: Environment, Energy and Science, Department of Planning, Industry and Environment.

DPIE (2020). *Koala habitat revegetation guidelines. A practical guide to identify, connect and revegetate koala habitat in New South Wales.* Published by: Environment, Energy and Science, Department of Planning, Industry and Environment.

DPIE (2020). *Post-Fire Koala Surveys.* A Save our Species Project. Northeast NSW. Department of Planning, Industry and Environment.

DPIE (2021). *Koala SEPP 2021 FAQs — development applications*. Published by the State of NSW and Department of Planning, Industry and Environment.

GeoLINK (2014). *Warrell Creek to Nambucca Heads Pacific Highway Upgrade Baseline (Spring) Koala Surveys*. Report to NSW Roads and Maritime Services.

Nambucca Shire Council (2009). *Release Strategy Rural-Residential Land Release Strategy*. Nambucca Shire Council (as amended 33 November 2010).

Nambucca Shire Council (2013). *Nambucca Development Control Plan 2010*. Nambucca Shire Council (as amended 13 March 2013).

NSW Legislative Council Portfolio Committee No. 7 – Planning and Environment (2020). *Koala populations and habitat in New South Wales Report 3 June 2020*. Report prepared by Portfolio Committee No. 7 – Planning and Environment.

OEH (2015). *Koala Habitat Study for the Nambucca Shire Council Coastal Area*. Report to Nambucca Shire Council.

OEH (2015). *Vegetation Mapping within the Nambucca Local Government Area. Coastal Lowland Vegetation Communities and Potential Threatened Ecological Communities Volume 1 — Project Report.* Report to Nambucca Shire Council.

OEH (2018). *A review of koala tree use across New South Wales*. State of NSW and Office of Environment and Heritage.

Phillips, S. and Callaghan, J. (2011). The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus*. *Australian Zoologist* (2011) 35 (3): 774–780.

Sandpiper Ecological Surveys (2020). *Nambucca Heads to Urunga Pacific Highway Upgrade: Operational Phase, Year Three. Operational Phase Biodiversity Monitoring – Year Three 2019. Final Report version 3*. Report prepared for Transport for NSW.

Woosnam-Merchez, O., Cristescu, R., Dique, D., Ellis, B., Beeton, R.J.S., Simmonds, J. & Carrick, F. (2012). What faecal pellet surveys can and can't reveal about the ecology of koalas *Phascolarctos cinereus*. *Australian Zoologist* Volume 36(2).

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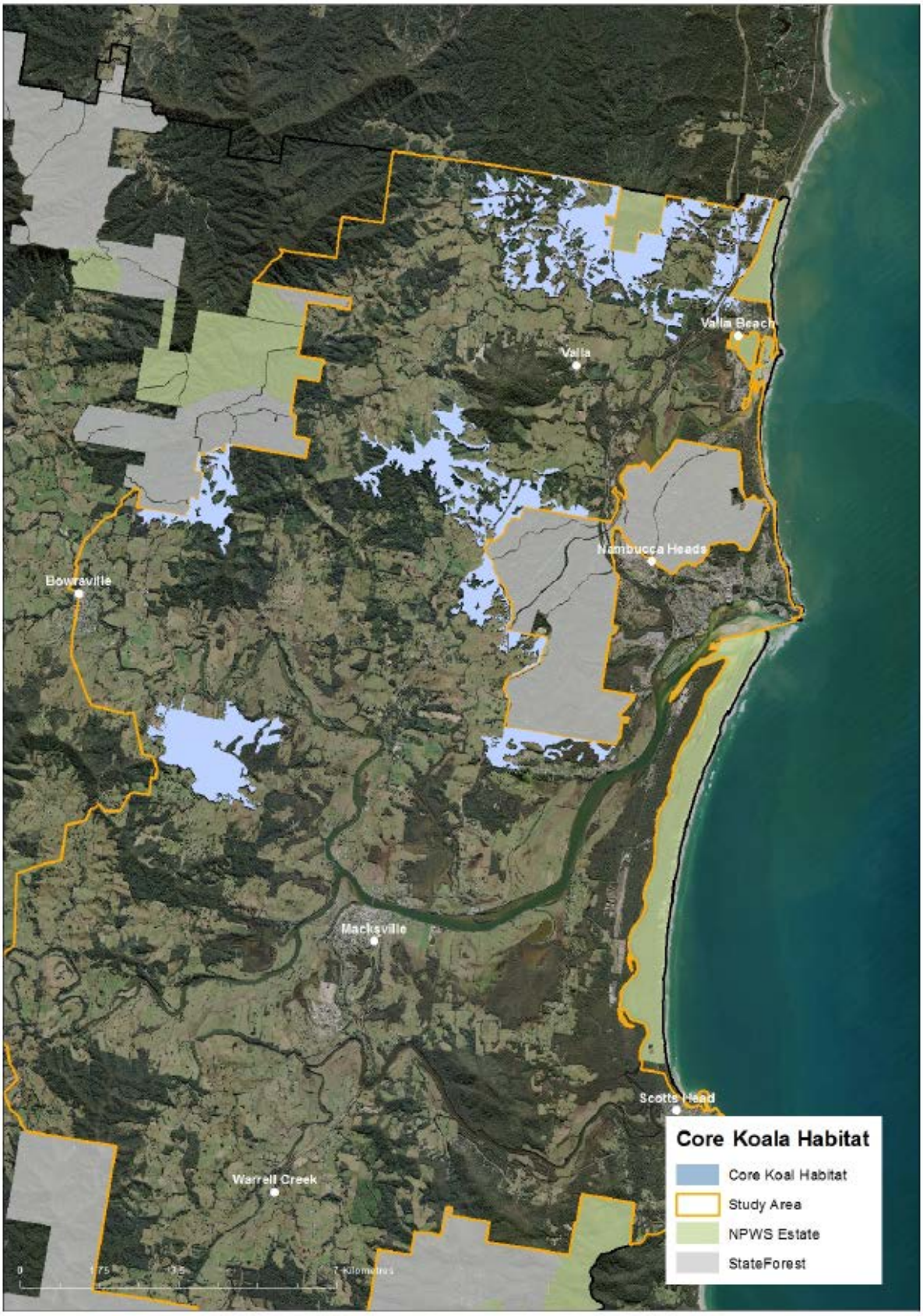
Appendix A

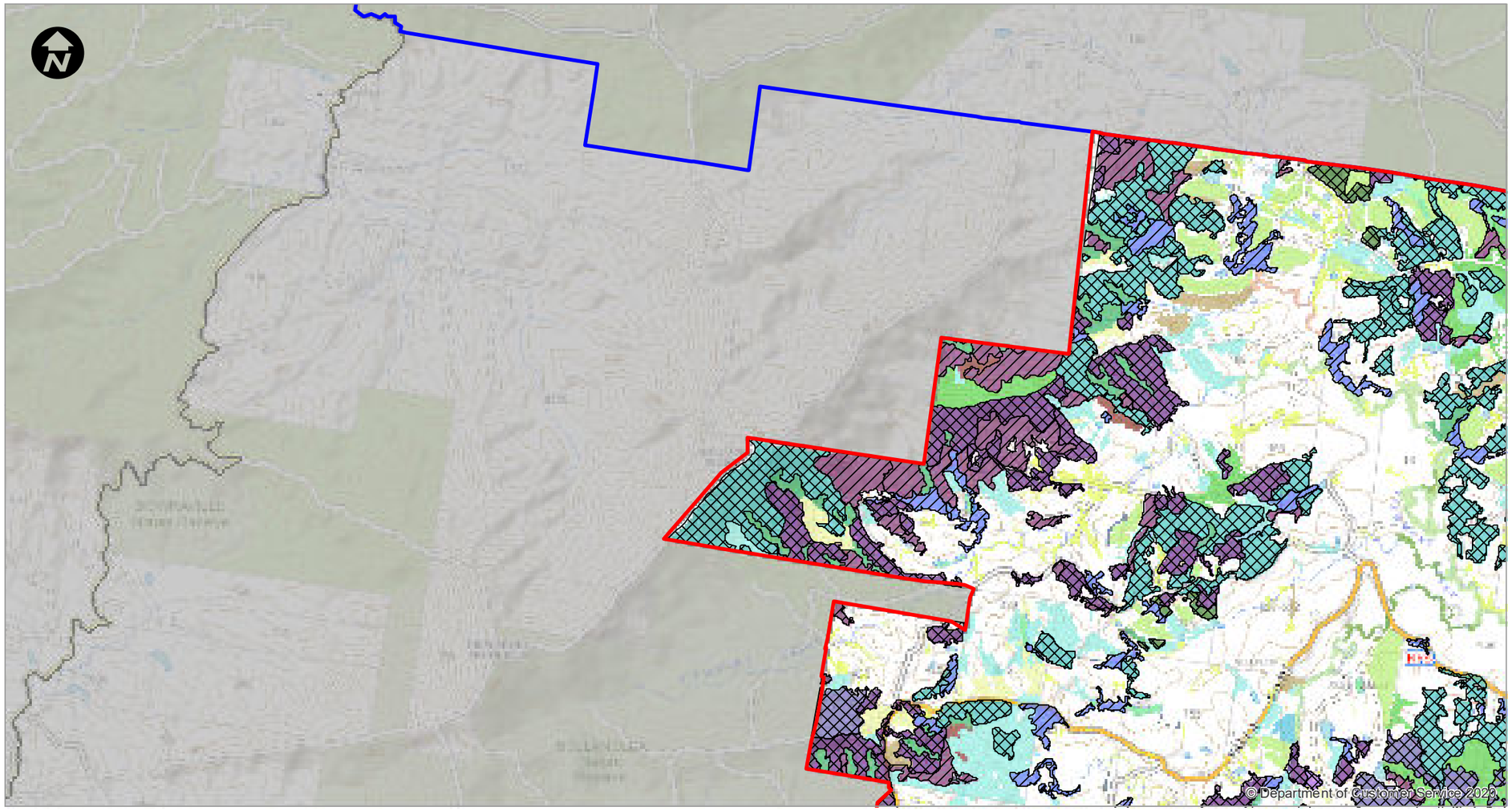
Core Koala Habitat (OEH 2015)

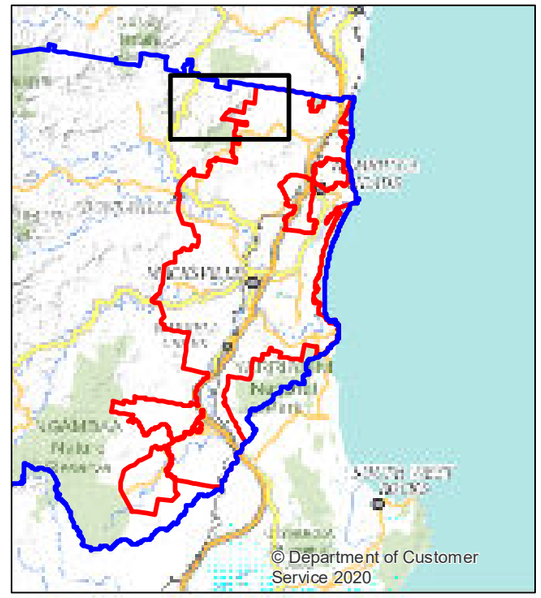


Core koala habitat within the koala habitat study area (Source: OEH 2015)

Appendix B

Vegetation Mapping (OEH 2015)





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Secondary A
- Secondary B

LEGEND

- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Camphor Laurel
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Rainforest Pioneers
- Riparian subtropical rainforest with River Oak emergents on lowland creek flats
- Spotted Gum- Tallowwood -Thick-leaved Mahogany - Small-fruited Grey Gum - Grey Ironbark grassy open forest on shallow sedimentary soils
- Spotted Gum- Tallowwood -Thick-leaved Mahogany -Small-fruited Grey Gum - Grey Ironbark wet shrubby open forest on sheltered slopes
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Weeping Lilly Pilly dry riparian rainforest

