

3. Existing environment

Chapter 3 presents an overview of the bioregional and landscape context of the project followed by the results of ecological surveys undertaken 2006 to 2012. Section 3.4 to Section 3.9 identifies all those species identified during ecological surveys. Detailed lists of species found during field surveys are in 0 to Appendix I. Section 3.10 identifies those significant or threatened species. However, it is acknowledged that the study area has suitable habitat for other species that were not identified during surveys. These species are identified and discussed in Section 3.11 and in Appendix D.

3.1. Bioregional context

The regional landscape has been assessed for an area up to 20 kilometres east and west of the project boundary. The boundary is wholly located within the NSW North Coast (NNC) Bioregion. This bioregion is one of the most diverse in NSW, with complex soil and vegetation patterns resulting from complex interactions of substrate, topographic and climactic variation.

In the north of the bioregion, soils derived from basalts support sub-tropical and warm temperate rainforests, or wet sclerophyll forests. Forests occurring on soils derived from granites and sandstones are mainly eucalypt vegetation communities and occupy much of the mid and southern areas of the bioregion from Woolgoolga to Tabbimoble. The dominant tree species vary and include Blackbutt (*Eucalyptus pilularis*), Tallowwood (*E. microcorys*), Scribbly Gum (*E. signata*), Large-leaved Spotted Gum (*Corymbia henryii*), Northern Grey Ironbark (*E. siderophloia*), Small-fruited Grey Gum (*E. propinqua*), Pink Bloodwood (*Corymbia intermedia*), Brush Box (*Tristania conferta*) and White Mahogany (*E. acmenoides*).

Heath and paperbark swamps in the bioregion occur behind coastal dunes and near lagoons and occur closest to the project boundary around Broadwater National Park. Estuaries are dominated by mangrove communities composed of Grey Mangrove (*Avicennia marina*) and River mangrove (*Aegiceras corniculatum*), and Saltmarsh species, some of which occur near the project boundary. Freshwater margins are occupied by Swamp Oak (*Casuarina glauca*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*) while Flooded Gum (*E. grandis*) and Forest Red Gum (*E. tereticornis*) grow on alluvial river flats.

Numerous freshwater wetlands and estuarine habitats occur through the region varying in size and condition according to location, land tenure and land use.

The regional context of the project is shown in Figure 3-1.

3.1.1. National parks and nature reserves

A number of national parks and nature reserves occur in the bioregion; those within 10 kilometres of the project boundary are described in Table 3-1. These have been considered in the context of the distribution of conserved habitat for listed species, communities and populations that may be affected by the project and the importance in maintaining connectivity within the landscape.

Conservation reserves managed by the National Parks and Wildlife Service (EPA) near the project boundary include Yuraygir State Conservation Area (which adjoins Yuraygir National Park), Mororo Creek Nature Reserve, Yaegl Nature Reserve, Bundjalung National Park, Tabbimoble Swamp Nature Reserve and Broadwater National Park. The largest area of national park potentially affected by the project boundary is Broadwater National Park which comprises a total area of 4055 hectares. Sections 8 and 9 of the project duplicate the existing highway through Broadwater National Park and some strip acquisition of land is required in this location.

Table 3-1: National parks and reserves within 10 kilometres of the project boundary

Project section	National park or reserve name	Description	Total area (hectares)
1	Coffs Coast Regional Park	Coastal Protection Zone (7a) Coffs Harbour City Councils LEP, occupying a coastal strip adjacent to Wedding Bells State Forest and Garby Nature Reserve. Includes coastal dune systems, rainforests, and heathlands.	388
1	Sherwood Nature Reserve	Located about 40 kilometres south of Grafton. The reserve is bordered by Conglomerate and Wedding Bells state forests and includes elevated plateaus with perched swamps and also pockets of littoral rainforest to the southwest (NPWS 2009a). Contains important population of the EPBC listed Square-fruited Ironbark.	5942
1-4	Yuraygir National Park	Borders the coastline to the east of the existing highway extending from Red Rock in the south to near the mouth of the Clarence River. Characterised by coastal dunes, heathlands and open forest. Pockets of littoral rainforest and wet sclerophyll forest also occur.	36,374
1-2	Yuraygir State Conservation Area	To the east of the existing Pacific Highway, around Halfway Creek and adjacent to the western border of Yuraygir National Park. Pockets of littoral rainforest and wet and dry sclerophyll forest occur.	3136
4	Woodford Island Nature Reserve	Located west of the Clarence River between Tyndale and Maclean. Conserves floodplain eucalypt forest and lowland rainforest communities.	373
4	Munro Island Nature Reserve	Located on the Clarence River near Sportsman Creek. The area of the reserve is variable due to fluvial processes that change the size of the island (NPWS 2009b). The reserve is one of only three that protect estuarine intertidal habitats of the North Coast Bioregion (NPWS 2009b).	14
4	Everlasting Swamp State Conservation Area	Located to the west of Munro Island Nature Reserve and the Clarence River it is the largest coastal floodplain swamp in NSW and is a significant habitat for water birds at a state, national and international level.	457

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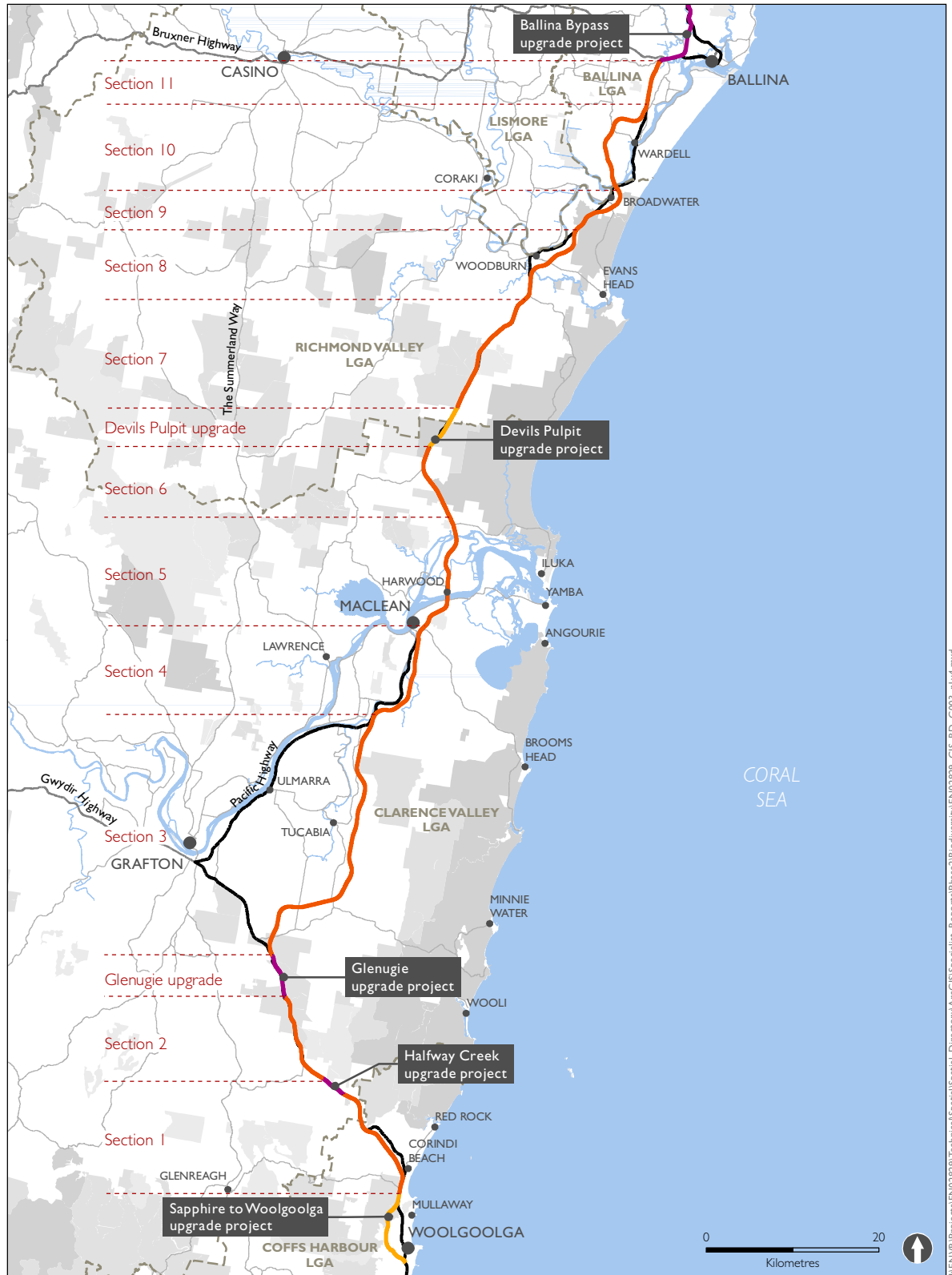
Project section	National park or reserve name	Description	Total area (hectares)
4-5	Yaegl Nature Reserve	Located immediately adjacent to the existing Pacific Highway. James Creek traverses the reserve and a SEPP 14 wetland (known as Farlows Swamp or the Maclean Wetlands), is protected by the reserve (NPWS 2009c). These wetlands include a large area of remnant floodplain paperbark forest that is not well represented in the NSW reserve system (NPWS 2009c).	312
4-5	Clarence Estuary Nature Reserve	Located on the Clarence River to the west of Yamba. Established to protect the Clarence estuary foreshore, SEPP 14 coastal wetlands and a small area of littoral rainforest (NPWS 2009d).	132
5-6	Chatsworth Hill State Conservation Area	Located to the west of Mororo Creek Nature Reserve on the Richmond Range (NPWS 2009e). The Reserve supports shrubby dry sclerophyll forest, wet sclerophyll forest and swamp sclerophyll forest	519
5-6	Mororo Creek Nature Reserve	Located on the Clarence River floodplain near Chatsworth Hill State Conservation Area and to the west of the existing Pacific Highway. This reserve and Chatsworth Hill State Conservation Area provide an important wildlife corridor between the coastal floodplain and the hinterland (NPWS 2009e). The reserve supports shrubby dry sclerophyll forest, wet sclerophyll forest and swamp sclerophyll forest.	79
5-8	Bundjalung National Park	The northernmost limit of the park occurs to the east of Tuckombil Canal, near the Evans River, and extends as far south as the Clarence River. The national park includes SEPP 14 wetlands and supports freshwater lagoons, mangrove mudflats and rare rainforests	21,195
6-7	Bundjalung State Conservation Area	Located to the west of the existing Pacific Highway and situated close to Tabbimoble State Forest and Doubleduke State Forest.	4869
7	Jackywalbin State Conservation Area	Located to the west of the existing Pacific Highway, contiguous with Doubleduke State Forest and Tabbimoble State Forest. It supports open forest habitats.	660
7	Tabbimoble Swamp Nature Reserve	Located to the east of the existing Pacific Highway and contiguous with Bundjalung National Park to the east. It conserves wetlands, littoral rainforest, and wet and dry sclerophyll forest.	1075
7-8	Yarringly Nature Reserve	Located to the west of the project and to the north of the Yarringly State Conservation Area.	287
7-8	Yarringly State Conservation Area	Bounded by Bungawalbin Creek which separates the area from Yarringly Nature Reserve. It supports open forest habitats.	237
8-9	Broadwater National Park	Located between Broadwater in the north, and Woodburn in the south. The existing Pacific Highway traverses through the national park. It supports heath, wetland and creek habitats.	4055
9	Tuckean Nature Reserve	Located west of the study area, between Broadwater and Wardell, the reserve forms part of a regional network of protected wetlands, including nearby Ballina Nature Reserve.	1037
10-11	Uralba Nature	Located to the west of the project just south of Ballina, on	155

Project section	National park or reserve name	Description	Total area (hectares)
	Reserve	the Blackwell Range. The reserve protects remnants of sub-tropical rainforest known as 'Big Scrub'.	
10-11	Victoria Park Nature Reserve	Located on the Alstonville Plateau to the west of the project. Also a 'Big Scrub' remnant.	17
10-11	Little Pimlico Island Nature Reserve	In the Richmond River west of Wardell, the reserve supports wetlands and littoral rainforest of state significance. It also contains rainforest elements representative of the 'Big Scrub' at their southern limit.	6
11	Richmond River Nature Reserve	Located east of Duck Creek, near Ballina, on the north-facing bank of the Richmond River estuary. The reserve contains significant wetland and coastal vegetation communities that provide significant habitat for birds, including those protected under international conservation agreements.	253

The Solitary Islands Marine Park managed by the Marine Parks Authority is a coastal reserve located between Coffs Harbour and Sandon. The park includes a number of small creeks and estuaries that discharge directly into the coast at this location. Of these the project crosses Corindi River and Dirty Creek (part of the Corindi River estuary) and Arrawarra Gully (part of Arrawarra Creek estuary) in Section 1. The designated marine reserve in Corindi River and Dirty Creek is downstream of the highway and there are no direct impacts on the park. At Arrawarra Gully the extent of the marine park is the current eastern extent of the highway. Indirect impacts on receiving waters are identified in the Working Paper – Water Quality.

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3-1 Regional context of the project



- The project
- Upgrade completed to dual carriageway
- Upgrade under construction
- Existing Pacific Highway

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3.1.2. State forests

Several state forests occur within 10 kilometres of the project (refer to Table 3-2). Eight state forests adjoin the project boundary being Glenugie, Tabbimoble, Wedding Bells, Newfoundland, Pine Brush, Devils Pulpit, Mororo and Doubleduke state forests.

Table 3-2: State forests within 10 kilometres of the project boundary

Project section	State forest*	Total area (hectares)
1	Wedding Bells State Forest	5048
1	Conglomerate State Forest	5657
1-2	Newfoundland State Forest	6280
1-2	Barcoongere State Forest	2133
3	Glenugie State Forest	3400
3	Divines State Forest	1514
3	Bom Bom State Forest	809
3	Candole State Forest	6546
3	Pine Brush State Forest	3955
4	Woodford North State Forest	214
5-7	Gibberagee State Forest	10418
6	Mororo State Forest	378
6-7	Devils Pulpit State Forest	1479
7	Tabbimoble State Forest	2270
7-8	Doubleduke State Forest	4293

In general, each of these forests are characterised by dry sclerophyll forests of Blackbutt, Mahogany, Spotted Gum and Ironbark, with limited low-lying areas comprising Paperbark or Forest Red Gum. These areas are zoned for timber harvesting and environmental protection and are occasionally leased for grazing; however their large size and range of microhabitats also provide significant areas for threatened species.

3.2. Landscape context

The NSW Landscapes coverage (Mitchell, 2003) is a statewide map of landscapes, compiled using existing resources and describing land attributes considered to drive ecosystem process. This is the most appropriate reference to identify the physical environmental features of the North Coast Bioregion and are summarised in Table 3-3 and shown in Figure 3-2. The proportion of cleared estimates for each landscape is derived from OEH (2012a) 'overcleared landscapes database'.

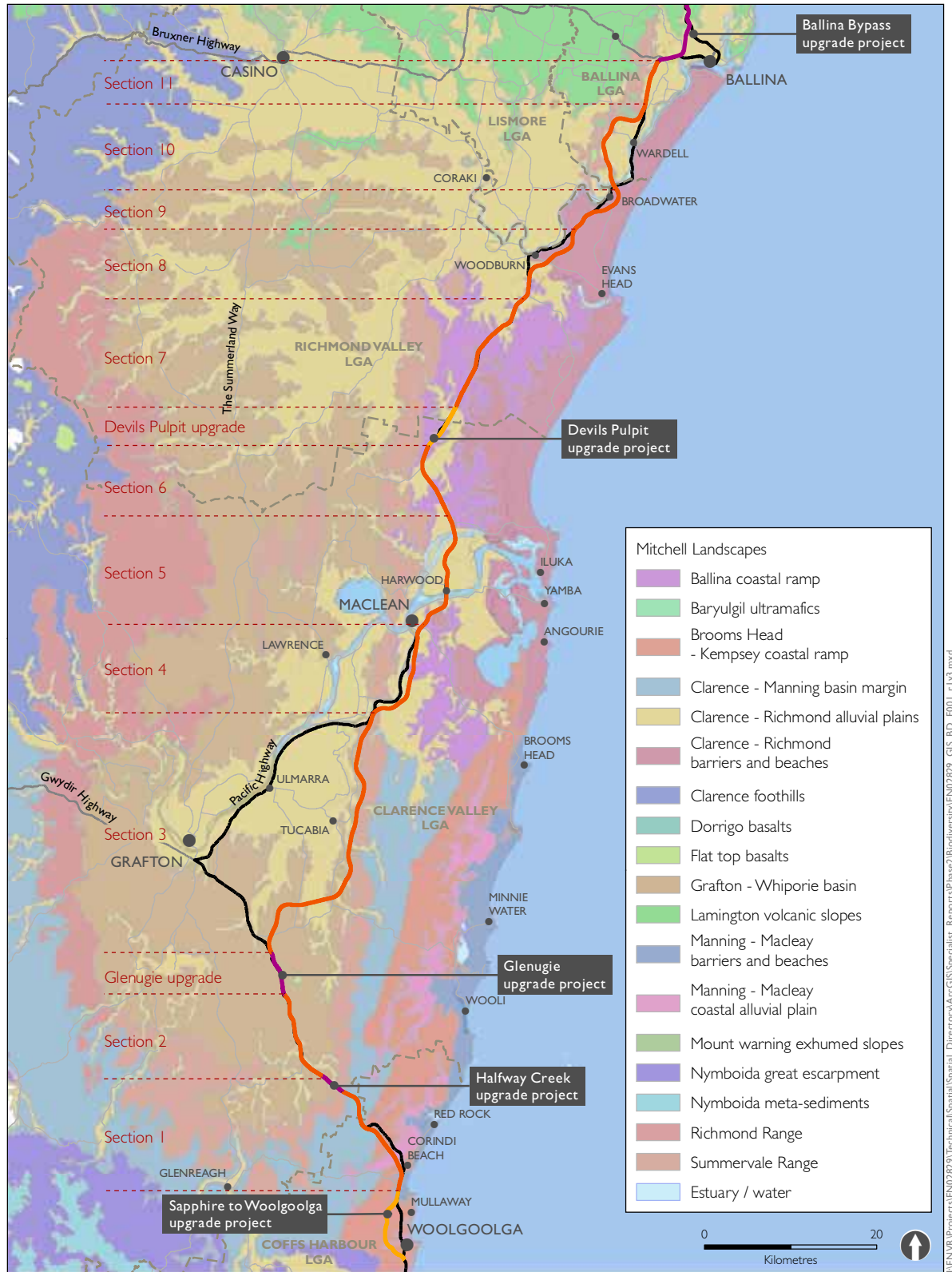
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In the eastern and central divisions of the state, geology and topography were emphasised. The project traverses a mix of floodplains, low hills and ranges as well as coastal environmental features including wide valleys, channels, swamps and terraces typical of the alluvial plains of the Clarence and Richmond rivers (Morgan 2001b, Mitchell 2003). This also includes the low hills and plains of the Manning River, Macleay River and Evans River.

Several coastal ranges occur in the east of the study area, the most prominent being the Summervale Range, incorporating Shark Creek and Pillar Valley ranges in the south and the coastal Ballina and Blackwall Ranges between Wardell and Ballina. Remaining areas have been formed by coastal barriers such as dunes, swamps and lagoons on Quaternary coastal sands with an elevation up to 25 metres.

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3-2 Landscape context



- The project
- Upgrade completed to dual carriageway
- Upgrade under construction
- Existing Pacific Highway

Table 3-3: Landscapes in the NSW North Coast Bioregion

Project section	Mitchell (2003) ecosystems	Landscape characteristics (geomorphic, pedologic and vegetation)	Percentage cleared*
Section 1	Coastal barriers	Manning-Macleay Beaches and Barriers: Beaches, dunes, swamps and lagoons on Quaternary coastal sands, general elevation 0 to 25 m, local relief 10 to 20 m. Yellow or white single grain quartz sand on destabilised dunes, well developed iron and humic podsols with depth to pan varying with position in the dune sequence, topography and depth to groundwater. Outer barrier; foredune with coast Spinifex coast wattle, and coast tea tree. Hind dunes with blackbutt, pink bloodwood, old man banksia and rainforest elements. Swampy lagoon zone of wet heath and swamp forest between the barriers with; dense tea tree, paperbark, Swamp Oak, and Swamp Mahogany. Inner barrier dunes tall forest of; Blackbutt, Northern Scribbly Gum, Needlebark Stringybark and Red Bloodwood. Wet heath with Lemon Scented Tea-tree, Prickly Tea-tree, Swamp Banksia, rushes and sedges.	35%
Section 1	Manning-Macleay	Manning-Macleay Coastal Alluvial Plain: Wide valleys, channels, floodplains, swamps, and terraces of the Manning and Macleay rivers and other coastal streams on Quaternary alluvium, general elevation 0 to 50 m, local relief 15 m. Dark organic loams and silty clay on the floodplain, gradational brown loams and yellow-brown texture-contrast soil on terraces, organic silty mud in swamps.	64%
Section 1		Brooms Head-Kempsey Coastal Ramp: Hills and low ranges of the coastal fall on lower Devonian greywacke, slate phyllite and quartzite and Permian Phyllite and schistose sandstone. General elevation 50 to 450 m, local relief 300 m. Thin, stony gradational loam and sandy loam on the slopes grading to yellow-brown texture-contrast soils on lower slopes and in valleys. Dry hardwood forest of Blackbutt, Sydney Blue Gum, and Large-fruited Blackbutt.	31%
Section 3	Clarence Basin	Summervale Range: Higher inland coastal range adjacent to Ballina Coastal Ramp on prominent line of middle Jurassic quartz sandstone and conglomerate, with prominent water gaps where streams have cut across the structure. Strong structural control with north-south folds. General elevation 50 to 325 m, local relief 150 m. Shallow stony red-brown structured loams, and red, yellow or brown texture-contrast soils in different slope positions, the colour differing with drainage conditions. Dry hardwood forest of Spotted Gum, Blackbutt, Large-fruited Blackbutt, with grasses and burrawang	12%
Sections 2-8, 10-11		Clarence-Richmond Alluvial Plains: Wide valleys, channels, floodplains, terraces and estuaries of the Clarence and Richmond rivers and other coastal streams on Quaternary alluvium, general elevation 0 to 50 m, local relief 15 m. Deep brown earths and structured brown clay on floodplains. Terrace with yellow texture-contrast soil containing ironstone concretions. Extensively cleared the valley floor supported forest of Cabbage Gum, Forest Red Gum, Broad-leaved Apple, River Oak, Silky Oak, Rough-barked Apple, Native Teak, Coastal Grey Box, Pink Bloodwood, Spotted Gum, Grey Ironbark, Broad-leaved Paperbark, Blackwood and Black She-oak. Salt marsh, mangrove communities and paperbark freshwater swamps occur in the estuary.	75%

Upgrading the Pacific Highway – Woolgoolga to Ballina Upgrade

Project section	Mitchell (2003) ecosystems	Landscape characteristics (geomorphic, pedologic and vegetation)	Percentage cleared*
Sections 2-3		Grafton-Whiporie Basin: Extensive low undulating hills and large drainage basins on sub-horizontal upper Jurassic interbedded quartz sandstone, lithic sandstone, clayey siltstone and coal measures. Often exhibits ironstone concretions in the weathering profile. General elevation 50 to 150 m, local relief 50 m. Yellow and brown texture-contrast soils on slopes and dark grey clays along valley floor streamlines. Dry hardwood forest of Spotted Gum, Blackbutt, Large-fruited Blackbutt, with grasses and burrawang.	35%
Sections 6-7		Ballina Coastal Ramp: Coastal ranges and low hills on early Jurassic sub-horizontal coarse felspathic sandstone, lithic sandstone, claystone and coal measures, general elevation 25 to 100m, local relief 50m. Yellow and brown texture-contrast soils on slopes and dark grey clays along valley floor streamlines. Dry hardwood forest of Spotted Gum, Blackbutt, Large-fruited Blackbutt, with grasses and burrawang. Limited areas of subtropical closed forest on higher quality soil and littoral closed forest on alluvium and sand dunes.	13%
Sections 8-9	Coastal Barriers	Clarence-Richmond Barriers and Beaches: Beaches, dunes, swamps and lagoons on Quaternary coastal sands, with inner and outer barrier dune sequences, general elevation 0 to 25 m, local relief to 10 m. Inland sequence of: siliceous sand on the beach with coast spinifex and coast casuarina on the berm. Siliceous sand with organic topsoil on the hind dune with Tuckeroo, Coast Wattle, and Broad-leaved Paperbark. Pleistocene high dunes with well developed podsol profile and Hairpin Banksia, Wallum Banksia, Heath Banksia, Black Tea Tree, Pink Bloodwood, Broad-leaved White Mahogany, grass trees, Kangaroo Grass and Blady Grass. Poorly drained inner low dunes and beach ridges, relief 1 to 2 m, with humus podsols and peaty podsols with Broad-leaved Paperbark, Wallum Bottlebrush, Common Tea tree, Common Reed, Common Rush and Coral Fern. Back barrier swamps and plains with gradational dark coloured loamy sand, peaty podsol and acid peat with Broad-leaved Paperbark, Swamp Oak, Swamp Mahogany, Forest Red Gum, Red Bloodwood, Pink Bloodwood, Coast Banksia, and Rough-barked Apple on better drained sites. High dunes on the bedrock coastal ramp with shallow podsols and Blackbutt, Pink Bloodwood, Broad-leaved White Mahogany, Red Bloodwood and Brush Cypress Pine.	39%

*Overcleared landscapes database (OEH 2012a)

3.2.1. Land tenure and land use

A buffer of 20 kilometres around the project boundary was used to identify the existing land tenure and land-use in the regional landscape (Figure 3-3). Forested lands make up around 50 per cent of this area. Around 26 per cent is contained within national parks and state forests and 24 per cent in private ownership. Wetlands make up only four per cent of the study area. Cleared agricultural and urban land make up 38 per cent of the area and remaining one per cent being transport corridors including the existing Pacific Highway, rail corridors, and other easements and corridors which contain forest.

