BIODIVERSITY CERTIFICATION STRATEGY

Brimbin

September 2014

DOCUMENT CONTROL

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ABBREVIATIONS

BCAM (or the Methodology) - *Biodiversity Certification Assessment Methodology*

EEC – Endangered Ecological Community

DoE – Commonwealth Department of the Environment (formerly Department of Sustainability, Environment, Water, Population, and Communities – SEWPaC)

EP&A Act – NSW Environmental Planning and Assessment Act 1979

EPBC Act – Commonwealth Environment Protection and Biodiversity Conservation Act 1999

OEH – NSW Office of Environment and Heritage

BVT - Revised Biometric Vegetation Types (now PCTs – Plant Community Types)

TSC Act – NSW Threatened Species Conservation Act 1995

1 INTRODUCTION

1.1 Biodiversity Certification process

Biodiversity Certification is an alternate assessment pathway given effect through an amendment to the NSW *Threatened Species Conservation Act 1995* (TSC Act). Biodiversity Certification allows local government in areas with high development pressure, (urban and coastal areas), to provide for the protection of biodiversity, including threatened species at the strategic planning stage.

By streamlining the current biodiversity assessment process, Biodiversity Certification provides the opportunity to replace assessment of threatened species on an individual lot basis, with a landscape-wide strategic assessment.

Biodiversity Certification is used to help identify areas of high conservation value which need protection, and areas that are less constrained and suitable for development. The process provides for a range of options to offset biodiversity impacts, should this be required, to enable development of an identified area. Biodiversity must be 'improved or maintained' for Biodiversity Certification to be conferred by the Minister for Environment and Heritage.

Once Biodiversity Certification is provided over a defined area, development may proceed without the usual environmental assessment requirements under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Biodiversity Certification process has been identified as an appropriate, equitable and efficient mechanism to address competing biodiversity conservation and development issues for Brimbin.

1.2 Assessment methodology

A central element to Biodiversity Certification is the establishment of the *Biodiversity Certification Assessment Methodology* (BCAM) under section 126S of the TSC Act.

An application for Biodiversity Certification must be consistent with the BCAM, which prescribes the manner in which a planning authority must undertake an assessment and sets out a rule set that ensures biodiversity values are improved or maintained as a result of conferring Biodiversity Certification over a Development Area.

This Project applies the BCAM to the Brimbin Assessment Area (Figure 1 and Figure 2) with the aim of achieving Biodiversity Certification over a defined development footprint which is currently, for the most part, cleared rural land.

1.3 Background

Biodiversity Certification of the proposed Brimbin development was recommended by Greater Taree City Council (Council) and the Office of Environment and Heritage (OEH) as a strategic solution to the significant planning, development and biodiversity issues

associated with the project. The use of the BCAM will resolve land use and biodiversity conflicts and provide development certainty.

While the development outcomes proposed in the Brimbin Draft Structure Plan (the Draft Structure Plan) are welcomed by Council, a range of environmental constraints and threatened entities are present and must be considered in the planning process. These include the known presence of threatened species, threatened ecological communities and high conservation value habitat features. The conservation and management of these high conservation value features is integral to the Brimbin development proposal.

The Biodiversity Certification of the proposal will permit development to proceed, but will also secure long term and comprehensive protection for the known and potential threatened biodiversity within the locality, and also provide a valuable and unique ecological corridor or link between two separate river systems.

Additional benefits include:

- A streamlined development assessment process;
- Greater certainty to landowners regarding potential land uses and future development opportunities;
- Savings in time and money spent on individual flora and fauna studies and negotiating individual conservation outcomes;
- Secure conservation outcomes for high value natural environments and strategically targeted mitigation or offset efforts at an early stage; and
- A reduction in the cumulative impacts resulting from continued ad-hoc development.

Whilst Council acknowledges the value and importance of sustainably managing the State's biodiversity, it also recognises the need to provide for economic growth, community services and facilities, and a supply of affordable residential land via a sound strategic planning process.

Using the Biodiversity Certification pathway, it is proposed to deliver better environmental outcomes from anticipated urban and peri-urban development, at lower cost by considering biodiversity issues up-front. This approach enables practical decision-making and recognises the importance of opting for a cost-effective approach to delivering offset requirements.

1.3.1 Purpose of this report

The purpose of this report, the Brimbin Biodiversity Certification Strategy (the Strategy), is to clearly demonstrate that the conservation measures described and justified within the Strategy meet the principle of "improve or maintain" such that Biodiversity Certification may be conferred on the site by the Minister. The Biodiversity Certification Assessment Report (the Assessment Report) which accompanies this document, describes the procedures and assumptions used to calculate the offset requirement (in terms of biodiversity credits) and also explains how the assessment provides an improve or maintain outcome. The Strategy outlines how, when and by whom the conservation measures will be provided. Both the Assessment Report and the Strategy must be submitted to the Minister for consideration and Biodiversity Certification of the development proposal.

1.4 Brimbin Biodiversity Certification Assessment Area

Throughout the report there is reference to the Assessment Area which includes all land within the Brimbin property, including areas proposed for conservation and certification. In this report it is assumed that the entire Certified Area will be developed, although some areas may remain undeveloped once the proposal is finalised. Other areas have been set aside as Retained Lands and are neither impacted nor form a part of the proposed offset areas. Some additional, though negligible, impacts will be associated with future roads and associated development with the Retained Areas. Areas set aside for conservation within the Assessment Area are divided into the following categories:

1. Conservation E1 (and replanting);
2. Conservation E2 (and replanting);
3. Vegetation 10 metre buffer;
4. Retained Area (*Eucalyptus seeana*);
5. Retained Area (EEC);
6. Retained Area (riparian linkage); and
7. Retained Area (steep land).

Although the Vegetation 10 metre buffer and Retained Lands *(E. seeana*, EEC, riparian linkage and vegetation on steep land) will not be developed, they do not currently form part of the offset package and therefore have also been considered as Retained Lands (i.e., are not assessable). The Conservation E2 (replanting) area also includes the Vegetation 10 metre buffer on the northern boundary of the Conservation E1 lands in the west of the site, and do form part of the offset package. A total 178.4 hectares of the Conservation (E1 National Park and Nature Reserves) lands has already been set aside as an offset for a previous development at West Wallsend and does not form part of the conservation lands for the Biodiversity Certification of the Brimbin development. Similarly, an area of 4.5 hectares also exists as a separate development offset (the Cundletown offset). This 182.9 hectare portion of the conservation lands, set aside as offsets for separate developments, is mapped in Figure 2 as "Separate Development Offset" and is excluded from consideration as conservation in this assessment.

As required by the BCAM, land uses shown in the Assessment Area have been classified into Certified Areas (lands on which Biodiversity Certification will be conferred), Conservation Areas (land utilised to offset the development) and Retained Lands (non-assessable at this stage). Figure 2 illustrates the layout of each of these three components within the study area. Together, each of these components constitute the Assessment Area. The Certified Area is 1,666.2 hectares in total, of which 259.0 hectares is native vegetation and associated early regeneration, 1,406.6 hectares is cleared land and 0.6 hectares is exotic vegetation. The Conservation Area is 1,019.2 hectares in total, of which 953.2 hectares is native vegetation and associated early regeneration, 45.2 hectares is cleared land that will be replanted to fully restored ecosystems and a further 20.8 hectares is cleared land that will not be restored (tracks and easements).

1.5 Project implementation

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Roche Group Pty Ltd (Roche Group) to survey their lands at Brimbin in order to gain an understanding of the ecological value of the area, guide future land use of the site and assist with the determination of the suitability of the site as compensatory habitat for both the Brimbin development and other non-local developments. The BCAM has been utilised in this assessment for the purposes of providing the justification for conferring Biodiversity Certification on the Brimbin development only.

Whilst Niche, in cooperation with Roche Group has prepared the draft version of the Strategy, Council will, in time be required to finalise the document and submit the formal application for Biodiversity Certification.

1.6 Financial

Roche Group has paid for the preparation of the Strategy.

1.7 Technical reference group

A technical reference group does not exist in a formal sense for the proposal, however a number of Council, OEH, Niche and Roche Group staff have been collaborating as a working group in developing the Strategy. The following people have been involved in the Biodiversity Certification assessment and / or working group:

- Richard Pamplin, Lisa Proctor and Christopher Ross of Greater Taree City Council;
- Estelle Blair, John Martindale, Dimitri Young and Krister Waern of OEH;
- Clare Manning and Steve Atkins of NPWS;
- Mr Wes Van der Gardner of Roche Group; and
- Dr Rhidian Harrington and Nathan Smith of Niche, both of whom are accredited BioBanking assessors.

1.8 Strategic context of the Brimbin Biodiversity Certification Assessment Area

The Assessment Area includes a total area of 3,715.2 hectares (Table 1) and is described in detail in Sections 1.8.1 to 1.8.3 below.

1.8.1 Certified Area

The Certified Area of 1,666.2 hectares includes 1,406.6 hectares of cleared land and 0.6 hectares of exotic vegetation for which little or no ecological value exists and therefore does not constitute native vegetation for the purposes of this assessment. An area of 259 hectares constitutes native vegetation for the purposes of the Strategy and is the component of the Certified Area that attracts a credit requirement in the Assessment Report. This vegetation is mature remnant or early regeneration (BCAM Moderate – Good

condition), vegetation within a 10 metre buffer to account for indirect impacts and also low condition vegetation as defined in the BCAM.

The Certified Area includes categories for a variety of uses including: Employment, Mixed Use Centre, Neighbourhood Centres, On-Site Lakes, Primary Production, Schools, Private Recreation, Residential Neighbourhood and Village Greens.

The area to be certified has been subject to numerous revisions and has been based on avoiding impacts to biodiversity, threatened or otherwise. Specifically, impacts to the *Eucalyptus seeana* Endangered Population have been minimised through these revisions, as have impacts to TECs, as listed on the TSC Act.

Table 1. Relationship of assessable and non-assessable lands within the Assessment Area

Land class	Component of the Assessment Area (area in hectares)	Area (ha)	Total Ecosystem Credits Created	Total Ecosystem Credits Required
Assessable Lands				
Conservation Area (Native vegetation and replanting)	Conservation E1 (936.5 ha) Conservation E2 (61.9 ha)	998.4	10,351	-
Conservation Area (Cleared lands not to be replanted)		20.8	0	-
Certified Area (Intact and regrowth native vegetation only)		259.0	-	5,645
Certified Area (Cleared lands and exotic vegetation)	Cleared (1,406.6 ha) Exotic (0.6 ha)	1,407.2	-	0
Lands excluded from assessment				
Retained Area (Intact and regrowth native vegetation only)	Riparian Linkages (21.8 hectares) Riparian EEC (69.7 hectares) Steep Lands (29.1 hectares) Environmental Living (659.2 hectares, unlikely to be developed) Vegetation for *Eucalyptus seeana* (28.8 hectares) On-site Lakes (38.3)	846.9	-	-
West Wallsend and Cundletown offset areas	West Wallsend (178.4 ha) Cundletown (4.5 ha)	182.9	-	-
	Total Area	**3,715.2**	**-**	**-**

A summary of native vegetation within the Certified Area is provided in Table 2. The table includes the Vegetation Zones as entered into the BCAM Calculator as remnant, early regeneration, low condition vegetation, 10 metre vegetated buffer for indirect impacts and red flags.

Table 2. BCAM Vegetation Zones within the Certified Area

Vegetation zone details	Niche vegetation type	EEC	Area of veg zone certified (ha)	Red Flag
HU511_Moderate/Good_BT	Blackbutt Tallowwood Tall Open Forest	Not an EEC	1.6	No
HU511_Moderate/Good_BT indirect	Blackbutt Tallowwood Tall Open Forest (indirectly impacted)	Not an EEC	0.6	No
HU511_Moderate/Good_BT Regen	Blackbutt Tallowwood Tall Open Forest (early regeneration)	Not an EEC	4.8	No
HU591_Moderate/Good_DP	Derived Swamp Paperbark Thicket	Swamp Sclerophyll Forest	0.8	Yes
HU703_Low_RGIB	Narrow-leaved Red Gum Ironbark Woodland (low condition)	Not an EEC	42.2	No
HU703_Low_RGIB Indirect	Narrow-leaved Red Gum Ironbark Woodland (low condition, indirectly impacted)	Not an EEC	0.8	No
HU703_Low_RGIB Mel	Red Gum Grey Ironbark Paperbark Forest (low condition)	Subtropical Coastal Floodplain Forest	9.5	No (BCAM low condition)
HU703_Low_RGIB Mel Indirect	Red Gum Grey Ironbark Paperbark Forest (low condition, indirectly impacted)	Subtropical Coastal Floodplain Forest	1.3	No (BCAM low condition)
HU703_Moderate/Good_RGIB	Narrow-leaved Red Gum Ironbark Woodland	Not an EEC	32.1	No
HU703_Moderate/Good_RGIB indirect	Narrow-leaved Red Gum Ironbark Woodland (indirectly impacted)	Not an EEC	4.5	No
HU703_Moderate/Good_RGIB Mel	Red Gum Grey Ironbark Paperbark Forest	Subtropical Coastal Floodplain Forest	3.1	Yes
HU703_Moderate/Good_RGIB Mel Indirect	Red Gum Grey Ironbark Paperbark Forest (Indirectly impacted)	Subtropical Coastal Floodplain Forest	0.2	Yes
HU703_Moderate/Good_RGIB Regen	Narrow-leaved Red Gum Ironbark Woodland (early regeneration)	Not an EEC	2.5	No
HU762_Moderate/Good_TG	Grey Gum Stringybark Tallowwood Tall Open Forest	Not an EEC	4.7	No
HU762_Moderate/Good_TG indirect	Grey Gum Stringybark Tallowwood Tall Open Forest (Indirectly impacted)	Not an EEC	0.5	No
HU762_Moderate/Good_TG Regen	Grey Gum Stringybark Tallowwood Tall Open Forest (early regeneration)	Not an EEC	1.2	No
HU763_Low_SI	Spotted Gum Ironbark Forest	Not an EEC	98.2	No
HU763_Low_SI Indirect	Spotted Gum Ironbark Forest (low condition)	Not an EEC	1.2	No
HU763_Moderate/Good_SI	Spotted Gum Ironbark Forest	Not an EEC	39.4	No
HU763_Moderate/Good_SI indirect	Spotted Gum Ironbark Forest (Indirectly impacted)	Not an EEC	1.3	No
HU763_Moderate/Good_SI Regen	Spotted Gum Ironbark Forest (early regeneration)	Not an EEC	5.2	No
HU943_Moderate/Good_SO	Swamp Oak Forest	Swamp Oak Floodplain Forest	1.6	Yes
HU943_Moderate/Good_SO indirect	Swamp Oak Forest (Indirectly impacted)	Swamp Oak Floodplain Forest	0.3	Yes
HU943_Moderate/Good_SO Regen	Swamp Oak Forest (early regeneration)	Swamp Oak Floodplain Forest	1.4	Yes
		Total	259	

1.8.2 Conservation Area

Areas set aside for conservation within the Assessment Area have been divided into the following categories:

1. Conservation E1 (and replanting);
2. Conservation E2 (and replanting);
3. Vegetation 10 metre buffer;
4. Retained Area (*Eucalyptus seeana*);
5. Retained Area (EEC);
6. Retained Area (riparian linkage); and
7. Retained Area (steep land).

The Vegetation 10 Metre Buffer and Retained Area (*E. seeana*, EEC, riparian linkage and steep land) do not currently form part of the Strategy, although where the 10 metre buffer intersects with existing native vegetation indirect impacts have been considered (refer to Section 3.7). The Vegetation 10 metre buffer on the northern boundary of the Conservation E1 lands in the west of the site does not form part of the offset package.

The Conservation Area defined for this Strategy only includes the Conservation E1 and E2 areas (and associated replanting zones) for the purposes of assessing ecosystem credit values. A summary of native vegetation within the Conservation Area is provided in Table 3 as the Vegetation Zones entered into the BCAM Calculator and includes remnant, early regeneration and replanting zones.

Table 3. BCAM Vegetation Zones within the Conservation Area

Vegetation zone details	Niche vegetation type	EEC	Area of veg zone offset (ha)
HU511_Moderate/Good_BT	Blackbutt Tallowwood Tall Open Forest	Not an EEC	115.7
HU511_Moderate/Good_BT Regen	Blackbutt Tallowwood Tall Open Forest (early regeneration)	Not an EEC	0.9
HU591_Moderate/Good_DP	Derived Swamp Paperbark Thicket	Swamp Sclerophyll Forest	2.2
HU591_Moderate/Good_PT	Swamp Paperbark Thicket	Swamp Sclerophyll Forest	3.6
HU703_Moderate/Good_RGAng E2	Red Gum Angophora Mahogany Woodland (E2 conservation)	Subtropical Coastal Floodplain Forest	22.9
HU703_Moderate/Good_RGIB	Narrow-leaved Red Gum Ironbark Woodland	Not an EEC	76.4
HU703_Moderate/Good_RGIB E2	Narrow-leaved Red Gum Ironbark Woodland (E2 conservation)	Not an EEC	13
HU703_Moderate/Good_RGIB E2 Regen	Narrow-leaved Red Gum Ironbark Woodland (E2 early regeneration)	Not an EEC	4.4
HU703_Moderate/Good_RGIB E2 Replanting	Narrow-leaved Red Gum Ironbark Woodland (E2 replanting)	Not an EEC	12.7
HU703_Moderate/Good_RGIB Mel	Red Gum Grey Ironbark Paperbark Forest	Subtropical Coastal Floodplain Forest	197.9
HU703_Moderate/Good_RGIB Mel E2	Red Gum Grey Ironbark Paperbark Forest (E2 conservation)	Subtropical Coastal Floodplain Forest	9.6
HU703_Moderate/Good_RGIB Regen	Narrow-leaved Red Gum Ironbark Woodland (early regeneration)	Not an EEC	2
HU762_Moderate/Good_TG	Grey Gum Stringybark Tallowwood Tall Open Forest	Not an EEC	141.5

Vegetation zone details	Niche vegetation type	EEC	Area of veg zone offset (ha)
HU762_Moderate/Good_TG Regen	Grey Gum Stringybark Tallowwood Tall Open Forest (early regeneration)	Not an EEC	22.7
HU762_Moderate/Good_TG Replanting	Grey Gum Stringybark Tallowwood Tall Open Forest (replanting)	Not an EEC	15.1
HU763_Moderate/Good_SI	Spotted Gum Ironbark Forest	Not an EEC	187.7
HU763_Moderate/Good_SI E2	Spotted Gum Ironbark Forest (E2 conservation)	Not an EEC	1
HU763_Moderate/Good_SI Regen	Spotted Gum Ironbark Forest (early regeneration)	Not an EEC	11.2
HU763_Moderate/Good_SI Replanting	Spotted Gum Ironbark Forest (replanting)	Not an EEC	9.6
HU783_Moderate/Good_FG E2	Flooded Gum Brush Box Tall Forest (E2 conservation)	Not an EEC	7
HU932_Moderate/Good_SM	Swamp Mahogany Forest	Swamp Sclerophyll Forest	66.9
HU934_Moderate/Good_FR Regen	Forest Redgum Forest (early regeneration)	Not an EEC but highly cleared PCT	1.9
HU934_Moderate/Good_FR Replanting	Forest Redgum Forest (replanting)	Not an EEC but highly cleared PCT	7.8
HU943_Moderate/Good_SO	Swamp Oak Forest	Swamp Oak Floodplain Forest	64.7
		Total	**998.4**

The Conservation Area will provide protection for 953.2 hectares of mature and early regeneration native vegetation, of which 367.8 hectares is TEC. An additional 45.2 hectares will be strategically replanted in order to provide linkages and supplementary refuges for wildlife. These areas also provide known habitat for three threatened flora; *Corybas dowlingii, Eucalyptus glaucina* and *E. seeana*. The population of *E. seeana* on the site forms a significant expansion of the previously known distribution of the Endangered Population of this species. The occurrence of *Corybas dowlingii* is the northern-most outlier of this species known to date.

The Conservation Area will also provide protection of known habitat for a range of threatened and migratory fauna. Species recorded in this and previous surveys are described in Section 4.4 of the Assessment Report.