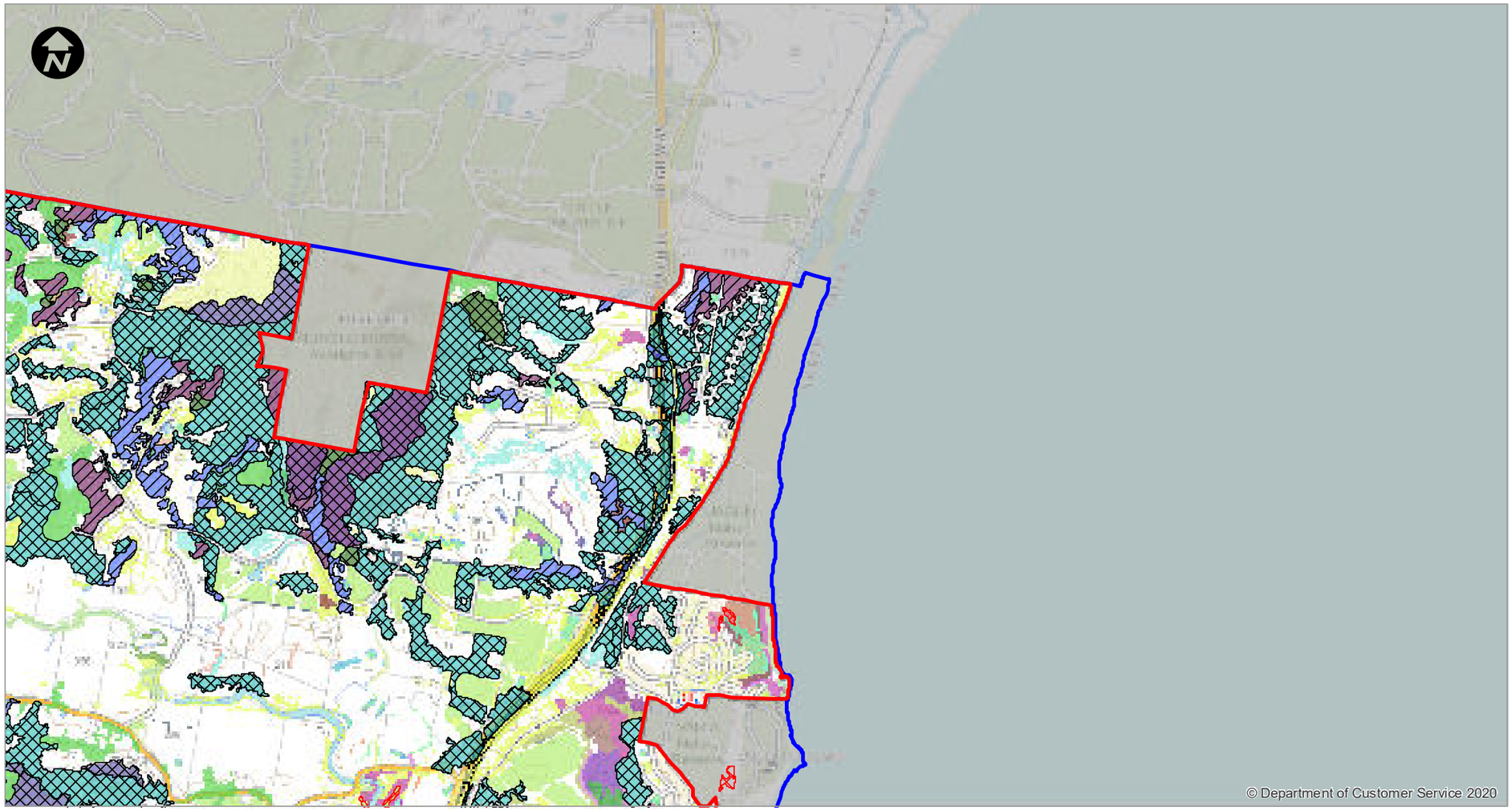
0 700 Metres

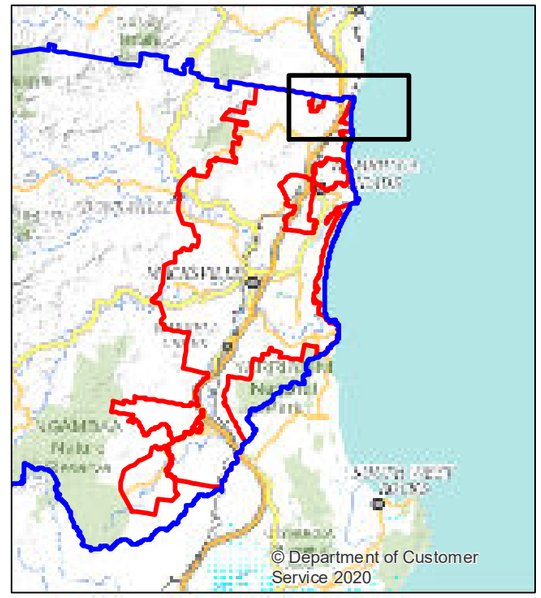
Appendix B - Vegetation Mapping
Sheet 1 of 13

GeoLINK environmental management and design

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1017

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 30/06/2021





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Primary
- Secondary A
- Secondary B

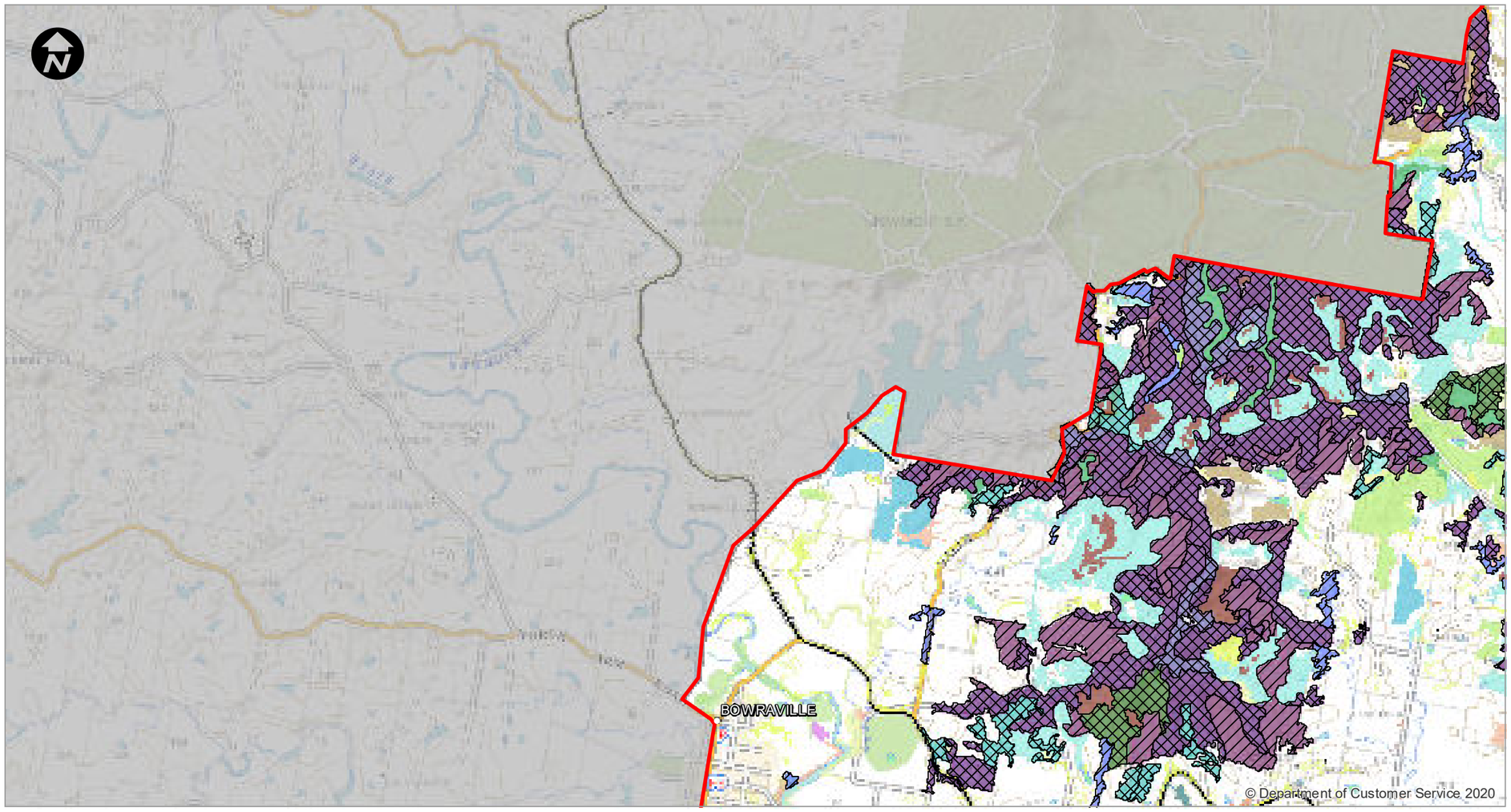
LEGEND

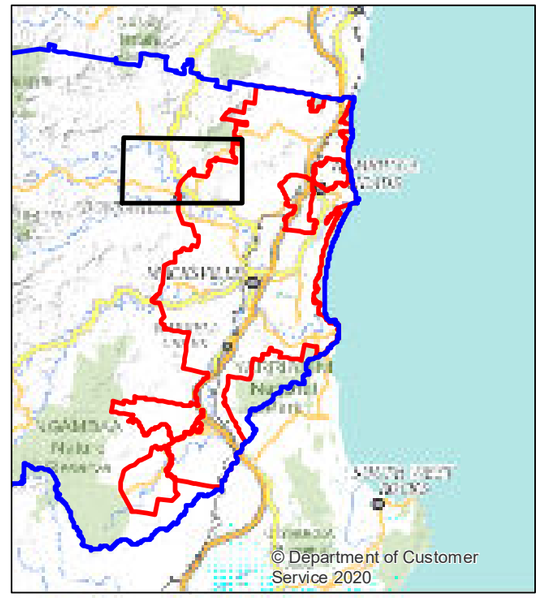
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Broad-leaved Paperbark - Bare Twig Rush swamp sclerophyll open forest of coastal swamps
- Broad-leaved Paperbark - Willow Bottlebrush forested wetland of creek channels draining intermittent coastal lakes and lagoons
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Brushbox headland littoral rainforest
- Camphor Laurel
- Coast Banksia woodland and open forest of coastal dunes
- Coast Wattle shrubland on coastal foredunes
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Forest Red Gum - Pink Bloodwood - Grey Ironbark open forest to woodland near coastal hills
- Grey Mangrove - River Mangrove low open or closed forest or shrubland of intertidal flats
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Pink Bloodwood - Brush Box open forest on coastal dunes and sandplains
- Pink Bloodwood - Red Mahogany - Swamp Box shrub/grass open forest at low altitudes
- Rainforest Pioneers
- Riparian subtropical rainforest with River Oak emergents on lowland creek flats
- Saltwater Couch - Samphire saltmarsh of low-lying estuarine areas
- Swamp Box - Forest Red Gum - Pink Bloodwood seasonal swamp forest on floodplains and low rises
- Swamp Mahogany - Willow Bottlebrush - Broad-leaved Paperbark forested wetland.
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Swamp Oak shrublands on coastal headlands
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Tuckeroo - Bird's Eye Alectryon - Beach Acronychia littoral rainforests
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Twig Rush saltmarsh of estuaries
- Weeping Lilly Pilly dry riparian rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 2 of 13