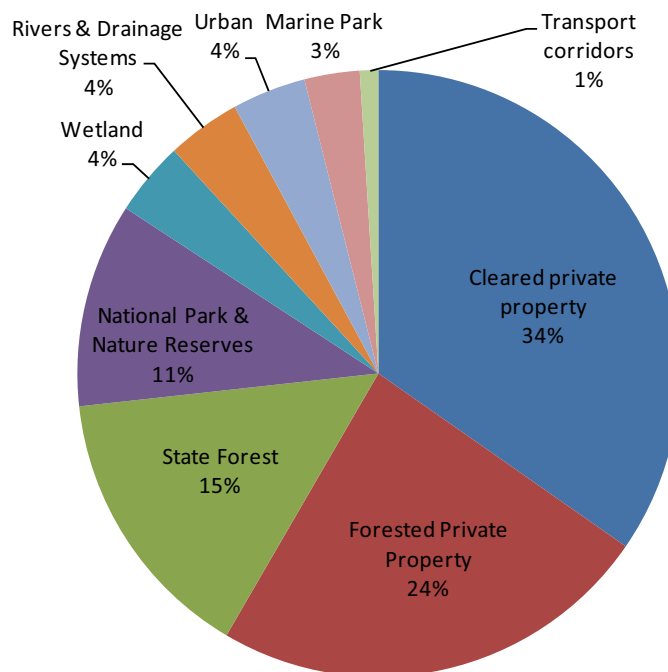


Figure 3-3: Land tenure and land use within 20 kilometres of the project boundary

3.2.2. Key habitats and corridors

Information on key habitats and movement corridors was obtained from the Key Habitats and Corridors project (DEC 2003) and Climate Change Corridors project (DECC 2007). These projects adopted a strategic approach to landscape conservation in north-east NSW by identifying regional key fauna habitats and linking habitat corridors, including current corridor locations and corridors likely to become important in the face of future climate change. The conservation corridors are summarised in Table 3-4 and shown in Figure 3-4 and Figure 3-5.

Table 3-4 Key regional, sub-regional and climate change corridors in the North Coast Bioregion

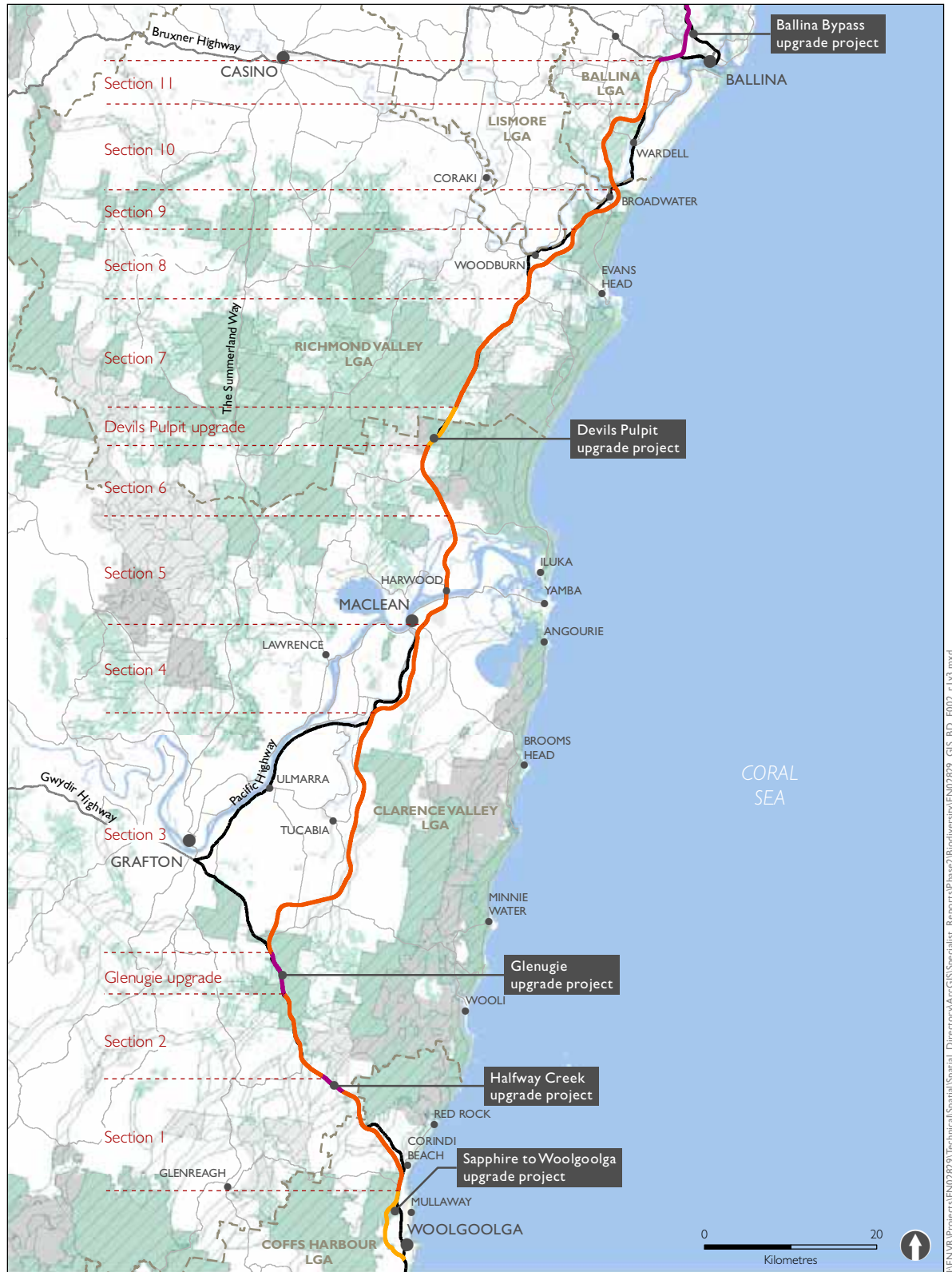
Regional corridor	Location description*	Focal species
OEH climate change corridors - moist corridors		
Alstonville Plateau Link	Intersects with western side of Sections 10 and 11. Not totally bisected by project.	Rose-crowned Fruit Dove, Pouched Frog
Corindi Connector	Crosses Section 1. Connects with the Yamba - Nymboida corridor. Totally bisected by project.	Yellow-bellied Glider, Grey-headed Flying-fox
Illuka - Richmond Range	Crosses Sections 6 and 7. Totally bisected by project.	Grey-headed Flying-fox, Whiptail Wallaby
Yamba - Nymboida	Crosses Section 1. Connects with the Corindi Connector corridor. Totally bisected by project.	Yellow-bellied Glider, Grey-headed Flying-fox
OEH climate change corridors - coastal corridors		
Ballina	Intersects with Sections 10 and 11. Not totally bisected by project.	Grey-headed Flying-fox, Rose-crowned Fruit Dove
Broadwater - Bungawalbin	Crosses Devils Pulpit Upgrade and Sections 7, 8 and 9. Totally bisected by project.	Koala, Emu
Coffs Coast	Intersects with Section 1. Not totally bisected by project.	Grey-headed Flying-fox, Koala. Spotted-tailed Quoll
Lower Clarence	Crosses Sections 3, 4, 5 and 6. Totally bisected by the project at several locations.	Wetland waterbirds, Emu
Uralba-Tuckean Swamp	Crosses Sections 10 and 11. Totally bisected by project.	Albert's Lyrebird, Koala
Yuraygir	Intersects with eastern side of Section 1. Not totally bisected by project.	Emu, Ground Parrot, Spotted-tailed Quoll
OEH climate change corridors - dry corridors		
Coastal Range	Dissected by Sections 1, 2 and 3 and the Glenugie Upgrade. Intersects with western edge of Sections 3 and 4.	Coastal Emu
Richmond Range-Bungawalbin	Intersects with western side of Sections 6 and 7 and the Devils Pulpit Upgrade. Not totally bisected by project.	Squirrel Glider, Spotted-tailed Quoll
OEH key corridors (listed from south north)		
Corindi (Corindi River)	Links with Redbank Creek corridor and key habitat areas across existing highway. Corindi River is totally bisected by Section 1.	Brolga, Black-necked Stork,
Dirty Creek	Links to Yuraygir National Park, state forests, key habitats and Redbank Creek corridor. Dissected by Section 1.	Yellow-bellied Glider, Rufous Bettong, Spotted-tailed Quoll
Lazyman Creek	Crosses Section 1 at Lazyman Creek. Links state	All fauna

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Regional corridor	Location description*	Focal species
	forest areas and key habitats.	
New-Sherwood	Crosses Section 1. Links to state forest areas, Sherwood Nature Reserve and key habitats. Totally bisected by project.	Yellow-bellied Glider, Rufous Bettong, Spotted-tailed Quoll
Yuraygir (Yuray-Sherwood, Yuraygir_CR)	Crosses Section 1. Links Sherwood Nature Reserve to Yuraygir National Park. Not totally bisected by project.	Yellow-bellied Glider, Rufous Bettong
Halfway Creek	Crosses section 2 at Halfway Creek (Section 2). Links Sherwood Nature Reserve to Yuraygir National Park. Totally bisected by project.	Rufous Bettong, Koala, Spotted-tailed Quoll
Snake Creek	Crosses Section 2. Connects areas of state forest and key habitats across the existing highway.	All fauna
Newfoundland State Forest	Western boundary intersects Section 2 of the project. Not totally bisected by project.	All fauna
Glenugie State Forest	Occurs either side of Section 2 and the Glenugie Upgrade. Project boundary intersects eastern patches in Section 2 and the Glenugie Upgrade. Totally bisected in Section 3.	All fauna
Pine Brush	Crosses Section 3. Not totally bisected by project.	Brush-tailed Phascogale
Mororo – Gibberage (Bundjalung, Mororo SF, Moro-Bundj)	Crosses project in Section 6. Connects to several other corridors, state forests and key habitats. Totally bisected by project	Yellow-bellied Glider
Bundjalung - Devils Pulpit (Bundjalung, Devils Pulpit, Devils_sf)	Crosses project at the Devils Pulpit Upgrade, which has been approved and is not part of the current assessment. Connects areas of state forest and key habitats across the existing highway. Totally bisected by project.	Yellow-bellied Glider, Brush-tailed Phascogale
Bundjalung-Tabbimoble (Tabbimoble_nr, Tabbimoble-Bundjalung, Doubleduke State Forest, Tabbimoble_sf)	Crosses project in multiple places in Section 7. Links key habitat areas across the existing highway at several locations. Totally bisected by project.	Long-eared Bat, Yellow-bellied Glider, Brush-tailed Phascogale, Spotted-tailed Quoll
Broadwater (Broadwater Ck, Broadwater NP)	Crosses Sections 9 and 10. Connects to several other corridors and key habitats to the west of project. Totally bisected by project.	Eastern Long-eared Bat, Black Bittern, Brush-tailed Phascogale
Wardell - Blackwall	Crosses Section 10 near Wardell. Totally bisected by project.	Eastern Long-eared Bat, Black Flying-fox
Wardell-Tuckean (Wardell)	Crosses Section 10 near Wardell. Totally bisected by project.	Eastern Long-eared Bat, Black Flying-fox
Wardell-Uralba	Intersects Section 11 and crosses project in Section 10 near Wardell. Totally bisected by project.	Eastern Long-eared Bat, Black Flying-fox
Emigrant Creek	Crosses Section 11. Connects to the Uralba-Ballina corridor to the northwest and the Richmond River to the east. Totally bisected by project.	All fauna
Key habitats	Key habitats are distributed throughout the local area and project boundary.	All fauna

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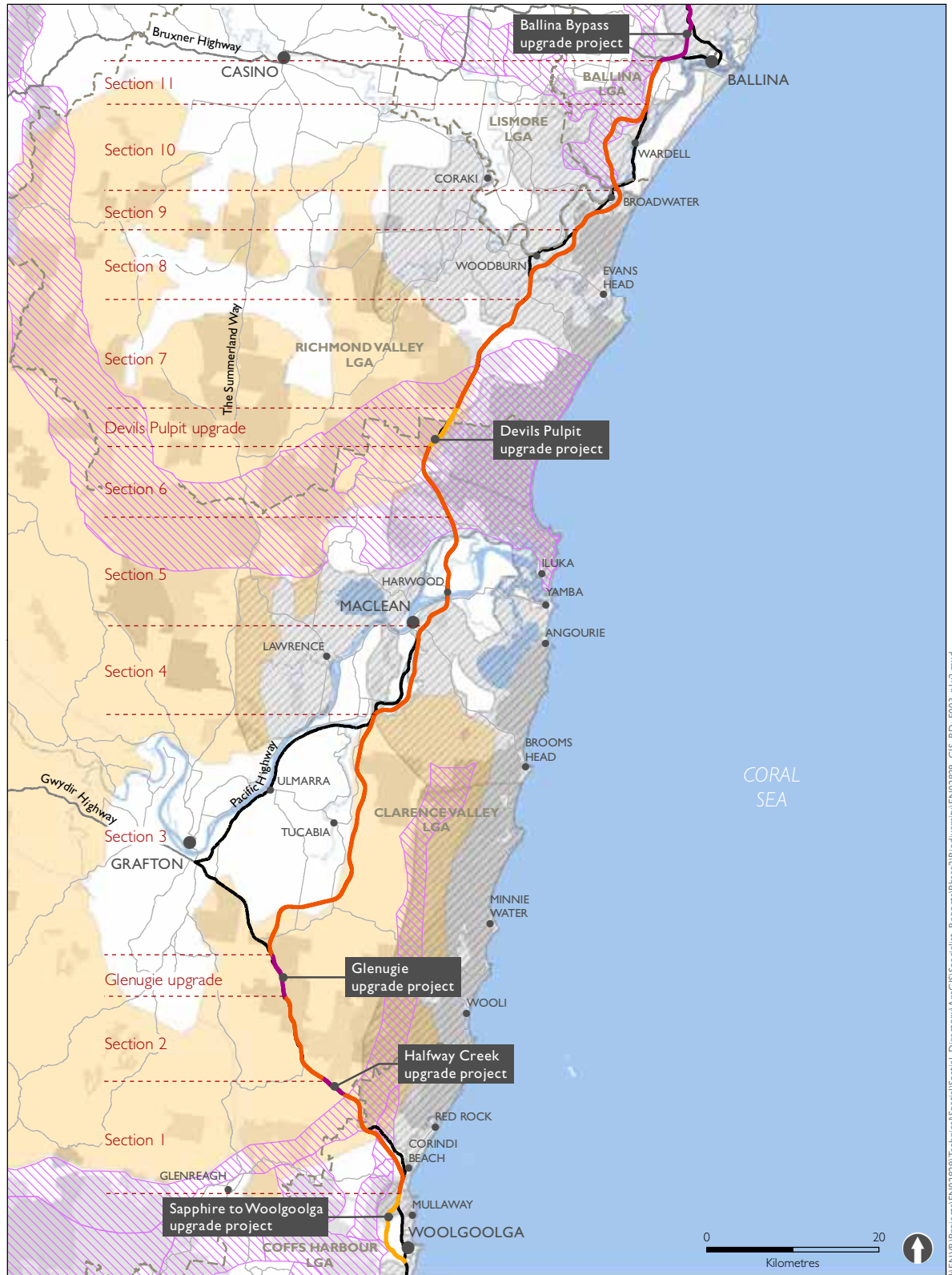
Figure 3-4 Key habitats and corridors



- Woolgoolga to Ballina upgrade project
- Upgrade completed to dual carriageway
- Upgrade under construction
- Existing Pacific Highway
- Fauna corridors
- Key fauna habitat

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3-5 Climate change corridors



- The project
- Upgrade completed to dual carriageway
- Upgrade under construction
- Existing Pacific Highway
- Moist corridors
- Coastal corridors
- Dry corridors

3.3. Historic and social context

The region supported populations of Aboriginal people living in diverse floodplain habitats before it was settled by Europeans in the 1830s and 1840s (DECC 2009b). Red cedar harvesters were early settlers to the region, followed by pastoral occupation. The region's abundant natural resources were greatly exploited with the introduction of chainsaws and swingsaws to North Coast forests from the mid twentieth century (DECC 2009b). The area now supports a significant agricultural and fishery economy. Agricultural activities such as dairy and beef cattle grazing, and sugar cane production were enhanced with the clearing and draining of freshwater and estuarine wetlands, rainforests, heathlands and woodlands. However, this land use change has challenged sustainable management of biodiversity due to the decline of aquatic and terrestrial habitats and water quality, and the increase of invasive species and acid sulfate soils (Smith 2011).

Tourism, urban and industrial developments have more recently developed in the region, which has experienced population growth. The project boundary passes through the Coffs Harbour, Clarence Valley, Richmond Valley and Ballina local government areas (LGAs). The combined population of these areas has been most recently estimated at 172,830 people (Australian Bureau of Statistics 2006).

Portions of the project follow the existing Pacific Highway corridor, with deviations around floodplain areas such as the Corindi River, Coldstream River and Shark Creek. The existing highway traverses a mix of densely vegetated habitats through Section 1-3, 6-8 and Section 10. The remaining sections generally traverse cleared agricultural landscapes supporting a mosaic of fragmented remnant and regrowth vegetation.

3.4. Vegetation communities

The vegetation types dominating the study area include:

- Dry sclerophyll open forests and woodlands
- Wet sclerophyll forests
- Swamp forests
- Floodplain forests
- Rainforests
- Freshwater wetlands
- Estuarine wetlands
- Heathlands
- Remaining areas comprise modified vegetation that has been extensively cleared and fragmented and exhibit elements of native and exotic plant communities that are difficult to classify.

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From these broad vegetation types a total of 57 plant communities have been classified on the basis of the dominant canopy species, of which many share similar flora species composition and vegetation structure. These 57 plant communities were grouped into 24 BioMetric vegetation types based on the dominant canopy and understorey flora, landscape position and geographic location.

A brief description of the structure and floristics of each vegetation type is provided in Table 3-5. Detailed descriptions of the floristics of each plant community are described in Appendix G. The table also describes the BioMetric Vegetation Type present and equivalent vegetation types as described in the specialist studies and where applicable matches these to threatened ecological communities (TEC) as listed under the TSC Act and / or EPBC Act.

The distribution of the BioMetric vegetation types in relation to the project boundary are shown in Figure 3-6 to Figure 3-31.

Table 3-5 Summary of vegetation associations in each project section

Equivalent CMA BioMetric vegetation type	Equivalent vegetation association mapped in the preferred route corridor studies	Fauna habitat type (refer to Section 3.5)	Threatened Ecological Community Type ¹	GDE*	Percentage cleared to date (%) ²
Black Bean - Weeping Lilly Pilly riparian rainforest of the North Coast	Section 3 Equivalent association Rainforest (SKM 2009)	Lowland Rainforest	Lowland Rainforest in NSW North Coast and Sydney Basin Bioregion (E)		75
Blackbutt - bloodwood dry heathy open forest on sandstones of the northern North Coast	Sections 1-3, and 6-7 Equivalent associations of Blackbutt/Tallowwood Ridgtop and Upper Slopes Forest (Ecotone 2007), Blackbutt Open Forest (SKM 2009) and Blackbutt (Ecos Environmental 2005)	Dry Forest			40
Blackbutt grassy open forest of the lower Clarence Valley of the North Coast	Sections 1, 9-10 Equivalent associations of Blackbutt/Tallowwood Lower Slopes and Gully Forest (Ecotone 2007) and Mahogany - Blackbutt Forests (Geolyse 2005)	Wet Sclerophyll and Floodplain Forest			30
Coast Cypress Pine shrubby open forest of the North Coast Bioregion	Sections 9-11 Equivalent associations of Banksia - Callitris Dry Heathy Woodlands & Heaths (Geolyse 2005)	Dry Forest	Coastal Cypress Pine Forest in NSW North Coast Bioregion (E)		40
Coastal floodplain sedgeland, rushlands, and forblands	Sections 3-4 and 9 Equivalent associations of Freshwater Wetlands (SKM 2009), Wetland - regenerating swamp forest (SKM 2010) and Knotweed Herbfields (Paddocks) (Geolyse 2005)	Freshwater Wetland	Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East bioregions (E)	Yes	80
Coastal heath on sands of the North Coast	Section 9 Equivalent association of Tea-tree - Banksia Heath (Geolyse 2005)	Wet and Dry Heath			10
Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast	Sections 4 Equivalent association of Flooded Gum Forest	Wet Sclerophyll and Floodplain Forest			40

Upgrading the Pacific Highway – Woolgoolga to Ballina Upgrade

Equivalent CMA BioMetric vegetation type	Equivalent vegetation association mapped in the preferred route corridor studies	Fauna habitat type (refer to Section 3.5)	Threatened Ecological Community Type ¹	GDE*	Percentage cleared to date (%) ²
Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the North Coast	All Sections Equivalent association of Riparian Forest (SKM 2010), Moist Floodplain Eucalypt Forest and Riparian Forest (Ecotone 2007), Forest Red Gum Forest and Mixed Floodplain Forest (SKM 2009), Red Gum - Tuckerroo Forests and Paperbark - Blackbutt Closed Forest (Geolyse 2005), and Red Mahogany (floodplain), Forest Red Gum, Wet Heath - Sedgeland and Stringybark-Ironbark-White Mahogany (Floodplain) (Ecos Environmental 2005)	Wet Sclerophyll and Floodplain Forest	Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion (E)		60
Grey Gum - Grey Ironbark open forest of the Clarence lowlands of the North Coast	Section 3, 6-8 and 10 Equivalent association of Grey Ironbark - Bloodwood Forest and Grey Gum - Tallowood Forest (Early works sites SKM 2010), Tallowood - Ironbark Open Forest (SKM 2009), Stringybark-Ironbark-White Mahogany (Ecos Environmental 2006)	Dry Forest			20
Hoop Pine - Yellow Tulipwood dry rainforest of the North Coast	Section 10 Equivalent association of Closed Forests (Geolyse 2005)	Lowland Rainforest	<ul style="list-style-type: none"> Lowland Rainforest on Coastal Floodplains (E) Lowland Rainforest of Subtropical Australia (CE) 		30
Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregion	Sections 5, and 10-11 Equivalent associations of Mangrove Forest (SKM 2009, 2010) and Mangrove Closed Forest (Geolyse 2005)	Estuarine Wetland			75
Narrow-leaved Red Gum woodlands of the lowlands of the North Coast	Sections 6-8 Equivalent association of Eastern Red Gums (Ecos Environmental 2006)	Wet Sclerophyll and Floodplain Forest	Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion (E)		40

Upgrading the Pacific Highway – Woolgoolga to Ballina Upgrade

Equivalent CMA BioMetric vegetation type	Equivalent vegetation association mapped in the preferred route corridor studies	Fauna habitat type (refer to Section 3.5)	Threatened Ecological Community Type ¹	GDE*	Percentage cleared to date (%) ²
Needlebank Stringybark - Red Bloodwood healthy woodland on sandstones of the lower Clarence of the North Coast	Sections 1-3 and 7 Equivalent associations of Needlebank - Scribbly Gum Open Forest (SKM 2009), Needlebank Stringybark/Scribbly Gum Forest on sandy soil (Ecotone 2007) and Needlebank Stringybark (Ecos Environmental 2006)	Dry Forest			20
Orange Gum (<i>Eucalyptus bancroftii</i>) open forest of the North Coast	Section 2 Equivalent association of Angophora Swamp Forest/Grassy Angophora Woodland (Ecotone 2007)	Dry Forest			75
Paperbark swamp forest of the coastal lowlands of the North Coast	Sections 1-2, and 4-8 Equivalent associations of Swamp Forest – Paperbark (Ecotone 2007), Paperbark (Ecos Environmental 2006), and Paperbark Swamp Forest and Paperbark Swamp Forest - Rainforest elements (SKM 2009, 2010)	Swamp Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (E)	Yes	75
Red Mahogany open forest of the coastal lowlands of the North Coast	Section 6-8 Equivalent associations of Red Mahogany and Swamp Box-Red Mahogany-Bloodwood-Stringybark-Tallowood and Red Mahogany (Ecos Environmental 2006)	Wet Sclerophyll and Floodplain Forest			30
Scribbly Gum - Needlebank Stringybark healthy open forest of coastal lowlands of the northern North Coast	Sections 3, 6-7 Equivalent associations of Scribbly Gum - Bloodwood Open Forest (SKM 2009) and Scribbly Gum (Ecos Environmental 2006)	Dry Forest			40
Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the North Coast	Section 2 Spotted Gum - Broad-leaved Ironbark Open Forest and Spotted Gum - Square-fruited Ironbark Open Forest (SKM 2009)	Dry Forest			40

Upgrading the Pacific Highway – Woolgoolga to Ballina Upgrade

Equivalent CMA BioMetric vegetation type	Equivalent vegetation association mapped in the preferred route corridor studies	Fauna habitat type (refer to Section 3.5)	Threatened Ecological Community Type ¹	GDE*	Percentage cleared to date (%) ²
Spotted Gum - Grey Ironbark - Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast	Sections 1-3, and 6-7 Equivalent associations of Spotted Gum/Ironbark Open Forest/Woodland (Ecotone 2007), Spotted Gum - Broad-leaved Ironbark Open Forest and Spotted Gum - Square-fruited Ironbark Open Forest (SKM 2009), and Spotted Gum (Ecos Environmental 2006)	Dry Forest			50
Swamp Box swamp forest of the coastal lowlands of the North Coast	Sections 1-2. Equivalent associations of Moist Floodplain Closed Forest with Rainforest Elements and Moist Floodplain Eucalypt Forest (Ecotone 2007)	Wet Sclerophyll and Floodplain Forest	Sub-tropical Coastal Floodplain Forest of the NSW North Coast bioregion (E)	Yes	70
Swamp Mahogany swamp forest of the coastal lowlands of the North Coast	Sections 1-6, and 8-10 Equivalent associations of Swamp Forest - Swamp Mahogany/Forest Red Gum (Ecotone 2007), Swamp Mahogany - Paperbark Forest (SKM 2009), Wet Heath - Sedgeland (Ecos Environmental 2006), and Paperbark - Mahogany Wet Heathy Woodlands and Paperbark - Swamp Mahogany Forest (Geolyse 2005)	Swamp Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (E)	Yes	75
Swamp Oak swamp forest of the coastal lowlands of the North Coast	Sections 1, 3, 4, 5, and 8-11 Equivalent associations of Swamp Oak Forest and Paperbark - Swamp Oak Forest (SKM 2009, 2010), Swamp Oak Forest (Ecotone 2007), Swamp Oak (Ecos Environmental 2006), and Paperbark - Swamp Oak Emergent Closed Forest and Paperbark - Swamp Oak Swampy Forests (Geolyse 2005)	Swamp Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions (E)	Yes	75
Tallowood dry grassy forest of the far northern ranges of the North Coast	Sections 3-6 Equivalent associations of Tallowood - Mahogany Forest and Tallowood - Ironbark Open Forest (SKM 2009, 2010)	Wet Sclerophyll and Floodplain Forest			15

Upgrading the Pacific Highway – Woolgoolga to Ballina Upgrade

Equivalent CIMA BioMetric vegetation type	Equivalent vegetation association mapped in the preferred route corridor studies	Fauna habitat type (refer to Section 3.5)	Threatened Ecological Community Type ¹	GDE*	Percentage cleared to date (%) ²
Turpentine moist open forest of the coastal hills and ranges of the North Coast	Section 3 Equivalent associations of Turpentine Open Forest and Turpentine - Red Mahogany - Paperbark Open Woodland (SKM 2007)	Wet Sclerophyll and Floodplain Forest			55
Wet heathland and shrubland of coastal lowlands of the North Coast	Sections 6-8 Equivalent association of Wet Heath – Sedgeland (Ecos Environmental 2006)	Wet and Dry Heath		Yes	75
White Booyong - Fig subtropical rainforest of the North Coast	Sections 8, 10 and 11 Equivalent association of Closed Forests (Geolyse 2005)	Lowland Rainforest	<ul style="list-style-type: none"> Lowland Rainforest on Coastal Floodplains (E) Lowland Rainforest of Subtropical Australia (CE) 		75
Modified habitats	All Sections Equivalent associations of totally cleared open pasture, Plantation, Cropland, Market Garden, Pine Forest etc., Cleared - Pasture with Scattered Trees, Cleared – Pasture, Disturbed Native Regrowth Stand and Eucalypt Plantation	Cleared and Modified			-

¹ Endangered (E) (TSC Act), Critically Endangered (CE) (EPBC Act).