The E1 lands will be transferred to NPWS under a Planning Agreement (s93F of EP&A Act) to be managed in accordance with an agreed Statement of Works. The Conservation E2 lands will be secured via an E2 Planning Instrument without management or funding.

1.8.3 Lands excluded from assessment

Retained Lands

Under the BCAM, Retained Lands form a part of the Assessment Area but are excluded from both the Certified Area and the Conservation Area, thereby not contributing to the credit calculations.

Currently 846.9 hectares of land within the Assessment Area is considered Retained Lands, comprising:

- Riparian Linkages (21.8 hectares);
- Riparian EEC (69.7 hectares);
- Steep Lands (29.1 hectares);
- Environmental Living (659.2 hectares, unlikely to be developed);
- Vegetation for *Eucalyptus seeana* (28.8 hectares); and
- On-site Lakes (38.3).

Whilst the Retained EEC, *E. seeana*, Riparian Linkage lands do not form part of the Conservation Area in this Strategy, these Retained lands will provide important wildlife corridors across the development and habitat in their own right due to their substantial width (40-60 metres).

Steep Lands refer to land that has a slope above 20 per cent and is therefore unsuitable for development. These areas form relatively small patches and are not connected to the Conservation Area so are not thought to be entirely consistent with the requirements of the Conservation Area. However, these areas are connected to larger patches of vegetation outside the property through the EEC, *E. seeana* and Riparian lands and provide important habitat in their own right. Additionally, seemingly cleared parts of this land are likely to naturally regenerate. Although not a formal part of the Conservation Area in this Strategy, the Steep Lands will also be a significant contribution to the ecological value of the locality as a whole.

Although these lands do not currently contribute formally to the credit calculations they are none-the-less a valuable component of the Strategy, as they will not be developed and will be protected from development and their biodiversity values are likely to improve over time through exclusion of grazing.

Environmental Living is an area that may or may not be developed and does not contribute to credit calculations at this stage.

Non-contributing offset areas

A further 182.9 hectares is offset area for previous developments and exists as conservation zones that will not contribute to the Strategy:

- The West Wallsend offset, 178.4 hectares adjacent to the Dawson River; and
- The Cundletown offset, 4.5 hectares adjacent to Lansdowne Road.

1.9 Community consultation and access

To be completed following exhibition.

1.10 Ecological assessment

A number of previous surveys have been undertaken within the site and its environs for flora and fauna, including:

- Connell Wagner (February 2004), *LES Baseline Environmental Assessment*;
- Connell Wagner (September 2004), *LES Stage 2 Impact Assessment Report*;
- Andrews Neil (October 2006), *Biometric and Analysis of Environmental Trade-Offs*;

- Andrews Neil (2008), *Brimbin Biometric and Constraints Analysis*;
- Whelans Insites (December 2009), *Preliminary Ecological Constraints Report for Specific Areas*;
- Niche (2011), *Brimbin Flora and Fauna Assessment*.

Niche (2014), *Biodiversity Certification Assessment Report, Brimbin* Biodiversity datasets and associated literature for the region were reviewed including:

- Existing vegetation mapping, as well as other available GIS data;
- Atlas of NSW Wildlife (OEH);
- EPBC Protected Matters Search Tool (DSEWPAC);
- Threatened Species Profiles Database (OEH);
- Biometric Vegetation Types Database (OEH, May 2012 updated version);
- Biometric Vegetation Types Benchmarks Database; and
- Correspondence from OEH BioBanking Team regarding updated Hunter CMA Plant Community Types (PCTs) and their relationship to Biometric Vegetation Types (BVTs).

Vegetation had been at least partially mapped for previous assessments of the study area and at a coarser resolution by Council. A comparison of the Niche (2010) vegetation mapping units with these mapping products is provided in Appendix C of the Assessment Report.

The site was surveyed by Niche over five discrete survey periods in June 2010, August 2010, October 2011, September 2013 and September 2014. Surveys of the site by other consultants have been conducted in February 2004 and December 2009. A full description of the applied biodiversity assessment methodology is provided in Section 3 of the Assessment Report. Field survey effort is mapped in Figures 3 and 4 of the Assessment Report.

The Assessment Report has been provided as Appendix A of this report (the Strategy).

2 ASSESSMENT OF VALUES

2.1 Biodiversity Values

The Assessment Report, appended to this Strategy as Appendix A, outlines the process undertaken to define biodiversity values and demonstrates compliance with the BCAM. Figures 1 through to 12 from the Assessment Report illustrate, in full, the biodiversity values of the Assessment Area.

2.2 Native vegetation footprint

The Assessment Area (excluding retained lands) supports 1,212.2 hectares of native vegetation, present as either mature forest or as early stage regeneration, of which 259 hectares occurs in the Certified Area and 953.2 hectares occurs in the Conservation Area (E1 and E2 combined). A further 45.2 hectares of cleared land within the Conservation Area will be fully restored to local vegetation types (i.e., replanted) and 20.8 hectares of cleared land that will not be replanted. This takes the total area under formal conservation to 1,019.2 hectares. Section 3.1 and Appendices A, B and C of the Assessment Report provide further information on vegetation within the Assessment Area. Figure 7 of the Assessment Report shows the vegetation types of the Assessment Area, as mapped by Niche, while Figure 8 shows the conversion of these vegetation types to TECs. All on-site vegetation types within a Biodiversity Certification Assessment Area must be classified as PCTs for standard use in the Biodiversity Certification Credit Calculator (the Calculator) as Vegetation Zones.

2.3 Delineation of vegetation zones

The Assessment Area supports 38 vegetation zones of nine different PCTs and an area of cleared land. Condition, as defined by the BCAM ('Moderate – Good' or 'Low'), was assigned to each of the vegetation zones within the Assessment Area and a qualitative condition category assigned as the Ancillary Code as mature remnant (Niche veg code on its own), early regeneration ('Regen') and replanting ('Replanting'). Further delineation of vegetation zones that occur within the Conservation Area was made according to whether the zones occurred within E1 or E2 lands. This latter stratification was necessary in order to discern the discounted credit generation for the E2 conservation areas (25 per cent in this case, as the areas will be secured as an E2 Planning Instrument without management or funding). The Vegetation Zones are mapped in Figure 10 of the Assessment Report.

2.4 Threatened flora and fauna

Targeted surveys were undertaken for a variety of threatened fauna species, some of which require species credits in order to be offset (i.e., they are not predicted within ecosystem credits). The extensive fauna surveys conducted by Niche in 2010 resulted in 11 threatened fauna being detected of which the following four require Species Credits in order to be offset; Koala, Brush-tailed Phascogale, Black-necked Stork and Comb-crested Jacana. Both

Black-necked Stork and Comb-crested Jacana have been previously recorded within the Assessment Area, however habitat for these species only occurs within retained lands and therefore no further consideration of these species is required. Three threatened plants were recorded within the Assessment Area; *Corybas dowlingii, Eucalyptus glaucina* and *E. seeana* (endangered population in the Greater Taree LGA).

Habitat for both Koala and Brush-tailed Phascogale will be impacted by the development; however *E. seeana* is the only threatened plant to fall within the Development Area. Further information on species predicted to occur within the Assessment Area and those requiring survey is found in Section 3 of the Assessment Report.

2.5 Areas of State or Regional conservation significance

Areas of State or regional conservation significance are defined in the Methodology as:

- Land that is mapped or defined as a state or regional biodiversity link and exist as published plans approved by the Director General of OEH;
- A riparian buffer 40 m either side of a major river on the coast and tablelands or 100 m either side of a major river on the western slopes and plains;
- A riparian buffer 30 m either side of a minor river or major creek on the coast and tablelands or 60 m either side of a minor river or major creek on the western slopes and plains;
- A riparian buffer 20 m either side of a minor creek on the coast and tablelands or 40 m either side of a minor creek on the western slopes and plains; or
- Areas listed as a SEPP 14 wetland.

The study area contains a regional and sub-regional corridor:

- The Lower Manning Valley regional wildlife corridor runs through the southern part of the site and connects extensive areas of vegetation east and west of the study area. There is a gap in this corridor at Lansdowne Road in the southern-central part of the property which would limit the value of the corridor for some native species such as small and medium ground-dwelling mammals. However, this gap would be replanted as part of the offset package, significantly improving the east-west connectivity within the locality. The broader corridor is considered to be highly valuable for biodiversity within the region given the links between important habitats and the suite of rare or threatened species that are known to occur, and this will be improved further by the replanting;
- The Lower Manning Valley sub-regional wildlife connects vegetation in the south of the study area to vegetation outside of the study area and over the Dawson River to the west.

Regional corridors are primary landscape corridors which provide potential residential and dispersal habitat for many species (Scotts 2003). Preserving these corridors is important for regional conservation planning and helping to reverse historical species declines. Almost all of the vegetation within the regional and sub-regional corridors will be protected within the Conservation Lands, which add significance to the importance of the offset package.

2.6 EPBC Act considerations

This section of the Methodology is only required to be included in an application for Biodiversity Certification where 'strategic assessment' under the EPBC Act is sought.

This section represents an assessment under the EPBC Act. Appendix B is the Protected Matters Search for matters of National Environmental Significance (NES), as listed on the EPBC Act, within a 10 kilometre radius from a centre point within the study area along Lansdowne Road, dated 26 May 2014.

Appendix C provides an assessment of Matters of National Environmental Significance (MNES). This assessment determined that no MNES would be significantly impacted by the proposal.

2.7 Red flags

Red flag issues that fall within the Certified Area include the areas of the following EECs in 'Moderate – Good' condition as defined in the BCAM:

1. The Swamp Sclerophyll Forest EEC (0.8 hectares);
2. The Subtropical Coastal Floodplain Forest EEC (3.3 hectares); and
3. The Swamp Oak Floodplain Forest EEC (3.3 hectares).

A full address of the red flag criteria is provided in Section 3.2 for each of these EECs. It is noted that a further 10.8 hectares of Subtropical Coastal Floodplain Forest exists within the Certified Area as BCAM 'Low' condition and is, therefore, excluded from consideration as a red flag.

Through an assessment of more appropriate local data (MALD assessment), as permitted by Section 3.4 of the BCAM, Appendix F of the Assessment Report has demonstrated that the *Eucalyptus seeana* Endangered Population is capable of withstanding a temporary loss and therefore the red flag for the population has been effectively switched off. As a result of certification of the Brimbin development, the population will be secured and managed in perpetuity on an improve or maintain basis.

Habitat for both Koala and Brush-tailed Phascogale will be impacted by the development, however a red flag is not triggered for either of these species.

Black-necked Stork and Comb-crested Jacana have been previously recorded within the Assessment Area, however habitat for these species only occurs within retained lands and therefore neither triggers a red flag.

2.8 Indirect impacts

Indirect impacts have been fully described and assessed in Section 3.7. To avoid any indirect impacts on native vegetation within the Assessment Area all native vegetation has been buffered by 10 metres. An assessment of the offsetting requirement of the Certified Area on biodiversity is provided in the Assessment Report and considers all unavoidable direct and indirect impacts.

2.9 Credit requirements

2.9.1 Ecosystem Credits

Table 9 of the Assessment Report is a summary of the Ecosystem Credit status assuming retirement of credits for a conversion to National Park estate (E1 National Park and Nature Reserves) and other conservation land (E2 Environmental Conservation). Land zoned as E2 Environmental Conservation will be secured as a Planning Instrument without secured management or funding and therefore attracts only 25 per cent of the full credit value for those lands (as per the offsetting rules of the BCAM). Section 4.1 provides an assessment of the full retirement of ecosystem credits under the rules for offsetting as permitted by the BCAM.

Whilst 18.2 hectares of EEC occurs within the Development Area, 10.8 hectares of this is in 'Low' condition as defined in the BCAM and, therefore, only the remaining 7.4 hectares requires a red flag variation. A red flag variation for each of the EECs is provided in Section 3.3.

2.9.2 Species Credits

Retirement of species credits is required for the development for the *Eucalyptus seeana* Endangered Population, Koala and Brush-tailed Phascogale. The Assessment Report and Section 4.2 of this Strategy demonstrates that the Conservation Areas can more than adequately offset each of these three species in terms of species credits created.

Habitat for either of the threatened animal species, Black-necked Stork or Comb-crested Jacana (both previously recorded), are not impacted by the proposed development and therefore no offsetting of these species is required. Further, neither of the threatened plants, *Corybas dowlingii* or *Eucalyptus glaucina*, are impacted by the proposed development and therefore no offsetting of these species is required.

As stated in Section 2.7, neither *Eucalyptus seeana*, Koala or Brush-tailed Phascogale trigger red flags and therefore a red flag variation is not required in respect to these species.

3 STRATEGIC PLANNING

3.1 Development Area (area proposed for Biodiversity Certification)

The area proposed for Biodiversity Certification, the Certified Area, is composed of a variety of proposed land uses as described in Section 1.8 above. The Certified Area is 1,666.2 hectares in total, of which 259 hectares is native vegetation, 1,406.6 hectares is cleared land and 0.6 hectares is exotic vegetation.

3.2 Red flags

Under Biodiversity Certification, red flags are areas that cannot simply be offset by the retirement of biodiversity credits in order to achieve an Improve or Maintain outcome for biodiversity. Red flags include:

- Highly cleared vegetation types (70% or greater);
- Endangered or critically endangered ecological communities as listed on the TSC or EPBC Acts, that are not in Low condition;
- Threatened species (TSC Act only) that are classed as not being able to withstand further loss in the CMA;
- Land that is mapped or defined as a state or regional biodiversity link in accordance with section 3.7.2 of the *Methodology*;
- A riparian buffer 40 m either side of a major river on the coast and tablelands or 100 m either side of a major river on the western slopes and plains;
- A riparian buffer 30 m either side of a minor river or major creek on the coast and tablelands or 60 m either side of a minor river or major creek on the western slopes and plains;
- A riparian buffer 20 m either side of a minor creek on the coast and tablelands or 40 m either side of a minor creek on the western slopes and plains; and
- Areas listed as a SEPP 14 wetland.

All riparian areas within the Assessment Area have been buffered by at least the riparian buffer distance noted above for Red Flags (i.e. no riparian buffer red flags are impacted) or, if they are vegetated beyond this buffer distance, the width of the adjacent vegetation. These riparian areas form additional conservation zones that are currently being withheld from the assessment as retained lands. No SEPP 14 land is present in the study area and none of the vegetation types within the Certified Area are highly cleared vegetation types as defined in the Biometric Vegetation Types database.

Further, as described in Section 2.7, the red flag for the *Eucalyptus seeana* Endangered Population has not been triggered due to the MALD assessment in Appendix F of the Assessment Report. The MALD assessment concludes that the *Eucalyptus seeana* Endangered Population is capable of withstanding a temporary loss and will be suitably offset through the retirement of species credits.

Habitat for both Koala and Brush-tailed Phascogale will be impacted by the development, however a red flag is not triggered for either of these species.

Therefore, the following three EECs constitute the red flag issues that fall within the Development Area:

1. The Swamp Sclerophyll Forest EEC (0.8 hectares);
2. The Subtropical Coastal Floodplain Forest EEC (3.3 hectares); and
3. The Swamp Oak Floodplain Forest EEC (3.3 hectares).

A further 10.8 hectares of Subtropical Coastal Floodplain Forest exists within the Development Area as BCAM 'Low' condition and therefore doesn't meet the definition of a red flag.

Table 4 outlines the process that must be followed in order to demonstrate that the development of the site achieves an "improve or maintain" outcome for biodiversity values (the "improve or maintain test") in relation to its potential impact on red flags.

In order to answer yes to Criteria 1b), and therefore achieve an improve or maintain outcome, the criteria for a red flag variation must be addressed. These criteria are provided in Section 2.4 of the Methodology and are fully addressed in Section 3.3 below.

Table 4. Improve or maintain test using the Methodology

Improve or maintain criteria (must answer YES to all three criteria)	YES	NO	Comment
1a) The development does not impact on the red flag, **or** 1b) The Director General has made a determination that the development does not impact on the red flag as per Section 2.4 of the Methodology	Possible		1a) is not satisfied and, therefore, to address 1b) justification must be presented to OEH using the criteria in Section 2.4 of the Methodology that the development will not impact on red flags
2. The direct impacts on the red flag are offset in accordance with the rules of Section 10 of the Methodology	Possible		Credit calculations described in detail in Section 5 of the Assessment Report and summarised in this report (the Strategy) in Section 4.
3. The indirect impacts on the red flag are appropriately minimised in accordance with Section 6 of the Methodology	Possible		Indirect impacts have been minimised and residual incorporated into credit calculations. Section 3.7 of the Strategy addresses indirect impacts.

3.3 Red flag variation

The following section constitutes a formal application for a red flag variation, provides justification for this claim and, through addressing the relevant criteria in s 2.4.1 – 2.4.4 of the BCAM, demonstrates that the impacts of Biodiversity Certification on the red flag areas can be offset in accordance with the rules and requirements in Section 10 of the BCAM.

A red flag variation is required for impacts to the following three EECs:

1. The Swamp Sclerophyll Forest EEC (0.8 hectares);
2. The Subtropical Coastal Floodplain Forest EEC (3.3 hectares); and
3. The Swamp Oak Floodplain Forest EEC (3.3 hectares).

A separate address of the red flag criteria has been provided for each EEC in Sections 3.3.1, 3.3.2 and 3.3.3 which follow.

3.3.1 Swamp Sclerophyll Forest Threatened Ecological Community

The Swamp Sclerophyll Forest red flag area is present as 0.8 hectares of Derived Swamp Paperbark Thicket (as mapped by Niche), all of which will be removed and none indirectly impacted.

Criteria a); all reasonable measures have been taken to avoid adverse impacts on the red flag areas and to reduce impacts of development on vegetation remaining within the Biodiversity Certification area

The Draft Structure Plan has been subject to numerous revisions that have been based on avoiding impacts to Swamp Sclerophyll Forest.

Master Plan

A Brimbin Master Plan will be drafted to ensure sensitive design principles are applied in the planning of subdivision layouts and future developments. It is expected that perimeter roads will be required to create separation between retained vegetation and residences for fire protection and also to minimise the number of created parcels abutting areas of high conservation value. This will discourage private property encroachments and will minimise indirect impacts such as garden waste dumping and 'tidying up' activities following occupation.

While Biodiversity Certification assumes the total removal of all habitat elements within the Development Area, this is unlikely to be the actual outcome once development is effected. The addition of nodes or increasing effective width of the buffer would be supported in principle, provided that this does not negatively impact on the broader habitat retained or the purpose of the buffer.

However, a number of other concerns pertaining to wholesale retention of patches within the Biodiversity Certification area have been considered. These relate to meeting asset protection and bushfire planning requirements, together with the cumulative action of indirect impacts operating on a larger edge to area ratio following development and the likely detrimental impacts on structure, function, composition and habitat value. While the management applied to these patches might mitigate against such impacts, experience dictates that within a residential setting, small isolated patches of retained vegetation are generally converted to under-scrubbed parkland (over time) with a resultant reduction in biodiversity values.

Similarly, the retention of hollow bearing trees within the Certification Area would also be supported in principle. However, retention of senescing trees has proven problematic within residential areas, with safety and risk management issues causing concern once occupations progress.

Weed and Pest Management

A Weed and Pest Management Plan will be implemented such that sustainable management of weed and pest species is maintained within the Conservation Area.

The common weed species within the Assessment Area were largely associated with disturbances such as grazing, clearing, tracks, easements and areas adjacent to drainage channels, they included; *Andropogon virginicus, Axonopus ficifolius, Chenopodium album, Cinnamomum camphora, Cirsium vulgare, Conyza* sp., *Cyperus congestus, Hypochaeris radicata, Lantana camara, Paspalum dilatatum, Plantago lanceolata, Rubus ulmifolius, Senecio madagascariensis, Setaria parviflora, Solanum mauritianum* and *Verbena bonariensis*. Two of these species, *Lantana camara* (lantana) and *Rubus ulmifolius* (blackberry) are listed as noxious weeds (Class 4) within the Greater Taree Local Government Area.