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 30/06/2021





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Secondary A
- Secondary B

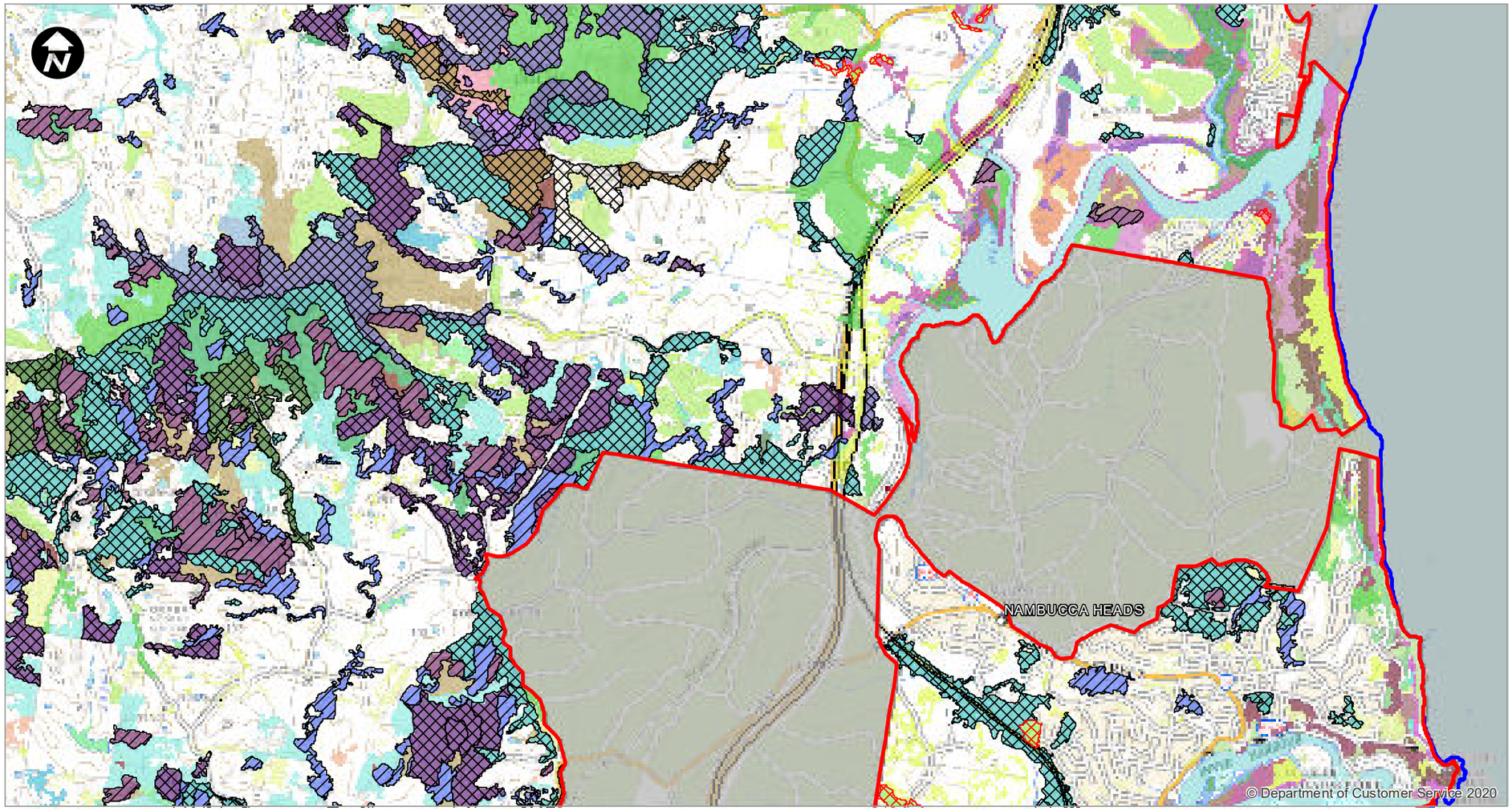
LEGEND

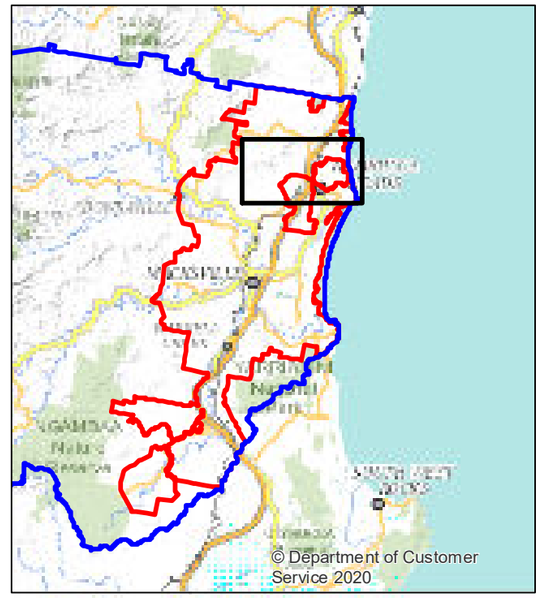
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Camphor Laurel
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Privet
- Rainforest Pioneers
- River Oak grassy open forest along larger rivers
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Weeping Lilly Pilly dry riparian rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 3 of 13

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 30/06/2021





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Primary
- Secondary A
- Secondary B

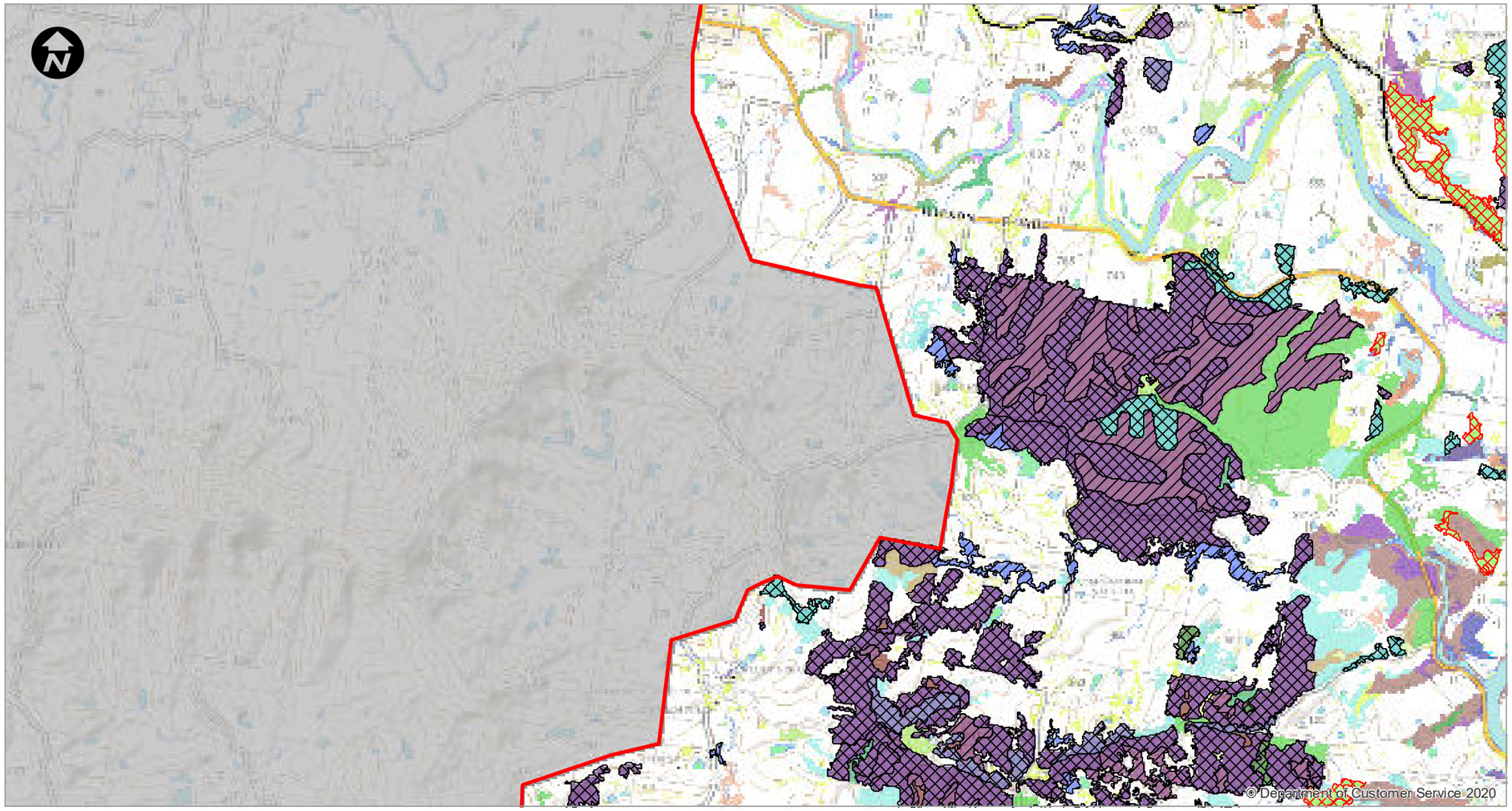
LEGEND

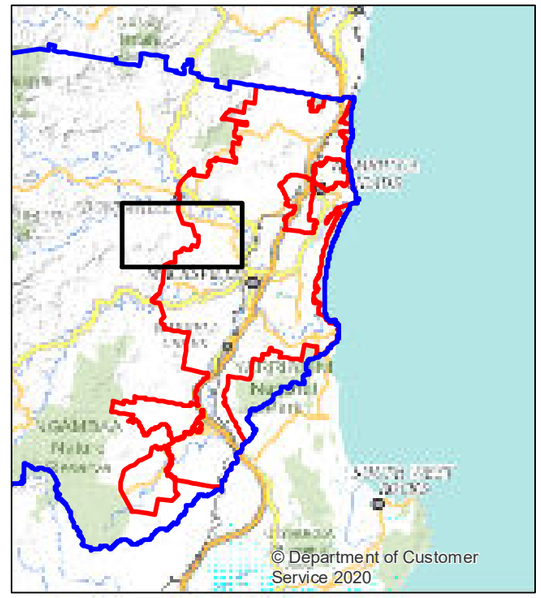
- Bitou Bush
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Bloodwood - Tallowwood Wet Sclerophyll Forests on sand
- Broad-leaved Paperbark - Bare Twig Rush swamp sclerophyll open forest of coastal swamps
- Broad-leaved Paperbark - Willow Bottlebrush forested wetland of creek channels draining intermittent coastal lakes and lagoons
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Brushbox headland littoral rainforest
- Camphor Laurel
- Coast Banksia woodland and open forest of coastal dunes
- Coast Wattle shrubland on coastal foredunes
- Common Reed grassland of alluvial floodplain and brackish tidal creeks
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Forest Red Gum - Pink Bloodwood - Grey Ironbark open forest to woodland near coastal hills
- Grey Mangrove - River Mangrove low open or closed forest or shrubland of intertidal flats
- Jointed Twig Rush- Swamp Water Fern freshwater wetlands of the alluvial floodplain
- Kangaroo Grass sod grassland of North Coast headlands
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Pink Bloodwood - Brush Box open forest on coastal dunes and sandplains
- Pink Bloodwood - Red Mahogany - Swamp Box shrub/grass open forest at low altitudes
- Prickly Couch - Sea Rush - Saltwater Couch saltmarsh of saline coastal swamps and flats
- Rainforest Pioneers
- Saltwater Couch - Samphire saltmarsh of low-lying estuarine areas
- Sea Rush saltmarsh of saline coastal swamps and flats
- Spotted Gum- Tallowwood -Thick-leaved Mahogany - Small-fruited Grey Gum - Grey Ironbark grassy open forest on shallow sedimentary soils
- Spotted Gum- Tallowwood -Thick-leaved Mahogany -Small-fruited Grey Gum - Grey Ironbark wet shrubby open forest on sheltered slopes
- Swamp Box - Forest Red Gum - Pink Bloodwood seasonal swamp forest on floodplains and low rises
- Swamp Mahogany - Willow Bottlebrush - Broad-leaved Paperbark forested wetland.
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Swamp Oak shrublands on coastal headlands
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Tea-tree rock outcrop shrubland
- Tuckeroo - Bird's Eye Alectryon - Beach Acronychia littoral rainforests
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Twig Rush saltmarsh of estuaries
- Wallum Banksia - Heath Phyllota Dry Sclerophyll Shrubland of North Coast Wallum Dunes; Beach Ridges and Sand Plains.
- Weeping Lilly Pilly dry riparian rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 4 of 13