² According to NRCMA BioMetric database.

*GDE: Groundwater Dependent Ecosystems: Groundwater dependent ecosystems are ecosystems which have their species composition and natural ecological processes determined to some extent by the availability of groundwater. Groundwater dependent ecosystems can include cave systems, springs, wetlands and groundwater dependent endangered ecological communities.

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Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Legend sheet A

Vegetation communities

-  Blackbutt grassy open forest of the lower Clarence Valley of the North Coast
-  Swamp Box swamp forest of the coastal lowlands of the North Coast
-  Red Mahogany open forest of the coastal lowlands of the North Coast
-  Narrow-leaved Red Gum woodlands of the lowlands of the North Coast
-  Blackbutt - Paperbark Moist Open Forest
-  Brush Box tall moist forest of the northern ranges of the North Coast
-  Flooded Gum - Tallowwood - Brush Box moist open forest of the coastal ranges of the North Coast
-  Tallowwood dry grassy forest of the far northern ranges of the North Coast
-  Forest Red Gum - Swamp Box of the Clarence Valley lowlands of the North Coast
-  Turpentine moist open forest of the coastal hills and ranges of the North Coast
-  Wet heathland and shrubland of coastal lowlands of the North Coast
-  Coastal heath on sands of the North Coast
-  Paperbark swamp forest of the coastal lowlands of the North Coast
-  Swamp Mahogany swamp forest of the coastal lowlands of the North Coast
-  Swamp Oak swamp forest of the coastal lowlands of the North Coast
-  Hoop Pine - Yellow Tulipwood dry rainforest of the North Coast
-  Black Bean - Weeping Lilly Pilly riparian rainforest of the North Coast
-  White Booyong - Fig subtropical rainforest of the North Coast
-  Coastal floodplain sedgeland, rushlands, and forblands
-  Mangrove - Grey Mangrove low closed forest of the NSW Coastal Bioregions
-  Blackbutt - bloodwood dry heathy open forest on sandstones of the northern North Coast
-  Coast Cypress Pine shrubby open forest of the North Coast Bioregion
-  Grey Gum - Grey Ironbark open forest of the Clarence lowlands of the North Coast
-  Orange Gum (Eucalyptus bancroftii) open forest of the North Coast
-  Spotted Gum - Grey Ironbark - Pink Bloodwood open forest of the Clarence Valley lowlands of the North Coast
-  Scribbly Gum - Needlebark Stringybark heathy open forest of coastal lowlands of the northern North Coast
-  Spotted Gum - Grey Box - Grey Ironbark dry open forest of the Clarence Valley lowlands of the North Coast
-  Needlebark Stringybark - Red Bloodwood heathy woodland on sandstones of the lower Clarence of the North Coast
-  Cleared/modified








Threatened ecological communities

-  Coastal Cypress Pine Forest in NSW North Coast Bioregion (Endangered, TSC Act)
-  Freshwater Wetlands on Coastal Floodplains (Endangered, TSC Act)
-  Lowland Rainforest on Coastal Floodplains (Endangered, TSC Act)
-  Lowland Rainforest of Subtropical Australia (Critically Endangered, EPBC Act) and Lowland Rainforest on Coastal Floodplains (Endangered, TSC Act)
-  Subtropical Coastal Floodplain Forest on Coastal Floodplains (Endangered, TSC Act)
-  Swamp Oak Floodplain Forest on Coastal Floodplains (Endangered, TSC Act)
-  Swamp Sclerophyll Forest on Coastal Floodplains (Endangered, TSC Act)

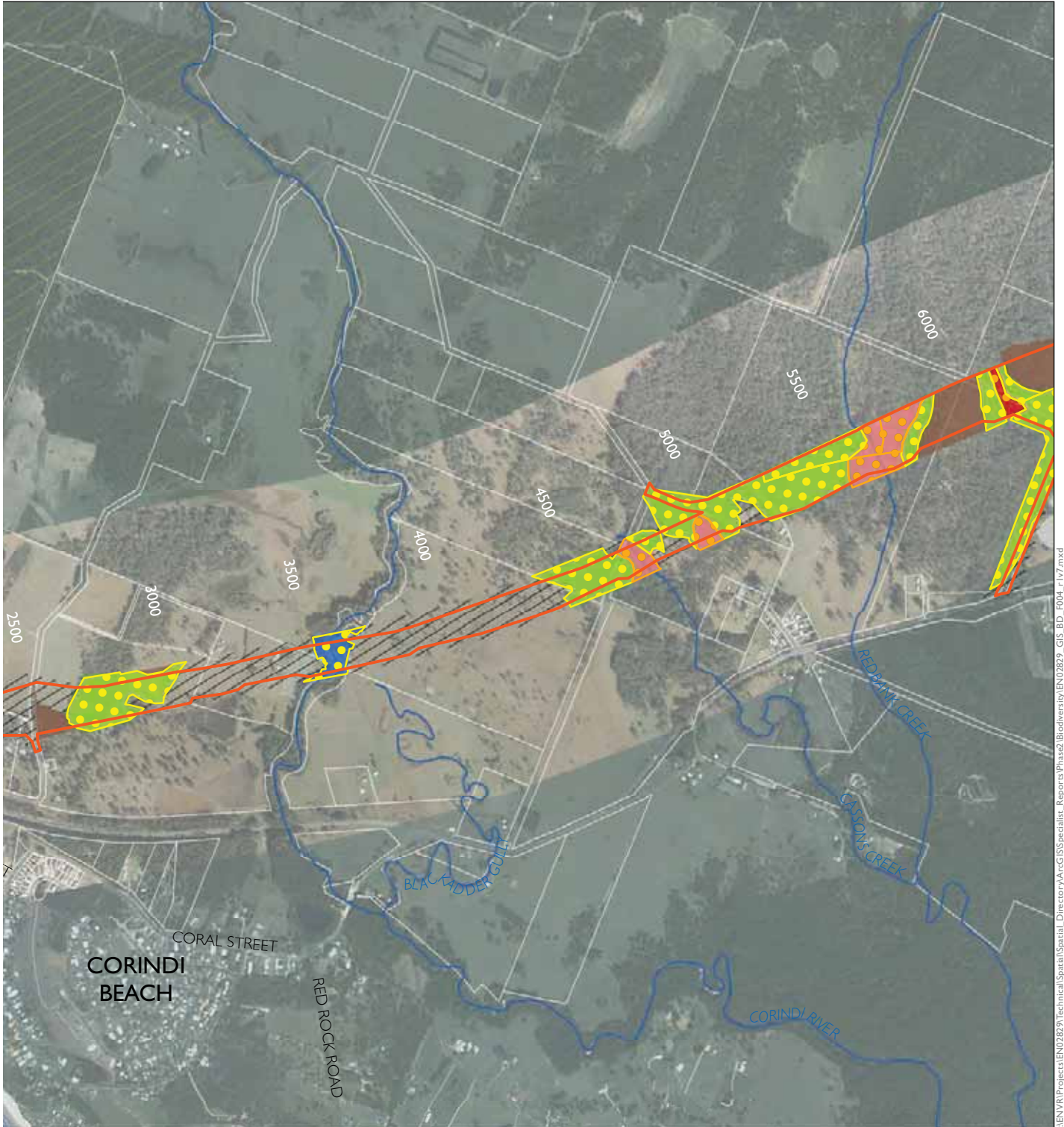
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 6 Vegetation communities and endangered ecological communities

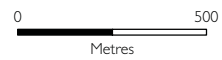


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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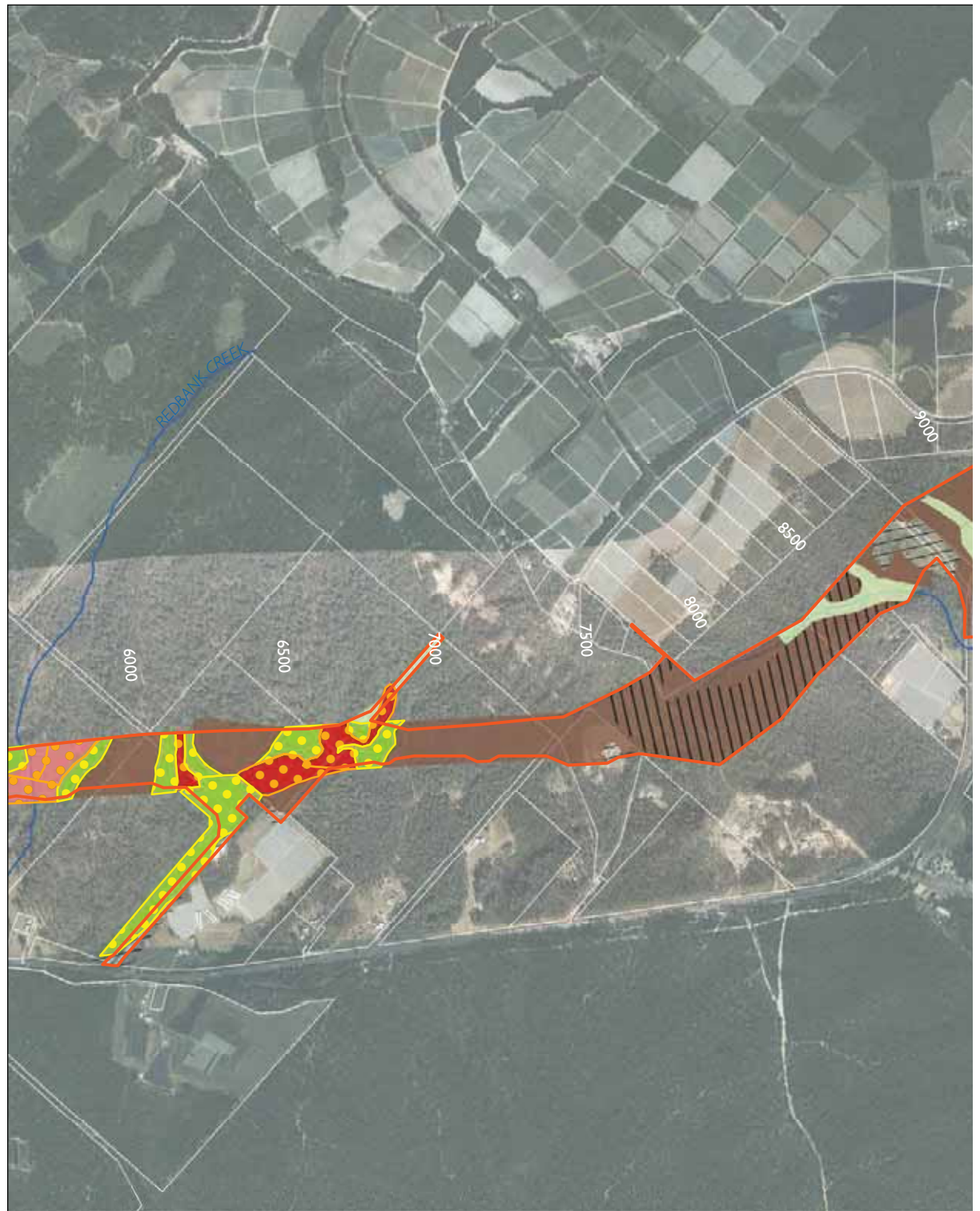
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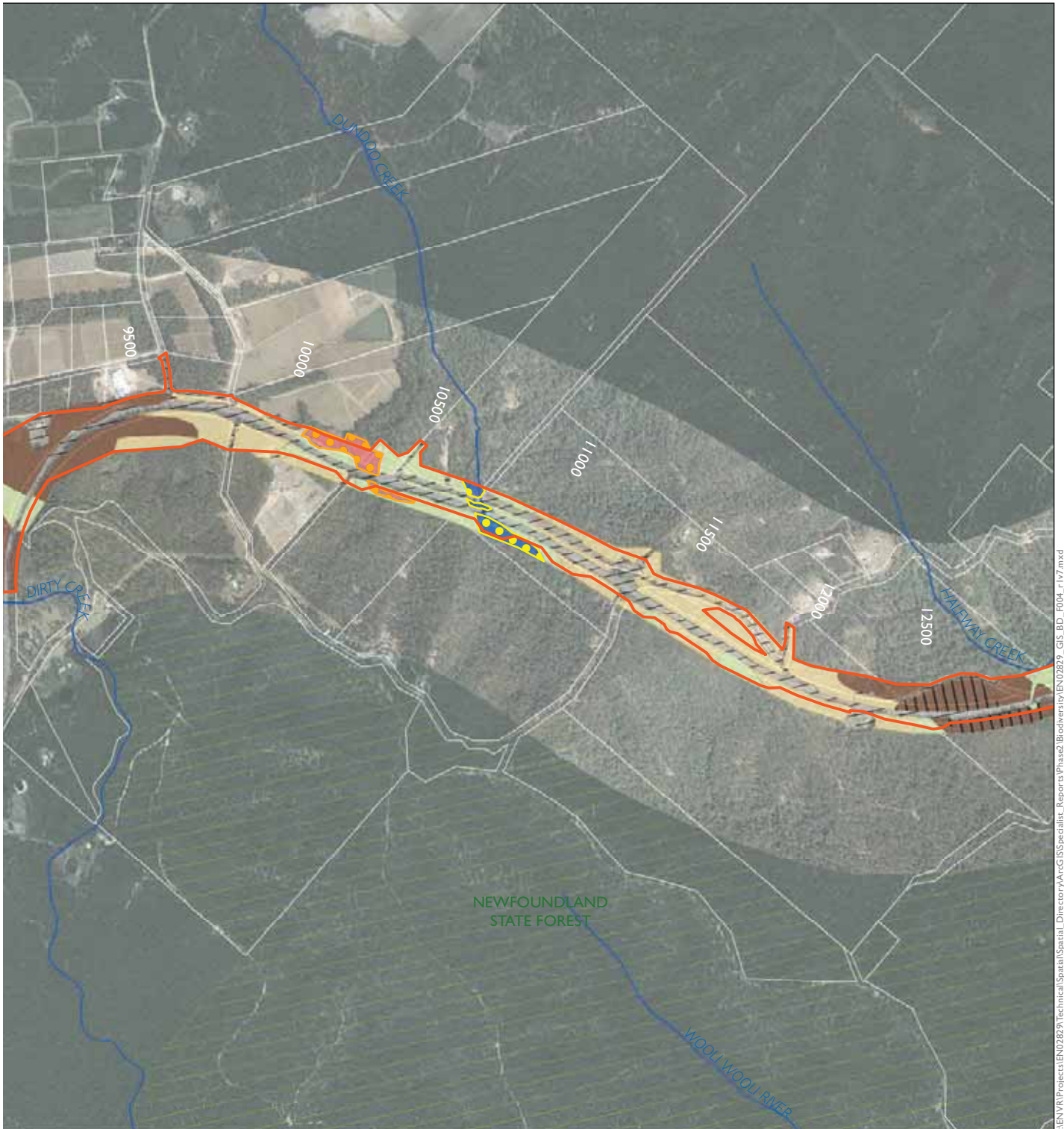
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 7 Vegetation communities and endangered ecological communities

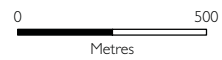


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 8 Vegetation communities and endangered ecological communities

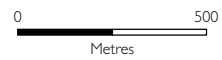


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to *Legend sheet A* for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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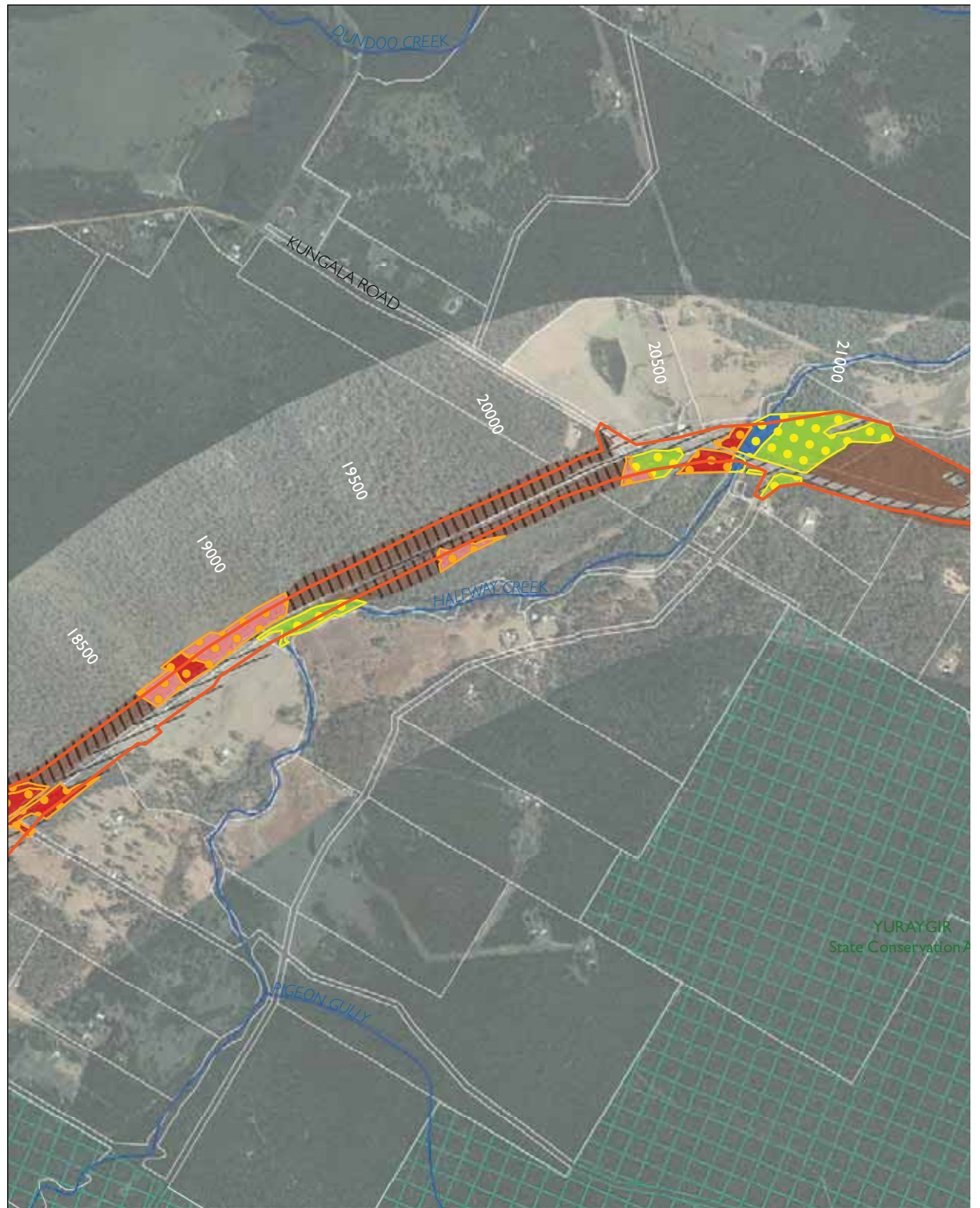


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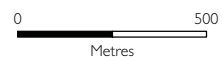
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 9 Vegetation communities and endangered ecological communities



- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to Legend sheet A for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 10 Vegetation communities and endangered ecological communities

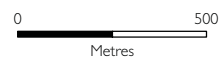


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| The project | National Park |
| Upgrade completed to dual carriageway | Nature Reserve / Regional |
| Upgrade under construction | Park / State Conservation Area |
| State Forest | |
- *Refer to *Legend sheet A* for vegetation map key

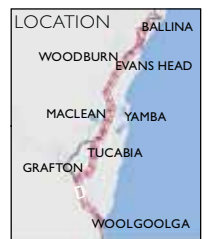
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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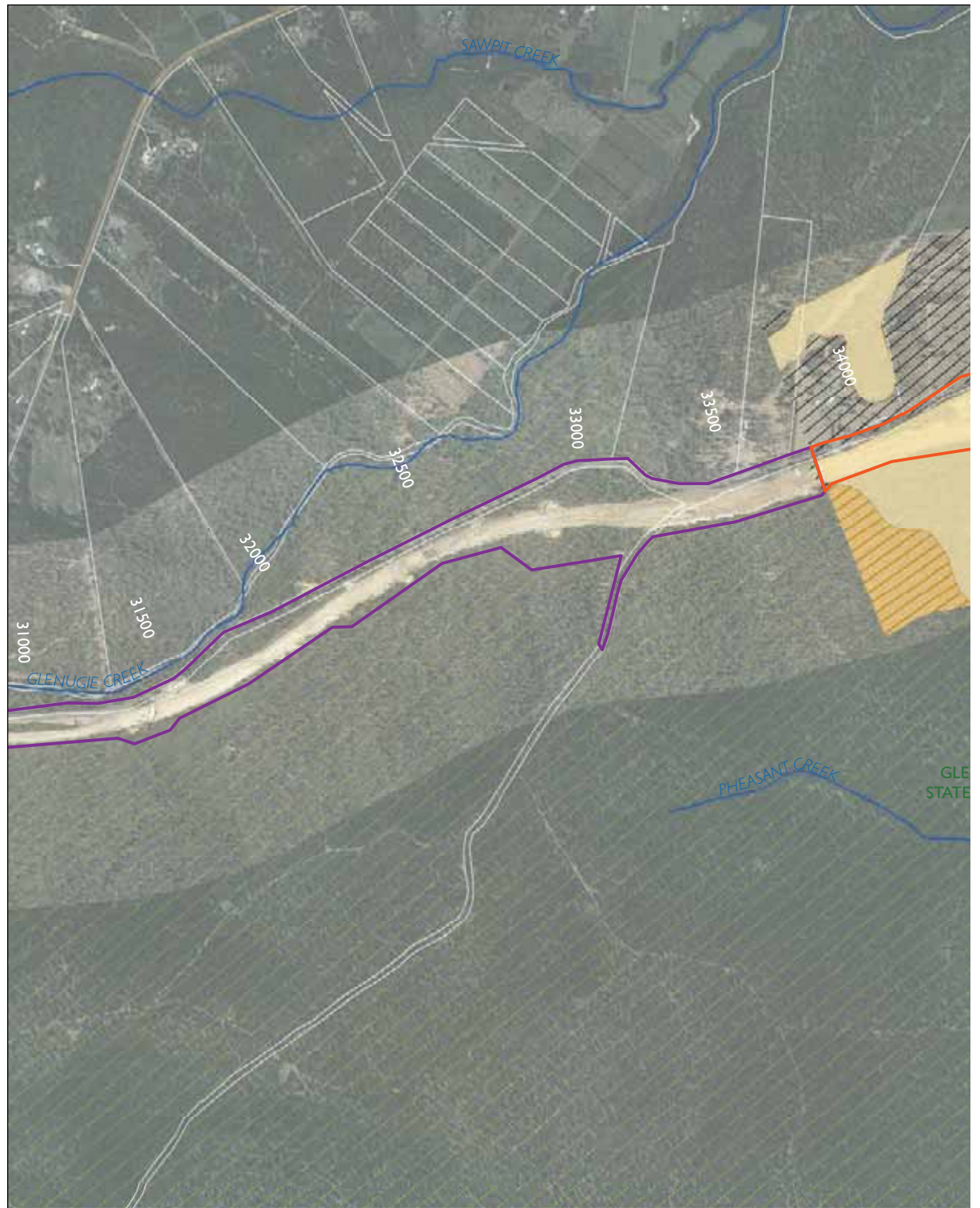