No feral fauna species were recorded during the field surveys, however it is highly likely that feral cats, dogs, rabbits and foxes are prevalent in the area. Stock will be permanently excluded from the intact remnant, regrowth and replanting areas and feral animals controlled.

Conservation Areas

The spatial distribution, size of patches and connectedness of Swamp Sclerophyll Forest proposed for conservation within the Assessment Area have minimised the overall impacts of conferring Biodiversity Certification on the red flag areas.

With 72.7 hectares of Swamp Sclerophyll Forest proposed to be conserved permanently as National Park (E1 Conservation), the outcome of this Biodiversity Certification proposal is positive. This is particularly evident when compared to the poor condition of the fragmented patches of Swamp Sclerophyll Forest within the Certified Area. The 0.8 hectares of Swamp Sclerophyll Forest is highly fragmented, being made up of several small and isolated patches (refer to Figure 11 of the Assessment Report) and represents 0.2 per cent of the total area of Swamp Sclerophyll Forest within the Assessment Area (505.6 hectares, including retained lands and separate development offsets). Swamp Sclerophyll Forest is present as 0.8 hectares of degraded Derived Paperbark Thicket which is not intact remnant, has a simplified structure and therefore has limited value for biodiversity. Furthermore, the extent of the impact locally diminishes to negligible levels due to the known presence of more Swamp Sclerophyll Forest outside of the Assessment Area, much of which exists in formal and non-formal conservation areas (e.g., Brimbin Nature Reserve).

Finally, the development was designed to minimise impacts on key ecological values such as Swamp Sclerophyll Forest, specifically the Certified Area sits mostly over the cleared part of the Assessment Area. Substantial areas of cleared land exist within the Certified Area (1,406.6 hectares) as compared to a much smaller amount in the Conservation Area that will not be revegetated (20.8 hectares).

Criteria b); appropriate conservation management arrangements cannot be established over the red flag area given its current ownership, status under a regional plan and zoning and the likely costs of future management.

Cost of future management of red flag areas

Figure 11 in the Assessment Report illustrates the limited extent and isolation of the patches of Swamp Sclerophyll Forest red flag areas in the western portion of the Assessment Area. Restoration and eventual on-going management of these areas would be

prohibitively expensive due to the high inputs required to restore such degraded habitats. The potential gain to threatened biodiversity would be negligible and require on-going high input management techniques (e.g., high levels of weed management and tubestock installation).

Criteria c) Viability must be low or not viable (vegetation and TECs)

In making an assessment that the viability of biodiversity values for TEC red flag areas is low or not viable, the Director General must be satisfied that ***one of the following factors applies***:

a) The current or future uses of land surrounding the red flag area reduce its viability or make it unviable.
b) The size and connectedness of vegetation in the red flag area to other native vegetation is insufficient to maintain its viability.
c) The condition of native vegetation in the red flag area is substantially degraded resulting in loss of or reduced viability.
d) The area of a red flag area containing a threatened species on land where Biodiversity Certification is conferred is minor relative to the area containing that threatened species on land subject to proposed conservation measures.

The 0.8 hectares of Swamp Sclerophyll Forest is highly fragmented into several isolated patches of Derived Paperbark Thicket. These patches are barely viable at the present time, are subject to grazing pressure and, given the current and probable future surrounding land use, it is likely that they will be rendered completely unviable. Figure 11 of the Assessment Report clearly demonstrates the fragmented and isolated nature of these patches, particularly in relation to the abundance of similar, connected, larger and better condition patches of Swamp Sclerophyll Forest within the Conservation Area (72.7 hectares) and also in the retained lands (Figure 8 of the Assessment Report).

As shown in Table 5 below, three of the four factors are satisfied and therefore the viability of biodiversity values for the EEC red flag areas is considered low or not viable.

Table 5. Address of Criteria c) factors for EEC red flags

Red flag	Factor	Factor Applies (Yes/No)	Justification
0.8 ha of Swamp Sclerophyll Forest	a) Current or future land use surrounding red flag area reduces viability	Yes	Whilst current land use is maintaining the 0.8 ha of Swamp Sclerophyll Forest within the Development Area (albeit unintentionally), future land use will result in the small, degraded and fragmented patches of EEC being surrounded by more intense land use in the form of urban development.
	b) Size and connectedness of native vegetation in red flag area is insufficient to maintain viability	Yes	The 0.8 ha of Swamp Sclerophyll Forest exists in small, highly fragmented patches. Figure 11 of the Assessment Report clearly demonstrates the fragmentation of Swamp Sclerophyll Forest within the Development Area.
	c) Condition of native vegetation in red flag area is substantially degraded resulting in reduced viability	No	As for a) and b) above Swamp Sclerophyll Forest is considered to be in poor condition and not viable in the long term, however it is not considered substantially outside of benchmark for the PCTs present.

Red flag	Factor	Factor Applies (Yes/No)	Justification
	d) Area of loss is minor, relative to the area of proposed conservation measures for the species	Yes	The 72.7 ha of Swamp Sclerophyll Forest conserved in future E1 National Park is considered a major local gain for biodiversity values. The large Swamp Sclerophyll Forest credit surplus of 848 Ecosystem Credits demonstrates that the loss of these degraded and isolated patches of Swamp Sclerophyll Forest is minor (only 11 credits required).

Criteria d) Contribution of the red flag area to regional biodiversity values is low (vegetation)

Three factors are required to be considered by the Director General in making a determination that contribution of a TEC to regional biodiversity values is low:

1. **Relative abundance**; that the vegetation type or critically endangered or endangered ecological community comprising the red flag area is relatively abundant in the region (CMA sub-region).
2. **Per cent remaining is high**: that the per cent remaining of the vegetation type or critically endangered or endangered ecological community comprising the red flag area is relatively high in the region.
3. **Per cent native vegetation (by area) remaining is high**: that the per cent remaining of all native vegetation cover in the region is relatively high.

The "Red Flag Region" is defined as the CMA subregion in which the red flag area is located and any adjoining CMA subregions. For the red flag areas that occur at Brimbin the Red Flag Region includes the Karuah-Manning, Macleay-Hastings, Mumel Escarpment, Upper Hunter and Hunter CMA subregions. This area has been mapped in Figure 3. In relation to the EECs that are red flags within the Development Area, Table 6 compares the size of the red flag area impacted at Brimbin and the amount of that TEC in the Red Flag Region. Forest Ecosystem mapping (NPWS 1999) for the lower North Coast was utilised to calculate these areas.

In relative terms, Table 6 clearly shows that the abundance and per cent remaining for Swamp Sclerophyll Forest is high when compared to the negligible size of the impacts within the Development Area. Swamp Sclerophyll Forest is unlikely to become extinct, either locally or regionally as a result of conferring Biodiversity Certification. Furthermore, the 0.8 hectares of Swamp Sclerophyll Forest is composed of highly modified regenerating vegetation (Derived Paperbark Thicket) and occurs as several isolated and fragmented patches. It is considered that the contribution of Swamp Sclerophyll Forest red flag area to regional biodiversity is very low, if not negligible.

Table 6. Relative abundance of red flag TECs to Forest Ecosystems within the Red Flag Region

TEC	Forest Ecosystem (NPWS 1999)	Red Flag Region (ha)	Development Area (ha)	Per cent impacted in Red Flag Region	Conservation Area (ha)
Swamp Sclerophyll Forest	Paperbark	10,377.7	0.8	0.007	72.7
	Swamp Mahogany	1,247.4			
Subtropical Coastal Floodplain Forest	Lowland Red Gum	484.2 *	3.3	0.7	230.4
Swamp Oak Floodplain Forest	Swamp Oak	4,124.9	3.3	0.08	64.7
	Grand Total	**16,003.8**	**7.4**		**367.8**

(includes 230.4 ha of conserved on-site vegetation)*

3.3.2 Subtropical Coastal Floodplain Forest Threatened Ecological Community

The Subtropical Coastal Floodplain Forest red flag area is present as 3.3 hectares of Red Gum Grey Ironbark Paperbark Forest (as mapped by Niche), of which 3.1 hectares will be removed and 0.2 hectares indirectly impacted through the creation of a new bushland edge. Consideration and discussion of indirect impacts is provided in Section 3.7.

Criteria a); all reasonable measures have been taken to avoid adverse impacts on the red flag areas and to reduce impacts of development on vegetation remaining within the Biodiversity Certification area

The Draft Structure Plan has been subject to numerous revisions that have been based on avoiding impacts to Subtropical Coastal Floodplain Forest.

Master Plan

Avoidance and mitigation measures that will be drafted into the Brimbin Master Plan have been described in full in Section 3.3.1 above and the same address applies here.

Weed and Pest Management

Weed and pest management measures to be implemented within the Assessment Area have been described in full in Section 3.3.1 above and the same address applies here.

Conservation Areas

The spatial distribution, size of patches and connectedness of Subtropical Coastal Floodplain Forest proposed for conservation within the Assessment Area have minimised the overall impacts of conferring Biodiversity Certification on the red flag areas.

With 230.4 hectares of Subtropical Coastal Floodplain Forest proposed to be conserved permanently (E1 and E2 Conservation Areas combined), the outcome of this Biodiversity Certification proposal is positive. This is particularly evident when compared to the poor condition of the fragmented patches of Subtropical Coastal Floodplain Forest within the Certified Area. The 3.3 hectares of Subtropical Coastal Floodplain Forest is highly fragmented, being made up of several small and isolated patches (refer to Figure 11 of the

Assessment Report) and represents 1.2 per cent of the total area of the EEC within the Assessment Area (273.1 hectares, including retained lands). A further 34.2 hectares of the EEC exists within the adjacent West Wallsend offset area (separate development offset). Furthermore, the extent of the impact locally diminishes to negligible levels due to the known presence of more Subtropical Coastal Floodplain Forest outside of the Assessment Area, much of which exists in formal and non-formal conservation areas (e.g., Brimbin Nature Reserve).

Also, the development was designed to minimise impacts on key ecological values such as Subtropical Coastal Floodplain Forest, specifically the Certified Area sits mostly over the cleared part of the Assessment Area. Substantial areas of cleared land exist within the Certified Area (1,406.6 hectares) as compared to a much smaller amount in the Conservation Area that will not be revegetated (20.8 hectares).

Lastly, impacts on Subtropical Coastal Floodplain Forest are likely an overestimate, as the retention of the vegetation for landscaping, street trees, green space, and the revegetation of the EECs within the Development Area has not been taken into consideration. Details for such are not yet defined or quantified in terms of area or ecosystem credits gained.

Criteria b); appropriate conservation management arrangements cannot be established over the red flag area given its current ownership, status under a regional plan and zoning and the likely costs of future management.

Cost of future management of red flag areas

Figure 11 in the Assessment Report illustrates the limited extent and isolation of the patches of Subtropical Coastal Floodplain Forest red flag areas in the western portion of the Assessment Area. Restoration and eventual on-going management of these areas would be prohibitively expensive due to the high inputs required to restore such degraded habitats. The potential gain to threatened biodiversity would be negligible and require on-going high input management techniques (e.g., high levels of weed management and tubestock installation).

Criteria c) Viability must be low or not viable (vegetation and TECs)

In making an assessment that the viability of biodiversity values for TEC red flag areas is low or not viable, the Director General must be satisfied that ***one of the following factors applies***:

a) The current or future uses of land surrounding the red flag area reduce its viability or make it unviable.
b) The size and connectedness of vegetation in the red flag area to other native vegetation is insufficient to maintain its viability.
c) The condition of native vegetation in the red flag area is substantially degraded resulting in loss of or reduced viability.
d) The area of a red flag area containing a threatened species on land where Biodiversity Certification is conferred is minor relative to the area containing that threatened species on land subject to proposed conservation measures.

The 3.3 hectares of Subtropical Coastal Floodplain Forest within the Certified Area is highly fragmented into several isolated patches of Red Gum Grey Ironbark Paperbark Forest.

These patches are barely viable at the present time, are subject to grazing pressure and, given the current and probable future surrounding land use, it is likely that they will be rendered completely unviable. Figure 11 of the Assessment Report clearly demonstrates the fragmented and isolated nature of these patches, particularly in relation to the abundance of similar, connected, larger and better condition patches of Subtropical Coastal Floodplain Forest within the Conservation Area (230.4 hectares) and also in the retained lands (Figure 8 of the Assessment Report).

As shown in Table 7 below, three of the four factors are satisfied and therefore the viability of biodiversity values for the EEC red flag areas is considered low or not viable.

Table 7. Address of Criteria c) factors for EEC red flags

Red flag	Factor	Factor Applies (Yes/No)	Justification
0.8 ha of Subtropical Coastal Floodplain Forest	a) Current or future land use surrounding red flag area reduces viability	Yes	Whilst current land use is maintaining the 3.3 ha of Subtropical Coastal Floodplain Forest within the Development Area (albeit unintentionally), future land use will result in the small, degraded and fragmented patches of EEC being surrounded by more intense land use in the form of urban development.
	b) Size and connectedness of native vegetation in red flag area is insufficient to maintain viability	Yes	The 3.3 ha of Subtropical Coastal Floodplain Forest exists in small, highly fragmented patches. Figure 11 of the Assessment Report clearly demonstrates the fragmentation of Subtropical Coastal Floodplain Forest within the Development Area.
	c) Condition of native vegetation in red flag area is substantially degraded resulting in reduced viability	No	As for a) and b) above Subtropical Coastal Floodplain Forest is considered to be in poor condition and not viable in the long term, however it is not considered substantially outside of benchmark for the PCTs present.
	d) Area of loss is minor, relative to the area of proposed conservation measures for the species	Yes	The 230.4 ha of Subtropical Coastal Floodplain Forest conserved in future E1 National Park is considered a major local gain for biodiversity values. The large Subtropical Coastal Floodplain Forest credit surplus of 2,067 Ecosystem Credits demonstrates that the loss of these degraded and isolated patches of Subtropical Coastal Floodplain Forest is minor (only 97 credits required for impacts to the portion of the EEC which is a red flag area, i.e., that portion in 'Moderate to Good' condition as defined in the BCAM).

Criteria d) Contribution of the red flag area to regional biodiversity values is low (vegetation)

Three factors are required to be considered by the Director General in making a determination that contribution of a TEC to regional biodiversity values is low:

1. **Relative abundance**; that the vegetation type or critically endangered or endangered ecological community comprising the red flag area is relatively abundant in the region (CMA sub-region).

2. **Per cent remaining is high**: that the per cent remaining of the vegetation type or critically endangered or endangered ecological community comprising the red flag area is relatively high in the region.
3. **Per cent native vegetation (by area) remaining is high**: that the per cent remaining of all native vegetation cover in the region is relatively high.

The "Red Flag Region" is defined as the CMA subregion in which the red flag area is located and any adjoining CMA subregions. For the red flag areas that occur at Brimbin the Red Flag Region includes the Karuah-Manning, Macleay-Hastings, Mumel Escarpment, Upper Hunter and Hunter CMA subregions. This area has been mapped in Figure 3. In relation to the EECs that are red flags within the Development Area, Table 6 (Section 3.3.1) compares the size of the red flag area impacted at Brimbin and the amount of each TEC in the Red Flag Region. Forest Ecosystem mapping (NPWS 1999) for the lower North Coast was utilised to calculate these areas.

In relative terms, Table 6 clearly shows that the abundance and per cent remaining for Subtropical Coastal Floodplain Forest is high when compared to the negligible size of the impacts within the Development Area. Subtropical Coastal Floodplain Forest is unlikely to become extinct, either locally or regionally as a result of conferring Biodiversity Certification. Furthermore, the 3.3 hectares of Subtropical Coastal Floodplain Forest within the Certification Area occurs as several isolated and fragmented patches. It is considered that the contribution of Subtropical Coastal Floodplain Forest red flag area to regional biodiversity is very low, if not negligible.

3.3.3 Swamp Oak Floodplain Forest Threatened Ecological Community

The Swamp Oak Floodplain Forest red flag area is present as 3.3 hectares of Swamp Oak Forest (as mapped by Niche), of which 1.6 hectares of mature forest will be removed, 1.4 hectares of early regeneration will be removed and 0.3 hectares of mature forest indirectly impacted through the creation of a new bushland edge. Consideration and discussion of indirect impacts is provided in Section 3.7.

Criteria a); all reasonable measures have been taken to avoid adverse impacts on the red flag areas and to reduce impacts of development on vegetation remaining within the Biodiversity Certification area

The Draft Structure Plan has been subject to numerous revisions that have been based on avoiding impacts to Swamp Oak Floodplain Forest.

Master Plan

Avoidance and mitigation measures that will be drafted into the Brimbin Master Plan have been described in full in Section 3.3.1 above and the same address applies here.

Weed and Pest Management

Weed and pest management measures to be implemented within the Assessment Area have been described in full in Section 3.3.1 above and the same address applies here.

Conservation Areas

The spatial distribution, size of patches and connectedness of Swamp Oak Floodplain Forest proposed for conservation within the Assessment Area have minimised the overall impacts of conferring Biodiversity Certification on the red flag areas.

With 64.7 hectares of Swamp Oak Floodplain Forest proposed to be conserved permanently as National Park (E1 Conservation) and a further 23.6 hectares to be informally conserved in retained lands (mostly riparian zones), the outcome of this Biodiversity Certification proposal in relation to this EEC is positive. This is particularly evident when compared to the poor condition of the fragmented patches of Swamp Oak Floodplain Forest within the Certified Area. Of the 3.3 hectares of Swamp Oak Floodplain Forest potentially impacted by the proposal, 1.4 hectares is in an early stage of regeneration and therefore has limited value for biodiversity at the current time, whilst 0.3 hectares will only be indirectly impacted through edge effects which will largely be mitigated. Therefore, only 1.6 hectares of mature Swamp Oak Floodplain Forest will be fully removed by the proposal which amounts to 1.7 per cent of the total area of the EEC within the Assessment Area (91.6 hectares, including retained lands). All of this Swamp Oak Floodplain Forest is highly fragmented, being made up of several small and isolated patches (refer to Figure 11 of the Assessment Report). A further 4.1 hectares of the EEC exists within the adjacent Cundletown offset area (separate development offset). Furthermore, the extent of the impact locally, diminishes to negligible levels due to the known presence of more Swamp Oak Floodplain Forest outside of the Assessment Area, much of which exists in formal and non-formal conservation areas (e.g., Brimbin Nature Reserve).

Also, the development was designed to minimise impacts on key ecological values such as Swamp Oak Floodplain Forest, specifically the Certified Area sits mostly over the cleared part of the Assessment Area. Substantial areas of cleared land exist within the Certified Area (1,406.6 hectares) as compared to a much smaller amount in the Conservation Area that will not be revegetated (20.8 hectares).

Lastly, impacts on Swamp Oak Floodplain Forest is likely an overestimate, as the retention of the vegetation for landscaping, street trees, green space, and the revegetation of the EECs within the Development Area has not been taken into consideration. Details for such are not yet defined or quantified in terms of area or ecosystem credits gained.

Criteria b); appropriate conservation management arrangements cannot be established over the red flag area given its current ownership, status under a regional plan and zoning and the likely costs of future management.

Cost of future management of red flag areas

Figure 11 in the Assessment Report illustrates the limited extent and isolation of the patches of Swamp Oak Floodplain Forest red flag areas in the western portion of the Assessment Area. Restoration and eventual on-going management of these areas would be prohibitively expensive due to the high inputs required to restore such degraded habitats. The potential gain to threatened biodiversity would be negligible and require on-going high input management techniques (e.g., high levels of weed management and tubestock installation).

Criteria c) Viability must be low or not viable (vegetation and TECs)

In making an assessment that the viability of biodiversity values for TEC red flag areas is low or not viable, the Director General must be satisfied that ***one of the following factors applies***:

a) The current or future uses of land surrounding the red flag area reduce its viability or make it unviable.
b) The size and connectedness of vegetation in the red flag area to other native vegetation is insufficient to maintain its viability.
c) The condition of native vegetation in the red flag area is substantially degraded resulting in loss of or reduced viability.
d) The area of a red flag area containing a threatened species on land where Biodiversity Certification is conferred is minor relative to the area containing that threatened species on land subject to proposed conservation measures.