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 30/06/2021





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Primary
- Secondary A
- Secondary B

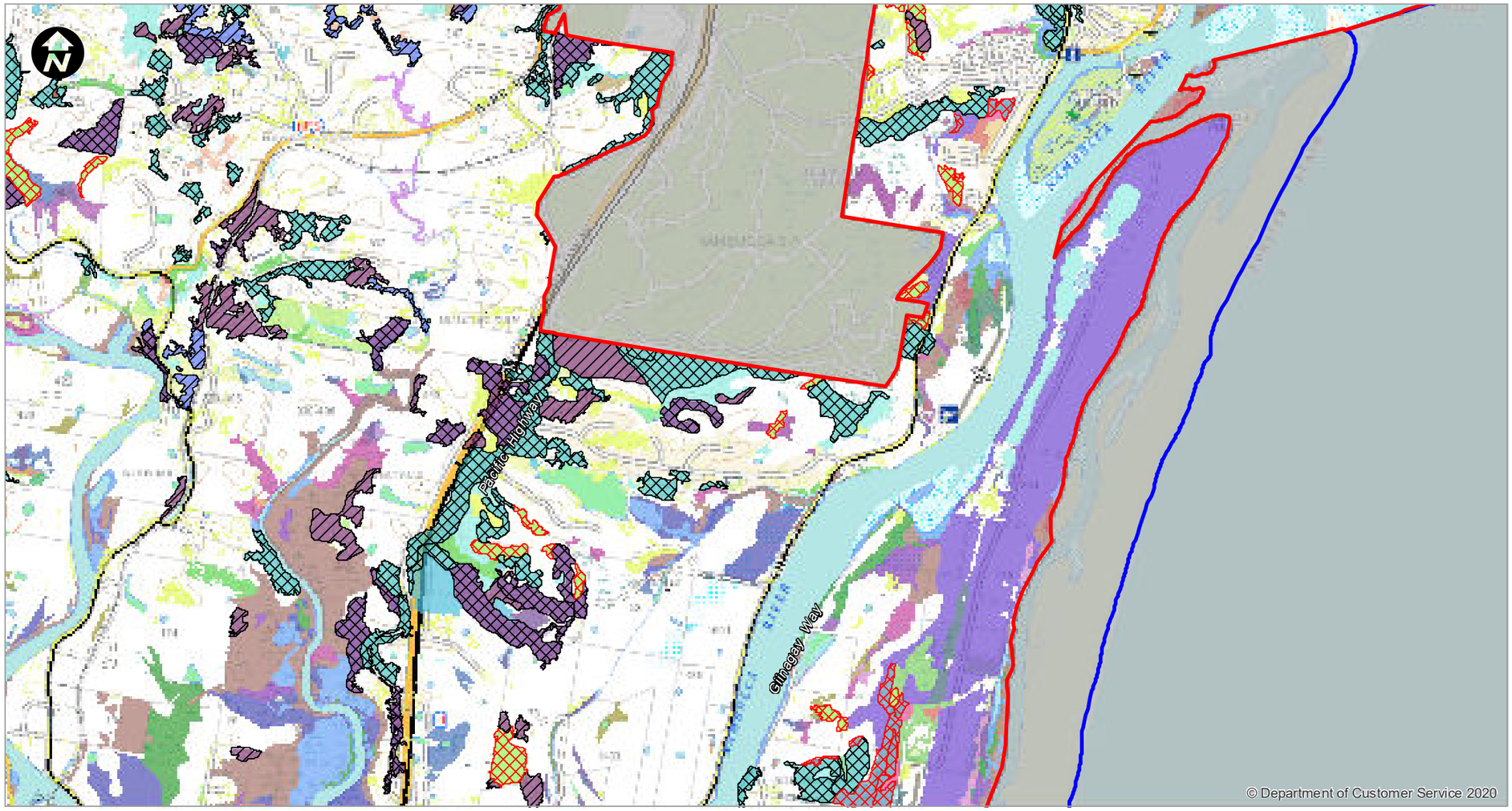
LEGEND

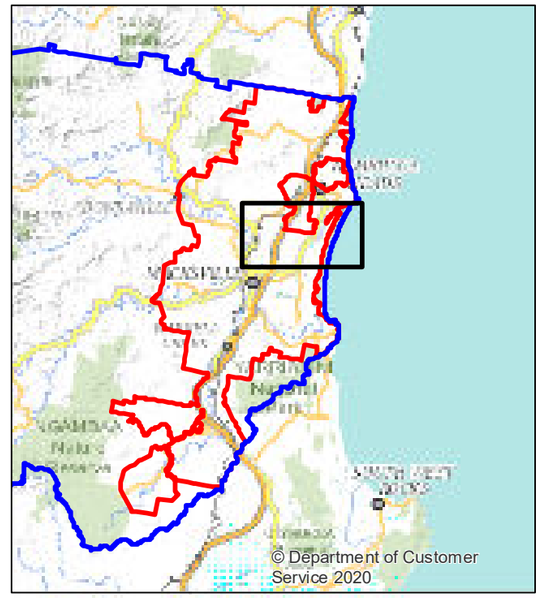
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Camphor Laurel
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Grey Mangrove - River Mangrove low open or closed forest or shrubland of intertidal flats
- Juncus rushlands on alluvial floodplains
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Prickly Couch - Sea Rush - Saltwater Couch saltmarsh of saline coastal swamps and flats
- Privet
- Rainforest Pioneers
- Riparian subtropical rainforest with River Oak emergents on lowland creek flats
- River Oak grassy open forest along larger rivers
- Saltwater Couch - Samphire saltmarsh of low-lying estuarine areas
- Swamp Mahogany - Willow Bottlebrush - Broad-leaved Paperbark forested wetland.
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Twig Rush saltmarsh of estuaries
- Typha freshwater wetland of the floodplain
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains
- Weeping Lilly Pilly dry riparian rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 5 of 13

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 30/06/2021





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Primary
- Secondary A
- Secondary B

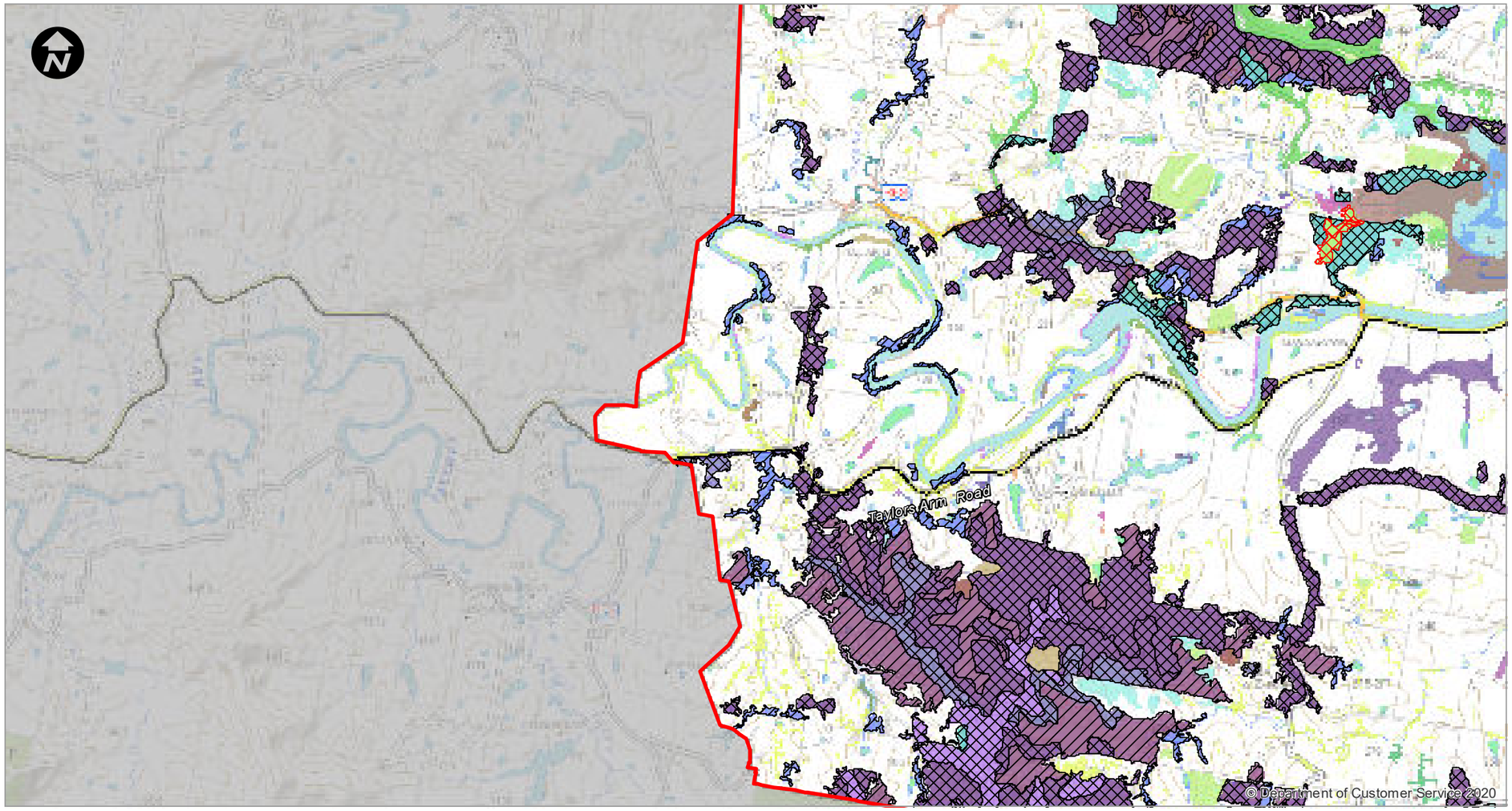
LEGEND

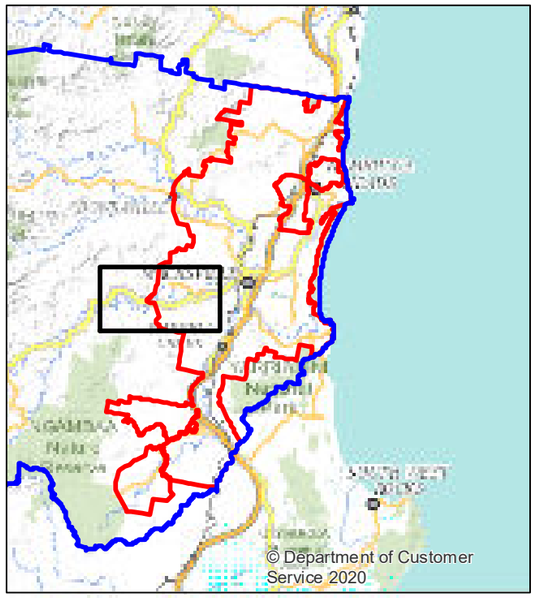
- Blackbutt - Needlebark Stringybark - Scribbly Gum - Slender Tea-tree Dry Sclerophyll Mallee of North Coast Wallum Dunes and Beach Ridges
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Blackbutt - Smooth-barked Apple- Needlebark Stringybark open forest on coastal dunes and sandplains
- Broad-leaved Paperbark - Bare Twig Rush swamp sclerophyll open forest of coastal swamps
- Camphor Laurel
- Coast Banksia woodland and open forest of coastal dunes
- Common Reed grassland of alluvial floodplain and brackish tidal creeks
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Grey Mangrove - River Mangrove low open or closed forest or shrubland of intertidal flats
- Juncus rushlands on alluvial floodplains
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Pink Bloodwood - Red Mahogany - Swamp Box shrub/grass open forest at low altitudes
- Prickly Couch - Sea Rush - Saltwater Couch saltmarsh of saline coastal swamps and flats
- Rainforest Pioneers
- Riparian subtropical rainforest with River Oak emergents on lowland creek flats
- River Oak grassy open forest along larger rivers
- Saltwater Couch - Samphire saltmarsh of low-lying estuarine areas
- Sea Rush saltmarsh of saline coastal swamps and flats
- Soft Twig Rush Sedgeland of North Coast Wallum Swamps
- Swamp Mahogany - Melaleuca sieberi shrub/sedge swamp forest on low lying sandy areas
- Swamp Mahogany - Willow Bottlebrush - Broad-leaved Paperbark forested wetland.
- Swamp Mahogany - tea-tree - Tassell Rush forested wetland of waterlogged wallum soils
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tea-tree tall shrubland of coastal freshwater sand swamp
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Twig Rush saltmarsh of estuaries
- Typha freshwater wetland of the floodplain
- Wallum Banksia - Heath Phyllota Dry Sclerophyll Shrubland of North Coast Wallum Dunes; Beach Ridges and Sand Plains.
- Wallum Banksia - Prickly Moses - Caustis recurvata dry heathland on coastal sands
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 6 of 13