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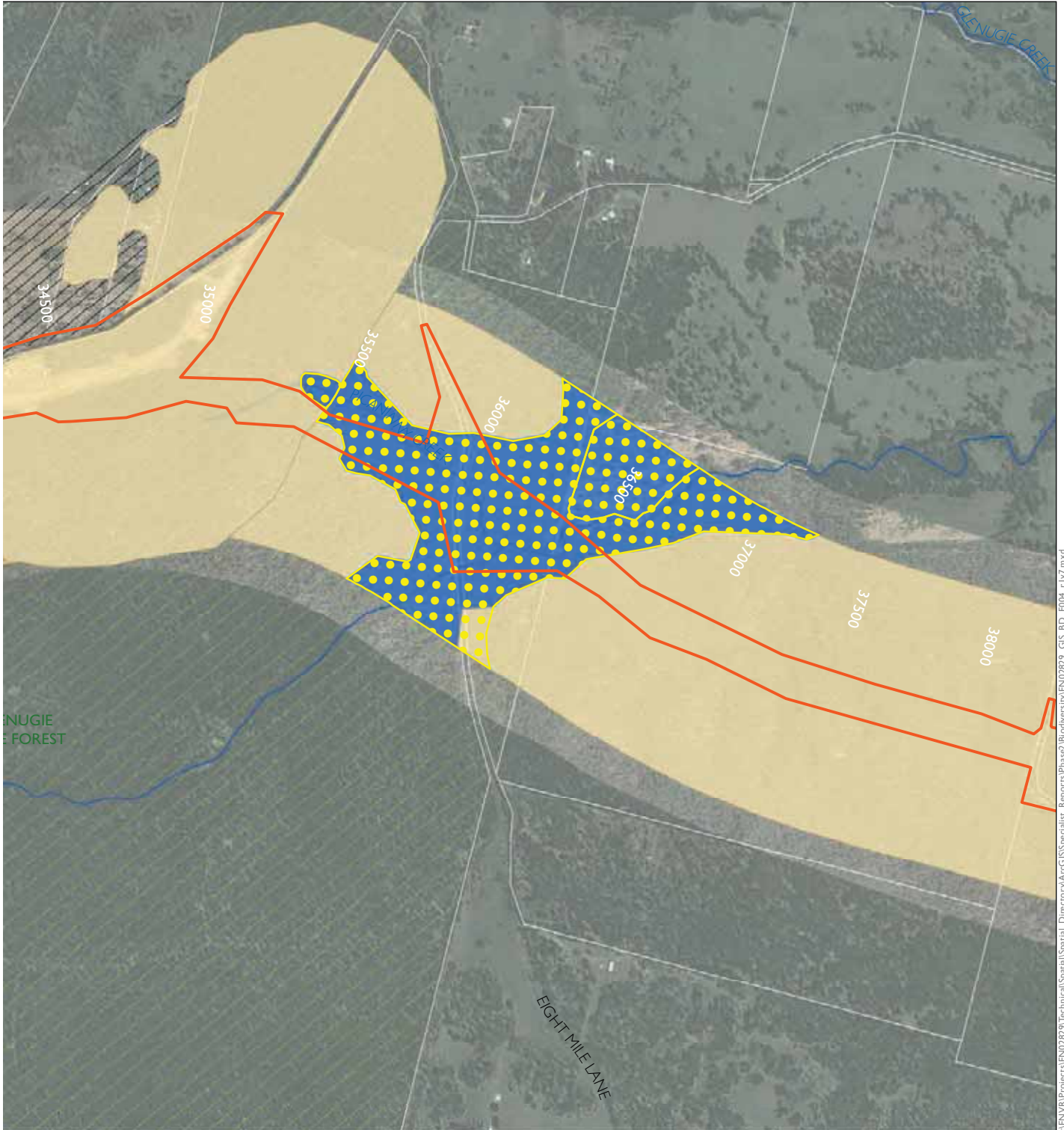
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - II Vegetation communities and endangered ecological communities

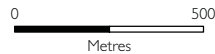


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
 - State Forest
- *Refer to Legend sheet A for vegetation map key*

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

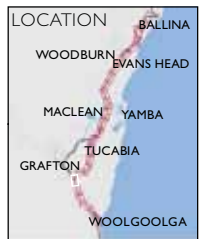


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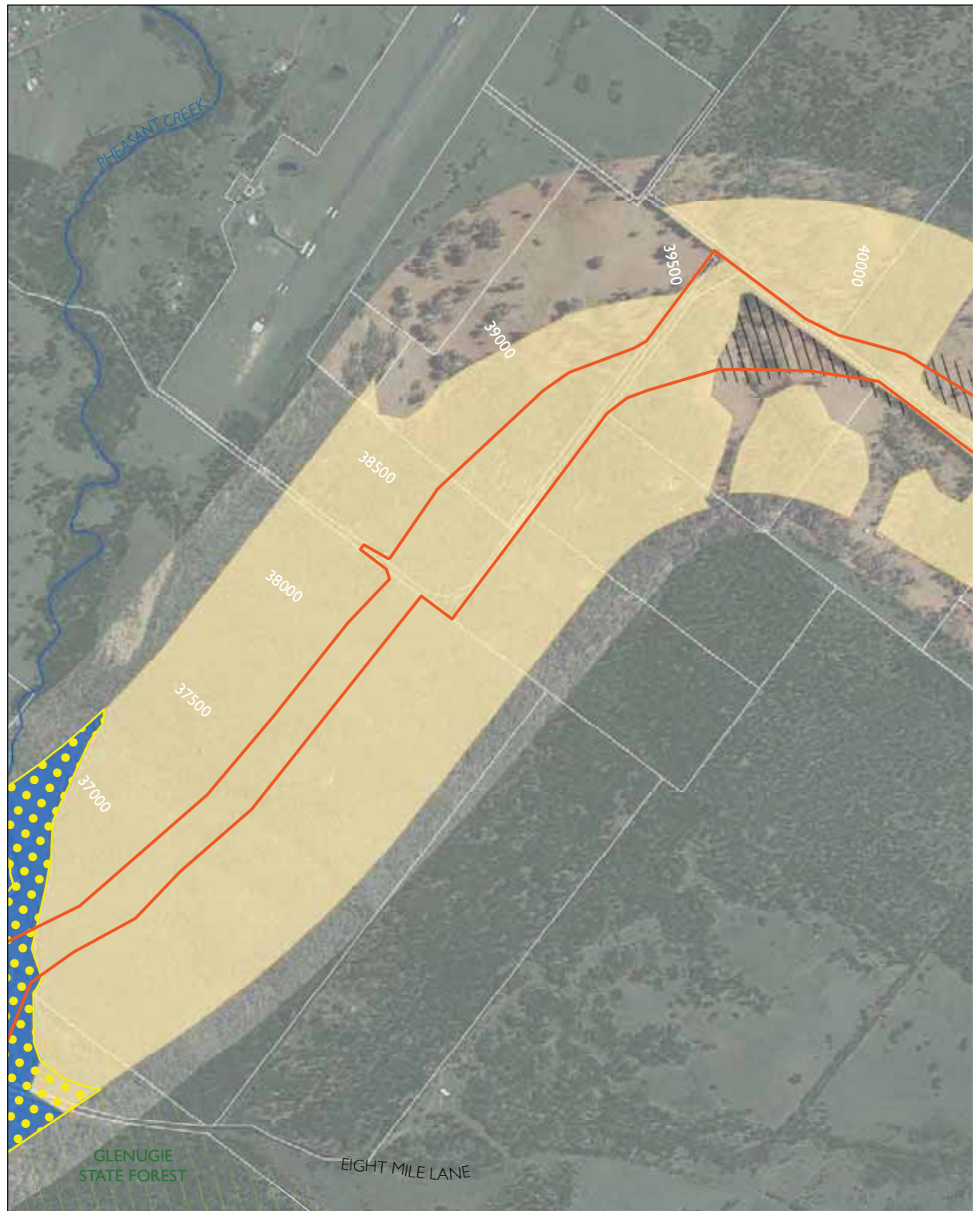
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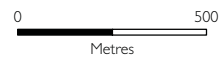
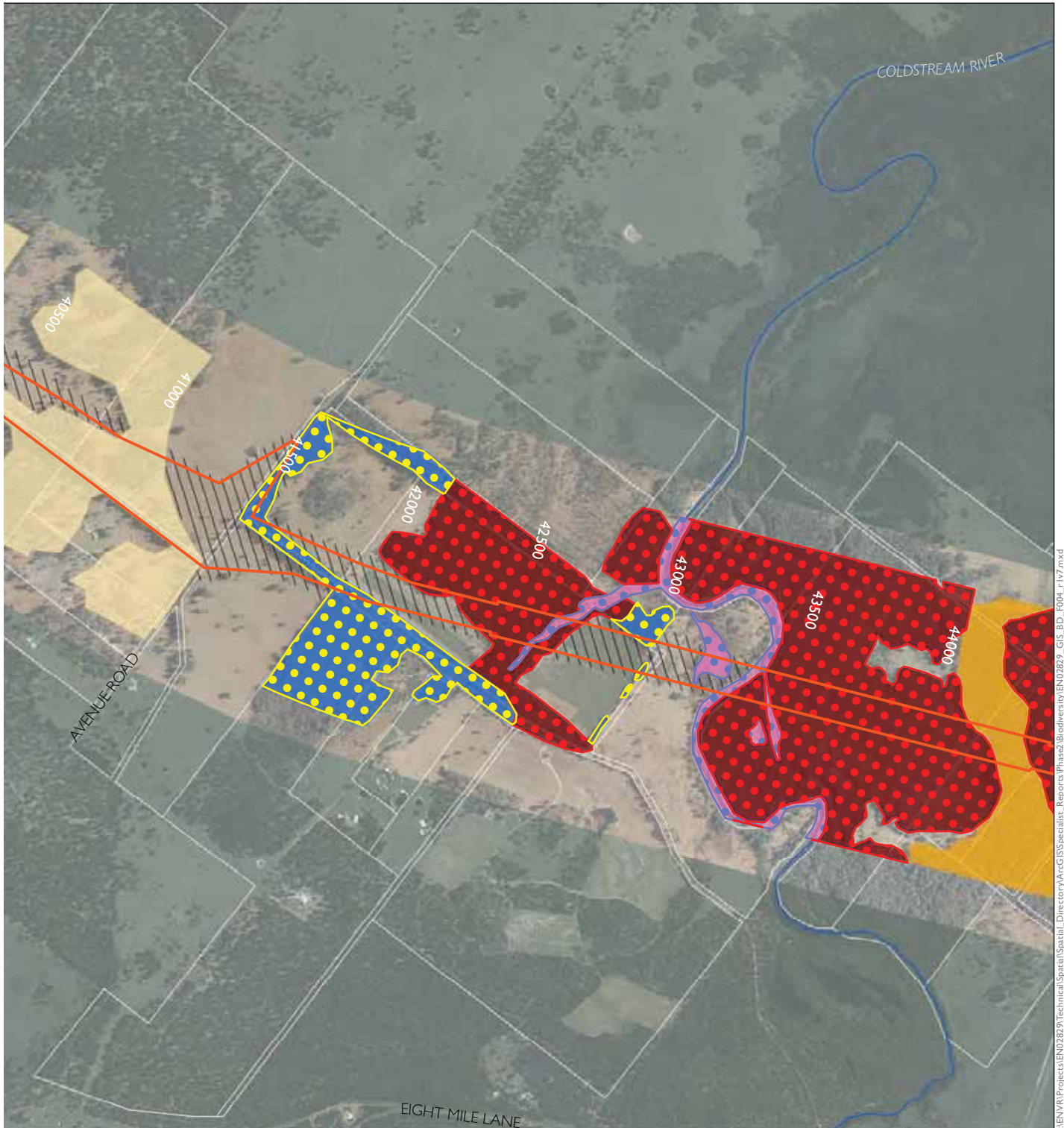
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 12 Vegetation communities and endangered ecological communities



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|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

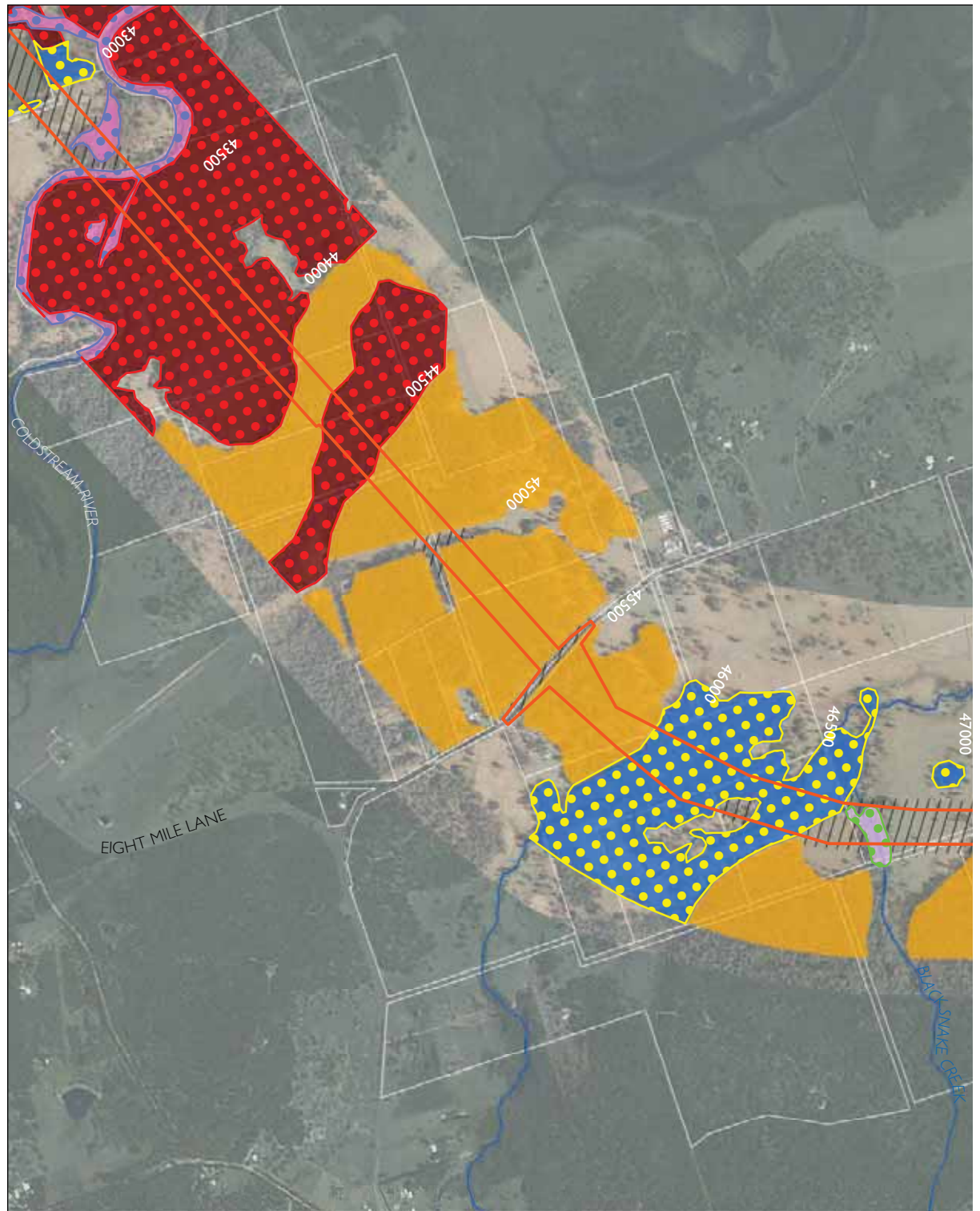









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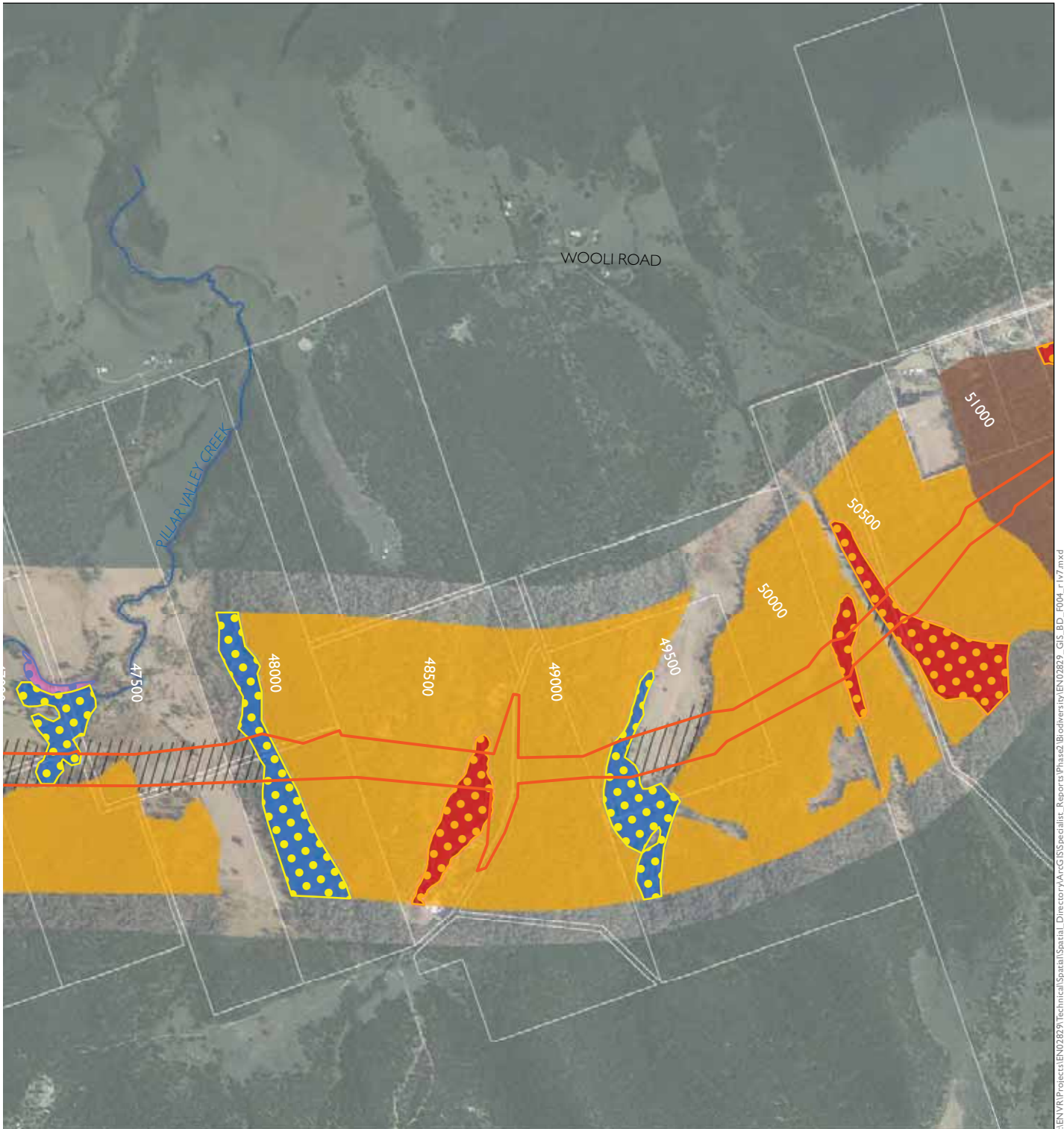
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 13 Vegetation communities and endangered ecological communities

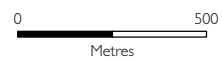


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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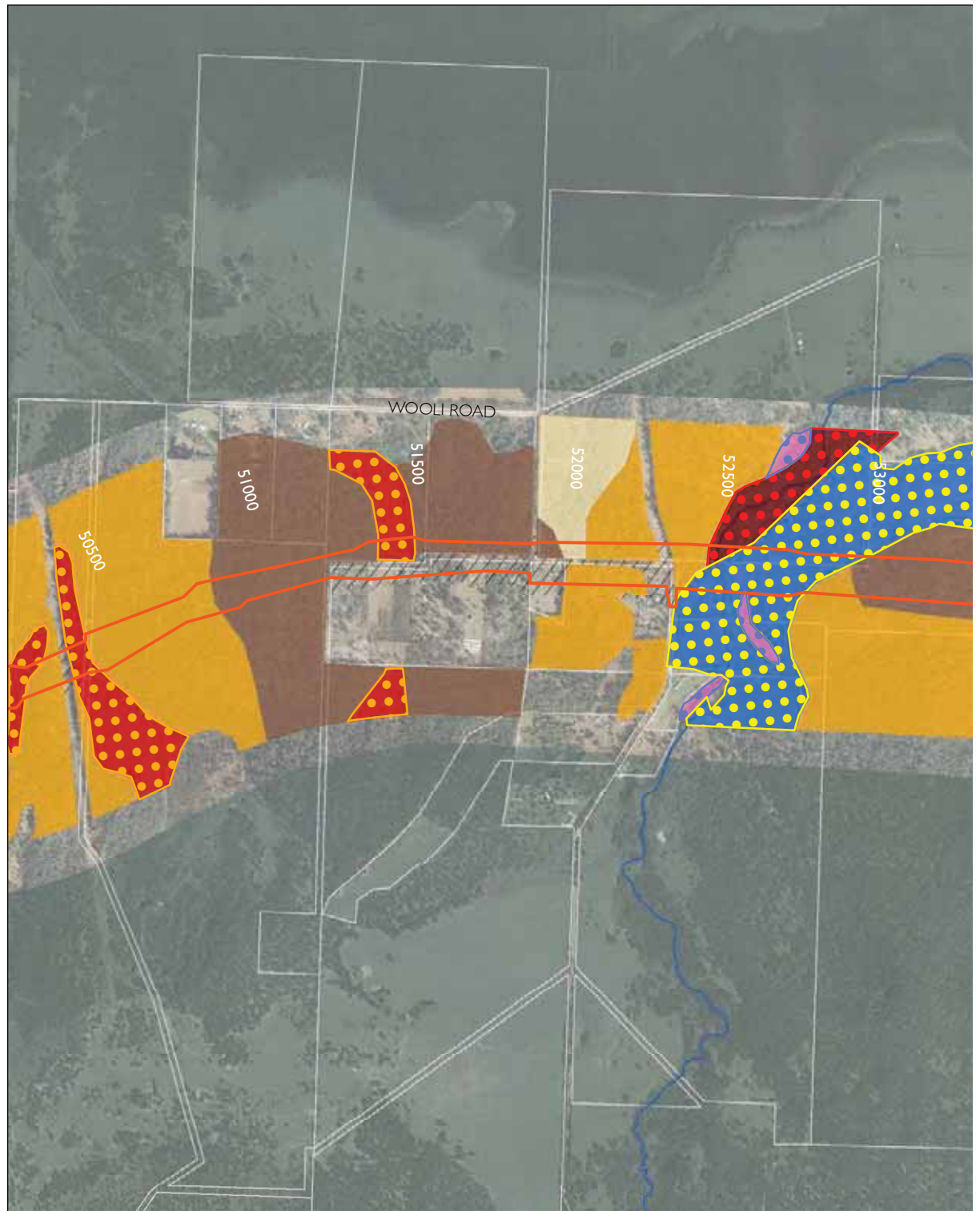









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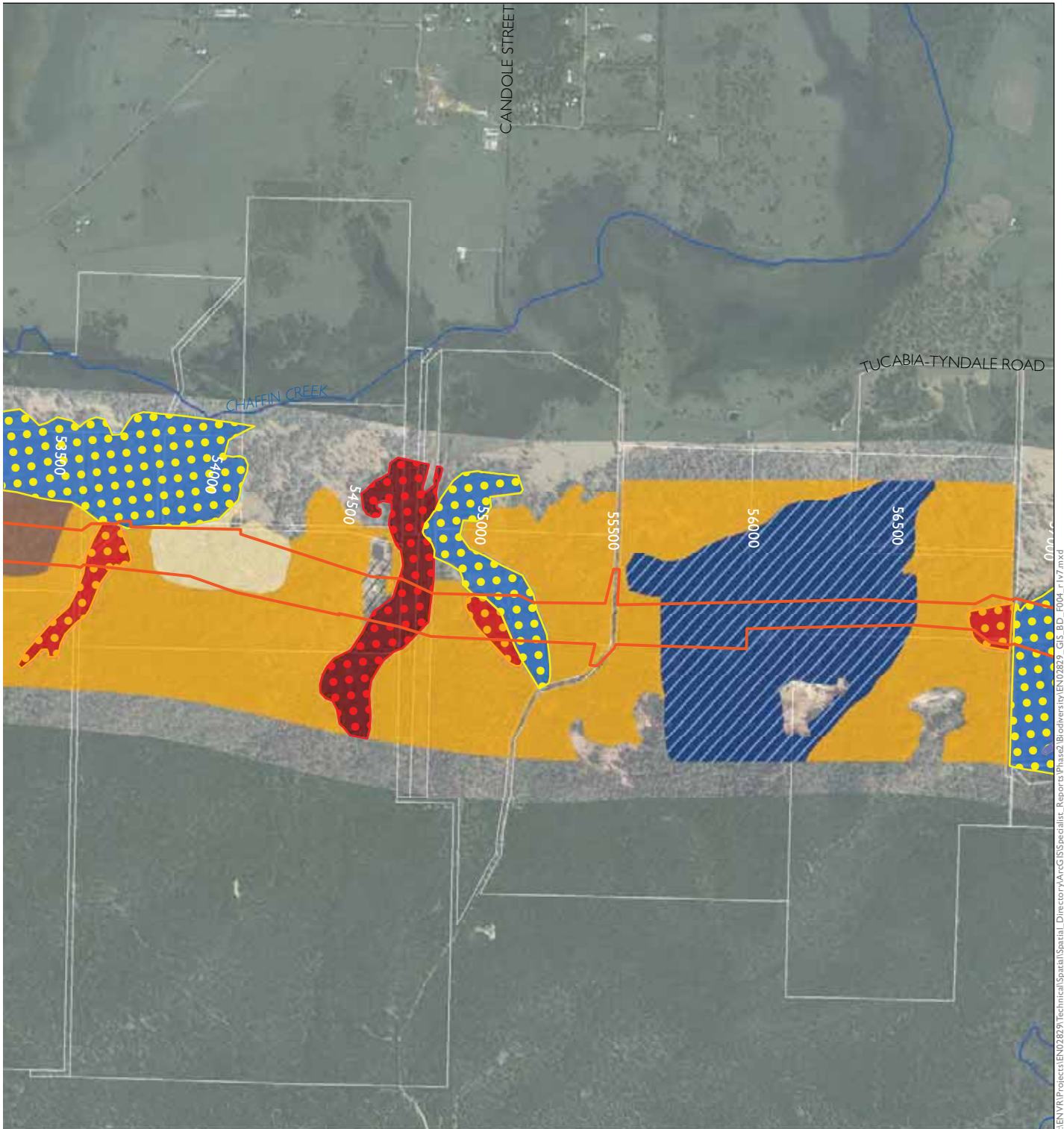
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 14 Vegetation communities and endangered ecological communities