The 3.3 hectares of Swamp Oak Floodplain Forest within the Certification Area is highly fragmented into several isolated patches. These patches are barely viable at the present time, are subject to grazing pressure and, given the current and probable future surrounding land use, it is likely that they will be rendered completely unviable. Figure 11 of the Assessment Report clearly demonstrates the fragmented and isolated nature of these patches, particularly in relation to the abundance of similar, connected, larger and better condition patches of Swamp Oak Floodplain Forest within the Conservation Area (64.7 hectares) and also in the retained lands (Figure 8 of the Assessment Report).

As shown in Table 8 below, three of the four factors are satisfied and therefore the viability of biodiversity values for the EEC red flag areas is considered low or not viable.

Table 8. Address of Criteria c) factors for EEC red flags

Red flag	Factor	Factor Applies (Yes/No)	Justification
0.8 ha of Swamp Oak Floodplain Forest	e) Current or future land use surrounding red flag area reduces viability	Yes	Whilst current land use is maintaining the 3.3 ha of Swamp Oak Floodplain Forest within the Development Area (albeit unintentionally), future land use will result in the small, degraded and fragmented patches of EEC being surrounded by more intense land use in the form of urban development.
	f) Size and connectedness of native vegetation in red flag area is insufficient to maintain viability	Yes	The 3.3 ha of Swamp Oak Floodplain Forest exists in small, highly fragmented patches. Figure 11 of the Assessment Report clearly demonstrates the fragmentation of Swamp Oak Floodplain Forest within the Development Area.
	g) Condition of native vegetation in red flag area is substantially degraded resulting in reduced viability	No	As for a) and b) above Swamp Oak Floodplain Forest is considered to be in poor condition and not viable in the long term, however it is not considered substantially outside of benchmark for the PCTs present.

Red flag	Factor	Factor Applies (Yes/No)	Justification
	h) Area of loss is minor, relative to the area of proposed conservation measures for the species	Yes	The 64.7 ha of Swamp Oak Floodplain Forest conserved in future E1 National Park is considered a major local gain for biodiversity values. The large Swamp Oak Floodplain Forest credit surplus of 639 Ecosystem Credits demonstrates that the loss of these degraded and isolated patches of Swamp Oak Floodplain Forest is minor (95 credits required of which only 58 apply to the direct loss of mature forest). A further 23.6 hectares will be conserved in retained lands.

Criteria d) Contribution of the red flag area to regional biodiversity values is low (vegetation)

Three factors are required to be considered by the Director General in making a determination that contribution of a TEC to regional biodiversity values is low:

1. **Relative abundance**; that the vegetation type or critically endangered or endangered ecological community comprising the red flag area is relatively abundant in the region (CMA sub-region).
2. **Per cent remaining is high**: that the per cent remaining of the vegetation type or critically endangered or endangered ecological community comprising the red flag area is relatively high in the region.
3. **Per cent native vegetation (by area) remaining is high**: that the per cent remaining of all native vegetation cover in the region is relatively high.

The "Red Flag Region" is defined as the CMA subregion in which the red flag area is located and any adjoining CMA subregions. For the red flag areas that occur at Brimbin the Red Flag Region includes the Karuah-Manning, Macleay-Hastings, Mumel Escarpment, Upper Hunter and Hunter CMA subregions. This area has been mapped in Figure 3. In relation to the EECs that are red flags within the Development Area, Table 6 (Section 3.3.1) compares the size of the Swamp Oak Floodplain Forest red flag area impacted at Brimbin and the amount of that TEC in the Red Flag Region. Forest Ecosystem mapping (NPWS 1999) for the lower North Coast was utilised to calculate these areas.

In relative terms, Table 6 clearly shows that the abundance and per cent remaining for Swamp Oak Floodplain Forest is high when compared to the negligible size of the impacts within the Development Area. Swamp Oak Floodplain Forest is unlikely to become extinct, either locally or regionally as a result of conferring Biodiversity Certification. Of the 3.3 hectares of Swamp Oak Floodplain Forest within the Certification Area, 1.4 hectares is early regeneration of limited biodiversity value and 0.3 hectares will be impacted by edge effects which will be largely mitigated. Furthermore, Swamp Oak Floodplain Forest is composed of several isolated and fragmented patches throughout the Certification Area. It is therefore considered that the contribution of Swamp Oak Floodplain Forest red flag area to regional biodiversity is very low, if not negligible.

3.3.4 Buffers along local biodiversity links

Local biodiversity links which are a riparian buffer 20 metres either side of a minor creek on the coast and tablelands or a riparian buffer 30 m either side of a minor river (Dawson River) on the coast and tablelands, qualifies as a red flag area. Such red flag areas exist within the Assessment Area and have been buffered by at least 20 or 30 metres respectively to form potential additions to the offsets, despite currently being excluded from credit calculations as retained lands. This riparian buffer serves to avoid impacts altogether, except for future roads and development associated infrastructure, clearly an improved outcome for local biodiversity links as red flags within the Assessment Area.

3.3.5 Additional assessment criteria – regional or State significance

Where the red flag area has regional or state biodiversity conservation significance as defined in section 2.3 of the methodology, the application (for Biodiversity Certification) must demonstrate that conferring Biodiversity Certification on the red flag area:

a) Will not substantially reduce the width of a riparian buffer with regional or state biodiversity significance, or
b) Will not substantially impact on the ecosystem functioning of a state biodiversity link or a regional biodiversity link, and
c) Will not significantly impact on the water quality of a major river, minor river, major creek, minor creek or a listed SEPP 14 wetland.

No State or Regional biodiversity links exist within the Development Area as approved by the Director General.

The creek lines within the Assessment Area qualify as minor creeks (c) and the Dawson River qualifies as a minor river. Buffers of at least 20 and 30 metres respectively have been designed around these waterways and reserved for conservation in the retained areas. Due to the protection that native vegetation (both intact and likely to regenerate) offers the landscape and soil profile in the Riparian lands, water quality is unlikely to be affected in these drainage lines.

3.4 Conservation Measures

The arrangement of the Conservation Area is shown in Figure 2 and is described in Section 1.8.2 of this report. Table 9 summarises the components of the Conservation Area.

Table 9. Key components of the Conservation Area

Niche Veg Code	Area of veg zone offset (ha)
Conservation E1 – Intact remnant and early regeneration	918.2
Conservation E1 – Replanting	41.2
Conservation E2 – Intact remnant and early regeneration	35.0
Conservation E2 – Replanting	4.0
	998.40
Cleared land (not replanted)	20.8

The Conservation Area provides a significant habitat resource for the suite of species potentially impacted by conferral of Biodiversity Certification. There is limited development (now or proposed) adjacent to these conservation lands (other than that proposed in this document), so, unlike the impacts generated from higher intensity, higher density developments within the Certified Area, there should be minimal indirect diminishing of biodiversity features and values over time.

The E1 Conservation offset lands are proposed to be permanently managed through transfer to National Parks Estate. The proposed action is consistent with a permanently managed conservation measure outlined in s8.1.2 of the Methodology and as such achieves 100 per cent of possible credits generated. The E2 Conservation offset lands will be protected under an amendment to the LEP as an E2 zoning (Planning Instrument) without secured management or funding, and therefore achieves 25 per cent of the possible credits created.

The specific management actions that will be applied to the intact remnant, regrowth and replanting components of the Conservation Area include:

- Exclusion of stock;
- Primary, secondary and maintenance weed management;
- Management of fire for conservation;
- Management of human disturbance;
- Retention of dead timber and stags;
- Erosion control (where necessary);
- Management of feral predators and rabbits; and
- Enhancement of linkages across the broader landscape.

The 20.8 hectares of cleared land within the Conservation Area that will not be revegetated, will be managed as tracks where tracks currently exist and periodically grazed, ensuring reduction in exotic pasture weed levels. Stock will be permanently excluded from the intact, regenerating and planted parts of the Conservation Area.

Replanting will use stems/ha for individual vegetation types as determined by the density calculations provided in the Niche (2014) Biodiversity Certification Assessment Report. Where appropriate, *Eucalyptus seeana* will be used to increase the number of stems conserved.

3.5 Minor variation to the BCAM

No variation to the BCAM is required as all offsetting can be achieved within the confines of the offsetting rules.

3.6 Additionality rules and discounting

Section 8.4 of the BCAM, limits the generation of biodiversity credits to instances where management actions are additional to any biodiversity conservation measures required to be carried out under existing obligations.

None of the lands within the proposed Conservation Area are subject to existing formalised management actions for conservation and, therefore, discounting does not apply in this case.

3.7 Indirect impact assessment

Impacts are categorised as direct or indirect as described in DECC (2007), which states:

> *"**Direct impacts** are those that directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.*
>
> ***Indirect impacts** occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development."*

The direct impacts of the proposal can be classified as four key and unavoidable impacts on threatened biodiversity and its habitat:

1. The removal of native vegetation.
2. The removal of part of the *Eucalyptus seeana* Endangered Population.
3. The removal of habitat for Koala.
4. The removal of habitat for Brush-tailed Phascogale.

These four impacts cannot be avoided or mitigated against and therefore must be offset.

Indirect impacts likely to occur as a result of the Brimbin development include edge effects, deleterious hydrological changes, sedimentation and erosion, weed invasion and increased human activity within or directly adjacent to sensitive habitat areas. Other than edge effects, each of these indirect impacts would be fully mitigated through the implementation of on-site management actions.

Furthermore indirect impacts will be absorbed through the following:

- The riparian buffers in retained lands;
- Lands to be added to the conservation area between the boundary roads and the offset lands once the former is defined by future engineering and structure plans;
- Replanting of the conservation area in selected locations; and
- Local street scape planting and retaining of native vegetation in the certified area where possible.

Edge effects

Edge effects are an indirect impact and relate to how ecological interactions are altered along the edge between two adjacent and competing land uses, in this case the zone between the proposed Certified Area, the E1 and E2 Conservation Areas and also the retained areas that will act as informal conservation areas. Such edge effects invariably result in an altered microclimate (light, heat and moisture) which can lead to a reduction in the resilience of native bushland, potential for weed invasion, potential for increased grazing of stock and altered predator-prey relationships. In respect to the mitigation of potential edge effects on site, stock will be removed, the conservation area fenced and public access will be minimised through the construction of a perimeter road in addition to a 10 metre buffer around the all areas of retained vegetation and the Conservation E1 and E2 Areas where they adjoin residential development within the Assessment Area. Vegetation outside the Assessment Area has not been buffered. Therefore, including private lot set backs the buffer would be effectively 20 to 25 metres. It is envisaged that this would contribute substantially to the management of uncontrolled human, pet and vehicle access into the adjacent Conservation Area and provide immunity from the consequences of edge effects.

Given the substantial buffer area, of which 10 metres will be fully revegetated along the boundary of the western E1 Conservation Area, and the mitigation measures listed above, it is anticipated that the only un-mitigated edge effect will be a minor level of weed invasion as a result of the altered microclimate and rubbish dumping by residents. Predator-prey relationships are unlikely to be exacerbated any more than currently exist on the site and it is anticipated that weed invasion would be limited to a few minor annual herbaceous weeds with, at worst the potential for some invasion of perennial exotic grasses within two or three metres of the disturbance edge. Current weed invasion within remnant vegetation within the Assessment Area generally doesn't extend more than 10 metres from an edge. Therefore, a 10 metre buffer was selected to absorb the impacts from herbaceous weed invasion and rubbish dumping. This 10 metre buffer for edge effects is considered more than adequate given mitigation, through an on-site weed management program, will prioritise weed invasion along the development edge and the exclusion zone created by the fencing of the Conservation Area would likely incorporate the buffer (i.e., in reality form a component of the Conservation Area).

An assessment of the offsetting requirement of the Development Area on biodiversity is provided in the Assessment Report and considers all direct and indirect impacts.

4 MATCHING LOSSES AND GAINS IN BIODIVERSITY

4.1 Ecosystem credits

Table 10 is a summary of the credit status from PCT through to Keith Class level. A deficit in credits exists for a single PCT, HU763 Tallowwood – Spotted Gum – Grey Gum grassy tall open forest (a deficit of 904 ecosystem credits). Impacts to all other eight PCTs can be fully offset on a like-for-like basis. The proposal has an overall surplus of 4,619 Ecosystem Credits.

4.1.1 Application of offset variation rules to Ecosystem Credits

Step 1. IBRA bioregion

The entirety of the Assessment Area and the conservation measures proposed are in the same IBRA bioregion (NSW North Coast).

Step 2. Ecosystem Credit status at vegetation class level

Under the offsetting rules of the BCAM, the shortage of 904 Ecosystem Credits for HU763, can be offset by the surpluses for either HU511 Blackbutt - Tallowwood dry grassy open forest (975 credits available) or HU762 Tallowwood - Small-fruited Grey Gum - Kangaroo Grass grassy tall open forest (1,645 credits available), as both of these PCTs occur in the same Keith Vegetation Class as HU763; Northern Hinterland Wet Sclerophyll Forests. Referring to Table 10, for the purposes of this assessment, retirement of the 904 ecosystem credit deficit for HU763 has occurred against the 975 ecosystem credit surplus for HU511, thereby reducing the credit surplus for HU511 to 71 credits. Thus the credit requirement for HU763 is reduced to 0 and therefore impacts to this PCT are considered to be offset.

Step 3. Ecosystem Credit status at vegetation formation level

Impacts to vegetation types within the Certified Area have been fully offset at PCT and Keith Class level and therefore offsetting at Keith Formation level is not required.

Minor variation to offsetting rules

Impacts to vegetation types within the Certified Area have been fully offset at PCT and Keith Class level and therefore a minor variation to the offsetting rules is not required.

Table 10. Ecosystem Credit status

Code	PCT name abbreviated	Class	Formation	Certified Area (ha)	Credits required	E2 Offset Area (ha)	E2 Credits (25%)	E1 Offset Area (ha)	E1 Credits (100%)	PCT Credit Status (Total)	Credit Status after class level retirement
HU934	Cabbage Gum - Forest Red Gum - Flax-leaved Paperbark Floodplain Forest	Coastal Floodplain Wetlands	Forested Wetlands	0	0	0	0	9.7	87	87	87
HU943	Swamp Oak swamp forest	Coastal Swamp Forests	Forested Wetlands	3.3	95	0	0	64.7	734	639	639
HU591	Paperbark swamp forest	Coastal Swamp Forests	Forested Wetlands	0.8	11	0	0	5.8	57	46	46
HU932	Swamp Mahogany - Flax-leaved Paperbark swamp forest	Coastal Swamp Forests	Forested Wetlands	0	0	0	0	66.9	802	802	802
HU703	Narrow-leaved Red Gum woodlands	Coastal Valley Grassy Woodlands	Grassy Woodlands	96.0	2,083	62.6	132	276.3	3,260	1,309	1,309
HU783	Flooded Gum - Brush Box - Tallowwood mesic tall open forest	North Coast Wet Sclerophyll Forests	Wet Sclerophyll Forests	0	0	7.0	20	0	0	20	20
HU511	Blackbutt - Tallowwood dry grassy open forest	Northern Hinterland Wet Sclerophyll Forests	Wet Sclerophyll Forests	7.0	140	0	0	116.6	1,115	975	71
HU762	Tallowwood - Small-fruited Grey Gum - Kangaroo Grass grassy tall open forest	Northern Hinterland Wet Sclerophyll Forests	Wet Sclerophyll Forests	6.4	181	0	0	179.3	1,826	1,645	1,645
HU763	Tallowwood - Spotted Gum - Grey Gum grassy tall open forest	Northern Hinterland Wet Sclerophyll Forests	Wet Sclerophyll Forests	145.5	3,135	1.0	3	208.5	2,228	-904	0
	Totals			**259**	**5,645**	**70.6**	**155**	**927.8**	**10,109**	**4,619**	**4,619**

(Shading used to indicate Keith Class alignment)

4.2 Species credits

The following species credits are required for the development:

1. *Eucalyptus seeana* (45,929 credits);
2. Koala (2,171 credits); and
3. Brush-tailed Phascogale (1,650 credits).

The Assessment Report demonstrates that the Conservation Areas can more than adequately offset each of these three species (80,706 credits created for *Eucalyptus seeana* and 5,426 credits created for both Koala and Brush-tailed Phascogale).

Table 11 shows that, subject to approval of the MALD assessment (refer to the Assessment Report), *Eucalyptus seeana* can be more than adequately offset through the retirement of species credits purely within the proposed E1 Conservation Area. Niche have calculated that a further 3,180 species credits can be created for *Eucalyptus seeana* through the conservation of an additional 2,120 individuals within the proposed E2 Conservation Area (25 per cent of full credit generation).

Neither *Corybas dowlingii* nor *Eucalyptus glaucina* are impacted by the proposed development and therefore no offsetting of these species is required.

Table 11. Species Credit status (balance) – threatened flora

Species	Listing status (NSW)	No on land to be certified	Number of credits required for certification	Red flagged	No on land under offset (E1 only)	Number of credits created for offset	Status of Species Credits (Flora)
Eucalyptus glaucina Slaty Red Gum	V	0	0	No	7	42	42
Eucalyptus seeana Narrow-leaved Red Gum	EP (Taree LGA)	3,215	45,929	No	13,451 *	80,706	34,777
Corybas dowlingii Red Helmet Orchid	E	0	0	No	1	6	6

** Stems conserved in E1 remnant areas only. Additional 3,534 credits generated for planting of 584 E. seeana in E1 areas (refer to Table 10) and a further 3,180 credits can be generated through the conservation and replanting of 2,120 individuals in E2 areas.*

Two threatened fauna recorded within the Assessment Area are not predicted in ecosystem credits on the site and therefore retirement of species credits is required for each of these species. These species are the Brush-tailed Phascogale and Koala. The assessable area of habitat is used to calculate the species credits required and created for threatened fauna.

As is evident from Table 12, an excess of species credits is generated for both the Brush-tailed Phascogale and Koala.

Table 12. Species Credit status (balance) – threatened fauna

Species	Listing status (NSW)	Certified area of habitat (ha)	Number of credits required for certification	Red flag ged	Conservation area of habitat (ha)	Number of credits created for offset	Status of Species Credits (Fauna)
Phascogale tapoatafa Brush-tailed Phascogale	V	82.5	1,650	No	904.3	5,426	3,776
Phascolarctos cinereus Koala	V	82.5	2,171	No	904.3	5,426	3,275

4.3 Credit profiles

Credit profile attributes (ecosystem) of ecosystem credits both required and generated are from the Macleay-Hastings sub-region of the Hunter Central Rivers CMA. Both the area to be certified and all conservation measures are located within the Assessment Area as described in Appendix A. There has been no requirement to seek ecosystem credits from outside the Assessment Area. Subject to approval of a red flag variation for EECs (Section 3.3 of this Strategy), the retirement of ecosystem credits at PCT and Keith Class level is considered to achieve an improved outcome in relation to threatened biodiversity.

Credit profile attributes for species credits required for the Certified Area and generated by proposed conservation measures are sufficient to offset the impacts to the *Eucalyptus seeana* Endangered Population, subject to approval of the MALD Assessment (Appendix F of the Assessment Report). Koala and Brush-tailed Phascogale are also fully offset through the retirement of species credits.

4.4 Expert reports

No expert reports are required for this assessment and Strategy.

5 CONCLUSION

The *Biodiversity Certification Assessment Methodology* (the BCAM) has been used to conduct a Biodiversity Certification Assessment of the proposed Brimbin Draft Structure Plan in the Brimbin locality, north of Taree.

The ecosystem credits required and generated by the proposal were calculated based on the BCAM. The results of the assessment demonstrate that the Conservation Area identified is sufficient to offset the impacts of the proposal, with a surplus of 4,619 ecosystem credits. This outcome would be subject to approval of a red flag variation for impacts to 7.4 hectares of degraded and highly fragmented EEC, present as Swamp Sclerophyll Forest (0.8 hectares), Subtropical Coastal Floodplain Forest (3.3 hectares) and Swamp Oak Floodplain Forest (3.3 hectares). Section 3.3.1 of this Strategy provides an address of the red flag criteria in relation to EECs and concludes that impacts to EECs are negligible compared to the conservation measures provided and also the local and regional abundance of these EECs.