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 30/06/2021





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Primary
- Secondary A
- Secondary B

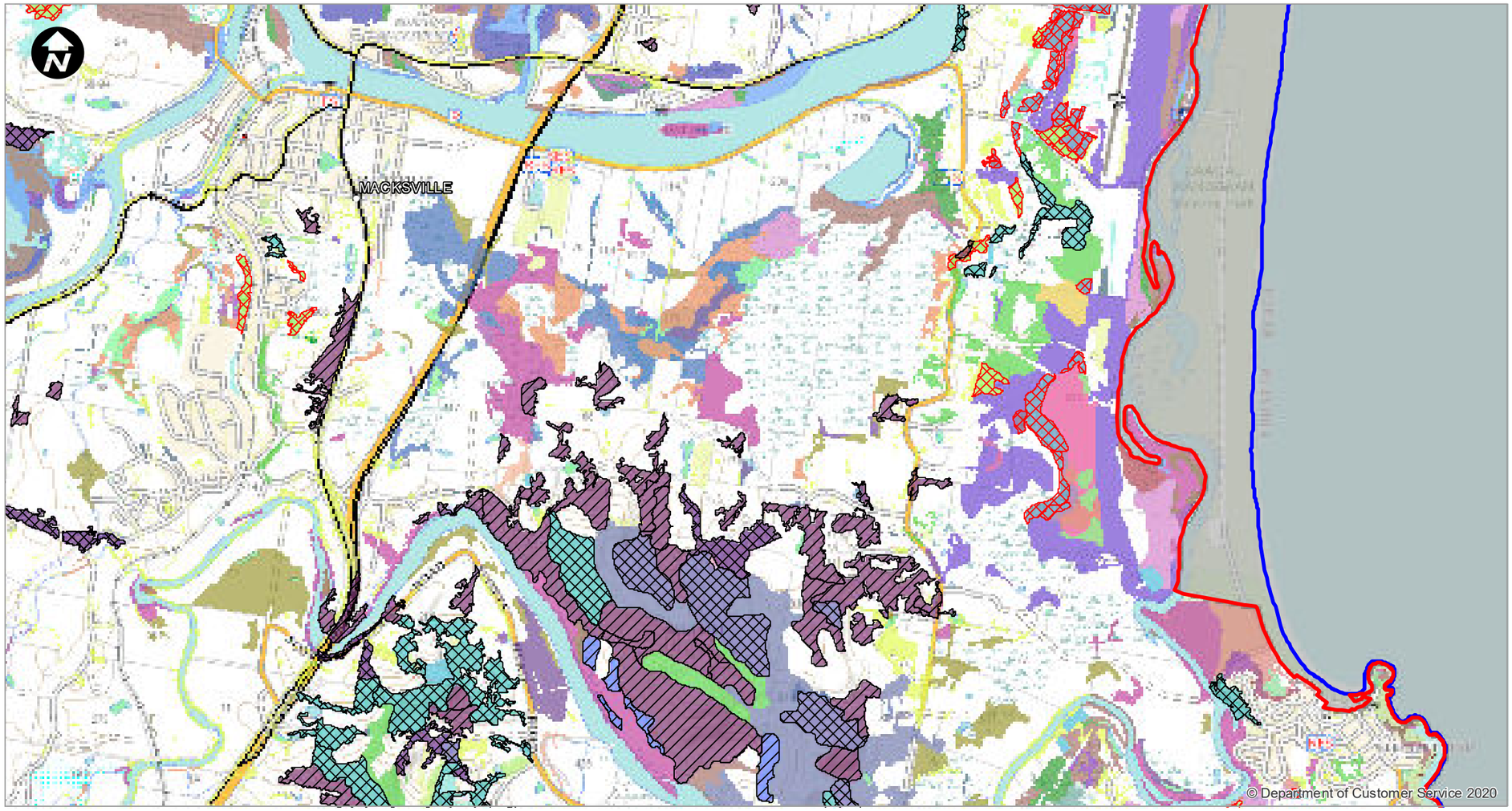
LEGEND

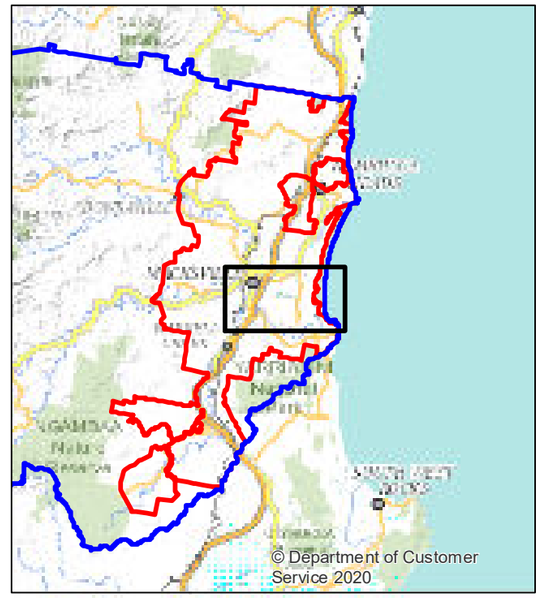
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Camphor Laurel
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Grey Mangrove - River Mangrove low open or closed forest or shrubland of intertidal flats
- Juncus rushlands on alluvial floodplains
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native remnant vegetation
- Prickly Couch - Sea Rush - Saltwater Couch saltmarsh of saline coastal swamps and flats
- Privet
- Rainforest Pioneers
- Riparian subtropical rainforest with River Oak emergents on lowland creek flats
- River Oak grassy open forest along larger rivers
- Saltwater Couch - Samphire saltmarsh of low-lying estuarine areas
- Spotted Gum- Tallowwood -Thick-leaved Mahogany - Small-fruited Grey Gum - Grey Ironbark grassy open forest on shallow sedimentary soils
- Swamp Mahogany - Willow Bottlebrush - Broad-leaved Paperbark forested wetland.
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Twig Rush saltmarsh of estuaries
- Typha freshwater wetland of the floodplain
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 7 of 13

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
Source of base data: Department of Customer Services
Date: 30/06/2021





LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Primary
- Secondary A
- Secondary B

LEGEND

- Blackbutt - Needlebark Stringybark - Scribbly Gum - Slender Tea-tree Dry Sclerophyll Mallee of North Coast Wallum Dunes and Beach Ridges
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Blackbutt - Smooth-barked Apple- Needlebark Stringybark open forest on coastal dunes and sandplains
- Bloodwood - Tallowwood Wet Sclerophyll Forests on sand
- Broad-leaved Paperbark - Bare Twig Rush swamp sclerophyll open forest of coastal swamps
- Brush Box - Grey Myrtle - Water Gum dry rainforests of poorer soils of gorges and river valleys
- Brushbox headland littoral rainforest
- Camphor Laurel
- Coast Banksia woodland and open forest of coastal dunes
- Coast Wattle shrubland on coastal foredunes
- Common Reed grassland of alluvial floodplain and brackish tidal creeks
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Grey Mangrove - River Mangrove low open or closed forest or shrubland of intertidal flats
- Jointed Twig Rush- Swamp Water Fern freshwater wetlands of the alluvial floodplain
- Juncus rushlands on alluvial floodplains
- Kangaroo Grass sod grassland of North Coast headlands
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Milky Mangrove Woodland of tidal estuaries
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Pink Bloodwood - Brush Box open forest on coastal dunes and sandplains
- Pink Bloodwood - Red Mahogany - Swamp Box shrub/grass open forest at low altitudes
- Prickly Couch - Sea Rush - Saltwater Couch saltmarsh of saline coastal swamps and flats
- Red Bloodwood - Thick-leaved Mahogany - Heathy Dry Open Forest on granite
- Saltwater Couch - Samphire saltmarsh of low-lying estuarine areas
- Sea Rush saltmarsh of saline coastal swamps and flats
- Soft Twig Rush Sedgeland of North Coast Wallum Swamps
- Swamp Mahogany - Melaleuca sieberi shrub/sedge swamp forest on low lying sandy areas
- Swamp Mahogany - Willow Bottlebrush - Broad-leaved Paperbark forested wetland.
- Swamp Mahogany - tea-tree - Tassell Rush forested wetland of waterlogged wallum soils
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Swamp Oak shrublands on coastal headlands
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Tea-tree rock outcrop shrubland
- Tea-tree tall shrubland of coastal freshwater sand swamp
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Twig Rush saltmarsh of estuaries
- Typha freshwater wetland of the floodplain
- Wallum Banksia - Prickly Moses - Caustis recurvata dry heathland on coastal sands
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains
- Yellow Pear Fruit - Cabbage Tree Palm - Small-Leaved Lilly Pilly - Brown Pine littoral rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 8 of 13

Information shown is for illustrative purposes only
Drawn by: AB Checked by: DSA Reviewed by: ILC
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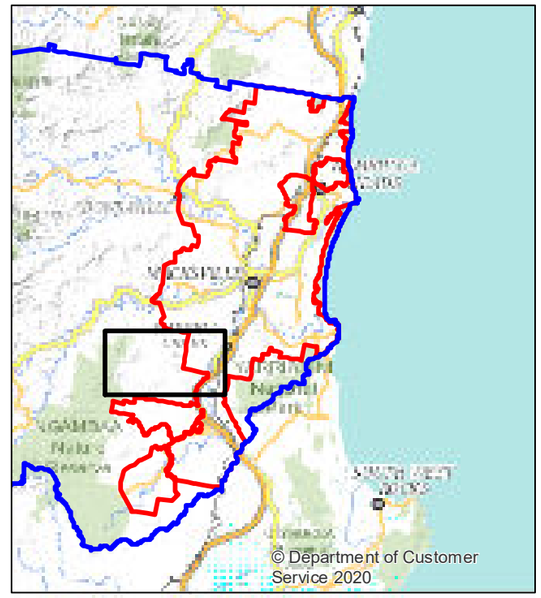

LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Secondary A
- Secondary B

LEGEND

- Bitou Bush
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Camphor Laurel
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Grey Myrtle - Brush Box dry rainforest on metasediments and lower nutrient volcanics
- Juncus rushlands on alluvial floodplains
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Rainforest Pioneers
- River Oak grassy open forest along larger rivers
- Spotted Gum- Tallowwood -Thick-leaved Mahogany - Small-fruited Grey Gum - Grey Ironbark grassy open forest on shallow sedimentary soils
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Weeping Lilly Pilly dry riparian rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 9 of 13