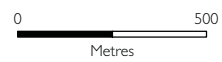


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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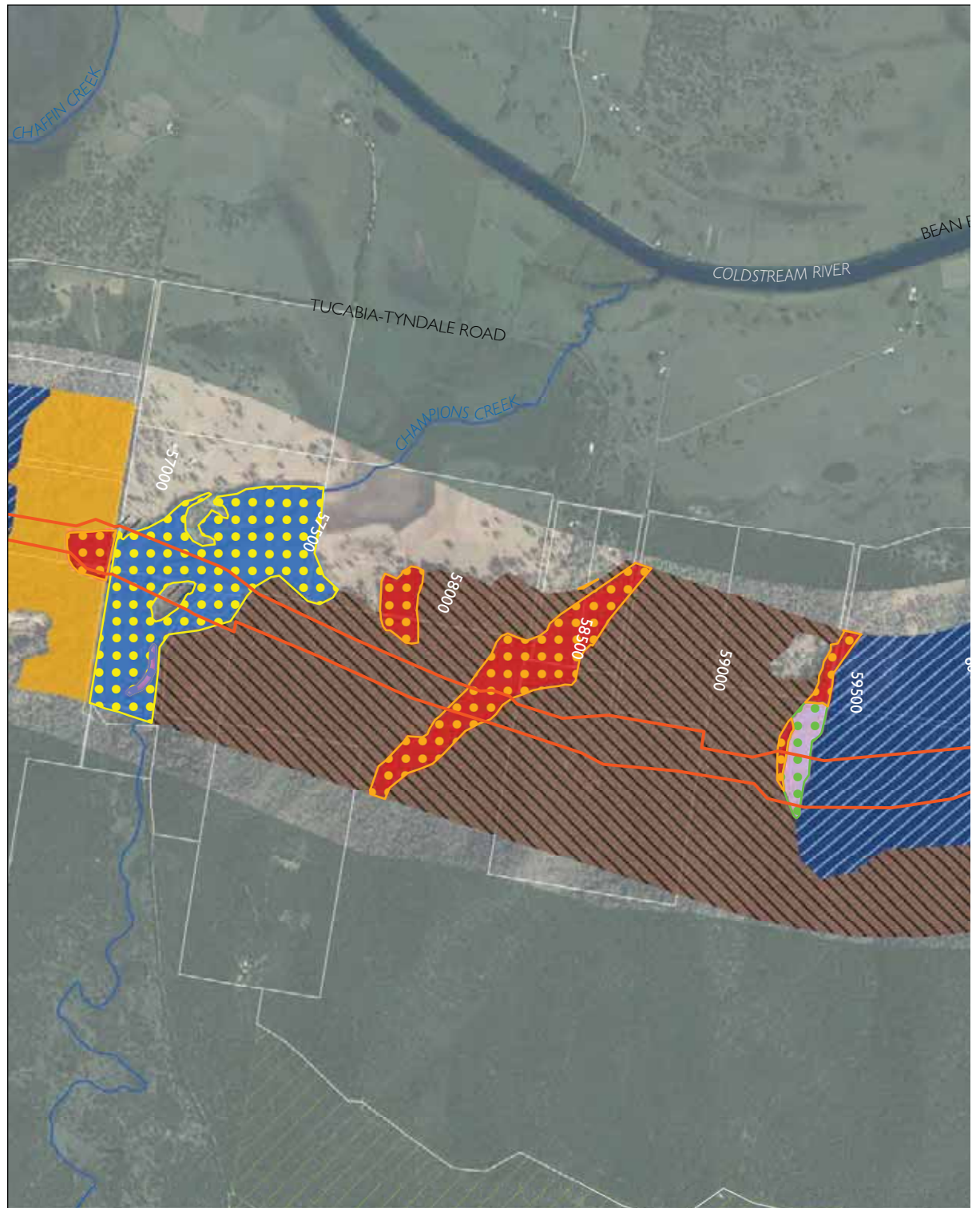
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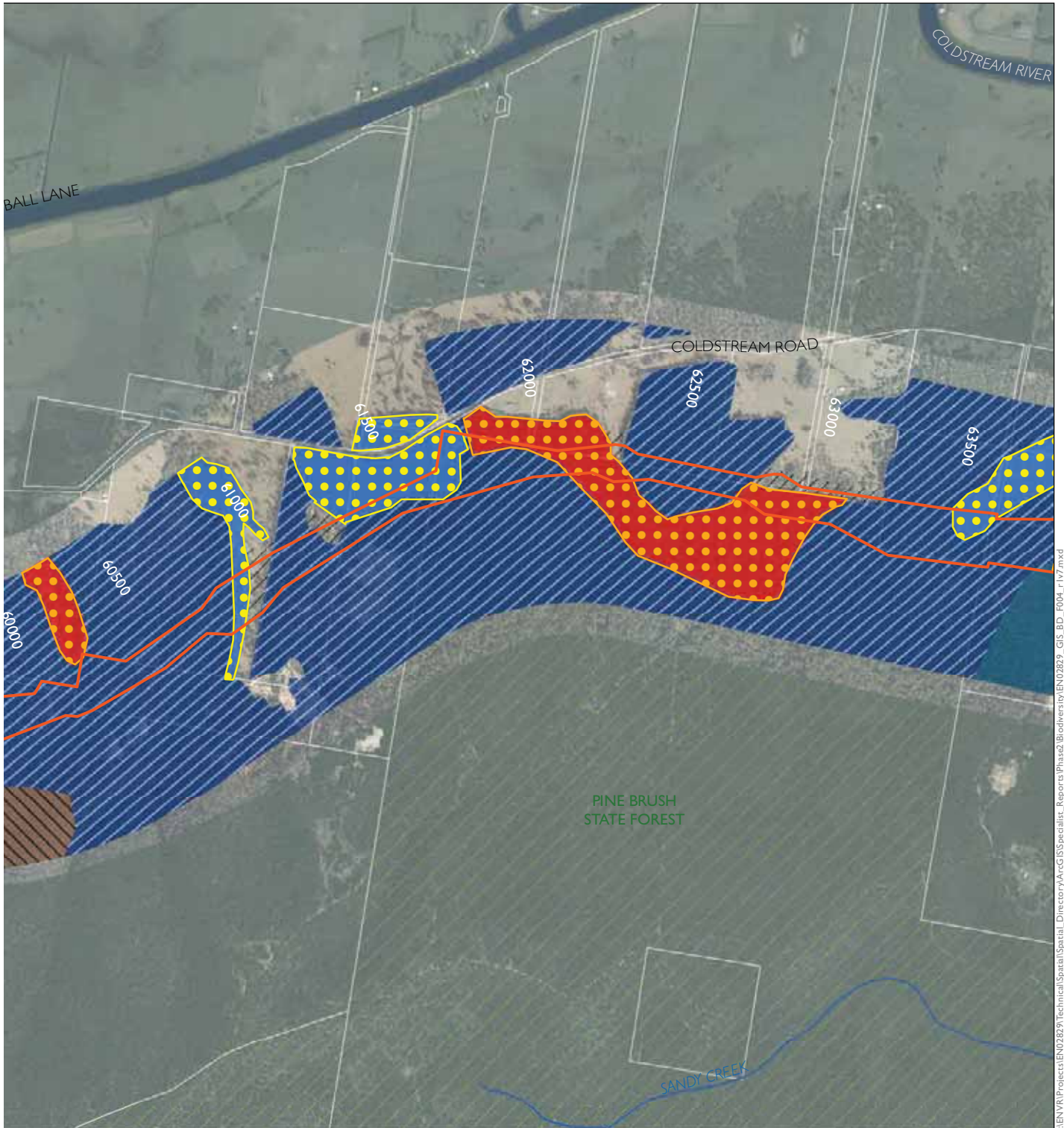
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 15 Vegetation communities and endangered ecological communities

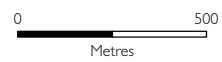


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to *Legend sheet A* for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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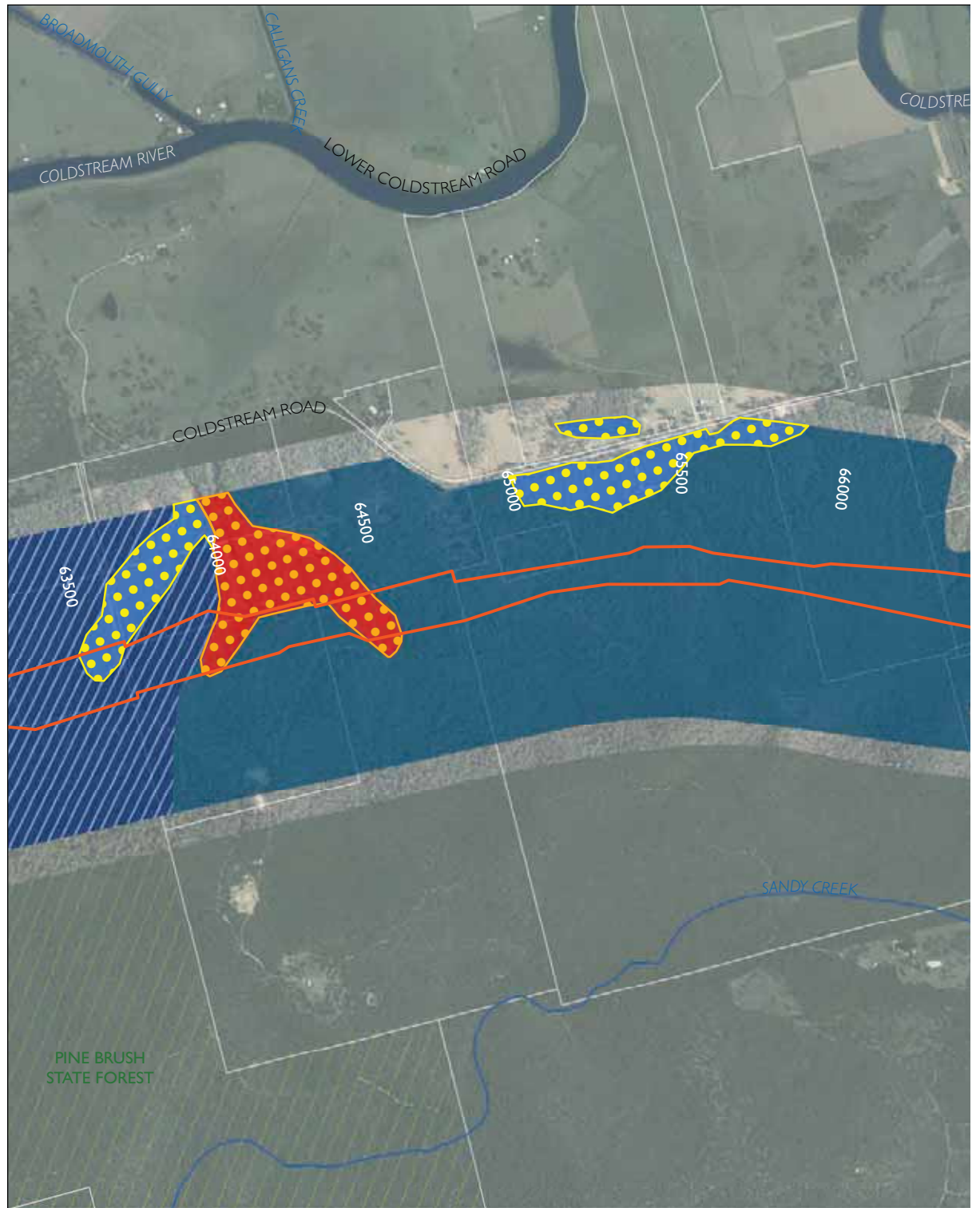
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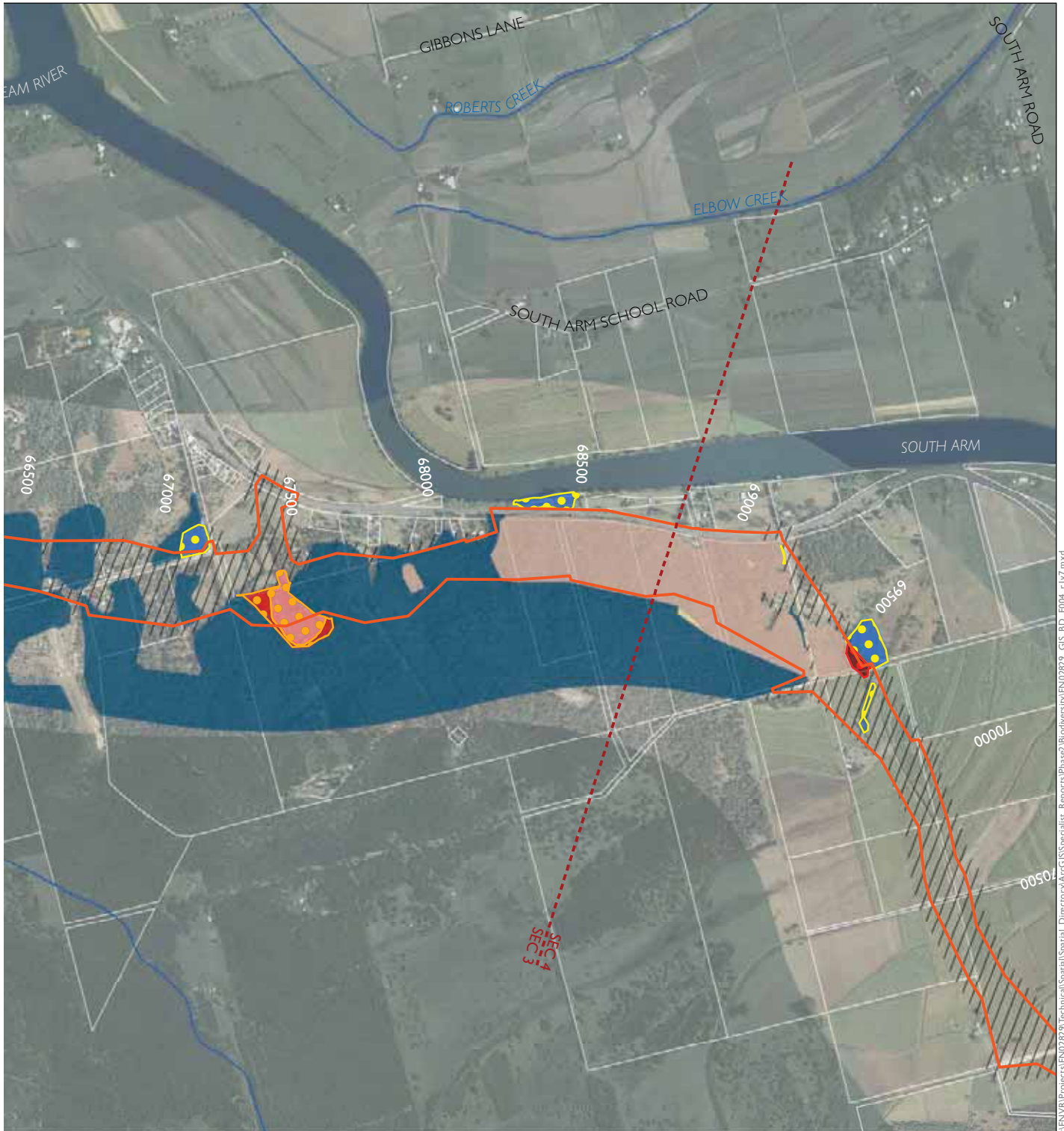
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 16 Vegetation communities and endangered ecological communities

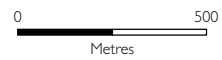


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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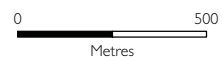
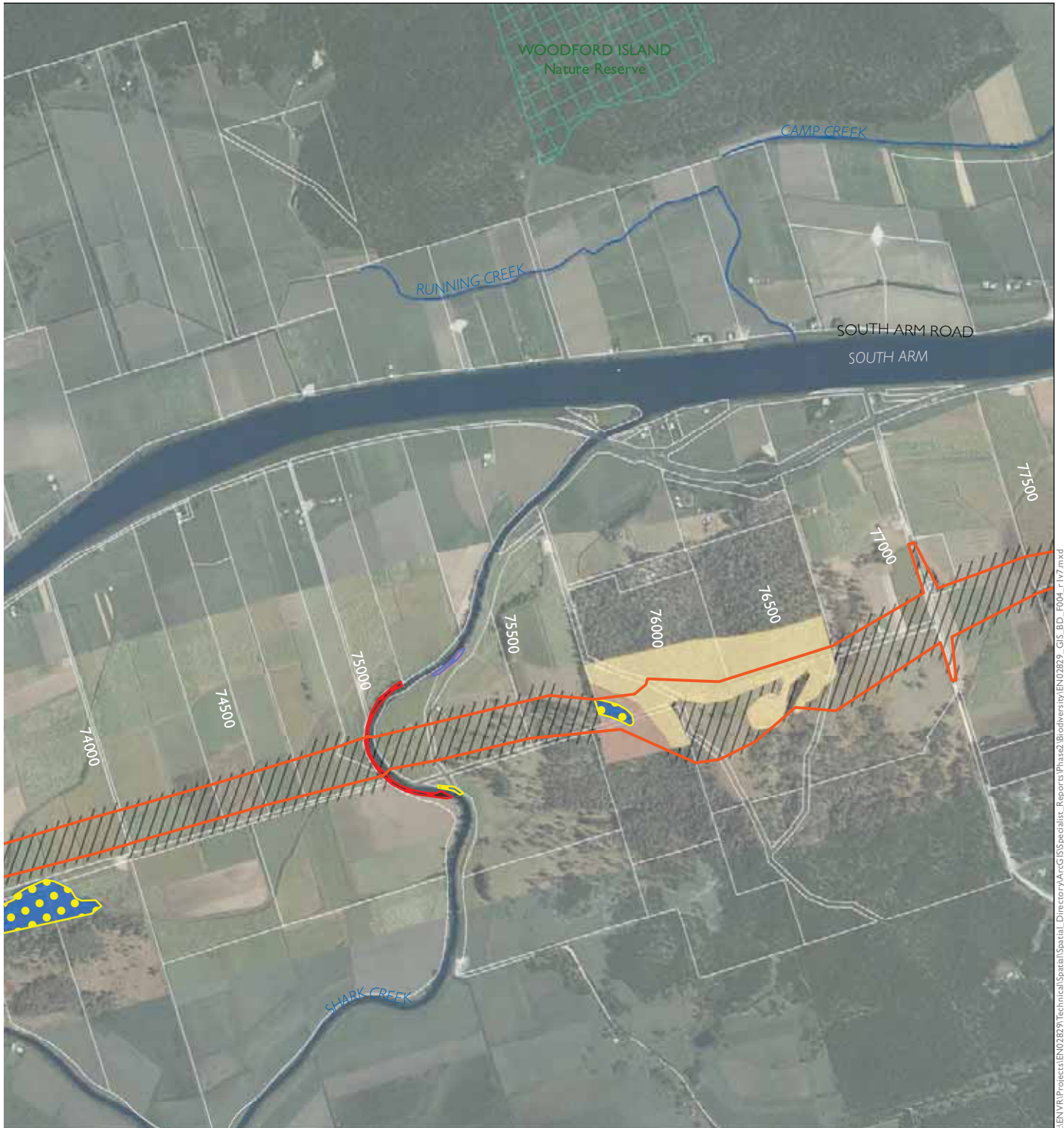
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 17 Vegetation communities and endangered ecological communities



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|---|--|
|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

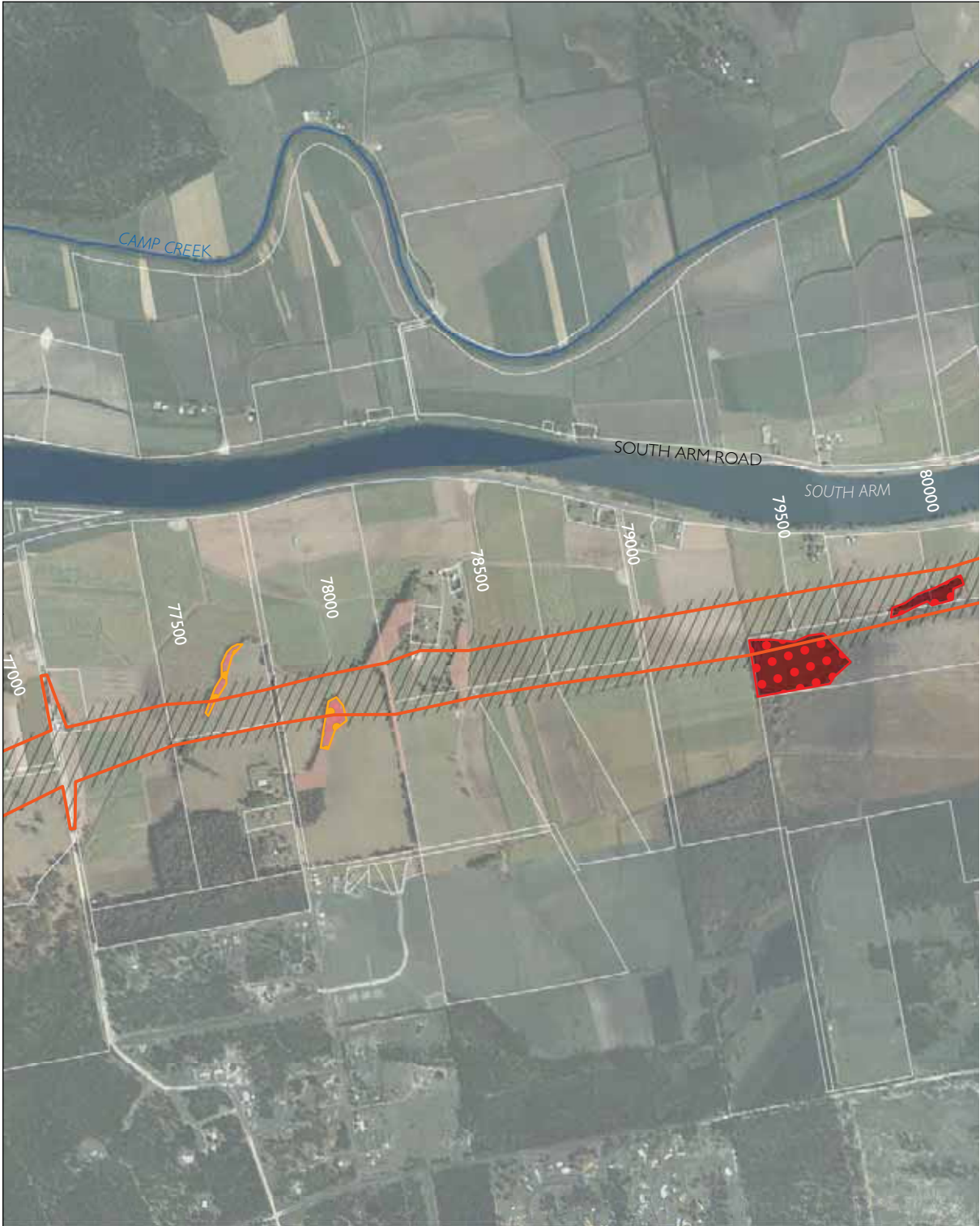


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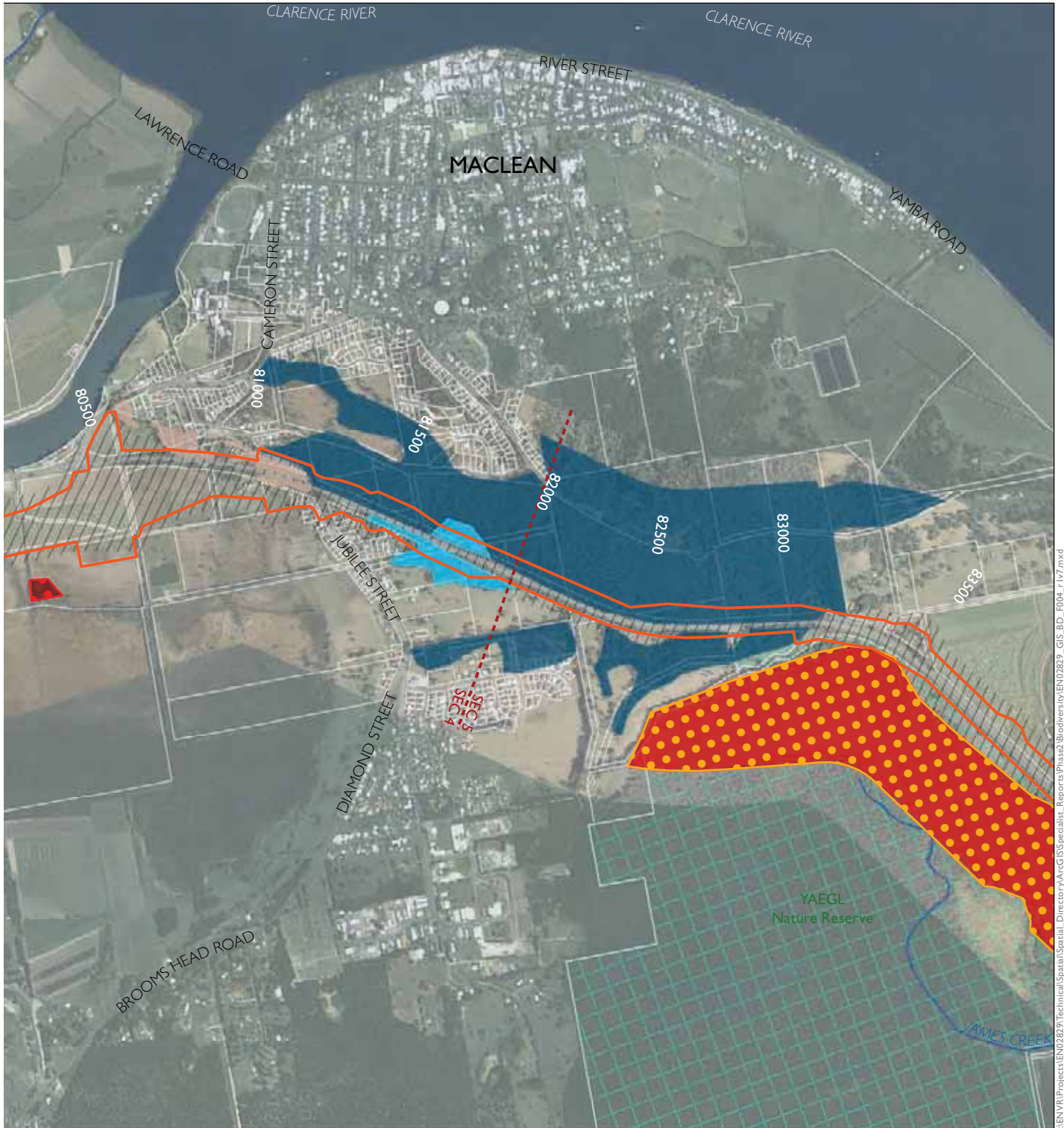
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 18 Vegetation communities and endangered ecological communities