The Species Credits required and generated by the proposal were calculated based on the BCAM. Subject to approval of the MALD assessment for *Eucalyptus seeana*, the results of the assessment demonstrate that the Conservation Area identified is sufficient to offset the impacts of the proposal in relation to threatened species credits (including those for Koala and Brush-tailed Phascogale).

Therefore, the proposal meets the 'improve or maintain' test required under the BCAM.

Under the BCAM a red flag variation is required in relation to impacts on EECs, and consideration by the Director General is requested in order to confer Biodiversity Certification over the Development Area. Details of the variations and justification of claims in support of the same are detailed in Section 3.3.

6 APPLICATION FOR BIODIVERSITY CERTIFICATION

a) Details of the exhibition of the Biodiversity Certification Strategy and Application

b) Submissions Report (following exhibition)

c) Details of how/if the Biodiversity Certification Strategy has been amended after the exhibition in response to submissions

REFERENCES

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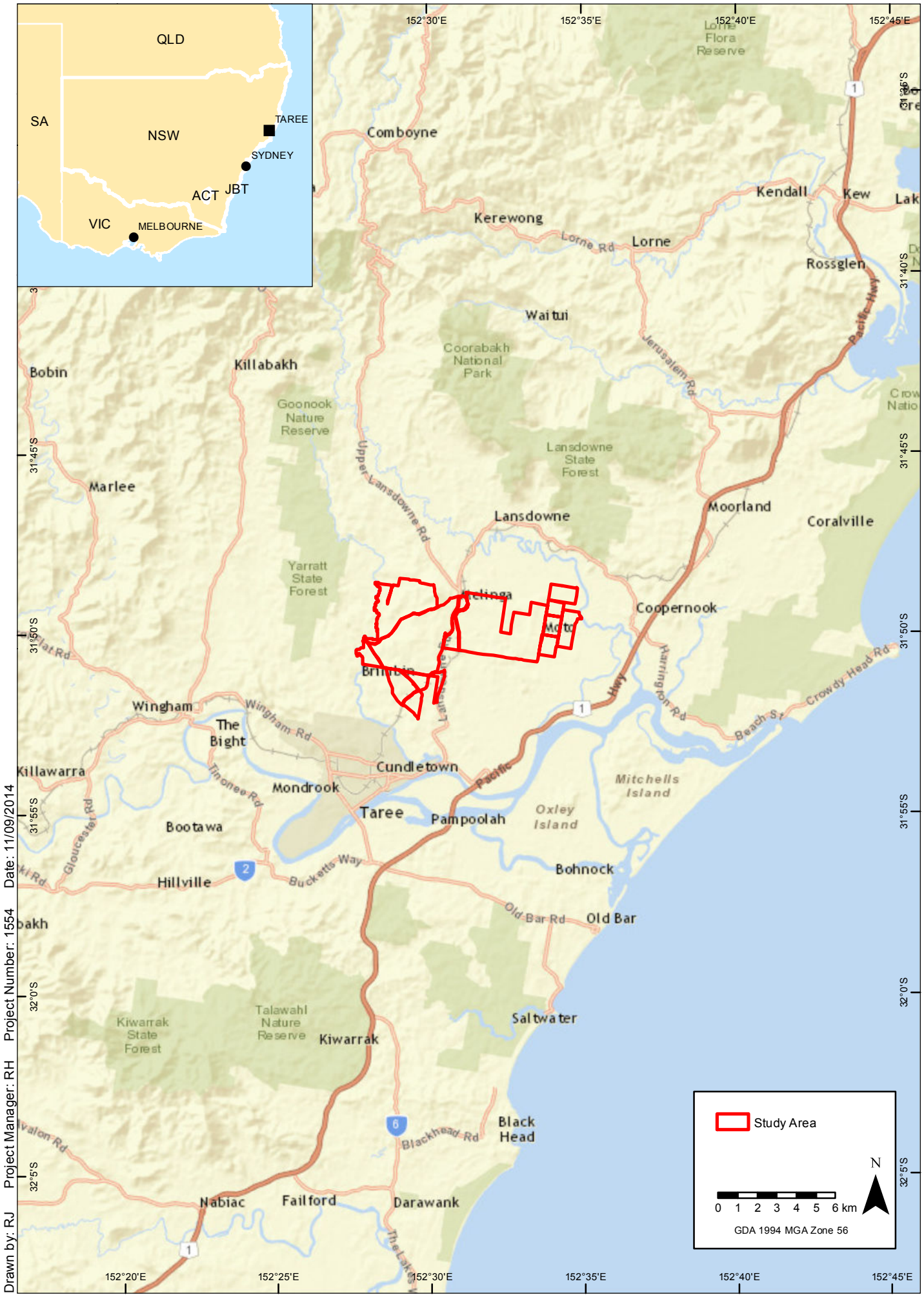
FIGURES



Location of the Biodiversity Certification Assessment Area

Brimbin Biocertification Assessment

FIGURE 1

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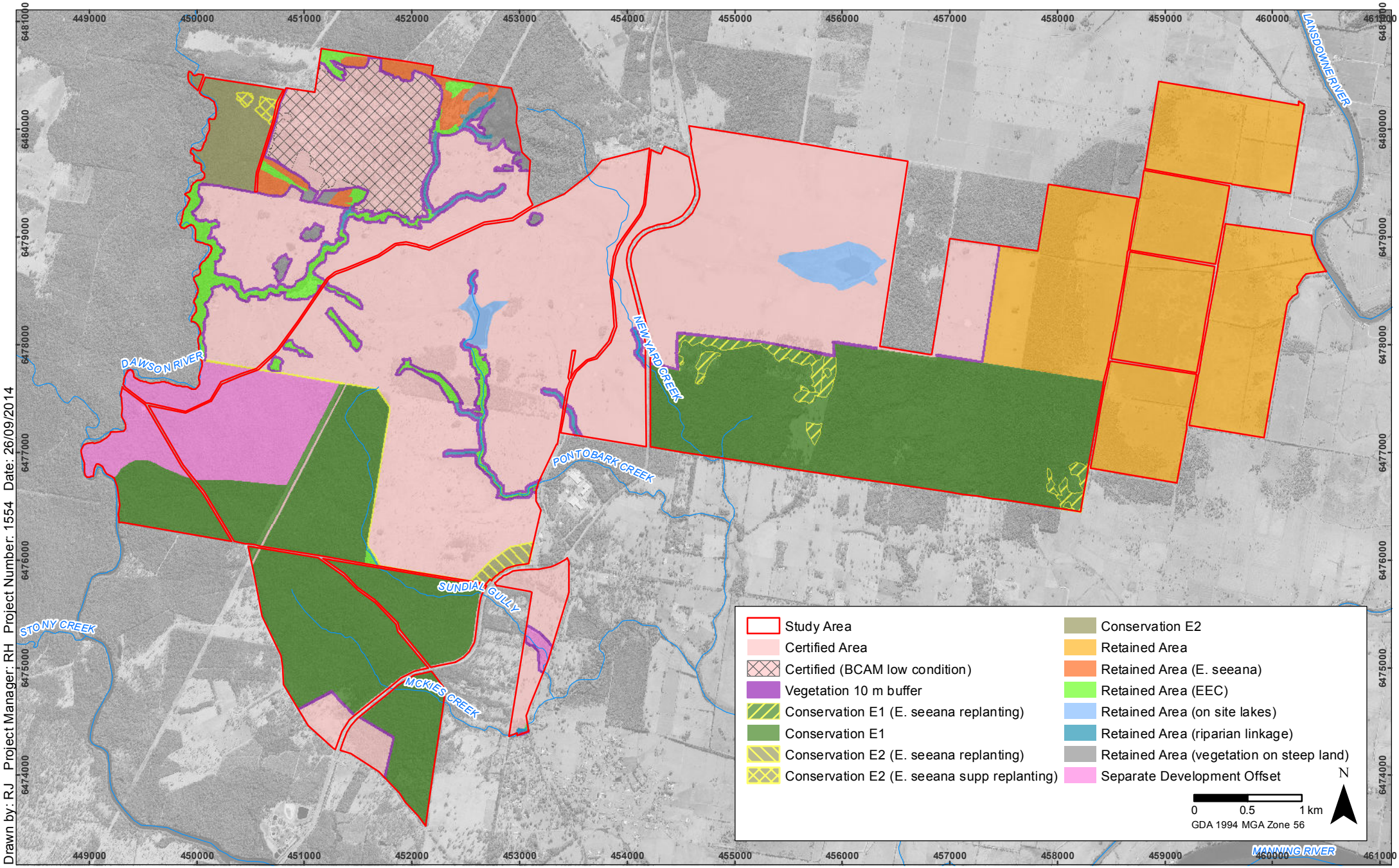

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Biodiversity Certification Assessment Area

Brimbin Biocertification Assessment

FIGURE 2

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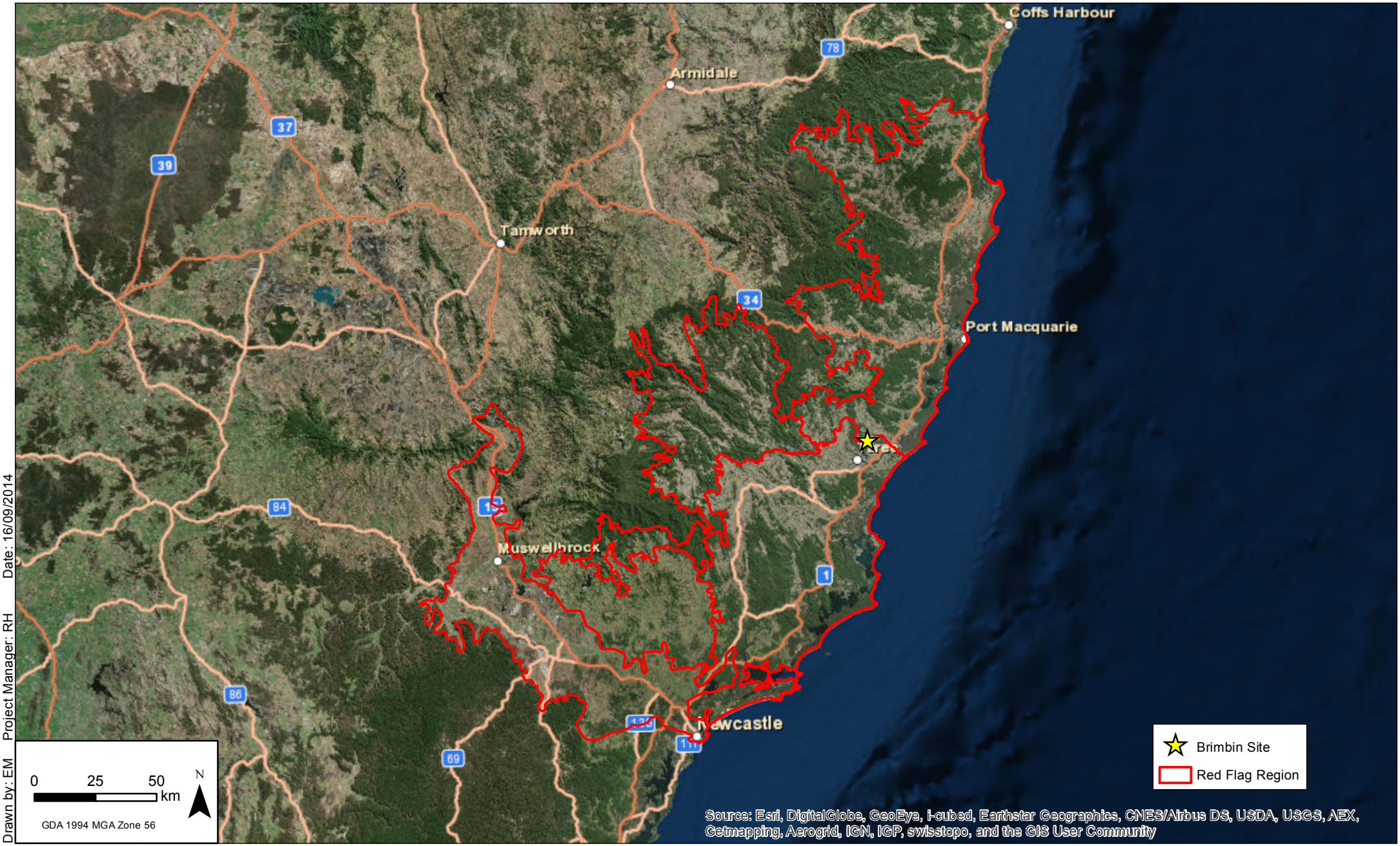

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1554 Brimbin BioCertification

Red Flag Region

FIGURE 3

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APPENDICES

Appendix A: Biodiversity Certification Assessment Report (Niche 2014)

BIODIVERSITY CERTIFICATION ASSESSMENT REPORT

Brimbin

September 2014

DOCUMENT CONTROL

Business Unit	Niche Environment and Heritage, Central Coast/Hunter		
Project No.	1554		
Document Description	Biodiversity Certification Assessment Report for the Brimbin development to accompany the Biodiversity Certification Strategy.		
	Name	Signed	Date
Supervising Manager(s)	Rhidian Harrington		29 September 2014

Person managing this document	Person(s) writing this document
Rhidian Harrington	Rhidian Harrington, Nathan Smith

External Review	Name
Wes van der Gardner	General Manager – Development, Roche Group

Document Status	Date
Rev 11	29 September 2014

Prepared for:	Roche Group
Address:	PO Box 325 Double Bay NSW 1360

Front Cover Photograph: Land at Brimbin (Rhidian Harrington ©).

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ABBREVIATIONS

BCAM (or 'the Methodology') - Biodiversity Certification Assessment Methodology

BCCC (or 'the Calculator') – Biodiversity Certification Credit Calculator

BVT – Biometric Vegetation Type (revised and re-aligned to PCTs in the Calculator within the Hunter CMA, see 'PCT' below)

DoE – Commonwealth Department of Environment (formerly Department of Sustainability, Environment, Water, Population, and Communities – SEWPaC)

EP&A Act – NSW *Environmental Planning and Assessment Act 1979*

EPBC Act – Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

GTCC (or the Council) – Greater Taree City Council

OEH – NSW Office of Environment and Heritage

PCT – Plant Community Type (formerly BVT)

TEC – Threatened Ecological Community (as listed on the TSC and/or EPBC Acts)

TSC Act – NSW *Threatened Species Conservation Act 1995*

EXECUTIVE SUMMARY

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Roche Group Pty Ltd (Roche Group) to conduct a Biodiversity Certification Assessment as the approval mechanism for future development on the Brimbin site under direction from Greater Taree City Council (GTCC).

Advice from the NSW Office of Environment and Heritage (OEH) is that a Biodiversity Certification assessment entails a two stage reporting process:

1. The *Biodiversity Certification Assessment Report*; and
2. The *Biodiversity Certification Strategy*.

This report constitutes the *Biodiversity Certification Assessment Report* (the Assessment Report) and contains a description of the proposal, the survey methodology and results, and provides the Ecosystem and Species Credit calculations. This Assessment Report describes the way in which the prescribed conservation measures for the development meet an 'improve or maintain' outcome for biodiversity values. The *Biodiversity Certification Strategy* (the Strategy) provides a full description and justification of these measures and also any red flag variations that may be requested of the Director General.

Field Survey

Niche conducted field surveys of the Brimbin site over five discrete survey periods in June 2010, July 2010, August 2010, October 2011, September 2013 and September 2014. Surveys of the site by other consultants have been conducted in February 2004 and December 2009. Collectively, these surveys included vegetation mapping and validation, bushland condition and resilience assessment, threatened flora random meanders, threatened plant population estimates (*Eucalyptus seeana*), Biobanking plots and a variety of threatened fauna surveys. The surveys undertaken for the assessment were consistent with the requirements of the *Biodiversity Certification Assessment Methodology* (the BCAM).

Key ecological features of the Assessment Area

The Assessment Area (the Certification Area, the Conservation Area and retained areas collectively) contain three Threatened Ecological Communities (TECs) as listed on the NSW *Threatened Species Conservation Act 1995* (TSC Act) and include Swamp Sclerophyll Forest, Swamp Oak Floodplain Forest and Subtropical Coastal Floodplain Forest. Of these TECs, 7.4 hectares is within the Certification Area, while 367.8 hectares is in the Conservation Area.

Threatened Flora

One endangered population as listed on the TSC Act, *Eucalyptus seeana* (Narrow-leaved Red Gum) in the Greater Taree LGA, is located both within the Assessment Area.

A single individual of the threatened plant, *Corybas dowlingii* (Red Helmet-orchid), which is listed as endangered on the TSC Act, was detected in the proposed Conservation Area only.

Nine individuals of the threatened plant, *Eucalyptus glaucina* (Slaty Red Gum), which is listed as vulnerable on the TSC Act and the Commonwealth *Environment Protection and*

Biodiversity Conservation Act 1999 (EPBC Act), were detected in the Conservation Area and retained lands.

Threatened Fauna

Twenty threatened fauna species were recorded within the Assessment Area, including; Glossy Black-cockatoo, Varied Sittella, Little Lorikeet, Scarlet Robin, Square-tailed Kite, Powerful Owl, Masked Owl, Black-necked Stork, Comb-crested Jacana, Koala, Squirrel Glider, Brush-tailed Phascogale, Grey-headed Flying-fox, Little Bentwing-bat, Eastern Bentwing-bat, Yellow-bellied Sheath-tailed Bat, East-coast Freetail Bat, Eastern False Pipistrelle, Greater Broad-nosed Bat and Large-footed Myotis.

A further nine migratory species listed on the EPBC Act have been recorded from the Assessment Area, including; Australian Wood Duck, Pacific Black Duck, Black-shouldered Kite, Whistling Kite, Wedge-tailed Eagle, Nankeen Kestrel, White-throated Needle-tail, Cattle Egret and Great Egret.

Wildlife Corridors and Key Habitat

The Lower Manning Valley regional wildlife corridor runs through the southern part of the site and connects extensive areas of vegetation east and west of the Assessment Area. This will largely be protected in the Conservation Area.

The Lower Manning Valley sub-regional wildlife corridor connects vegetation in the south of the Assessment Area to vegetation outside of the Assessment Area and over the Dawson River to the west.

Credit Calculations

Ecosystem and species credit calculations using the Biodiversity Certification Credit Calculator have shown that, subject to approval of red flag variations for three EECs (Swamp Sclerophyll Forest, Subtropical Coastal Floodplain Forest and Swamp Oak Floodplain Forest) and approval of a more appropriate local data (MALD) assessment for the *Eucalyptus seeana* Endangered Population (Appendix F), retirement of ecosystem and species credits will achieve an improved outcome from the conferral of Biodiversity Certification on the Brimbin Draft Structure Plan.

The assessment resulted in an overall surplus of 4,619 Ecosystem Credits. Consistent with the BCAM rules for offsetting, a deficit of 904 Ecosystem Credits for HU763 Tallowwood – Spotted Gum – Grey Gum grassy tall open forest has, for the purposes of this assessment, been retired against the 975 ecosystem credit surplus for HU511 Blackbutt - Tallowwood dry grassy open forest, as both of these PCTs occur in the same Keith Vegetation Class. Thus the credit requirement for HU763 is reduced to 0 and therefore impacts to this PCT are considered to be offset.

Subject to approval of the MALD Assessment in Appendix F, impacts to the *Eucalyptus seeana* Endangered Population can be more than adequately offset through the retirement of species credits (a surplus of 34,777 species credits is present within the Conservation Area). Neither *Corybas dowlingii* nor *Eucalyptus glaucina* are impacted by the proposed development and therefore no offsetting of these species is required.

Brush-tailed Phascogale and Koala are not predicted in Ecosystem Credits on the site and therefore retirement of Species Credits is required for each of these species. Although the Black-necked Stork and Comb-crested Jacana were both previously recorded within the Assessment Area, habitat for these species only occurred within retained lands and therefore further consideration of these species was not required (i.e., habitat for these two species will not be impacted within the Certification Area).

Red flags

Three red flag issues fall within the Certification Area:

1. Swamp Sclerophyll Forest TEC;
2. Subtropical Coastal Floodplain Forest TEC; and
3. Swamp Oak Floodplain Forest TEC;

Red flag variations will be provided in the Strategy report.