GeoLINK environmental management and design

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1017

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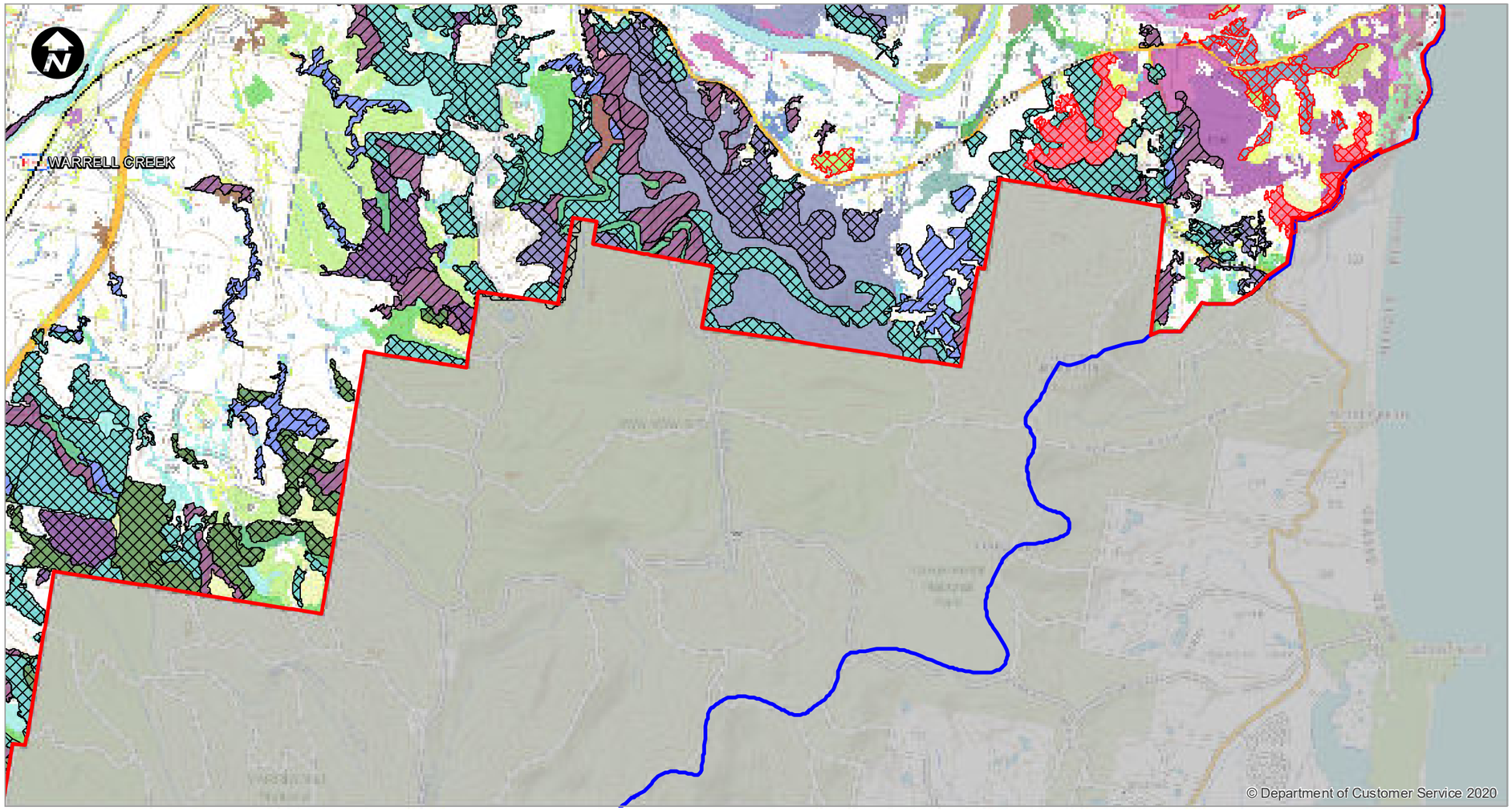

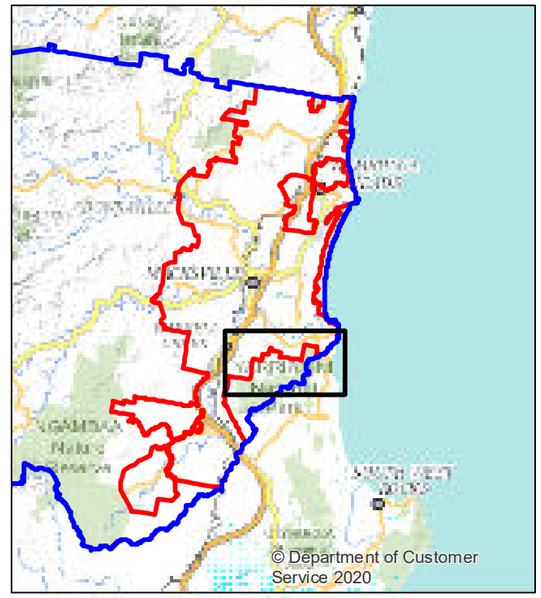

LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Primary
- Secondary A
- Secondary B

LEGEND

- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Broad-leaved Paperbark - Bare Twig Rush swamp sclerophyll open forest of coastal swamps
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Brushbox headland littoral rainforest
- Camphor Laurel
- Coast Wattle shrubland on coastal foredunes
- Common Reed grassland of alluvial floodplain and brackish tidal creeks
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Forest Red Gum - Pink Bloodwood - Grey Ironbark open forest to woodland near coastal hills
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Jointed Twig Rush- Swamp Water Fern freshwater wetlands of the alluvial floodplain
- Juncus rushlands on alluvial floodplains
- Kangaroo Grass sod grassland of North Coast headlands
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Pink Bloodwood - Brush Box open forest on coastal dunes and sandplains
- Pink Bloodwood - Red Mahogany - Swamp Box shrub/grass open forest at low altitudes
- Prickly Couch - Sea Rush - Saltwater Couch saltmarsh of saline coastal swamps and flats
- Rainforest Pioneers
- Red Bloodwood - Thick-leaved Mahogany - Heathy Dry Open Forest on granite
- Saltwater Couch - Samphire saltmarsh of low-lying estuarine areas
- Swamp Box - Forest Red Gum - Pink Bloodwood seasonal swamp forest on floodplains and low rises
- Swamp Mahogany - Willow Bottlebrush - Broad-leaved Paperbark forested wetland.
- Swamp Mahogany - tea-tree - Tassell Rush forested wetland of waterlogged wallum soils
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Swamp Oak shrublands on coastal headlands
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Tea-tree rock outcrop shrubland
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Twig Rush saltmarsh of estuaries
- Typha freshwater wetland of the floodplain
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 10 of 13

GeoLINK environmental management and design

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1017

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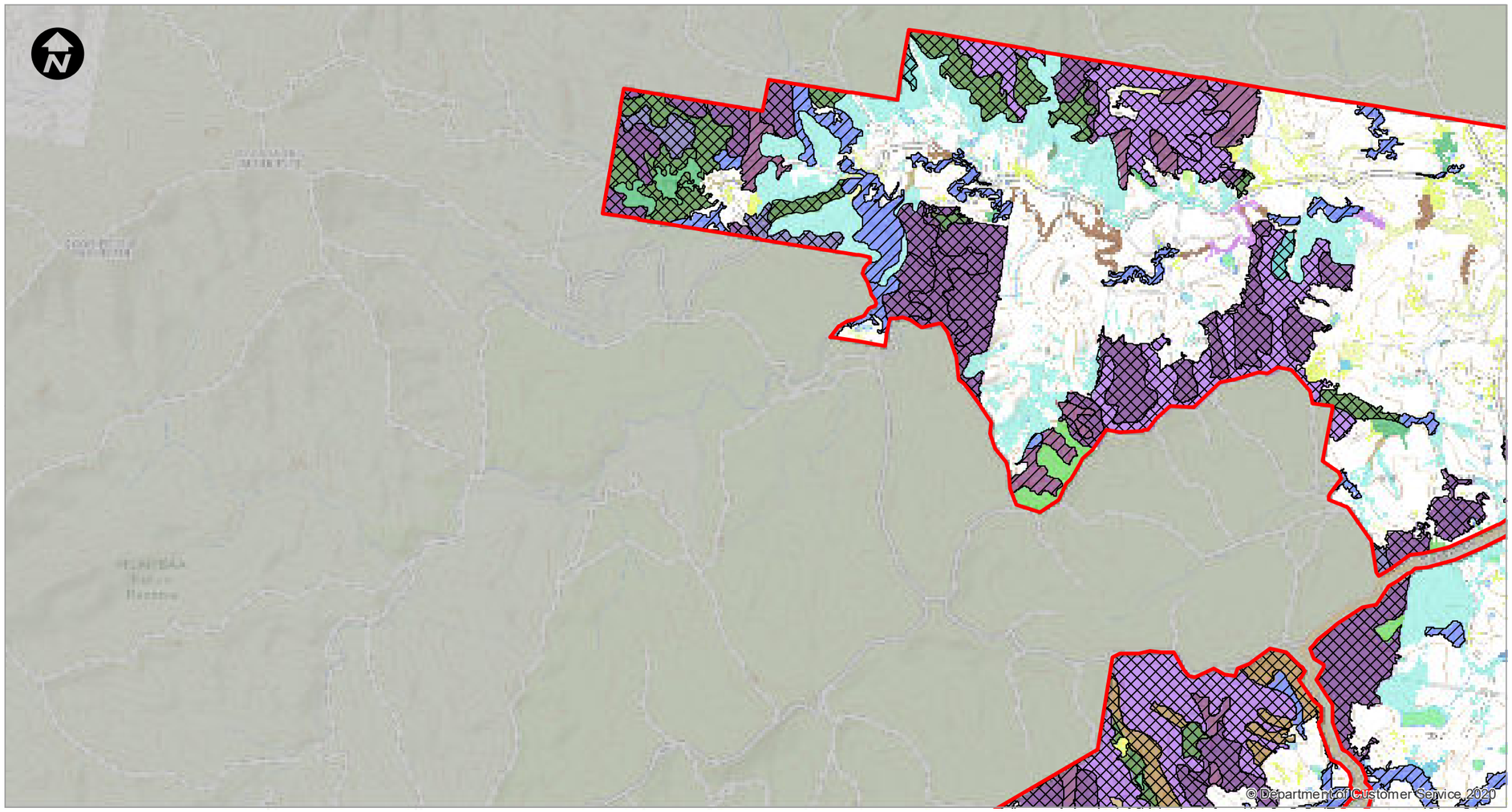

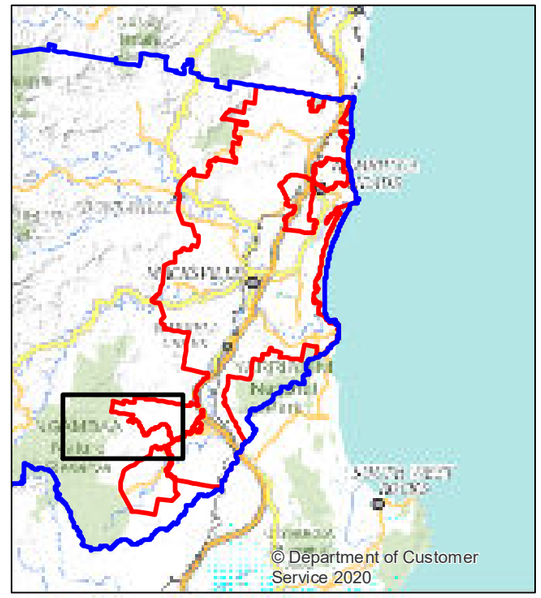

LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Secondary A
- Secondary B

LEGEND

- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Rainforest Pioneers
- River Oak grassy open forest along larger rivers
- Spotted Gum- Tallowwood -Thick-leaved Mahogany - Small-fruited Grey Gum - Grey Ironbark grassy open forest on shallow sedimentary soils
- Spotted Gum- Tallowwood -Thick-leaved Mahogany -Small-fruited Grey Gum - Grey Ironbark wet shrubby open forest on sheltered slopes
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 11 of 13