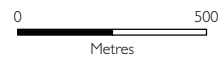


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to Legend sheet A for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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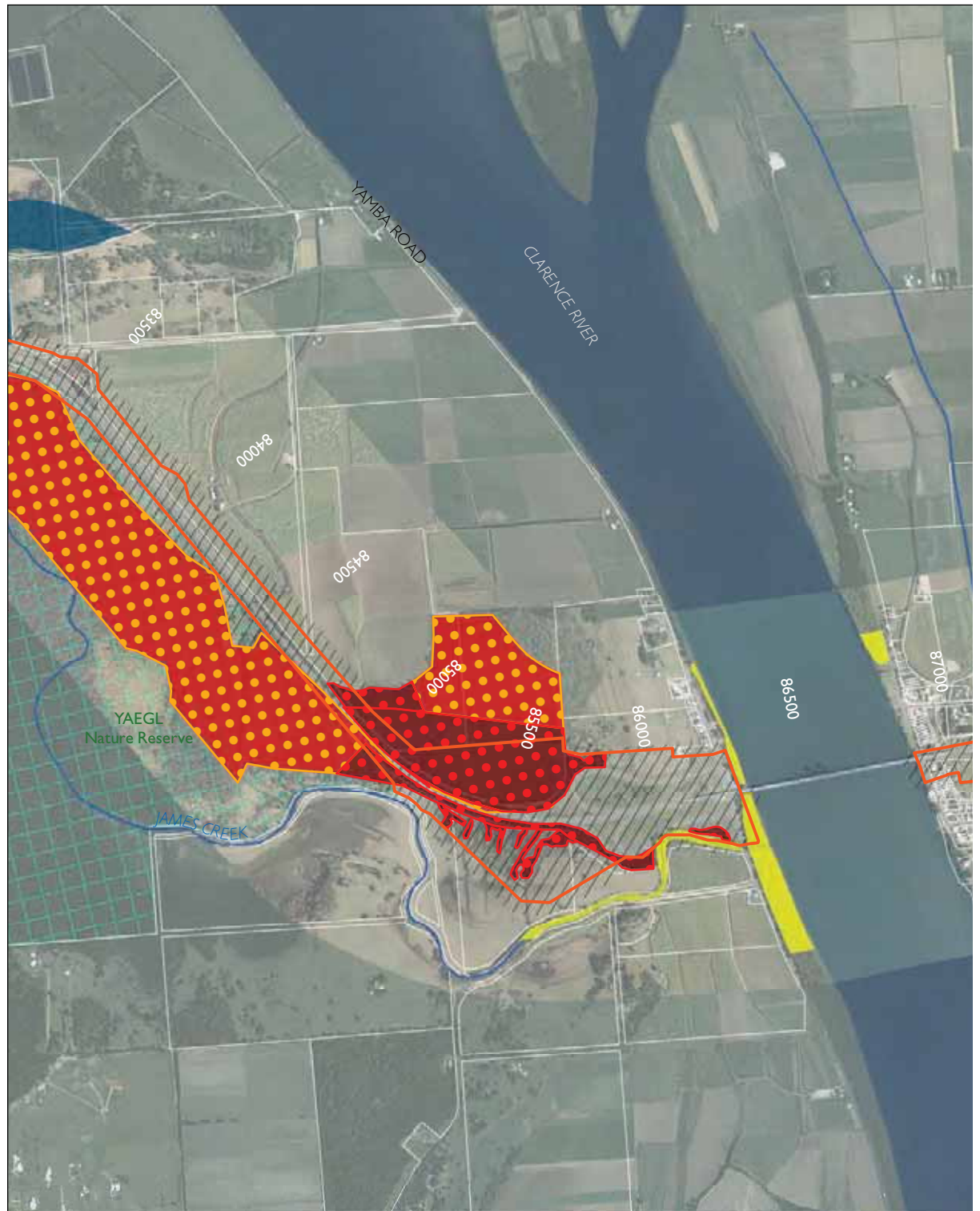


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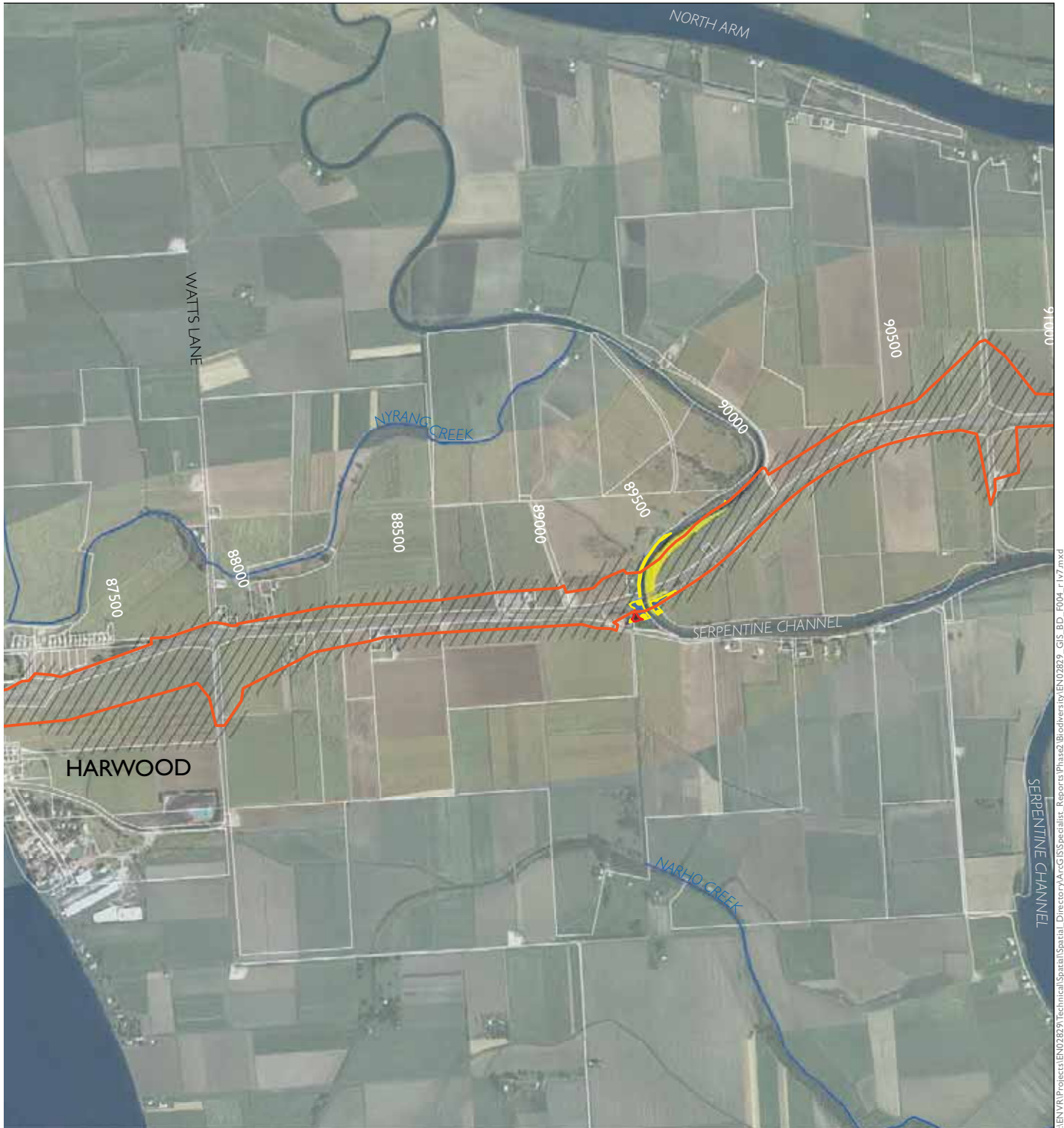
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 19 Vegetation communities and endangered ecological communities

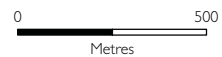


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to Legend sheet A for vegetation map key*

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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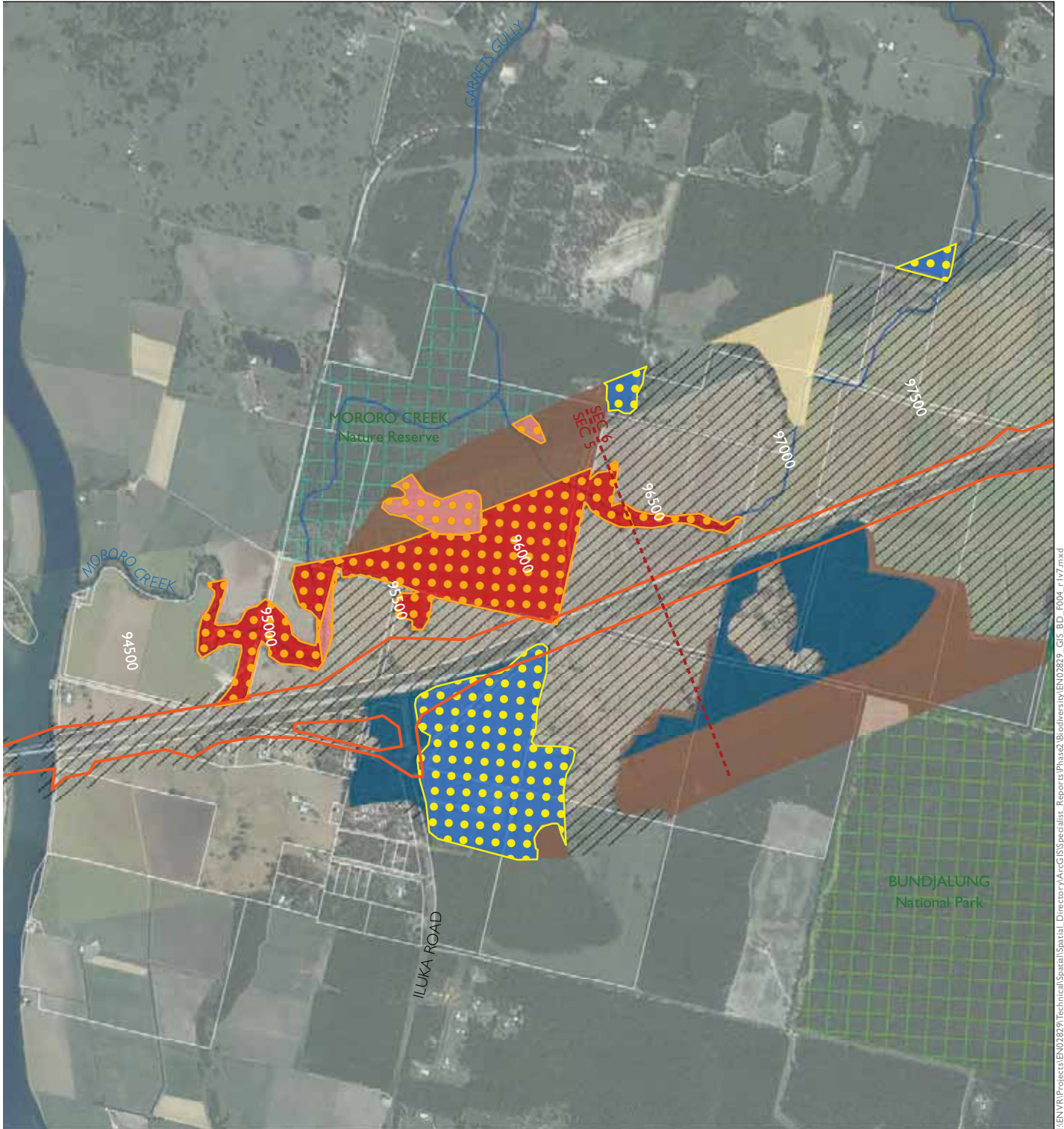
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 20 Vegetation communities and endangered ecological communities

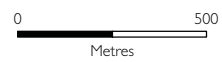


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|---|--|
|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | |
- *Refer to Legend sheet A for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

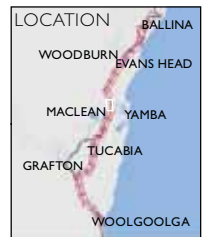


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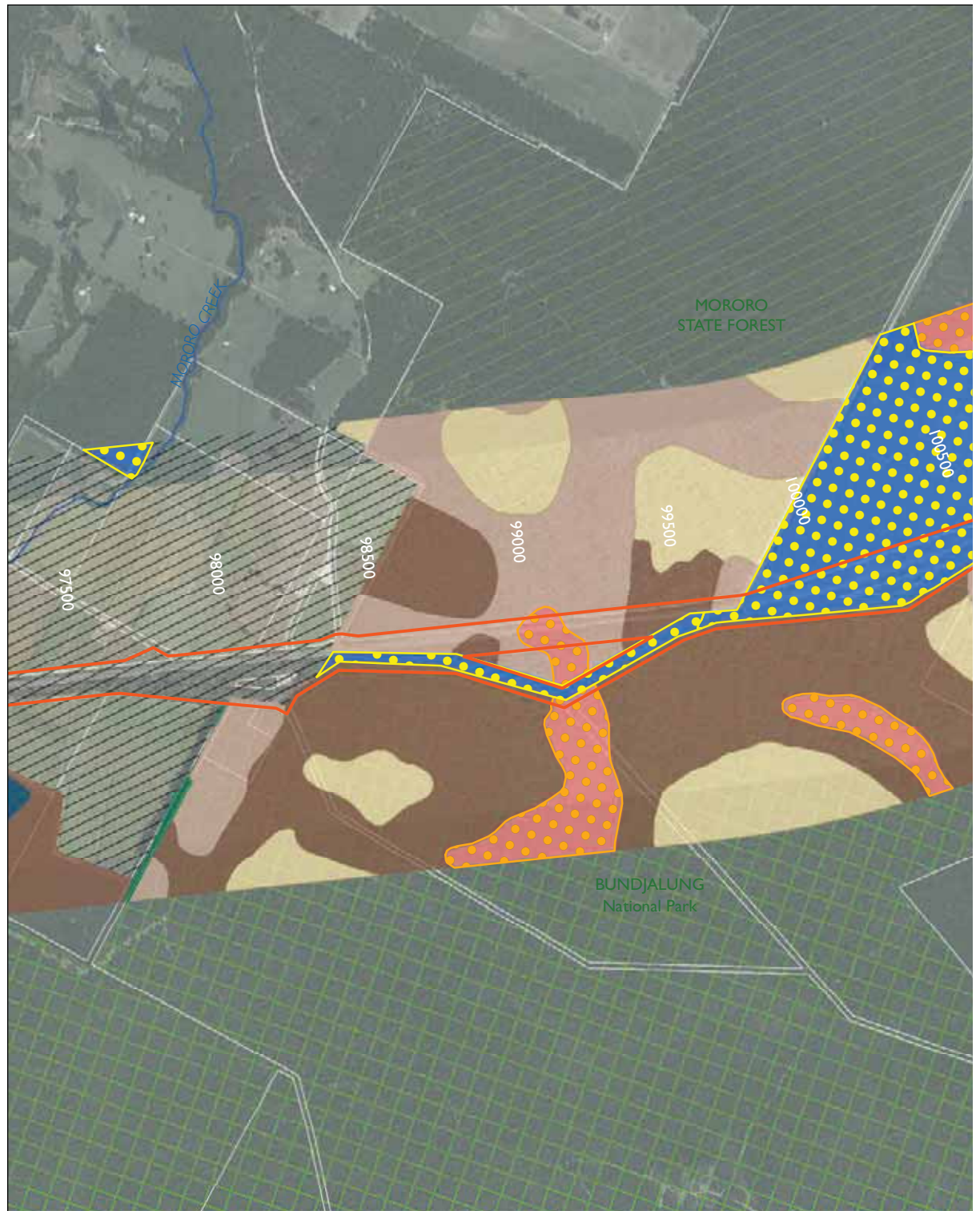
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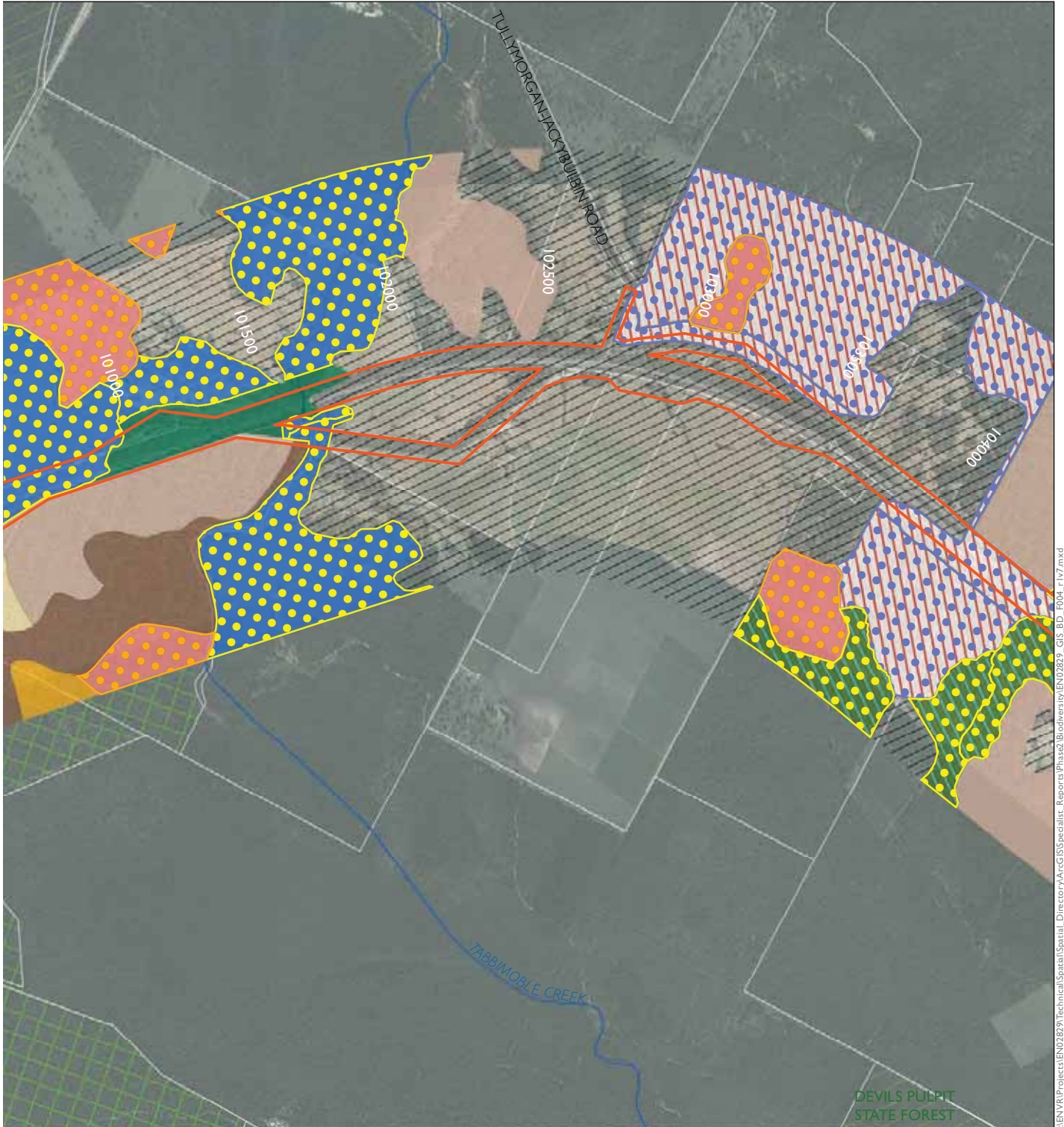
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 21 Vegetation communities and endangered ecological communities

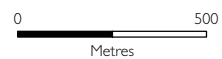


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to *Legend sheet A* for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 22 Vegetation communities and endangered ecological communities

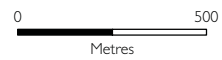


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to *Legend sheet A* for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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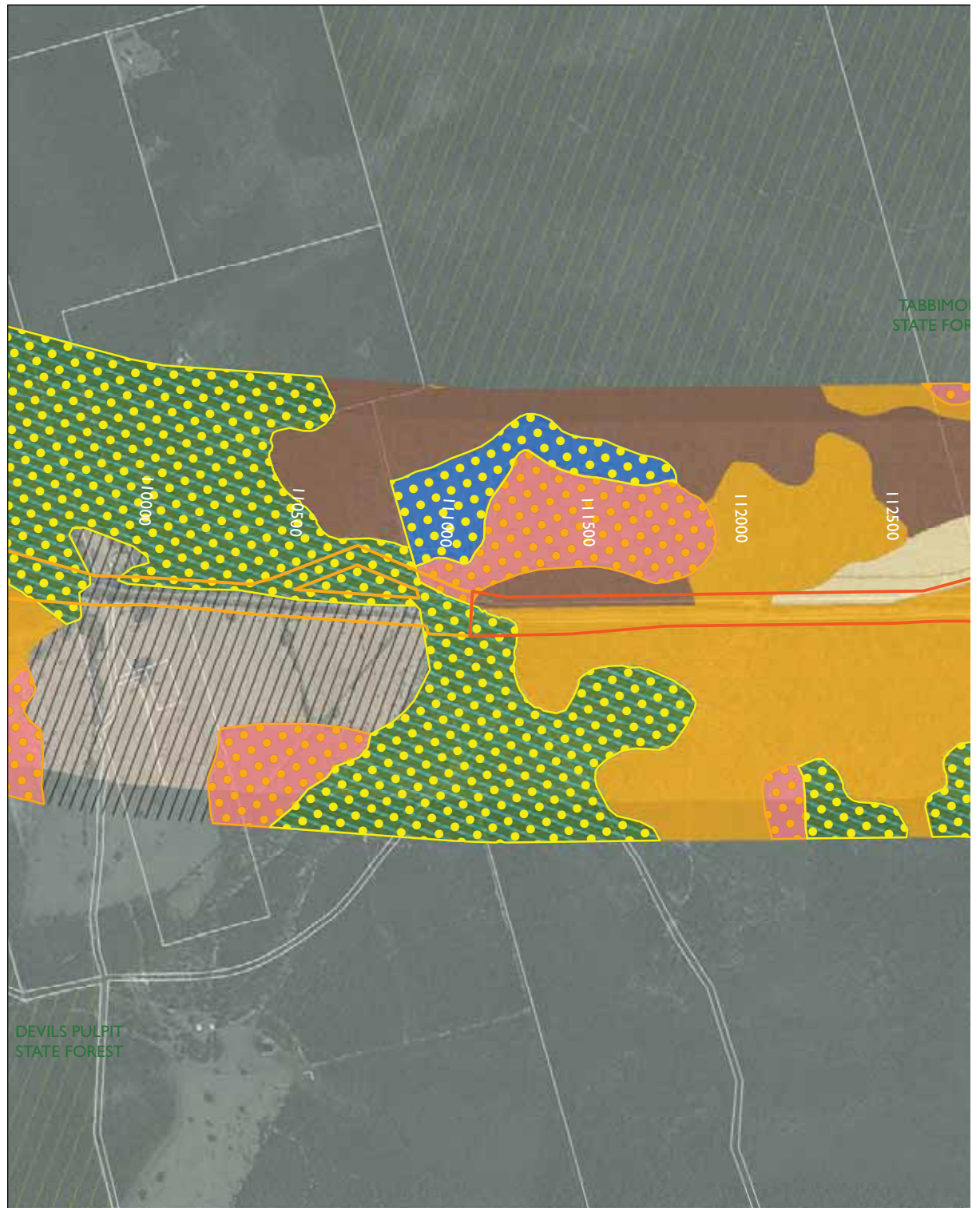


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Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 23 Vegetation communities and endangered ecological communities

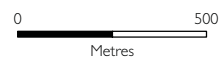


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to *Legend sheet A* for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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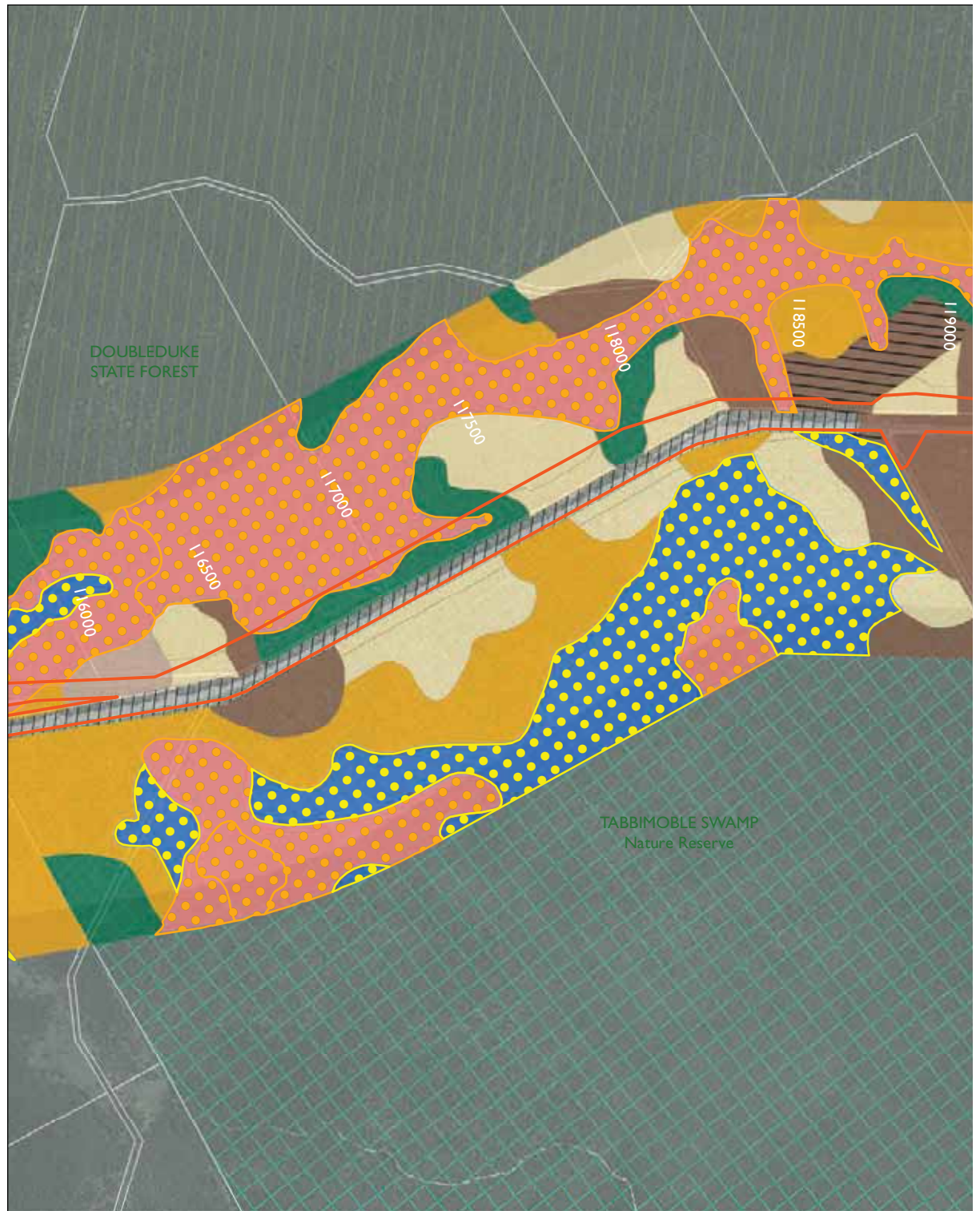
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Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 24 Vegetation communities and endangered ecological communities