1 INTRODUCTION

1.1 Project background

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Roche Group Pty Ltd (Roche Group) to survey their lands at Brimbin in order to gain an understanding of the ecological value of the area, guide future land use of the site and assist with the determination of the site's suitability as compensatory habitat for on-site and off-site developments. The *Biodiversity Certification Assessment Methodology* or BCAM (DECCW 2011), has been utilised in this assessment for the purposes of providing the justification for conferring Biodiversity Certification on one particular development as proposed by Roche Group, Brimbin. The Brimbin site is located approximately eight kilometres north of Taree in the lower Manning River catchment (Figure 1).

1.1.1 Purpose of this report

The purpose of the Assessment Report is to accompany the Strategy which must ultimately be collated and submitted by Greater Taree City Council (GTCC). The Assessment Report describes the procedures and assumptions used to calculate the offset requirement (in terms of biodiversity credits). It also explains how the assessment provides an 'improve or maintain' outcome for biodiversity values. The Strategy outlines how, when and by whom the conservation measures will be provided. Both the Assessment Report and the Strategy must be submitted to the Minister for the Environment for consideration and certification of the development proposal.

1.1.2 Objectives of this assessment

The specific objectives of Biodiversity Certification Assessment include the following:

- Undertake a review of relevant literature, a review of relevant databases and discussion with relevant experts;
- Undertake targeted surveys for threatened plant and animal species and their habitat in the Assessment Area;
- Accurately map the vegetation types occurring within the Assessment Area and align these types to previous classifications used, and the 'best fit' Plant Community Types (PCTs) used in the Biodiversity Certification Credit Calculator (the Calculator);
- Provide a description of the ecological values of the Assessment Area, including threatened biodiversity and red flags; and
- Assess the ecological value in terms of Ecosystem and Species Credit Status using the Calculator.

1.2 Brimbin Biodiversity Certification Assessment Area

Throughout the report there is reference to the Certification Area which is illustrated in Figure 2. The report outlines the various land uses for the proposed development, including

conservation. In this report it is assumed that the entirety of the Certification Area will be developed, although some areas may remain undeveloped once the proposal is finalised. Some additional, though negligible, impacts will be associated with future roads and associated infrastructure. Areas set aside for conservation within the Assessment Area are divided into the following categories:

1. Conservation E1 (and replanting);
2. Conservation E2 (and replanting);
3. Vegetation 10 metre buffer;
4. Retained Area (*Eucalyptus seeana*);
5. Retained Area (EEC);
6. Retained Area (riparian linkage); and
7. Retained Area (steep land).

Although the Vegetation 10 metre buffer and Retained lands (E. Seeana, EEC, riparian linkage and vegetation on steep land) would not be developed, they do not currently form part of the offset package and have therefore been considered as 'retained lands' and are not assessable. The Conservation E2 (replanting) area also includes the Vegetation 10 metre buffer on the northern boundary of the Conservation E1 lands in the west of the site, and do form part of the offset package. Approximately 182.5 hectares of the Conservation lands (E1 National Park and Nature Reserves) have already been set aside as an offset for previous developments and do not form part of the Conservation Area for the certification of the Brimbin development. This 182.5 hectare portion of the conservation lands is mapped in Figure 2 and has been excluded from the Conservation Area in this assessment.

As required by the BCAM, the land uses have been classed into the Certification Area (lands on which Certification will be conferred), Conservation Area (land utilised to offset the development) and Retained Lands (non-assessable at this stage). Figure 2 maps these three components within the Assessment Area. The Certified Area of 1,666.2 hectares includes 1,406.6 hectares of cleared land, 0.6 hectares of exotic vegetation for which little or no ecological value exists and an area of 259 hectares of native vegetation that attracts a credit requirement. The Conservation Area will provide protection for 953.2 hectares of mature and early regeneration native vegetation, of which 367.8 hectares is TEC. An additional 45.2 hectares will be strategically replanted in order to provide linkages and supplementary refuges for wildlife.

2 METHODS

2.1 Offsetting methodology

The current assessment utilises the *Biodiversity Certification Assessment Methodology* (the BCAM), after advice from GTCC and OEH. During the field survey of June, July and August 2010, a total of 65 Biobanking Plots (50 x 20 metres) were conducted. A further 12 plots were conducted in September 2014 in the northwest portion of the Certification Area, subsequently determining this area to be in BCAM Low condition, as defined in the BCAM (refer to Section 3.1). The required data for the parameters in 'Appendix 2 – Field methodology for measuring condition attributes in Site Value' of DECCW (2009) were collected within each plot. This more than meets the requirements of the BCAM.

Indicative plots, under certain assumptions, have been utilised in the Calculator for vegetation zones that were not sampled. For instance, all replanting areas are in exotic paddocks and therefore have been assumed to have no native over-storey or mid-storey cover, a low native groundcover, a moderate exotic plant cover, no logs and no trees with hollows.

2.2 Literature and database review

2.2.1 Previous surveys

A number of previous surveys have been undertaken within the site and its environs for flora and fauna, including:

- Connell Wagner (February 2004), *LES Baseline Environmental Assessment*;
- Connell Wagner (September 2004), *LES Stage 2 Impact Assessment Report*;
- Andrews Neil (October 2006), *Biometric and Analysis of Environmental Trade-Offs*;
- Andrews Neil (2008), *Brimbin Biometric and Constraints Analysis*;
- Whelans Insites (December 2009), *Preliminary Ecological Constraints Report for Specific Areas*; and
- Niche (2011), *Brimbin Flora and Fauna Assessment*.

The field survey effort and results of these assessments and reports have been summarised in Table 1.

Table 1. Summary of previous surveys

Report	Survey methods	Results
Connell Wagner (February 2004) *LES Baseline Environmental Assessment*	• Review of existing information and databases; • Field survey 17 Nov – 5 Dec 2003; • Targeted threatened plant random meanders; • Plot-based floristic surveys; • Diurnal bird and animal searches;	• Five vegetation communities identified, none nominated as TECs; • Presence of *Eucalyptus seeana* (narrow-leaved red gum) Endangered Population; • Threatened animals recorded included; Square-tailed Kite, Glossy

Report	Survey methods	Results
	• Nocturnal surveys (spotlighting, call playback); • Owl broadcast survey; • Ultrasonic bat detection; • Elliot trapping; and, • Hair tubes.	Black-cockatoo, Brush-tailed Phascogale, Squirrel Glider, Koala, Grey-headed Flying Fox, Little Bent-wing Bat, Large Bent-wing Bat and Yellow-bellied Sheath-tailed Bat.
Connell Wagner (September 2004) *LES Stage 2 Impact Assessment Report*	No additional survey work conducted. Assessment of likely impact on natural environment	• Proposal was likely to have a significant impact on the natural environment and therefore mitigation, offsetting and compensatory habitat measures recommended for the unavoidable residual impact.
Andrews Neil (October 2006) *Biometric and Analysis of Environmental Trade-Offs*	• Desktop investigations related to previous works and mapping; and, • Use of the PVP Developer to calculate 'Improve or Maintain' offsetting requirement of the proposed development (altered since 2006).	• The system of improve or maintain offsets as proposed in 2006 were sufficient subject to an overall management strategy incorporating the offsets proposed (rejected by Greater Taree City Council).
Andrews Neil (2008) *Biometric and Constraints Analysis*	• Largely desktop analysis with some vegetation validation.	• Identified the presence of Subtropical Coastal Floodplain Forest and the *Eucalyptus seeana* Endangered Population within the study area
Whelans Insites (December 2009) *Preliminary Ecological Constraints Report for Specific Areas*	• Preliminary Site Inspection with OEH; • Ecological Survey, 2-6 November 2009; • 3 nocturnal surveys including Elliot trapping, harp trapping, Anabat and remote camera; • Habitat searches and diurnal bird surveys; • Threatened plant random meander surveys; • 20 x 20 m floristic plots using Braun-Blanquet cover-abundance; • Updated flora species list; and, • Vegetation mapping validation	• Seven vegetation communities identified including the TECs Subtropical Coastal Floodplain Forest and Swamp Sclerophyll Forest; • Presence of *Eucalyptus seeana* (narrow-leaved red gum) Endangered Population. • Threatened animals recorded included; Little Lorikeet, Koala (scat), East-coast Freetail Bat, Eastern False Pipistrelle, Large-footed Myotis, Greater Broad-nosed Bat, Little Bentwing Bat, Eastern Bentwing Bat.

2.2.2 Other data sources

Biodiversity datasets and associated literature for the region were reviewed including:

- ❒ Existing vegetation mapping, as well as other available GIS data;
- ❒ Atlas of NSW Wildlife (OEH);
- ❒ EPBC Act Protected Matters Search Tool (DoE);
- ❒ Threatened Species Profiles Database (OEH);
- ❒ Biometric Vegetation Types Database (OEH, May 2012 updated version);
- ❒ Biometric Vegetation Types Benchmarks Database; and
- ❒ Correspondence from Mr John Seidel, OEH BioBanking Team, regarding updated Hunter CMA Plant Community Types (PCTs) and their relationship to revised Biometric Vegetation Types (BVTs).

2.3 Field survey

2.3.1 Vegetation Mapping – Ecosystem Credits

Base vegetation maps utilising information from previous studies and reports and aerial photography were utilised in the field for classifying the vegetation communities on the site.

Vegetation had been at least partially mapped for previous assessments of the Assessment Area and at a coarser resolution by GTCC. A comparison of the Niche (2010) mapping with these mapping products is provided in Appendix C.

For this assessment, which utilises the BCAM, conversion of the previously utilised revised Biometric Vegetation Types (BVTs) to the new Plant Community Types (PCTs) for the Hunter CMA was required. This was done under advisement from Mr John Seidel of the OEH BioBanking Team. The alignment of Niche mapping with PCTs and the actual PCTs, TECs, red flag vegetation greater than 70 per cent cleared and vegetation formations and classes (Keith 2004) is provided in Appendix A.

Vegetation zone mapping

The BCAM requires the mapping of vegetation zones within the Assessment Area and defines a vegetation zone as a relatively homogenous area that is of the same vegetation type and broad condition state. Condition was determined to be in three different categories throughout the site:

- Intact or relatively mature forest and woodland where the original structure and composition exists;
- Early regeneration and woodland where one or more layers of the vegetation have been modified or lost but the zone retains good capacity for regeneration (i.e., resilience); and
- Future replanting zones that are currently cleared land.

A description of each of the vegetation zones within the Assessment Area is provided in Section 3.3.

Vegetation Plots

As required by the BCAM, 50 x 20 metre BioBanking plots were conducted at select locations within each PCT to collect the required ten site attributes for Ecosystem Credit calculations. This fieldwork was conducted over three separate survey periods in June, July and August 2010. An additional survey was conducted in September 2014 in the northern portion of the Certification Area. Plots were randomly selected in the field with the use of field maps but were maintained, where possible at 200 metres apart.

An array of equidistant survey locations was defined using GIS and a rapid assessment of structure, with the composition of the vegetation being assessed at as many of these locations as possible. Full floristic plots, Braun-Blanquet cover-abundance scores and dissimilarity analyses were viewed as unnecessary for the purposes of this assessment.

Flora survey effort is shown in Figure 3.

2.3.2 Threatened flora surveys – Species Credits

Threatened flora random meanders

Random meander surveys were carried out to locate and record threatened plant species. Where threatened plant species were detected, population estimates were made using a suitably robust and scientific method.

Random meander surveys were conducted in November and December 2003, November 2009 and June, July and August 2010, either by Niche or other parties.

Additional threatened flora random meanders were carried out in late September 2013 for *Diuris flavescens* which was identified in the Biodiversity Certification Calculator as a species requiring survey and, as the species is relatively cryptic for much of the year, for which the appropriate season had not been previously sampled. Areas proposed for Certification were sampled as a priority and according to the OEH threatened species survey guidelines (DEC 2004). The random meander is represented in Figure 4. No specimens of *D. flavescens* were detected within the area proposed for Certification and, therefore, the species is not required to be offset.

***Eucalyptus seeana* population estimates**

A population estimate was made for *Eucalyptus seeana* using the following methodology.

E. seeana density was mapped as points in the northwest and southwest corners of the Brimbin site (Figure 6. Points were attributed with stems/hectare counts (zero for sites without *E. seeana*). Eighty-seven locations were sampled over an area of approximately 250 hectares.

Stem densities were then averaged for the coincident vegetation types, and these averages were then assigned to all equivalent vegetation types. In doing so, densities were separately calculated for where vegetation was in Low condition, versus Moderate/Good condition (BCAM).

2.3.3 Threatened fauna surveys – Species Credits

Fauna surveys were conducted from 21 June to 1 July 2010 by two zoologists, Rhidian Harrington and Matt Swan. Surveys were conducted across all habitat types within the study area. All survey locations and data were recorded with the use of a Trimble Nomad GPS (accuracy 2-5 metres).

Survey methodology is described below and survey effort is summarised in Table 2. Survey locations are displayed in Figure 4.

Table 2. Fauna survey techniques and survey effort

Survey Technique	Number of Sites	Survey Effort per Site	Survey Dates	Total Survey Effort
Diurnal Birds	24	20 minute 2 hectare census	22/06/10 – 1/07/10	8.3 Person Hours
Call Playback - Owls	4	5 minute playback and listening for each species	24/06/10 – 1/07/10	11.2 Person Hours
Call Playback - Mammals	3	5 minute playback and listening for each species	27/06/10 – 30/06/10	3 Person Hours
Terrestrial Camera Traps	9 (11 separate camera traps)	1 or 2 cameras per site	22/06/10 – 1/07/10	96 Trap Nights
Arboreal Elliot Trapping	5	8 Elliot A and 7 Elliot B Traps at each site	21/06/10 – 1/07/10	630 Trap Nights
Hair Tubes (Ground)	7	7 50 mm and 7 110x70 mm hair tubes	21/06/10 – 1/07/10	798 Trap Nights
Hair Tube Arboreal	1	7 50 mm and 7 110x70 mm hair tubes	23/06/10 – 30/06/10	98 Trap nights
Harp Trapping	3 (2 harp traps)	1 harp trap	23/06/10 – 1/07/10	15 Trap Nights
Anabat Detection	7 (2 Anabat units)	1, 2 or 3 nights per site	22/06/10 – 30/06/10	15 Recording Nights
Spotlight Search	11 Separate sites	At least 0.5 hours of spotlighting	23/06/10 – 1/07/10	11 Person Hours

Elliot Traps – Arboreal

Type A and B arboreal Elliot trapping was undertaken at five sites for either eight or ten consecutive nights. Eight type A and seven type B traps were set up at each of the five trapping sites. Pairs of traps were spaced at 20 m intervals along a transect to make seven separate trapping stations at each site, with the last station having three traps (two Elliot A, one Elliott B). Traps were placed on platforms and mounted on trees approximately 2.0-2.5 metres off the ground. Traps were baited with a mixture of peanut butter, rolled oats, honey and truffle oil. The base of the trees was sprayed with a mixture of honey and water.

Traps were checked each morning and any captured animals were identified and released at the site of capture.

Hair Tubes – Ground

Two sizes of hair tubes (50 mm and 110 x 70 mm) were placed at each of the five trapping sites and at two additional sites. At the trapping sites seven pairs of the hair tubes were placed at the trapping stations close the arboreal Elliott traps. At the two additional hair tube sites, the hair tubes were placed at 20 metre intervals. Of the additional hair tube sites, Hair Tube Site 1 had eight pairs of hair tubes and Hair tube Site 2 had seven pairs. Hair tubes were in place for either seven, eight or ten nights.

The hair tubes were baited with either dog food, chicken wings or a mixture of peanut butter, rolled oats, honey and truffle oil. Double-sided tape was only adhered to the upper and lateral inner surface of the tubes so as to limit the incidence of 'by catch'. Hair samples were sent to Barbara Triggs of "Dead Finish" for analysis.

Hair Tubes – Arboreal

At Hair Tube Site 2 seven pairs of hair tubes were placed in trees using water resistant electrical tape. Arboreal hair tubes were placed in pairs alongside ground hair tubes. The hair tubes were baited with a mixture of peanut butter, rolled oats, honey and truffle oil. Hair samples were sent to Barbara Triggs of "Dead Finish" for analysis.

Camera Traps

'Reconyx' motion sensing camera traps were placed at ground level. Two camera traps were placed at four of the five trapping sites. One camera was placed at a hair tube sites, and another camera trap was placed at the remaining trapping site. On the 28th of June, six camera traps were moved from the trapping sites and placed in three separate transects consisting of two camera traps for the remaining three nights.

The cameras were set to take three pictures upon sensing motion and placed in front of baited hair tubes. The ground in front of the camera traps was sprayed with a mixture of truffle oil and water. Upon recovery, the pictures were individually analysed and animals were identified to the lowest possible taxonomic level.

Nocturnal Call Playback - Owls

Four call playback sites were established at strategic positions in the landscape so calls would broadcast down in to valleys and achieve maximum coverage.

After an initial listening period of five minutes, calls of the Barking Owl, Grass Owl, Masked Owl, Sooty Owl and Powerful Owl were broadcast through a 10 watt megaphone for five minutes followed by a five minute listening period and a two minute period of spotlighting. Calls of the Grass Owl were only broadcast at two of the sites which were deemed to be in the vicinity of potential habitat.

No call playback was performed on the 21st, 22nd or 23rd of June 2010 due to rainfall impeding the ability to broadcast.

Nocturnal Call Playback – Mammals

Calls of the Squirrel Glider and Koala were broadcast at three of the owl call playback sites. The calls were broadcast on the 28th, 29th and 30th of June 2010. Calls were broadcast for five minutes followed by a five minute listening period.

Diurnal Bird Surveys

Birds were surveyed at stationary points by one zoologist for at least twenty minutes. Birds were identified with the use of 10 X 42 binoculars or from their calls. Surveys were conducted as close as possible to dawn or dusk when bird activity is greatest.

Twenty-four separate bird surveys were undertaken across the study area for a total survey effort of 8.3 person hours. Two dawn water bird surveys were conducted in the large dam in the paddock to the north of the site. Incidental observations of birds were recorded throughout the course of other surveys.

Harp Trapping

Harp traps targeting microchiropteran bats were deployed at three sites within the study area. Traps were set up in potential flyways and checked the following morning.

Anabat Detection

Two ultrasonic recording devices (Anabats) were deployed at seven separate sites across the study area. The devices were left in place for a minimum of two nights and recorded from dusk until dawn.

Spotlighting

Spotlighting took place either on foot or from a slow moving vehicle using one or two handheld 50-watt spotlights. The speed of survey was approximately one kilometre per hour on foot or five kilometres per hour in the vehicle.

Spotlighting and active listening for frogs was conducted in the sedgeland complex, however detectability was limited due to the time of year surveys were undertaken (winter).

Stag Watching

Stag watches involved observing hollows for fauna occupancy. Stag watches were conducted from 30 minutes before dusk to 30 minutes after dusk on two trees within the study area on the 29th of June. A total survey effort of 2 person hours was conducted.

Habitat Assessment

Habitat assessments were carried out at various locations throughout the course of surveys of the study area and involved an assessment of the type and condition of fauna habitat as well as potential for threatened species to occur. The habitat assessment was guided by plant community structure and the occurrence of important features such as tree hollows, canopy feeding resources, leaf litter, fallen timber, water bodies and specific feeding resources such as koala feed trees.

2.4 Determination of threatened species requiring survey – Species Credits

Upon a review of the available threatened species data from previous and current surveys, the seasons that surveys have been carried out and the answers given to the Geographic Habitat questions in the BioBanking Calculator, the Calculator determined that further survey is required for two threatened species; Eastern Pygmy-possum (an arboreal mammal) and *Diuris flavescens* (Pale Yellow Doubletail, a terrestrial orchid). In the case of Eastern Pygmy-possum, the nomination of this species as requiring additional survey effort is entirely a result of no single month of the year being identified in the Calculator as appropriate for survey for the species. Clearly this is an error in the Calculator. Previous and current survey effort described in Section 3 is deemed adequate for the species.

As described in Section 2.3.2, additional threatened flora random meanders were carried out in late September 2013 targeting *Diuris flavescens*. No specimens of *D. flavescens* were

detected within the Certification Area and, therefore, the species is not required to be offset.