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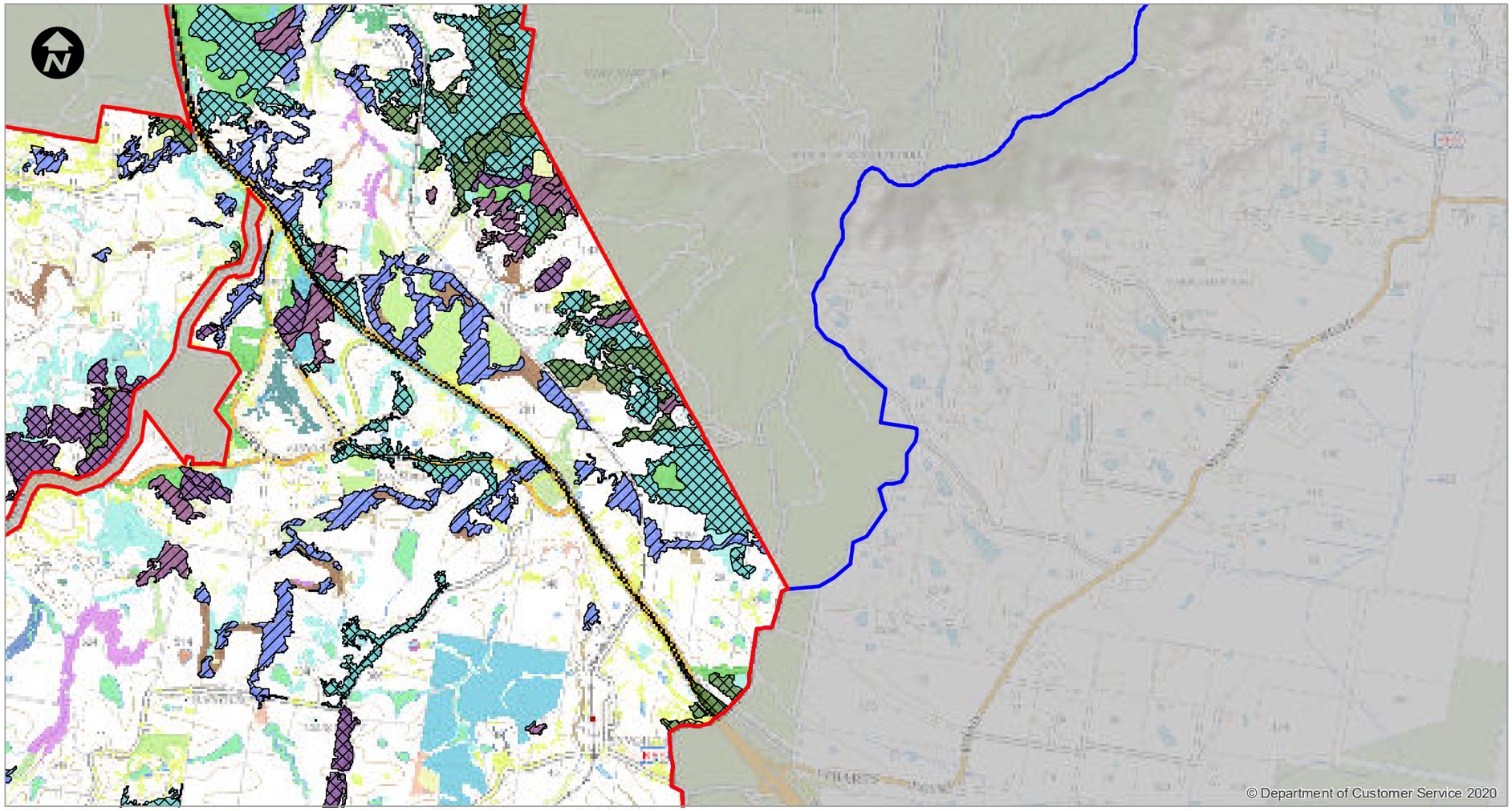

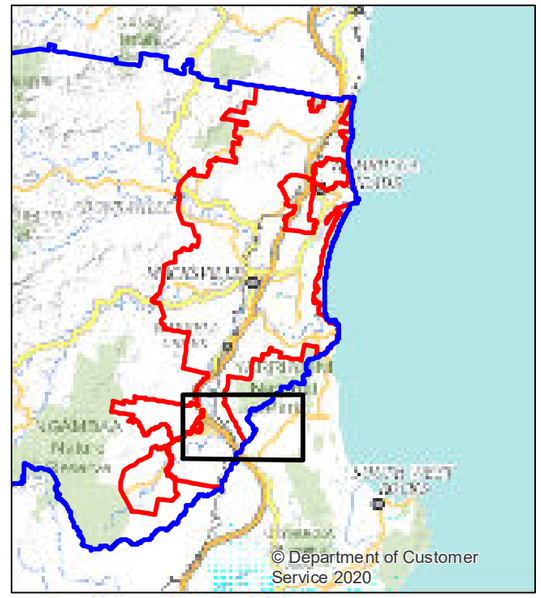

LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Secondary A
- Secondary B

LEGEND

- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Camphor Laurel
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Privet
- Rainforest Pioneers
- River Oak grassy open forest along larger rivers
- Swamp Oak - Broad-leaved Paperbark - Willow Bottlebrush floodplain forested wetland
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains
- Weeping Lilly Pilly dry riparian rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 12 of 13

GeoLINK environmental management and design

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1017

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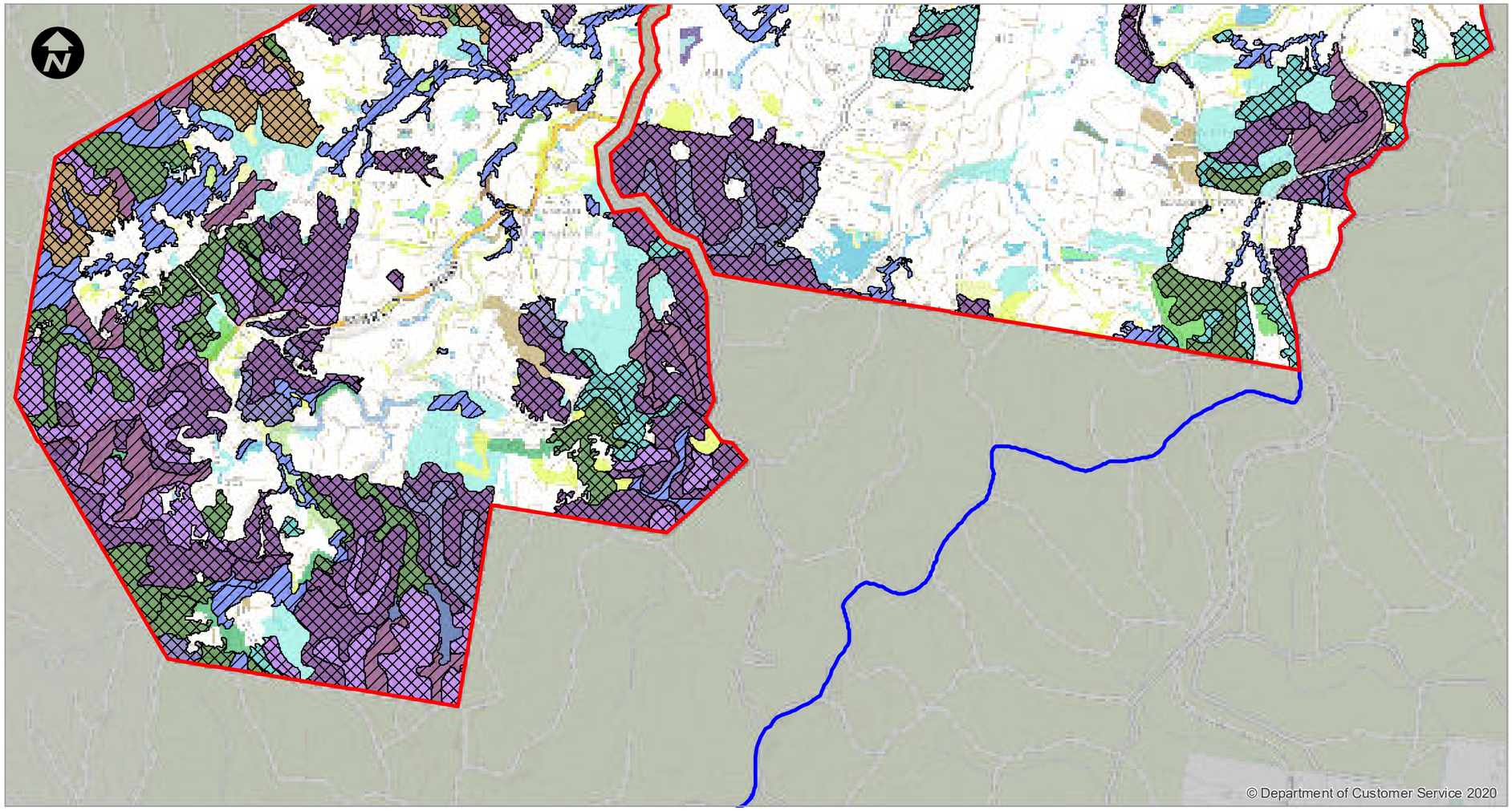

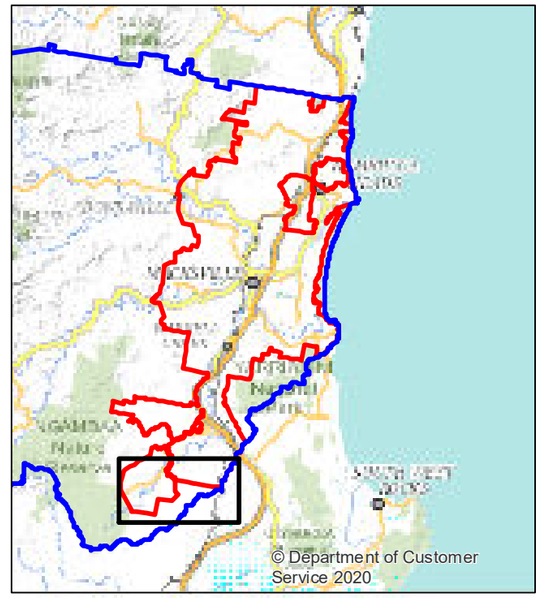

LEGEND

- Nambucca LGA
- Study area

Koala Habitat

- Secondary A
- Secondary B

LEGEND

- Bitou Bush
- Blackbutt - Red Mahogany - Bloodwood dry open forest on infertile sandy soils of low coastal rises and hills
- Brush Box - Grey Myrtle - Water Gum dry rainforests of poorer soils of gorges and river valleys
- Brush Box - Tallowwood - Sydney Blue Gum shrubby wet open forest of coastal hills and escarpment ranges
- Eleocharis equisetina freshwater wetland of coastal floodplains
- Environmental Plantings
- Exotic Plantation
- Exotic Vegetation
- Flooded Gum moist open forest of sheltered lower slopes and gullies
- Giant Water Gum - Rough-leaved Elm - Small-leaved Fig - Hard Quandong subtropical rainforest on coastal floodplains
- Knotweed wet meadow forbland on alluvial soils of coastal floodplains
- Lagoon forbland of permanent wetlands on the coastal floodplains
- Lantana
- Maidens Blush - Yellow Carabeen - Native Tamarind - Bangalow Palm subtropical rainforest on metasediments of the southern coastal ranges and escarpment
- Native Pioneers
- Native Plantation
- Native remnant vegetation
- Rainforest Pioneers
- Riparian subtropical rainforest with River Oak emergents on lowland creek flats
- Spotted Gum- Tallowwood -Thick-leaved Mahogany - Small-fruited Grey Gum - Grey Ironbark grassy open forest on shallow sedimentary soils
- Spotted Gum- Tallowwood -Thick-leaved Mahogany -Small-fruited Grey Gum - Grey Ironbark wet shrubby open forest on sheltered slopes
- Swamp Oak forested wetland of saline areas of coastal estuaries
- Tall Spike Rush freshwater wetland of coastal floodplains and depressions in low hills
- Tallowwood - Blackbutt moist shrubby tall open forest of the hinterland ranges
- Tallowwood - Small-fruited Grey Gum - Ironbark - Forest Oak wet sclerophyll forest
- Tallowwood - Small-fruited Grey Gum - Ironbark Forest Oak dry sclerophyll forest
- Turpentine - Brush Box - Flooded Gum - Blackbutt shrubby moist forest of sub-coastal lowlands
- Water Couch Mud Grass wet grassland meadow on alluvial soils of coastal floodplains
- Weeping Lilly Pilly dry riparian rainforest