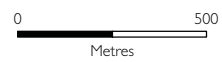


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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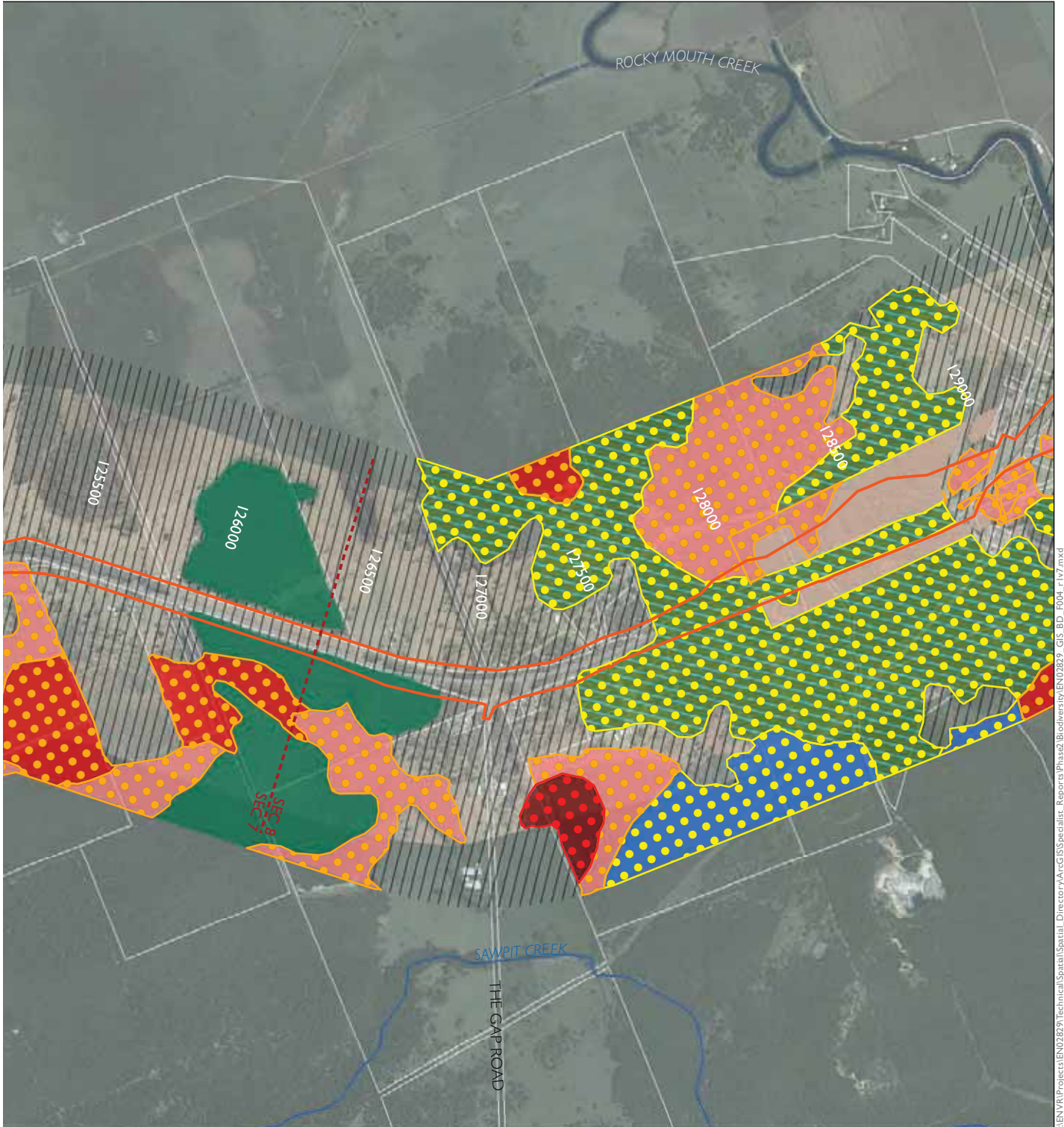
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 25 Vegetation communities and endangered ecological communities

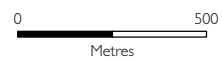


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

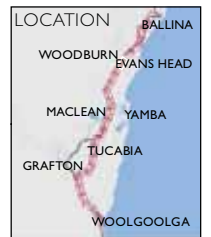


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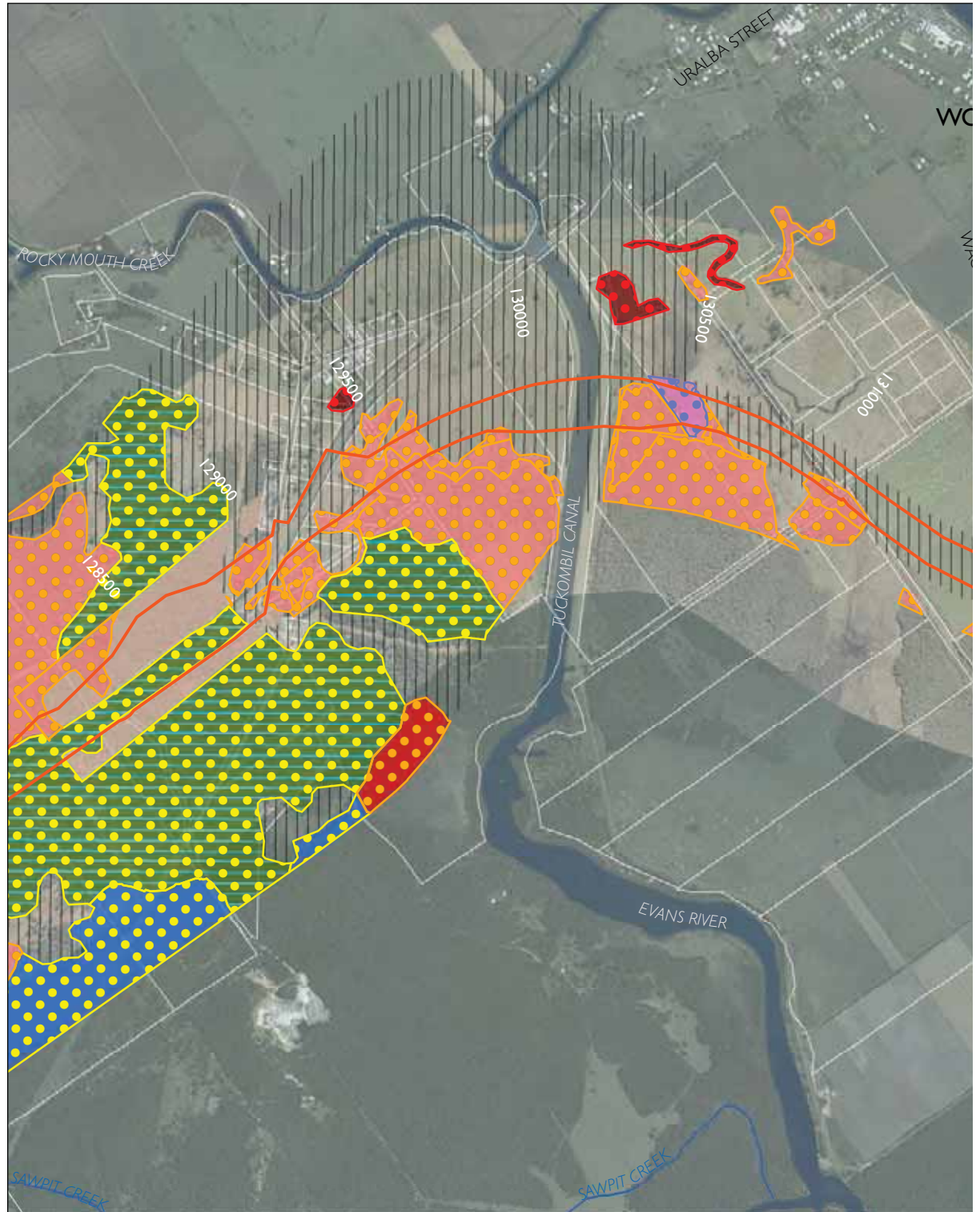
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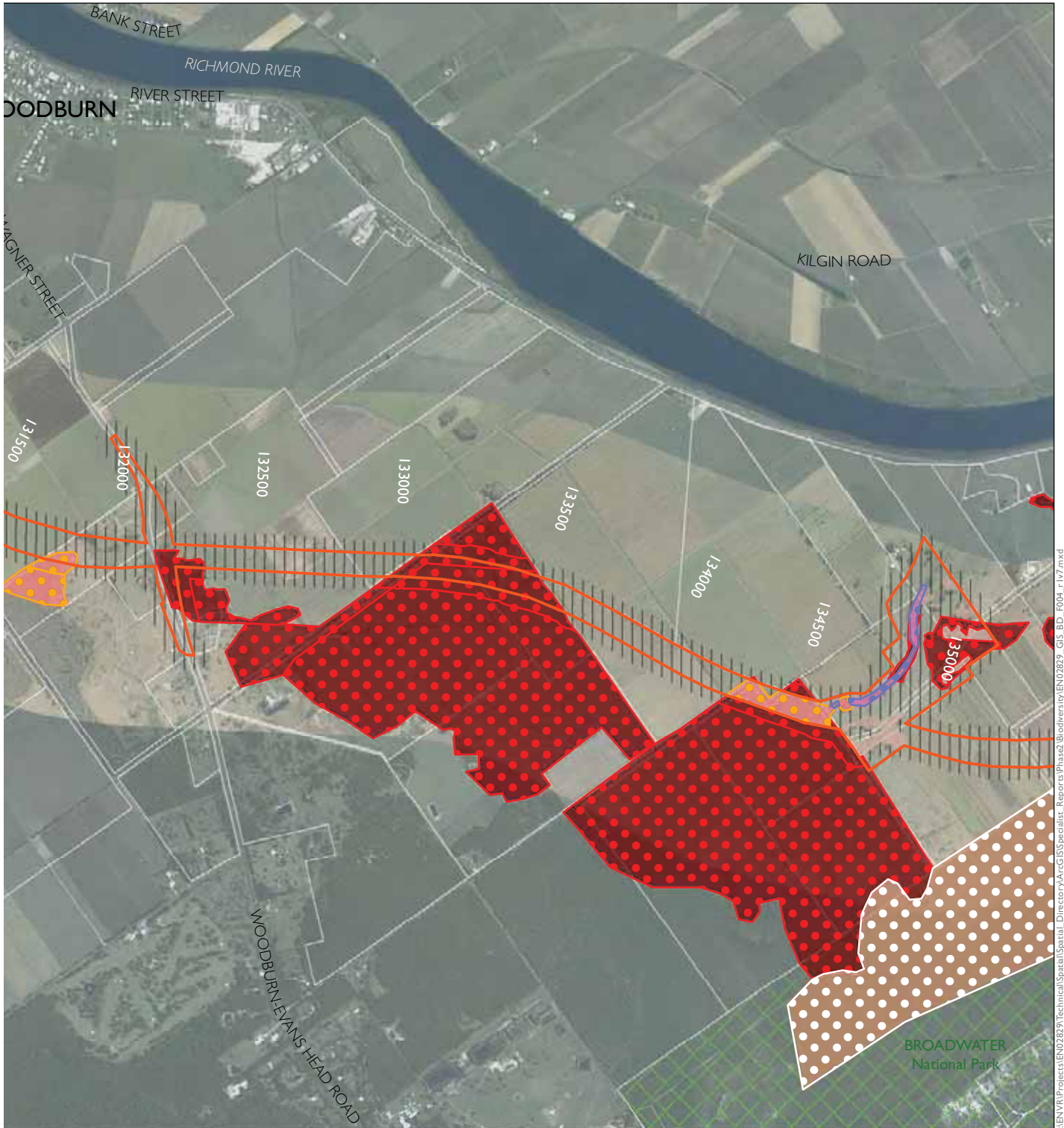
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 26 Vegetation communities and endangered ecological communities

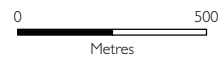


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to *Legend sheet A* for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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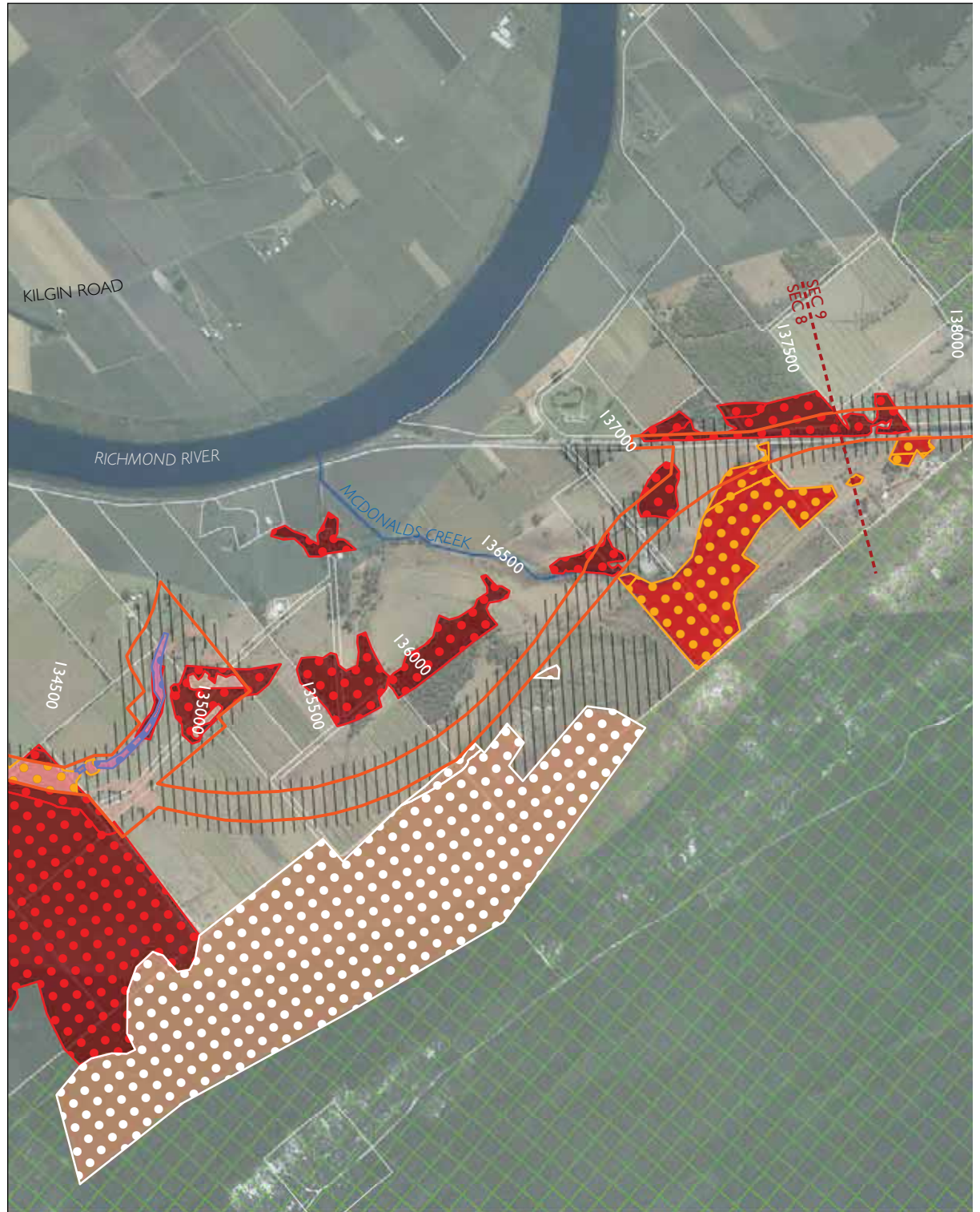
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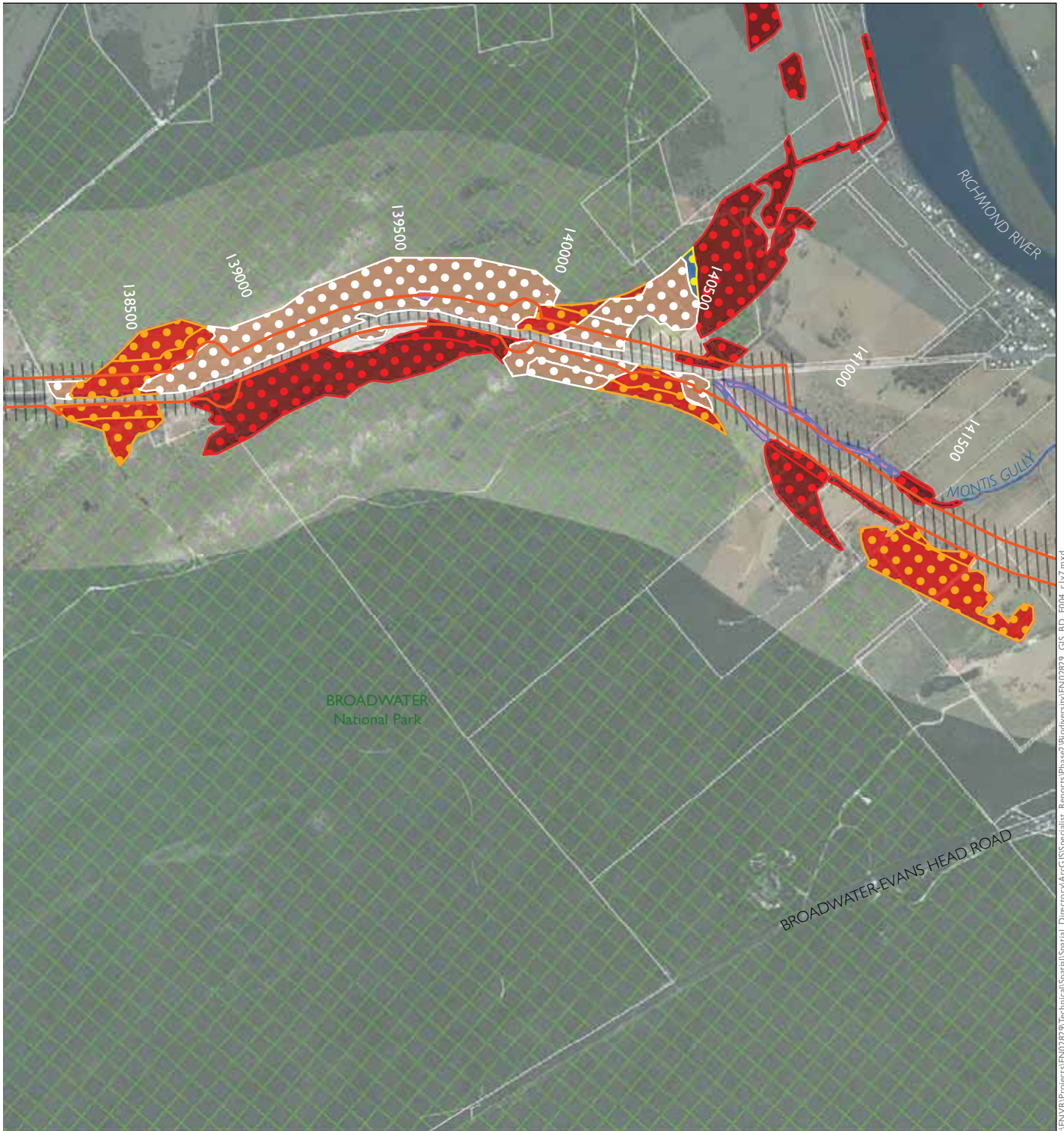
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 27 Vegetation communities and endangered ecological communities

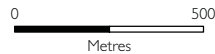


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | |
- *Refer to Legend sheet A for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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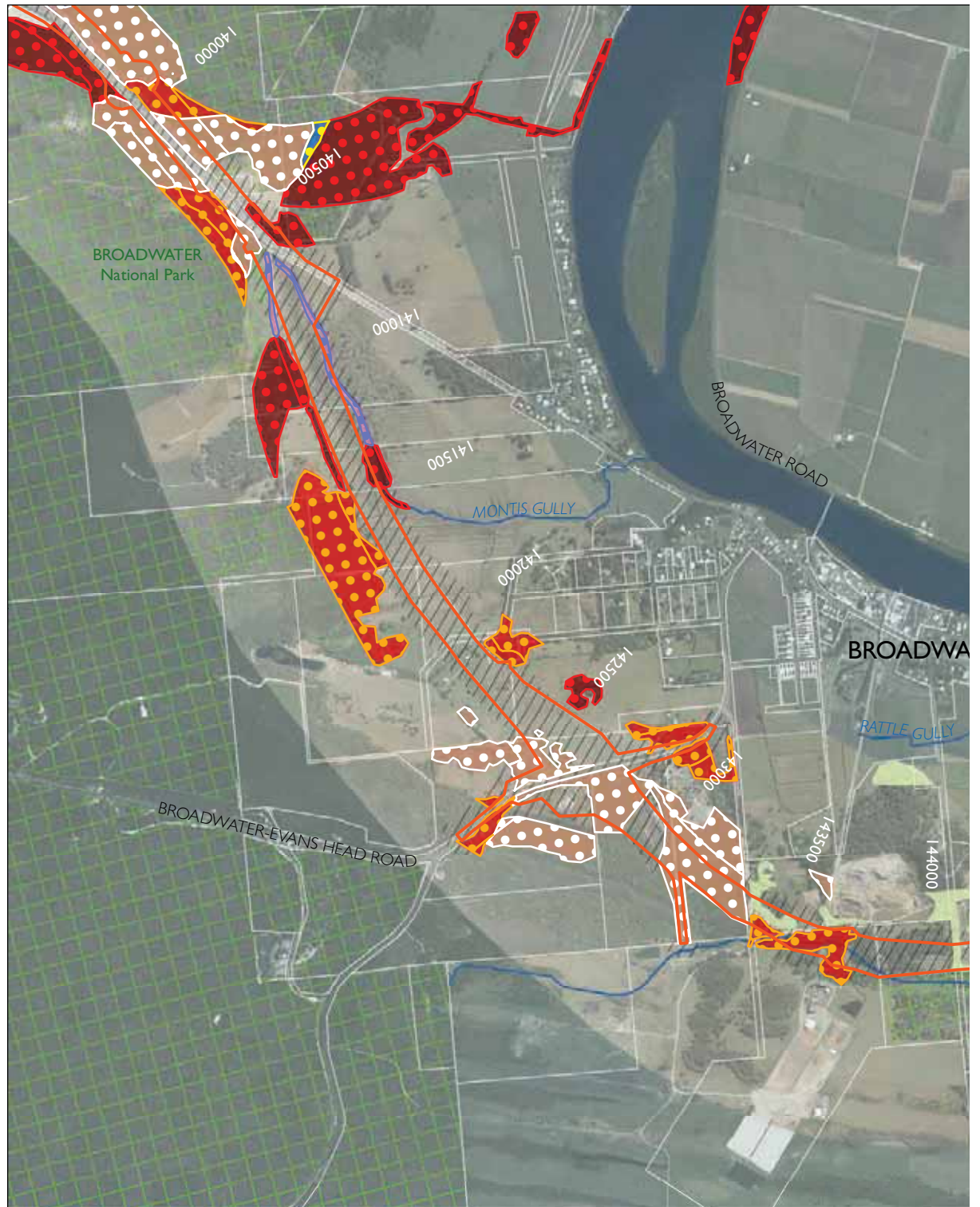
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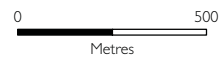
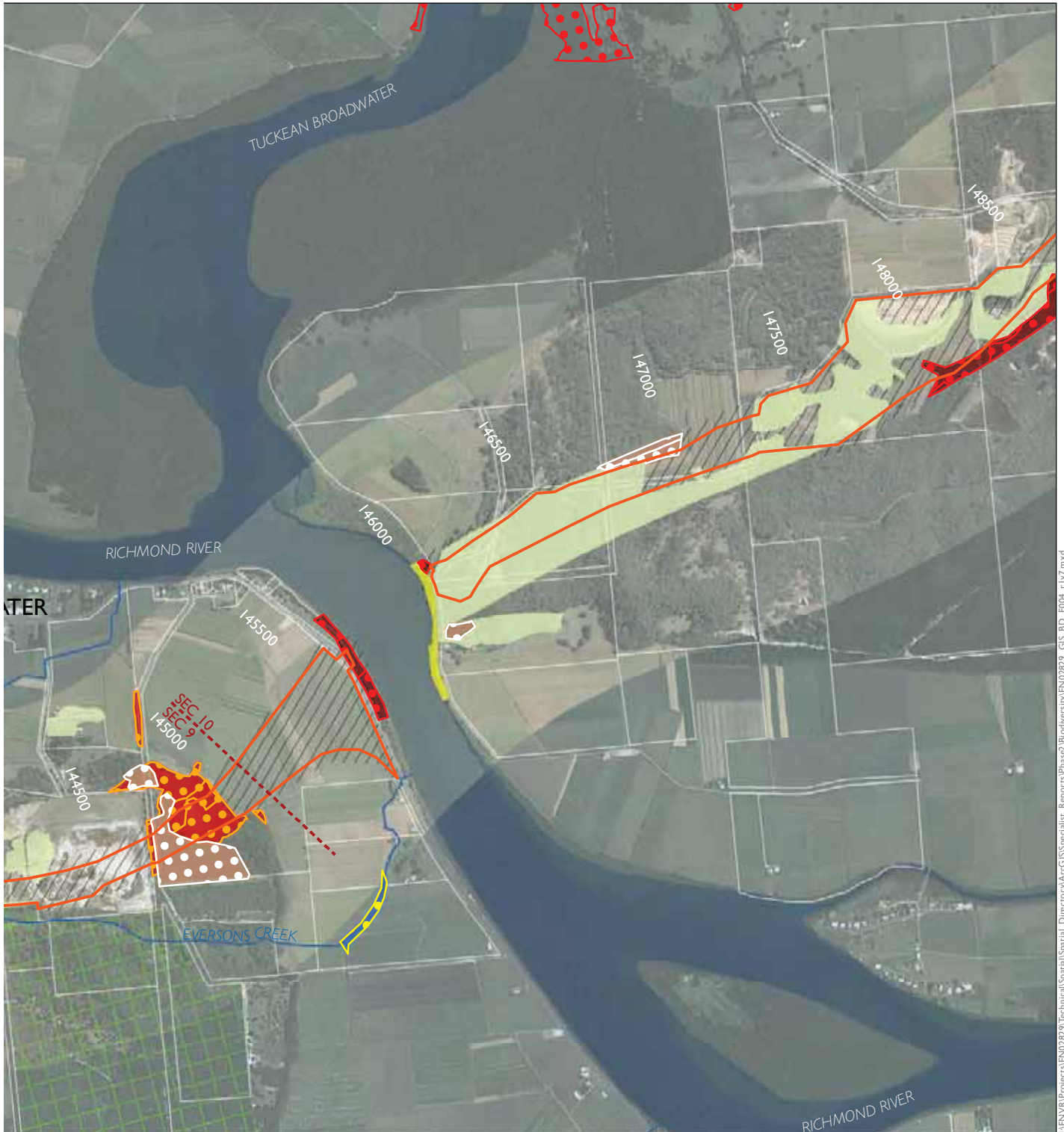
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 28 Vegetation communities and endangered ecological communities