2.5 Limitations of this assessment

Some species are cryptic, and are only likely to occur or be detected seasonally, or use the site periodically. For example, some frogs and bats are more difficult to detect in the winter months.

Inclement weather was experienced for the first three days of the survey period in July 2011, which affected some surveys such as call playback. This also limited vehicular travel within the study area and accessing some sections of the site. For example, more time was needed in the field for vegetation mapping and validation as large parts of the study area had to be accessed on foot. Furthermore, a lack of vehicle access to more remote areas made the checking of traps difficult and time-costly. Remote techniques (camera traps and hair tubes) were utilised in these sections so that they did not need to be revisited on a daily basis.

Despite these limitations, it is considered that the survey effort and data now at hand, through either the Niche surveys or previous surveys, is sufficient to support robust conclusions in relation to the biodiversity of the site.

Vegetation communities have been aligned to a best-fit PCT. The alignments have been discussed with OEH.

3 RESULTS

3.1 Stratification of BCAM vegetation condition

3.1.1 BCAM Definition of 'Low condition' vegetation

As defined in the BCAM, vegetation in low condition means:

a) *woody native vegetation with native over-storey percent foliage cover less than 50 % of the lower value of the over-storey percent foliage cover benchmark for that vegetation type, and where either;*
   - *less than 50% of ground cover vegetation is indigenous species, or*
   - *greater than 90% of ground cover vegetation is cleared*

   OR

b) *native grassland, wetland or herbfield where either;*
   - *less than 50 % of ground cover vegetation is indigenous species, or*
   - *more than 90 % of ground cover vegetation is cleared*

   OR

c) *native vegetation with a site value score of 34 or lower.*

If native vegetation is not in low condition, it is in moderate to good condition.

3.1.2 Plot data and site scores

Upon additional BioBanking plot survey conducted in September 2014, BCAM Low condition was assigned to the entirety of the vegetation in the northern portion of the Certified Area previously mapped as 'regrowth' and is represented as 'Certified BCAM Low condition' in Figure 2. Three vegetation types as mapped by Niche are affected:

- Spotted Gum Ironbark Forest (SI) which aligns to the PCT HU763 Tallowwood - Spotted Gum - Grey Gum grassy tall open forest;
- Narrow-leaved Red Gum Ironbark Woodland (RGIB) which aligns to the PCT HU703 Narrow-leaved Red Gum woodlands; and
- Red Gum Grey Ironbark Paperbark Forest (RGIB Mel) which also aligns to HU703.

The site attribute data was collated from 12 plots conducted (thus meeting the minimum number of plots required for vegetation in Moderate – Good condition). Plot locations were selected randomly on-site using marked up A3 field maps and spaced at least 200 metres apart.

Most, if not all, of the plots are well outside of benchmark for the relevant PCTs, particularly in relation to Native Plant Species Richness, Native Overstorey Cover, Native Midstorey Cover, Native Ground Cover Shrubs, Exotic Plant Cover, Length of Fallen Logs and Trees with Hollows (seven of the ten attributes). Occasionally the attributes for Native Ground Cover ('grasses' and 'other') are also outside of benchmark.

Native Plant Species Richness (NPS) is generally very low compared to the benchmark and exotic plant cover (EPC) is for the most part very high. This is mostly due to the severe infestation of perennial exotic grasses in this area, primarily *Andropogon virginicus* (whiskey grass) and clearly demonstrates the severely degraded composition of this part of the site and its lack of regenerative potential. No trees with hollows (NTH) were detected, clearly indicating a lack of mature trees and, together with the lack of fallen timber or logs (FL), shows that the area has been subject to quite vigorous land management practices such as clearing, stick-raking, possible tilling, grazing, pasture improvement and burning-off. This is also borne out by the analysis of historical imagery provided in Section 3.1.3. In summary, the area mapped as 'Certified BCAM Low condition' in Figure 2 not only meets the definition of Low condition, it is clearly highly modified and degraded and has limited value for biodiversity (other than as a nursery for an artificially high number immature *Eucalyptus seeana*).

Table 3 through to 5 below clearly demonstrate that these vegetation zones are in Low condition as defined in the BCAM. The main implication of this vegetation being in Low condition is that 10.8 hectares of Subtropical Coastal Floodplain Forest can be excluded from consideration as a red flag as per the definition of red flags in the BCAM (i.e., only EECs that are in 'Moderate to Good' condition). This reclassification as Low condition vegetation is also likely to mean a substantial reduction in credits required.

Table 3. Comparison of Spotted Gum – Ironbark Forest (SI) to benchmark values for HU763

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL
D	13	0	0	10	2	16	80	0	1	0
E	20	0	1.5	20	0	32	58	0	1	0
F	23	0	0	28	0	18	52	0	1	0
K	26	0	14.5	28	0	14	44	0	1	0
L	20	0	0	12	2	16	68	0	1	0
Benchmarks from BCAM Calculator (HU763)	**>= 51**	**22-45**	**5-40**	**5-25**	**10-20**	**5-20**	**> 5**	**>= 1**	**1**	**>= 20**
Benchmark for 'Low condition'		**< 11**		**< 50 %**						
Average score from plots		0		(28+52+46+42+30)/5 = 39.6						
Meets 'Low condition'		Yes		Yes						
Site score	The site value score for this vegetation zone was 27 and is therefore in Low condition									

Table 4. Comparison of Narrow-leaved Red Gum Ironbark Woodland (RGIB) to benchmark values for HU703

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL
A	24	0	1	6	0	14	62	0	1	0
B	27	4	4.5	20	0	10	66	0	1	0
C	23	0	7.5	20	6	32	74	0	1	0

H	12	0	0	16	0	28	46	0	1	0
Benchmarks from BCAM Calculator	**>= 41**	**15-40**	**5-20**	**30-50**	**5-10**	**20-40**	**> 5**	**>= 1**	**1**	**>= 5**
Benchmark for 'Low condition'		**< 7.5**		**< 50 %**						
Average score from plots		1		(20+30+58+14)/4 = 30.5						
Meets 'Low condition'		Yes		Yes						
Site score	The site value score for this vegetation zone was 33 and is therefore in Low condition									

Table 5. Comparison of Red Gum Grey Ironbark Paperbark Forest (RGIB Mel) to benchmark values for HU703

Plot Name	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL
G	13	0	0	14	4	20	70	0	1	0
I	21	0	8.5	20	8	8	40	0	1	0
J	13	0	6.5	12	28	14	66	0	1	0
Benchmarks from BCAM Calculator	**>= 41**	**15-40**	**5-20**	**30-50**	**5-10**	**20-40**	**> 5**	**>= 1**	**1**	**>= 5**
Benchmark for 'Low condition'		**< 7.5**		**< 50 %**						
Average score from plots		0		(38+36+54)/3 = 42.7						
Meets 'Low condition'		Yes		Yes						
Site score	The site value score for this vegetation zone was 31 and is therefore in Low condition									

3.1.3 Air photo Interpretation of BCAM 'Low condition' area

This section adds a further justification to the classification of the area mapped as 'Certified (BCAM Low condition) in Figure 2.

A series of aerial photographs are available to underpin the assessment of the 'Low condition' area, as shown in Appendices G (i) and G (ii). Non-rectified imagery from 1969, 1979, 1989, 1991 and 1997 were obtained through LPI and OEH and locally geo-referenced to the low condition area. These images have not been orthorectified, so terrain and camera distortions are still present. However, the rectification is sufficient to establish multi-temporal visual comparison of the imagery and associated vegetation change. These changes are itemised below:

- 1969: Although the image is of poor resolution, the canopy pattern is indicative of a mature forest, with no evidence of recent clearing;
- 1979: This image indicates that a major disturbance event occurred between 1969 and 1979. A number of features suggest the area has been cleared by timber harvesting activities. These include a cleared central access zone with irregular margins, narrower cleared zones running off the central zone at c. 90 degrees, and a canopy texture indicative of understorey or young regenerating trees only (i.e., although the image is of higher resolution compared to 1969, the mature canopy pattern is not evident);
- 1989: By this time, the 'Low condition' area is essentially free of trees, with an image tone and texture consistent with an open, grassy landscape. The slightly

darker tone of the area, compared to adjacent open paddocks to the east and south, is indicative of either harvesting trash, or very low density, and low elevation, regeneration. Adjacent, more heavily vegetated areas show a disturbance pattern consistent with selective logging;

- 1991: There is very little significant difference between 1989 and 1991 imagery in terms of vegetation cover or growth-disturbance status. However, the higher resolution and colour imagery allows a more definitive separation between highly-disturbed, selectively logged areas, and the cleared areas, where there is only minor evidence of regeneration;
- 1997: The most conspicuous feature of this image is that of recent fire, affecting the entire 'Low condition' area, as well as adjacent areas to the east and south. The burn was moderately hot, evidenced by the (just discernible) crown scorching on the scattered, late-regeneration trees. Any understorey regeneration appears to have been destroyed, as opposed to what might be expected in a 'cool' burn, where only the grassy understorey is consumed; and
- 2010: By this time, scattered trees have reached mid-regeneration status, and adjacent selectively-logged areas display canopy closure. The 'Low condition' area is best described as secondary grassy open woodland, as opposed to the closed canopy forest, or open forest with shrubby understorey, typical of the regional surrounds.

In summary, the aerial photographic interpretation of the 'Low condition' area indicated that it has a timber harvesting and burn history from post 1969 to 1997, resulting in conversion of a tall open forest (or, potentially, a closed canopy forest) into an open grassy woodland.

3.2 Vegetation zones

After stratification into BCAM condition (Moderate – Good or Low) and then qualitative ancillary code assignments, 38 Vegetation Zones were defined for the Assessment Area of which 24 are present in the Certified Area (Table 6) and 25 are present in the E1 and E2 Conservation Areas (Table 7). In the case of the Certification Area, ancillary code stratification was on the basis of whether mature forest or early regeneration was affected and whether the impacts were direct or indirect. For the Conservation Area, ancillary code stratification was on the basis of whether the area to be conserved was in E1 or E2 lands, mature forest or early regeneration and replanting. Such a detailed and complex stratification was necessary to accurately assess the credit requirement and credits generated by the proposed conservation measures.

Substantial areas of cleared land exist within the Certification Area (1,407.2 hectares, including 0.6 hectares of exotic vegetation) and a smaller amount in the Conservation Area (20.8 hectares). These cleared areas are not assessable and cannot therefore form vegetation zones as per the BCAM, but are separate to cleared areas within the Conservation Area that will be replanted, which do form part of the assessment.

Vegetation mapping for the study area is presented in Figure 7, with the Plant Community Types (PCTs) mapped in Figure 10.

Table 6. Vegetation zones within the Certified Area

Vegetation zone details	Niche vegetation type	EEC	Area of veg zone certified (ha)	Red Flag
HU511_Moderate/Good_BT	Blackbutt Tallowwood Tall Open Forest	Not an EEC	1.6	No
HU511_Moderate/Good_BT indirect	Blackbutt Tallowwood Tall Open Forest (indirectly impacted)	Not an EEC	0.6	No
HU511_Moderate/Good_BT Regen	Blackbutt Tallowwood Tall Open Forest (early regeneration)	Not an EEC	4.8	No
HU591_Moderate/Good_DP	Derived Swamp Paperbark Thicket	Swamp Sclerophyll Forest	0.8	Yes
HU703_Low_RGIB	Narrow-leaved Red Gum Ironbark Woodland (low condition)	Not an EEC	42.2	No
HU703_Low_RGIB Indirect	Narrow-leaved Red Gum Ironbark Woodland (low condition, indirectly impacted)	Not an EEC	0.8	No
HU703_Low_RGIB Mel	Red Gum Grey Ironbark Paperbark Forest (low condition)	Subtropical Coastal Floodplain Forest	9.5	No (BCAM low condition)
HU703_Low_RGIB Mel Indirect	Red Gum Grey Ironbark Paperbark Forest (low condition, indirectly impacted)	Subtropical Coastal Floodplain Forest	1.3	No (BCAM low condition)
HU703_Moderate/Good_RGIB	Narrow-leaved Red Gum Ironbark Woodland	Not an EEC	32.1	No
HU703_Moderate/Good_RGIB indirect	Narrow-leaved Red Gum Ironbark Woodland (indirectly impacted)	Not an EEC	4.5	No
HU703_Moderate/Good_RGIB Mel	Red Gum Grey Ironbark Paperbark Forest	Subtropical Coastal Floodplain Forest	3.1	Yes
HU703_Moderate/Good_RGIB Mel Indirect	Red Gum Grey Ironbark Paperbark Forest (Indirectly impacted)	Subtropical Coastal Floodplain Forest	0.2	Yes
HU703_Moderate/Good_RGIB Regen	Narrow-leaved Red Gum Ironbark Woodland (early regeneration)	Not an EEC	2.5	No
HU762_Moderate/Good_TG	Grey Gum Stringybark Tallowwood Tall Open Forest	Not an EEC	4.7	No
HU762_Moderate/Good_TG indirect	Grey Gum Stringybark Tallowwood Tall Open Forest (Indirectly impacted)	Not an EEC	0.5	No
HU762_Moderate/Good_TG Regen	Grey Gum Stringybark Tallowwood Tall Open Forest (early regeneration)	Not an EEC	1.2	No
HU763_Low_SI	Spotted Gum Ironbark Forest	Not an EEC	98.2	No
HU763_Low_SI Indirect	Spotted Gum Ironbark Forest (low condition)	Not an EEC	1.2	No
HU763_Moderate/Good_SI	Spotted Gum Ironbark Forest	Not an EEC	39.4	No
HU763_Moderate/Good_SI indirect	Spotted Gum Ironbark Forest (Indirectly impacted)	Not an EEC	1.3	No
HU763_Moderate/Good_SI Regen	Spotted Gum Ironbark Forest (early regeneration)	Not an EEC	5.2	No
HU943_Moderate/Good_SO	Swamp Oak Forest	Swamp Oak Floodplain Forest	1.6	Yes
HU943_Moderate/Good_SO indirect	Swamp Oak Forest (Indirectly impacted)	Swamp Oak Floodplain Forest	0.3	Yes
HU943_Moderate/Good_SO Regen	Swamp Oak Forest (early regeneration)	Swamp Oak Floodplain Forest	1.4	Yes
		Total	259	

3.2.1 Conservation Areas

Twenty-five Vegetation Zones are present within the Conservation Areas (Table 7).

Table 7. Vegetation zones within the Conservation Areas (E1 and E2)

Vegetation zone details	Niche vegetation type	EEC	Area of veg zone offset (ha)
HU511_Moderate/Good_BT	Blackbutt Tallowwood Tall Open Forest	Not an EEC	115.7
HU511_Moderate/Good_BT Regen	Blackbutt Tallowwood Tall Open Forest (early regeneration)	Not an EEC	0.9
HU591_Moderate/Good_DP	Derived Swamp Paperbark Thicket	Swamp Sclerophyll Forest	2.2
HU591_Moderate/Good_PT	Swamp Paperbark Thicket	Swamp Sclerophyll Forest	3.6
HU703_Moderate/Good_RGAng E2	Red Gum Angophora Mahogany Woodland (E2 conservation)	Subtropical Coastal Floodplain Forest	22.9
HU703_Moderate/Good_RGIB	Narrow-leaved Red Gum Ironbark Woodland	Not an EEC	76.4
HU703_Moderate/Good_RGIB E2	Narrow-leaved Red Gum Ironbark Woodland (E2 conservation)	Not an EEC	13
HU703_Moderate/Good_RGIB E2 Regen	Narrow-leaved Red Gum Ironbark Woodland (E2 early regeneration)	Not an EEC	4.4
HU703_Moderate/Good_RGIB E2 Replanting	Narrow-leaved Red Gum Ironbark Woodland (E2 replanting)	Not an EEC	12.7
HU703_Moderate/Good_RGIB Mel	Red Gum Grey Ironbark Paperbark Forest	Subtropical Coastal Floodplain Forest	197.9
HU703_Moderate/Good_RGIB Mel E2	Red Gum Grey Ironbark Paperbark Forest (E2 conservation)	Subtropical Coastal Floodplain Forest	9.6
HU703_Moderate/Good_RGIB Regen	Narrow-leaved Red Gum Ironbark Woodland (early regeneration)	Not an EEC	2
HU762_Moderate/Good_TG	Grey Gum Stringybark Tallowwood Tall Open Forest	Not an EEC	141.5
HU762_Moderate/Good_TG Regen	Grey Gum Stringybark Tallowwood Tall Open Forest (early regeneration)	Not an EEC	22.7
HU762_Moderate/Good_TG Replanting	Grey Gum Stringybark Tallowwood Tall Open Forest (replanting)	Not an EEC	15.1
HU763_Moderate/Good_SI	Spotted Gum Ironbark Forest	Not an EEC	187.7
HU763_Moderate/Good_SI E2	Spotted Gum Ironbark Forest (E2 conservation)	Not an EEC	1
HU763_Moderate/Good_SI Regen	Spotted Gum Ironbark Forest (early regeneration)	Not an EEC	11.2
HU763_Moderate/Good_SI Replanting	Spotted Gum Ironbark Forest (replanting)	Not an EEC	9.6
HU783_Moderate/Good_FG E2	Flooded Gum Brush Box Tall Forest (E2 conservation)	Not an EEC	7
HU932_Moderate/Good_SM	Swamp Mahogany Forest	Swamp Sclerophyll Forest	66.9
HU934_Moderate/Good_FR Regen	Forest Redgum Forest (early regeneration)	Not an EEC but highly cleared PCT	1.9
HU934_Moderate/Good_FR Replanting	Forest Redgum Forest (replanting)	Not an EEC but highly cleared PCT	7.8
HU943_Moderate/Good_SO	Swamp Oak Forest	Swamp Oak Floodplain Forest	64.7
		Total	**998.4**

3.2.2 Threatened Ecological Communities

Six vegetation zones equate to three distinct Threatened Ecological Communities (TECs); Subtropical Coastal Floodplain Forest, Swamp Sclerophyll Forest and Swamp Oak Floodplain Forest. These TECs are listed in Table 8 and mapped in Figure 8. No more than 7.4 hectares of TEC that are not in Low condition will be impacted within the Certification Area, while 367.8 hectares of TEC falls within the Conservation Area.

A total of 597.6 hectares of TEC exists within the retained lands of which 102.5 hectares of Herbfield constitutes a fourth TEC within the study area, namely Freshwater Wetlands on Coastal Floodplain.

Table 8. TECs within the study area

Niche Vegetation Type	TEC	Retained Land	Certification Area	Red flag vegetation	Total Conservation (E1 and E2)
Herbfield	Freshwater Wetland	102.5	0	0	0
Red Gum Grey Ironbark Paperbark Forest	Subtropical Coastal Floodplain Forest	39.4	14.1	3.3 (10.8 ha in BCAM Low condition)	230.4
Derived Swamp Paperbark Thicket	Swamp Sclerophyll Forest	432.1	0.8	0.8	72.7
Swamp Paperbark Thicket					
Swamp Mahogany Forest					
Swamp Mahogany (early regeneration)					
Swamp Oak Forest	Swamp Oak Floodplain Forest	23.6	3.3	3.3	64.7
Swamp Oak Forest (early regeneration)					
Total		**597.6**	**18.0**	**7.4**	**367.8**

3.3 Vegetation Community Descriptions

Blackbutt – Tallowwood Tall Open Forest (BT)

123.6 hectares of Blackbutt – Tallowwood Tall Open Forest and associated early regeneration is located in the Assessment Area of which 7.0 hectares falls within the Certification Area. In general this unit was considered to have good resilience throughout the Assessment Area.

The unit is dominated by an open canopy of *Eucalyptus pilularis* (blackbutt) and *Eucalyptus microcorys* (tallowwood) with less common occurrences of *Eucalyptus eugenioides* (thin-leaved stringybark) and *Eucalyptus siderophloia* (grey ironbark). The mid-storey is a sparse

combination of medium-sized trees such as *Callistemon salignus*, *Alphitonia excelsa*, *Melaleuca styphelioides* and *Glochidion ferdinandi*. The shrub layer is more-or-less absent except for the occasional *Breynia oblongifolia* and sub-shrubs such as *Hibbertia aspera*. The ground-cover is dominated by grasses such as *Imperata cylindrica*, *Poa labillardieri*, *Echinopogon* spp. and *Entolasia* spp., while the herbs *Pteridium esculentum*, *Lomandra longifolia*, *Dichondra repens*, *Pseuderanthemum variabile* and *Pratia purpurascens* are also common.