0 700 Metres

Appendix B - Vegetation Mapping
Sheet 13 of 13

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Appendix C

Koala SEPP 2021 - Schedule 2 Koala Use Tree Species

SEPP Koala Habitat Protection 2021 - Schedule 2 Koala use tree species: North Coast KMA

Tree species which may occur within the Study Area are shaded in grey

Scientific name	***Common name(s)***
Allocasuarina torulosa	Forest Oak
Angophora floribunda	Rough-barked Apple
Corymbia gummifera	Red Bloodwood
Corymbia henryi	Large-leaved Spotted Gum
Corymbia intermedia	Pink Bloodwood
Corymbia maculata	Spotted Gum
Eucalyptus acmenoides	White Mahogany
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus bancroftii	Orange Gum
Eucalyptus biturbinata	Grey Gum
Eucalyptus campanulata	New England Blackbutt
Eucalyptus canaliculata	Large-fruited Grey Gum
Eucalyptus carnea	Thick-leaved Mahogany
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus eugenoides	Narrow-leaved stringybark
Eucalyptus fibrosa	Broad-leaved Red Ironbark
Eucalyptus glaucina	Slaty Red Gum
Eucalyptus globoidea	White Stringybark
Eucalyptus grandis	Flooded Gum
Eucalyptus laevopinea	Silver-top Stringybark
Eucalyptus largeana	Craven Grey Box
Eucalyptus microcorys	Tallowwood
Eucalyptus moluccana	Grey Box
Eucalyptus nobilis	Forest Ribbon Gum
Eucalyptus pilularis	Blackbutt
Eucalyptus placita	Grey Ironbark
Eucalyptus planchoniana	Bastard Tallowwood
Eucalyptus propinqua	Small-fruited Grey Gum
Eucalyptus psammitica	Bastard White Mahogany
Eucalyptus punctata	Grey Gum
Eucalyptus resinifera	Red Mahogany
Eucalyptus robusta	Swamp Mahogany
Eucalyptus rummeryi	Steel Box
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus scias	Large-fruited Red Mahogany
Eucalyptus seeana	Narrow-leaved Red Gum
Eucalyptus siderophloia	Grey Ironbark
Eucalyptus signata/Eucalyptus racemosa	Scribbly Gum/Narrow-leaved Scribbly Gum
Eucalyptus tereticornis	Forest Red Gum

Scientific name	*Common name(s)*
Eucalyptus tindaliae	Stringybark
Eucalyptus umbra	Bastard White Mahogany
Melaleuca quinquenervia	Broad-leaved Paperbark

Appendix D

KAR Content Requirements

Requirements for a Koala Assessment Report (KAR); adopted from Koala SEPP 2021

KAR Requirement
Principle 1. Understand Koala habitat values
What is known about the size, health and viability of the koala population?
What is known about the generational persistence of the local koala populations? This should be informed by a record analysis to determine population trends and persistence over time.
What is the broader landscape context of the habitat within the site area? For instance, is it contiguous with broader areas of habitat or relatively isolated, and what are the likely regional movement patterns of koalas using the site area?
Does the site area contain particular values likely to serve an important ecological function for koalas? For instance, does it provide linkage between other habitats or serve as a habitat buffer to broader areas?
Could the habitat area and/or koala population using the site area be important to the recovery of the koala? For instance, does the habitat contain features that might provide refuge during droughts, extreme heat, or fire? Or is the population considered to be healthy, robust or showing relatively low incidence of disease?
Drawing on evidence presented, what significance are the values of the site to preserving the existing Koala population and supporting recovering and expanding populations?
Principle 2. Avoid intensifying land use in Koala habitat areas through appropriate landscape planning and site selection
How has the development footprint avoided core Koala habitat?
What feasible alternative site selections were assessed as part of the process?
Principle 3. Encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas
Development avoids the direct loss of core Koala habitat within the site area and avoids fragmentation
Core Koala habitat is excluded from the development footprint
Principle 4. Minimise potential direct impacts to Koalas through Koala sensitive design
Development avoids direct impacts to core Koala habitat within the site area.
Where some loss of core Koala habitat cannot be avoided (and provided it is consistent with all other criteria), development is designed in a way that retains higher value areas across the site and avoids fragmentation of habitat within the site area and more broadly within the region.
Development is undertaken in a way that maintains the potential function of the core Koala habitat.
Principle 5. Implement best practice measures for the management of identified risks to Koalas.
All relevant indirect impacts to Koalas and Koala habitat associated with the development are identified.
Development uses best practice management measures to address the potential impacts considered likely to pose an increased risk to Koalas or their habitat.

Appendix E

Koala Survey Methods

Koala Survey Methodology to support Koala Assessment Reports

The following methodology derives from the SAT and RG-bSAT approach (Phillips & Callaghan 2011). The methodology is adopted from both the *Comprehensive Koala Plan of Management for south-east Lismore* (2013) and the *Bellingen Shire Council Coastal Area Koala Management Strategy* (2017).

Step 1

Determine appropriate sampling intensities for the site to be assessed as per **Table 1**.

Table 1. SAT Sampling Intensity

Area of study area	*Sampling intensity*
<15 ha	75 m x 75 m
15–50 ha	125 m x 125 m
>50 ha	175 m x 175 m

Step 2

a) Overlay a map/aerial photo of the development area with a square grid the dimensions of which correspond to the "survey sampling intensity" detailed in Table 1.

b) Use the grid-cell intersections to identify sampling points that fall upon areas of land wherein 30 trees of any species that have a dbh ≥ 100mm could theoretically be sampled within a radius approximately equal to that of 50% of the sampling intensity being utilised (e.g. 75m = 38m radius, 125m = 73m etc).

c) Disregard any sampling points that fall within areas such as water bodies or areas that do not have measurable forest cover or are a vegetation type not utilised by Koala (e.g. heathland or treeless wetlands).

Step 3

a) Field site sampling for the presence / absence of koala usage is to be undertaken at each sampling point using the Spot Assessment Technique (SAT) (Phillips & Callaghan, 2011).

b) The resulting koala activity level at each field site within PKH are then interpreted as either "Low" (less than 6%) or "High" use (equal to or greater than 6%).

Appendix F

Area Compensation - Example

The worked example for area compensation (refer **Section 7.5.3.2**) provided below is taken from the *Bellingen Shire Council Coastal Area Koala Management Strategy* (Bellingen Shire Council, 2017).

Within a 50 hectare proposed subdivision, there are 20 hectares of degraded primary koala habitat located on undevelopable land on the development area. After all efforts to avoid, minimise and mitigate the adverse impacts of the proposed subdivision on koala habitat have been exhausted, clearing of 0.46 hectares of primary koala habitat is proposed to upgrade an existing road servicing the proposed development.

Should the development proposal process apply Protection as the measure to compensate for clearing of 0.46 hectares of primary koala habitat, the area of receiving land required is calculated as follows.

Area of Habitat Compensation Works = Area impacted x Compensation Multiplier

= 0.46 ha x 4

= 1.88 hectares

Similarly, should the development proposal be suited to Rehabilitation or Restoration as the measure to compensate for proposed clearing, the area of receiving land required is therefore, 3.76 hectares and 5.64 hectares respectively as follows.

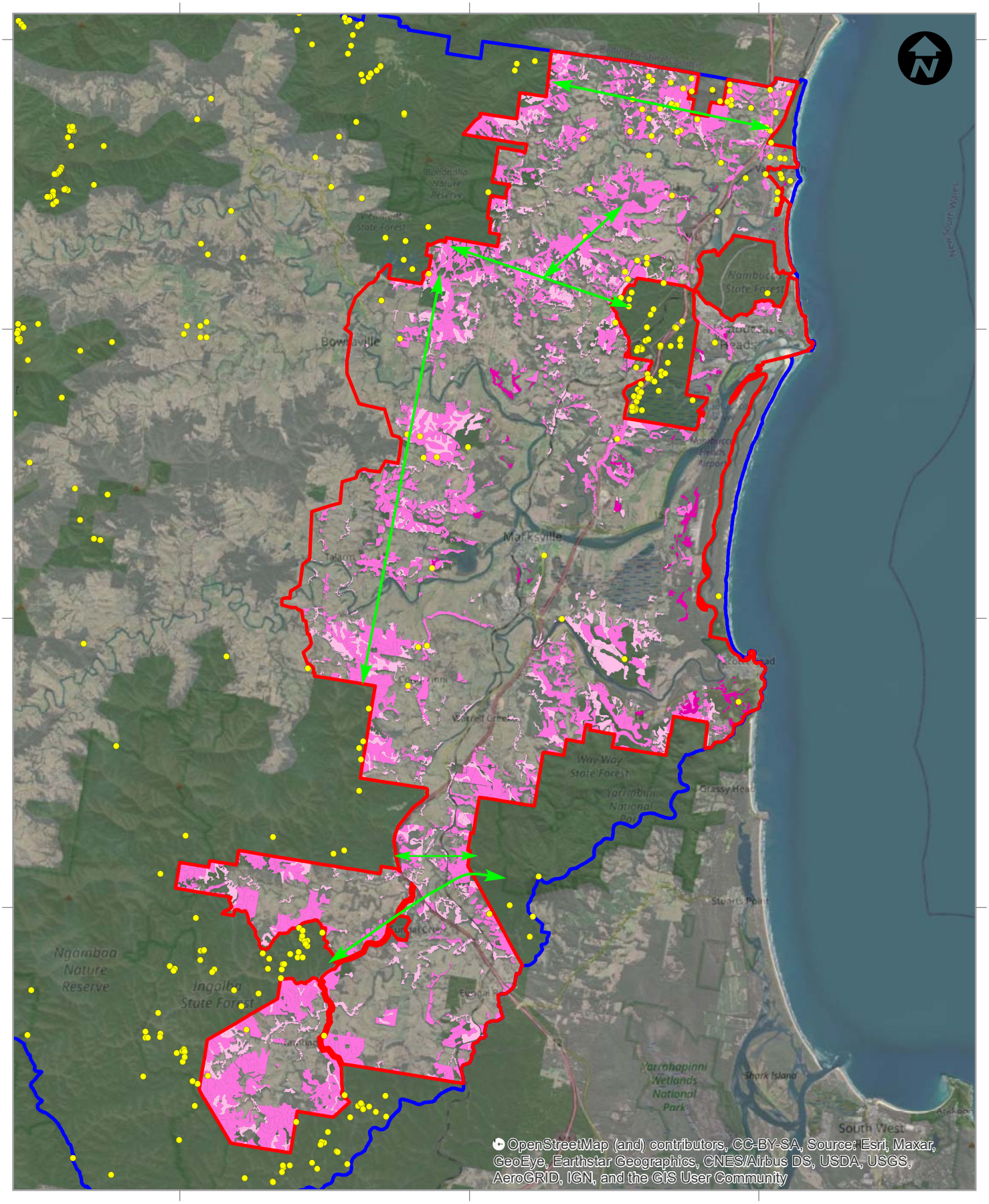
Table 9. Example of the Area of Habitat Compensation Works required

Based on an area of 0.46 ha of primary koala habitat proposed to be impacted by development activity.

Class of Habitat Compensation Works chosen by proponent	Area Impacted (ha)	Compensation Multiplier (from)	Area of Habitat Compensation Works (ha)
Protection	0.46	4	1.88
Rehabilitation	0.46	8	3.76
Restoration	0.46	12	5.64

Appendix G

Priority Locations For Habitat Restoration and Conservation



GDA 1994 MGA Zone 56

LEGEND

- Nambucca LGA
- Study area
- Primary
- Secondary A
- Secondary B
- Indicative priority Koala corridors
- Bionet Koala record

0 3.5 Km

Appendix G: Priority Locations For Habitat Restoration and Conservation

GeoLINK environmental management and design

Koala Management Strategy 2021 - Nambucca Coastal Area
3547-1019

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Date: 16/09/2021