-  The project
 -  Upgrade completed to dual carriageway
 -  Upgrade under construction
 -  State Forest
 -  National Park
 -  Nature Reserve / Regional
 -  Park / State Conservation Area
- *Refer to Legend sheet A for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

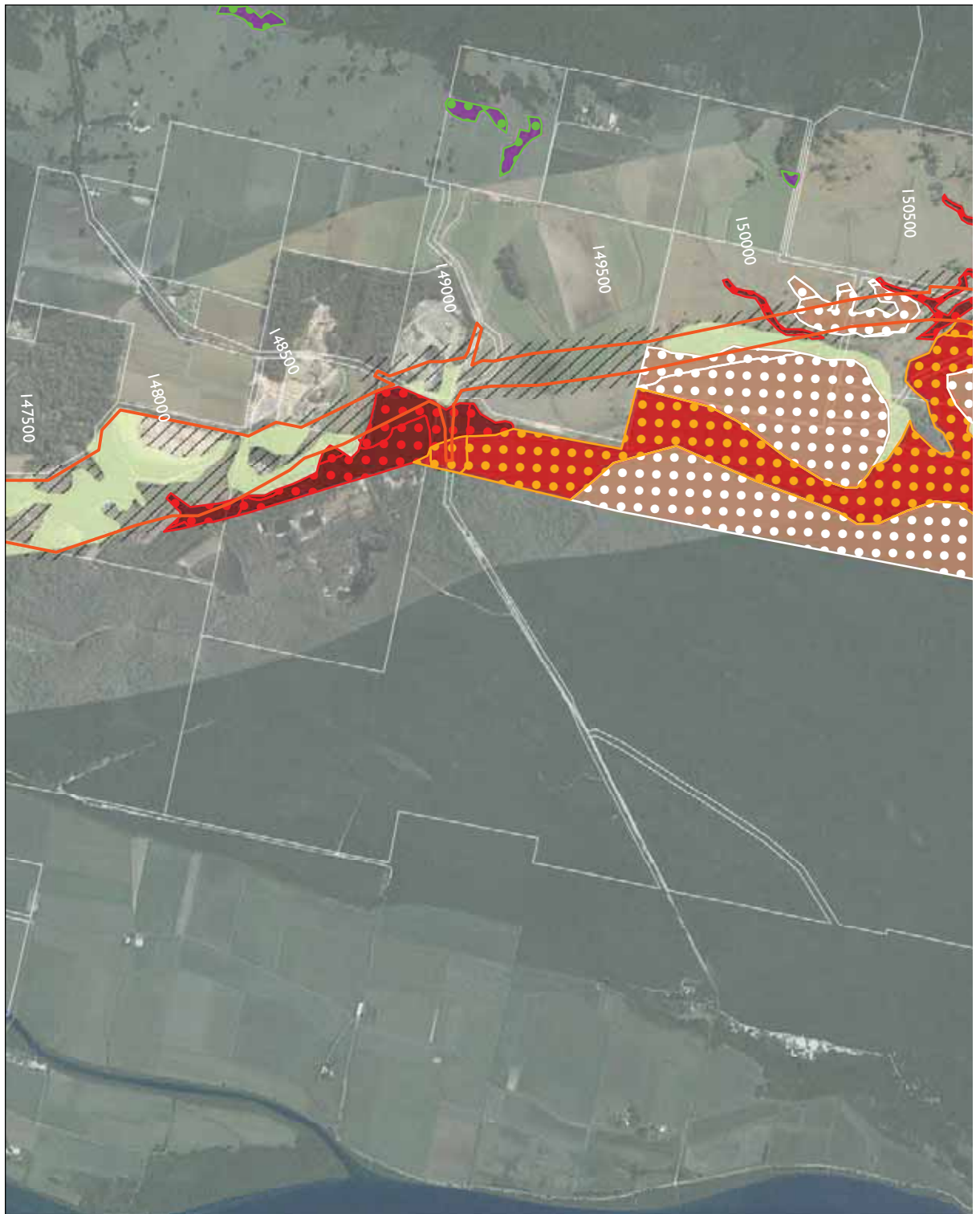








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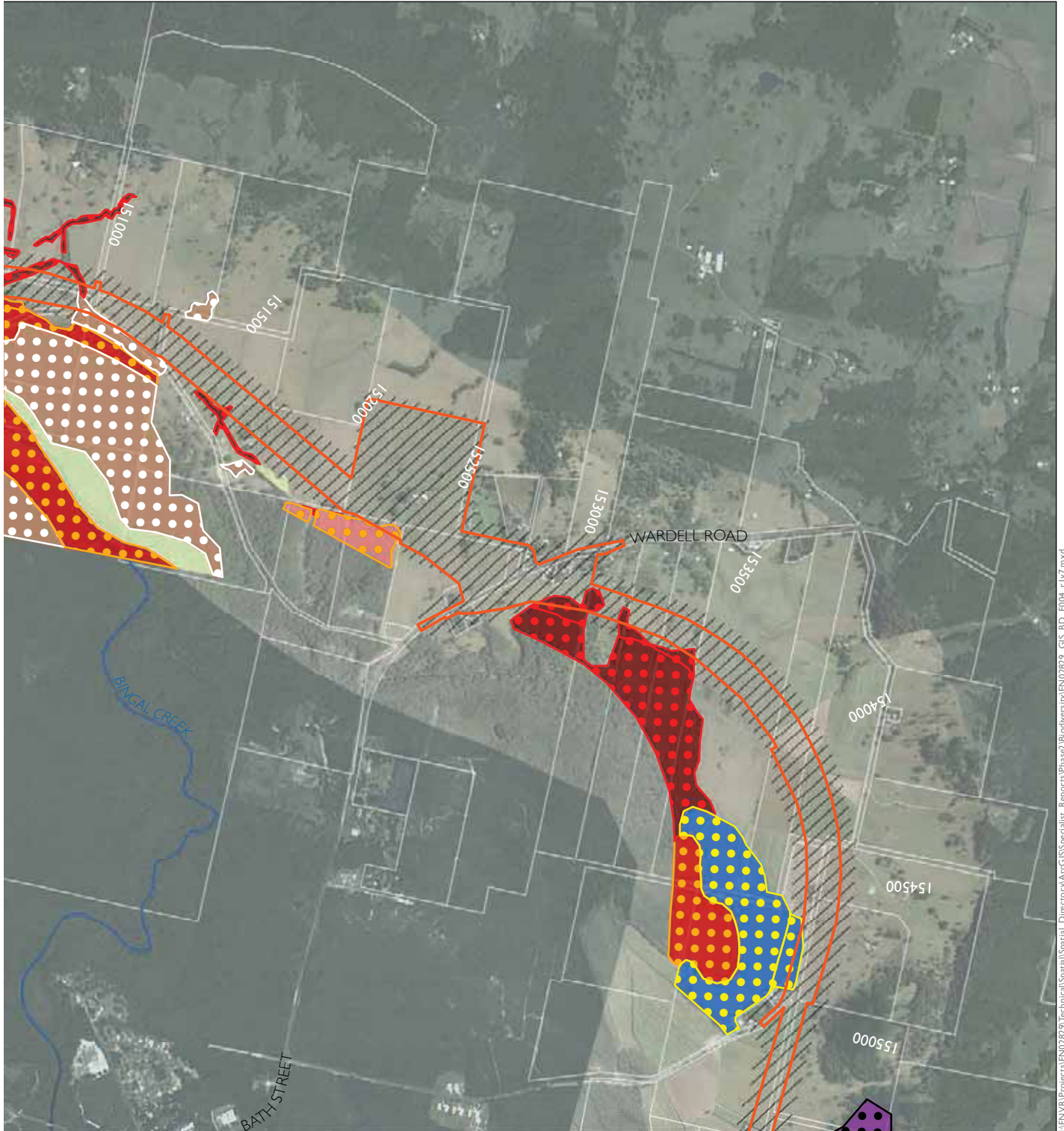
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 29 Vegetation communities and endangered ecological communities

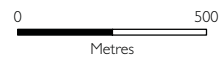


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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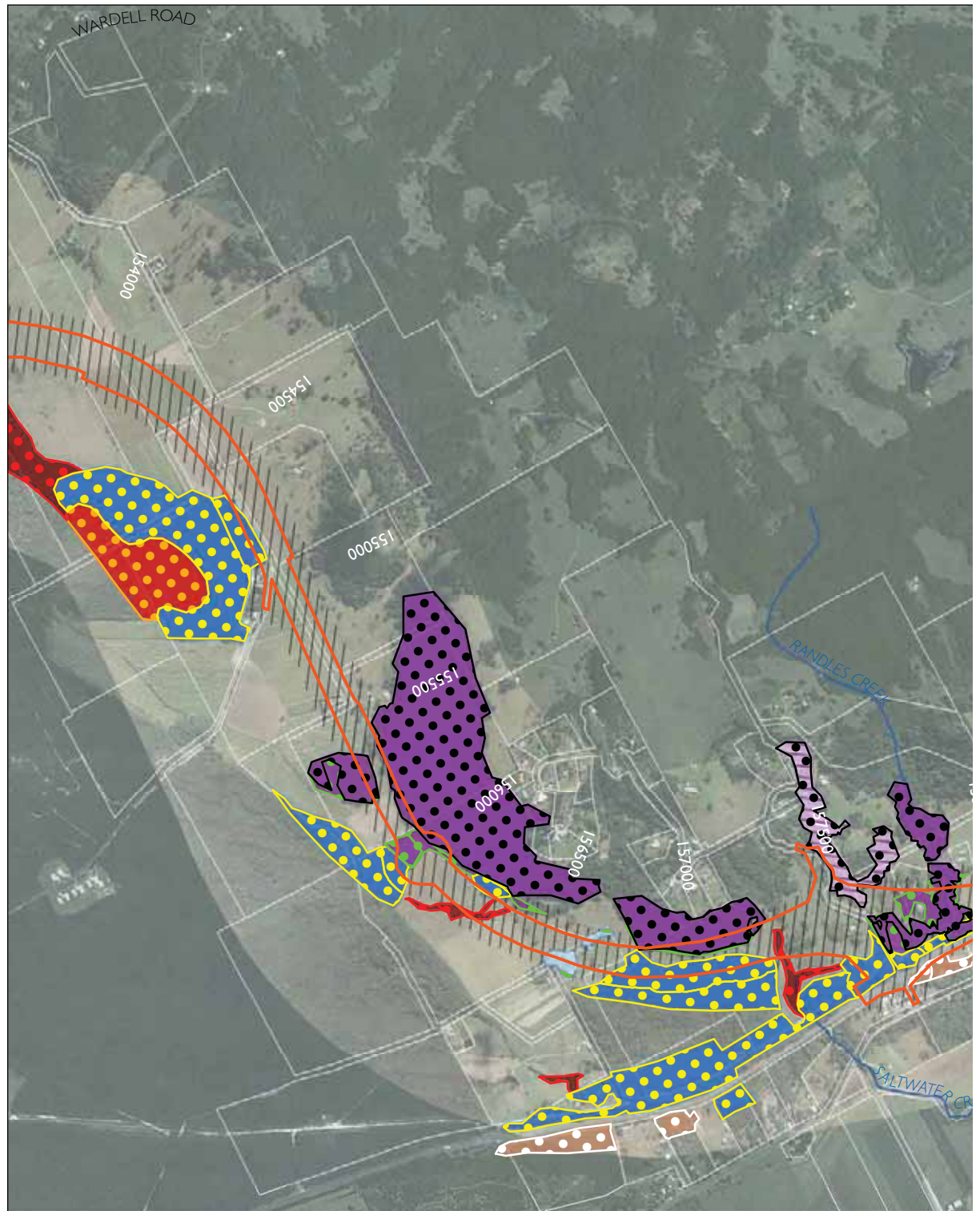
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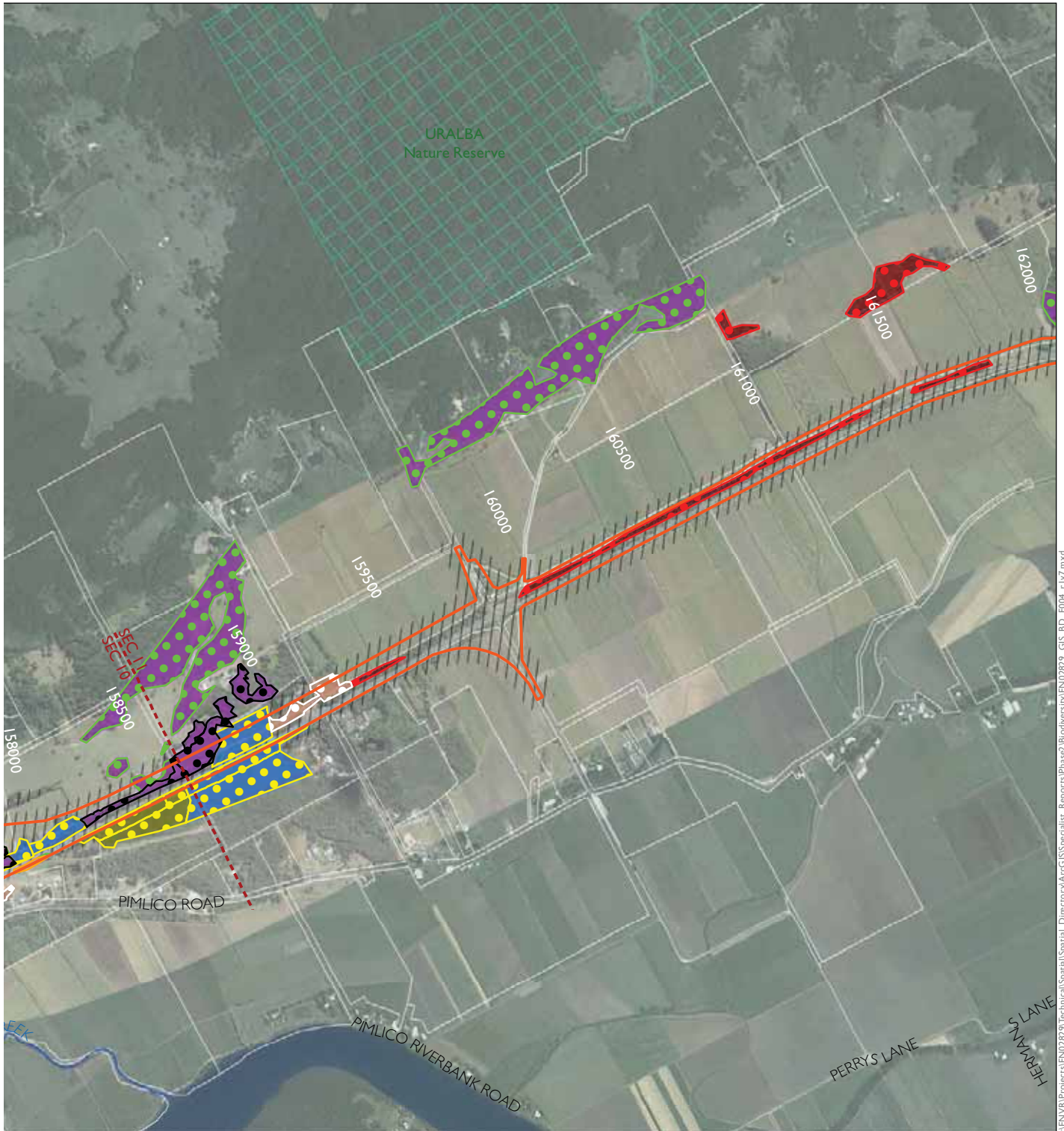
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 30 Vegetation communities and endangered ecological communities

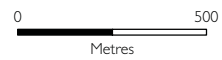


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|  The project |  National Park |
|  Upgrade completed to dual carriageway |  Nature Reserve / Regional |
|  Upgrade under construction |  Park / State Conservation Area |
|  State Forest | *Refer to Legend sheet A for vegetation map key |

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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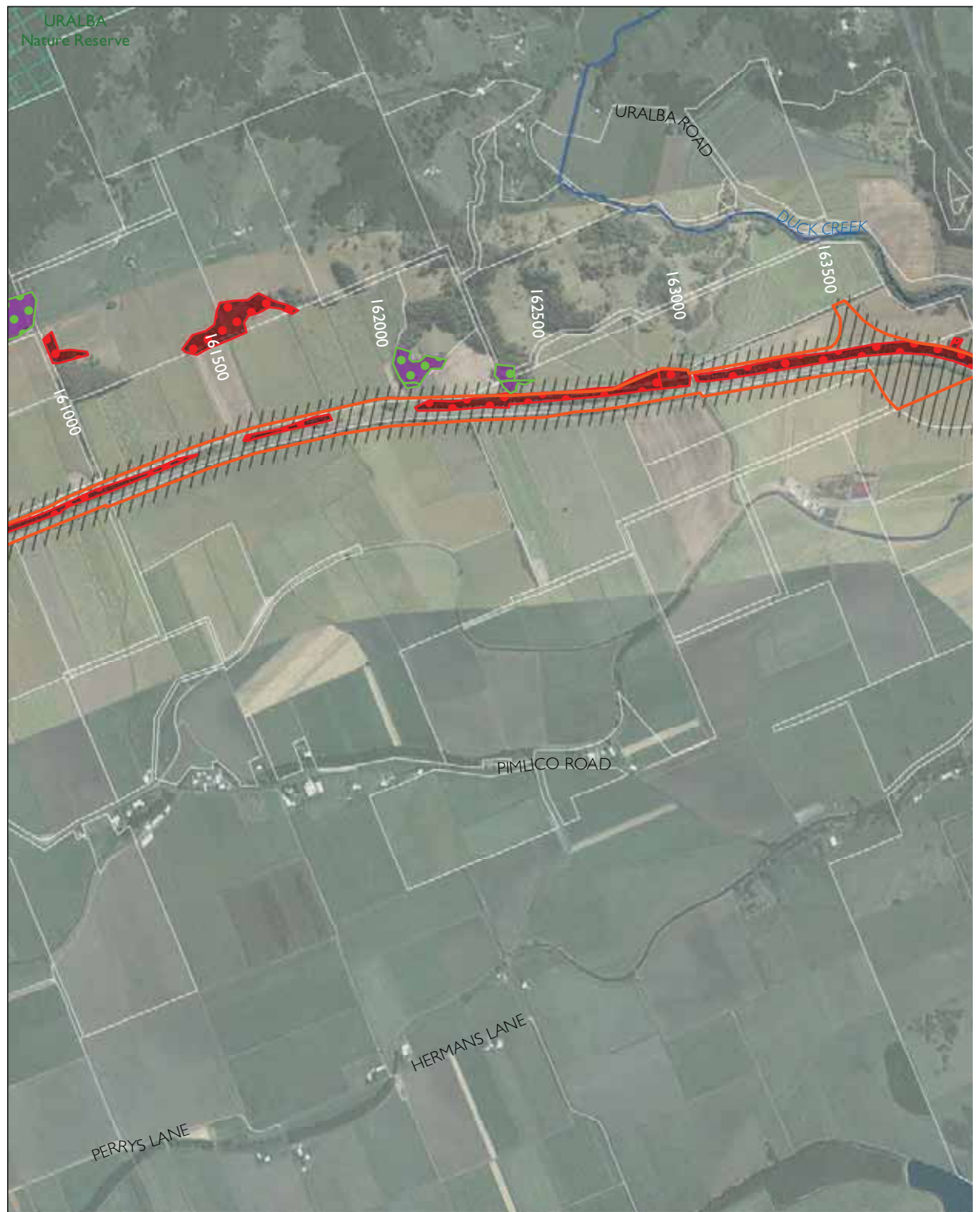
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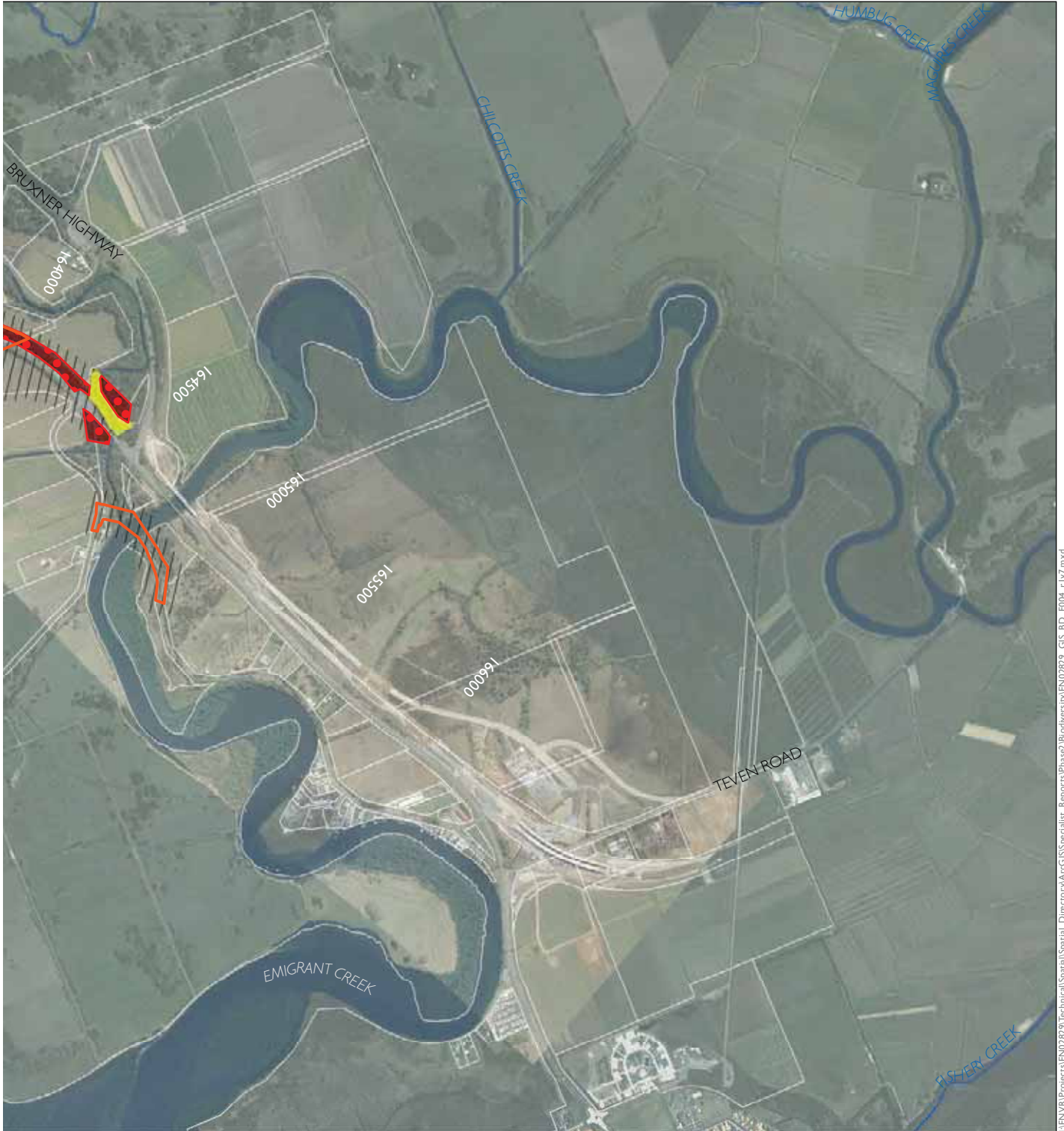
Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade

Figure 3 - 31 Vegetation communities and endangered ecological communities

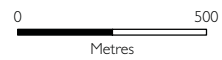


- The project
 - Upgrade completed to dual carriageway
 - Upgrade under construction
 - State Forest
 - National Park
 - Nature Reserve / Regional
 - Park / State Conservation Area
- *Refer to Legend sheet A for vegetation map key

Upgrading the Pacific Highway - Woolgoolga to Ballina Upgrade



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