For the purposes of this report, this vegetation type has been aligned to the PCT, HU511 Blackbutt – Tallowwood dry grassy open forest of the southern North Coast, and is not considered to constitute any component of a TEC.

Forest Redgum Forest (early regeneration) (FR Regen)

1.9 hectares of Forest Red Gum early regeneration is located within the Assessment Area, none of which falls within the Certification Area. This unit displayed poor resilience, although it would regenerate with moderate management input and removal of grazing pressure.

The unit is dominated by *E. tereticornis* with a largely absent mid-storey and shrub layer. The ground cover was dominated by grasses and herbs such as *Carex appressa*, *Echinopogon* spp., *Entolasia* spp., *Oplismenus imbecillus* and *Dichondra repens*.

For the purposes of this report, this vegetation type has been aligned to the PCT, HU934 Cabbage Gum - Forest Red Gum - Flax-leaved Paperbark Floodplain Forest. The type does not equate to any TEC but is a highly cleared vegetation type in the PCTs database.

Flooded Gum Brush Box Tall Forest (FG)

7.0 hectares of Flooded Gum Brush Box Tall Forest is located within the Assessment Area, all of which falls within the E2 Conservation Area. This unit displayed good resilience and was largely intact remnant vegetation.

The unit is dominated by a tall (+30 metre) open canopy of *Eucalyptus grandis* (flooded gum) and *E. microcorys* (tallowwood) with *Lophostemon confertus* (brush box) and *Syncarpia glomulifera* (turpentine) forming a dense, tall mid-storey. A shrub and small tree layer was dominated by *Acmena smithii*, *Neolitsea dealbata* and *Cryptocarya microneura*. Common ground covers included *Oplismenus imbecillus*, *Dichondra repens* and *Gymnostachys anceps*.

For the purposes of this report, this vegetation type has been aligned to the PCT, HU783 Flooded Gum – Brush Box – Tallowwood mesic tall open forest, and is not considered to constitute any component of a TEC.

Grey Gum Stringybark Tallowwood Tall Open Forest (TG)

170.6 hectares of Grey Gum Stringybark Tallowwood Tall Open Forest and associated early regeneration is located within the Assessment Area, of which 6.4 hectares falls within the Certification Area. In general, this unit displayed good resilience and would regenerate to a remnant state with a reduction in grazing pressure and fire frequency.

The unit is dominated by an open canopy of *Eucalyptus microcorys* (tallowwood) and *Eucalyptus propinqua* (small-fruited grey gum) with less common occurrences of *Eucalyptus eugenioides* (thin-leaved stringybark) and *Eucalyptus siderophloia* (grey ironbark). The mid-storey is sparse and typically features *Allocasuarina littoralis*. The shrub layer is more-or-less absent except for the occasional *Leucopogon juniperinus* and the ground cover is dominated by grasses and herbs such as *Echinopogon* spp., *Entolasia* spp., *Oplismenus imbecillus* and *Dichondra repens*.

For the purposes of this report, this vegetation type has been aligned to the PCT, HU762 Tallowwood - Small-fruited Grey Gum - Kangaroo Grass grassy tall open forest, and is not considered to constitute any component of a TEC.

Spotted Gum - Grey Ironbark Open Forest (SI)

345.2 hectares of Spotted Gum – Grey Ironbark Open Forest and associated early regeneration is located within the Assessment Area, of which 145.3 hectares falls within the Certification Area (99.4 hectares in BCAM Low condition). In general this unit displayed good resilience (other than the Low condition area) and would regenerate to a remnant state with a reduction in grazing pressure and fire frequency. A discussion on the assessment of Low condition for this and other vegetation units is provided in Section 3.1.

The unit is dominated by an open canopy of *Corymbia maculata* (spotted gum) and *Eucalyptus siderophloia* (grey ironbark) with less common occurrences of *Eucalyptus microcorys* (tallowwood). The mid-storey is sparse and typically features *Allocasuarina littoralis*, *Acacia maidenii* and immature eucalypts. The shrub layer is largely non-existent and the ground-cover is dominated by grasses and herbs such as *Echinopogon* spp., *Entolasia* spp., *Microlaena stipoides*, *Eragrostis brownii*, *Schoenus paludosus* and *Lomandra multiflora*.

For the purposes of this report, this vegetation type has been aligned to the PCT, HU763 Tallowwood – Spotted Gum – Grey Gum tall open forest, and is not considered to constitute any component of a TEC.

Eucalyptus seeana (Narrow-leaved Red Gum) is common in this vegetation type (though not dominant) and therefore this type is considered known habitat for the *Eucalyptus seeana* Endangered Population.

Sporadic occurrences of the threatened *Eucalyptus glaucina* (Slaty Red Gum) were also found in this vegetation type.

Narrow-leaved Red Gum - Grey Ironbark - Paperbark Forest (RGIB Mel)

221.6 hectares of Narrow-leaved Red Gum – Grey Ironbark – Paperbark Forest and associated early regeneration is located within the Assessment Area, of which 10.8 hectares, entirely of Low condition vegetation, falls within the Certification Area. Other than the vegetation in Low condition, this unit generally displayed good resilience and would regenerate to a remnant state with a reduction in grazing pressure. A discussion on the assessment of Low condition for this and other vegetation units is provided in Section 3.1.

The unit is primarily dominated by *Eucalyptus seeana* (narrow-leaved red gum) and *E. siderophloia* (grey ironbark), but included a mixed eucalypt canopy of *E. tereticornis*, *E. amplifolia*, *E. resinifera* and *E. propinqua*. The mid-storey is a dense layer of trees with dominant species including *Melaleuca nodosa*, *Callistemon salignus*, *Melaleuca styphelioides*, *Casuarina glauca* and *Melaleuca linariifolia*, typically featuring *Allocasuarina littoralis*. The shrub layer is largely absent except for occasional *Leucopogon juniperinus* and juvenile over-storey species. The ground cover is dominated by grasses and herbs such as *Echinopogon* spp., *Entolasia* spp., *Oplismenus imbecillus* and *Dichondra repens*.

For the purposes of this report, this vegetation type has been aligned to the PCT, HU703 Narrow-leaved Red Gum woodlands of the lowlands of the North Coast. This was the best fit PCT when compared to other PCTs in the OEH Vegetation Types Database. This vegetation type directly aligns to the Subtropical Coastal Floodplain Forest TEC due to the predominance of *Melaleuca* spp. in the mid-storey and its predominant position in the landscape being flow channels and floodplain areas.

Eucalyptus seeana (narrow-leaved red gum) is a dominant in this vegetation type and therefore this type is considered known habitat for the *Eucalyptus seeana* Endangered Population.

Narrow-leaved Red Gum Grey Ironbark Woodland (RGIB)

177.9 hectares of Narrow-leaved Red Gum Grey Ironbark Woodland is located within the Assessment Area, of which 82.1 hectares falls within the Certification Area (43 hectares in Low condition). Other than the vegetation in Low condition, this unit generally displayed good resilience and would regenerate to a remnant state with a reduction in grazing pressure. A discussion on the assessment of Low condition for this and other vegetation units is provided in Section 3.1.

The unit is primarily dominated by *Eucalyptus seeana* (narrow-leaved red gum) and *E. siderophloia* (grey ironbark), associated with *E. propinqua*. The mid-storey is a sparse layer of trees including *Melaleuca nodosa* and *Allocasuarina littoralis*. The shrub layer is largely absent except for occasional *Leucopogon juniperinus* and juvenile over-storey species. The ground cover is dominated by grasses and herbs such as *Echinopogon* spp., *Entolasia* spp., *Oplismenus imbecillus* and *Dichondra repens*.

This unit differs from Narrow-leaved Red Gum - Grey Ironbark - Paperbark Forest and Red Gum Angophora Mahogany Woodland in that it is located in drier substrates away from flow channels and floodplains and lacks the dense mid-storey of these other similar types. On this basis, it is not considered to constitute a part of the Subtropical Coastal Floodplain Forest TEC. This vegetation type is, however, considered a part of the PCT, HU703 Narrow-leaved Red Gum woodlands of the lowlands of the North Coast.

Eucalyptus seeana (narrow-leaved red gum) is a dominant in this vegetation type and therefore this type is considered known habitat for the *Eucalyptus seeana* Endangered Population.

Red Gum Angophora Mahogany Woodland (RG Ang)

22.8 hectares of Narrow-leaved Red Gum Angophora Mahogany Woodland is located within the Assessment Area, all of which falls within the E2 Conservation Area.

The unit is primarily dominated by *Eucalyptus seeana* (narrow-leaved red gum), *Angophora subvelutina* (broad-leaved apple) and *Eucalyptus carnea* (broad-leaved mahogany). The mid-storey is an open layer of trees with dominant species including *Melaleuca nodosa*, *Callistemon salignus*, *Melaleuca styphelioides*, *Casuarina glauca* and *Melaleuca linariifolia*. Common ground covers included *Echinopogon* spp., *Microlaena stipoides, Imperata cylindrica* and *Entolasia* spp.

For the purposes of this report, this vegetation type has been aligned to the PCT, HU703 Narrow-leaved Red Gum woodlands of the lowlands of the North Coast. This was the best fit PCT when compared to other PCTs in the OEH Vegetation Types Database. This vegetation type directly aligns to the Subtropical Coastal Floodplain Forest TEC due to the predominance of *Melaleuca* spp. in the mid-storey and its predominant position in the landscape being flow channels and floodplain areas.

Eucalyptus seeana (narrow-leaved red gum) is a dominant in this vegetation type and therefore this type is considered known habitat for the *Eucalyptus seeana* Endangered Population.

Swamp Oak Forest (SO)

68 hectares of Swamp Oak Forest and associated early regeneration is located within the Assessment Area, of which 3.3 hectares falls within the Certification Area. The condition of this unit varies from intact mature forest to early regeneration with moderate levels of weed infestation. Overall the type exhibits a high level of resilience.

The unit is dominated by a moderately dense canopy of *Casuarina glauca* (swamp oak) with scattered *Melaleuca* spp. Eucalypts are largely absent from this unit except the occasional *Eucalyptus amplifolia* (cabbage gum), *E. resinifera* (red mahogany) and *E. propinqua* (small-fruited grey gum). A mid-storey and shrub layer is largely absent except for immature *C. glauca* and patches of *Parsonsia straminea*. The ground cover is dominated by a mix of moisture loving grasses and herbs such as *Oplismenus* spp., *Carex appressa*, *Dichondra repens*, *Gahnia clarkei* and *Christella dentata*.

This vegetation type has been aligned to the PCT, HU943 Swamp Oak swamp forest. The type is also aligned with the Swamp Oak Floodplain Forest TEC.

Swamp Paperbark Thicket and derived type (PT and DP)

Swamp Paperbark Thicket was largely a derived community resulting from intensive ploughing of the lowland areas (non-assessable retained lands) in the eastern portion of the Draft Structure Plan. A total of 6.6 hectares of this community is found within the Assessment Area, of which 0.8 hectares of the derived type only (DP), falls within the Certification Area. No intact thicket occurs in the Certification Area, however 3.6 hectares of intact thicket (PT) and 2.2 hectares of the derived type (DP) occurs in the Conservation Area.

This is a simplified vegetation type comprised of a dominant shrub-layer of *Melaleuca ericifolia* (swamp paperbark) at varying stages of maturity, depending on when it had last been ploughed. This shrub layer typically had a projective foliage cover of more than 80 per cent and was up to 2.5 metres high at its tallest. Small patches of this community appeared to resemble a remnant form but there is no obvious justification for this. The type is species poor, typically recording less than ten native species per plot. This is likely due to the dominance of *M. ericifolia*. Immature individuals of *Eucalyptus robusta* and *Casuarina glauca* inhabit this type as sporadic occurrences, suggesting that it was once a swamp forest type with *M. ericifolia* dominant in patches in the mid-storey. At the time of the field survey, this type was inundated to an average of 100 millimetres.

As this type is a derived vegetation unit, it was difficult to align it to a Hunter Central Rivers PCT, however the unit was most likely derived from HU591 Paperbark Swamp Forest of the coastal lowlands of the North Coast and Sydney Basin. Despite the poor structural and floristic integrity of the unit, it is considered a modified form of the Swamp Sclerophyll Forest TEC.

Swamp Mahogany Forest

66.9 hectares of Swamp Mahogany Forest falls entirely within the Conservation Area and none occurs in the Certification Area. This unit is largely in good condition within the Assessment Area, having been spared from over-clearing; however it suffers from heavy grazing pressure in places.

The over-storey is primarily dominated by *Eucalyptus robusta* (swamp mahogany), with *E. tereticornis* (forest red gum) and *E. resinifera* (red mahogany) occurring less frequently. The mid-storey is dominated by a dense layer of medium-sized trees with dominant species including *Melaleuca nodosa*, *Callistemon salignus*, *Melaleuca styphelioides*, *Casuarina glauca* and *Melaleuca linariifolia*. The shrub layer is largely absent except for sporadic occurrences of *Breynia oblongifolia*, *Glochidion ferdinandi* and immature over-storey and mid-storey species. The ground cover is dense and generally dominated by *Gahnia clarkei*, *Blechnum indicum* and *Dichondra repens*.

This vegetation type has been aligned to the PCT, HU932 Swamp Mahogany - Flax-leaved Paperbark swamp forest, and forms part of the Swamp Sclerophyll Forest TEC present on the site.

Replanting

45.2 hectares of cleared land will be strategically revegetated with local provenance tube stock. This will include the planting of *Eucalyptus seeana*. Planting within each vegetation type will be conducted at a stems per hectare density as detailed in Table 9. Revegetation will be composed of a variety of vegetation types typical of the adjacent native vegetation. The split of relevant vegetation types is provided in Table 7.

Herbfield

102.5 hectares of Herbfield is located within the eastern part of the Assessment Area and is entirely within an area of non-assessable retained lands. This unit is substantially modified with a moderate cover of weeds, low species richness and low resilience.

Structurally the unit has a high cover of native grasses and herbs no more than 0.2 metres high due to a high level of grazing. Due to the heavy grazing pressure plant identification was difficult, however the unit is dominated by the native grass *Hemarthria uncinata*, with *Chorizandra cymbaria*, *Baumea teretifolia* and *Juncus usitatus* also common. Common weed species included *Paspalum dilatatum* and *Cyperus congestus*. Along with Derived Swamp Paperbark Thicket, this unit is seen as having been heavily impacted by the combination of the alteration of natural flow regimes, heavy ploughing and grazing pressure.

This vegetation type was aligned to the PCT, HU532 Coastal floodplain sedgelands, rushlands and forblands of the North Coast, and is also aligned with the Freshwater Wetland on Coastal Floodplain TEC.

Cleared and exotic

1,427.4 hectares of cleared land exists throughout the Assessment Area, of which 1,406.6 hectares is within the Certification Area. The remaining area of cleared land exists within retained lands. A small area of exotic weed cover has been mapped, 0.6 hectares.

The cleared land is a mixture of native and exotic pastures and herbfields with some regenerating patches of eucalypts. Isolated areas might hold moderate resilience but, on the whole, these areas have been degraded through first clearing, then tilling, pasture improvement and grazing, and therefore hold little or no ecological value.

3.4 Flora

171 plant species were recorded during the field survey, of which 16 were exotic (nine per cent) and 155 were native species (91 per cent). A full list of the flora recorded on-site is provided in Appendix C.

3.4.1 Threatened Flora

Threatened flora (and fauna) recorded during the field surveys are represented in Figure 4. Fauna survey effort

Figure 5 and the distribution of the *Eucalyptus seeana* population is shown in Figure 6.

***Eucalyptus glaucina* (Slaty Red Gum)**

Seven individuals of *Eucalyptus glaucina* (Slaty Red Gum) occurred in the Conservation Area on drier soils along ridge tops, while an additional two specimens were located in retained lands (Riparian). These specimens were confirmed by the presence of buds.

***Corybas dowlingii* (Red Helmet-orchid)**

Corybas dowlingii (Red Helmet-orchid), which is listed as endangered on the TSC Act was recorded within the proposed Conservation Land in the east of the Assessment Area. Previously this species had not been recorded further north than Bulahdelah, approximately 75 kilometres to the south. This is considered a significant record and raises the conservation significance of the Assessment Area. The specimen was confirmed by the National Herbarium of NSW.

***Eucalyptus seeana* (Narrow-leaved Red Gum)**

Previous recordings (Whelans Insites 2009) of *Eucalyptus seeana*, which is listed on the TSC Act as an Endangered Population within the Greater Taree LGA, were confirmed in the Assessment Area by Niche. The species is considered common to dominant in the western portion of the Assessment Area.

Due to the extent and density of the species within the Assessment Area, it was considered necessary to provide a rigorous estimate of the population. This estimate was carried out using the BCAM described in Section 2.3.2.

The population estimates (number of stems) for the Conservation Area and for the Certification Area is provided in Appendix F. *E. seeana* was known to be present in seven of the vegetation types as mapped by Niche (2011).

Table 9 summarises this data for the Biodiversity Certification Assessment Area and provides a population estimate based on these density counts. The population estimate found that 3,215 individuals fall within the Certification Area while 16,160 individuals will be reserved in the E1 and E2 Conservation Areas (including replanting). A further 2,015 individuals are estimated to occur within the retained lands, whilst a further 3,791 individuals are estimated to occur in the West Wallsend Offset and 195 individuals within the Vegetated 10 metre buffer. However, the individuals outside the E1 and E2 Conservation Areas have not been included in the BCAM credit calculations and thus the relative impacts are less than that stated by the credit calculations.

Table 10 shows the number of *E. seeana* replanted within each conservation zone.

Tree health, DBH, presence/absence of tree hollows were not recorded as these attributes were not regarded as necessary for the stem density analysis. However, based on observations during the field assessment, the Conservation Lands generally contain larger and healthier individuals of *E. seeana*, being located in undisturbed forest and in optimal habitat adjacent to the Dawson River, when compared to the Certified lands. The same statement can be made regarding *E. seeana* within the Retained lands, although to a lesser degree.

Table 9. Summary of *E. seeana* population estimate

Vegetation Zone	E. seeana (stems/ha)	Certified Area habitat (ha)	Certified Area stems	Certified Low condition habitat (ha)	Certified Low condition stems	Conservation E1 habitat (ha)	Conservation E1 stems	Conservation E2 habitat (ha)	Conservation E2 stems	Retained Area habitat (ha)	Retained Area stems	Separate Development Offset habitat (ha)	Separate Development Offset stems	Grand Total habitat (ha)	Grand Total stems
Blackbutt Tallowwood Tall Open Forest-Mod/good	22.1	7.06	156	-	-	116.0	2563	-	-	0.5	11.0	-	-	123.6	2730
Grey Gum Stringybark Tallowwood Tall Open Forest-Mod/good	14.9	6.45	95	-	-	164.1	2445	-	-	20.6	306.0	20.7	309	211.9	3155
Narrow-leaved Red Gum Ironbark Woodland-Mod/good	28.4	39.4	995	-	-	78.4	2176	13.2	374	26.5	610.0	8.8	250	166.3	4405
Narrow-leaved Red Gum Ironbark Woodland-Low	2.4	-	-	42.7	103	-	-	-	-	-	-	-	-	42.7	351
Red Gum Angophora Mahogany Woodland-Mod/good	51.5	-	-	-	-	-	-	22.2	1,144	6.6	338.0	34.2	1765	62.9	3247

Vegetation Zone	E. seeana (stems/ha)	Certified Area habitat (ha)	Certified Area stems	Certified Low condition habitat (ha)	Certified Low condition stems	Conservation E1 habitat (ha)	Conservation E1 stems	Conservation E2 habitat (ha)	Conservation E2 stems	Retained Area habitat (ha)	Retained Area stems	Separate Development Offset habitat (ha)	Separate Development Offset stems	Grand Total habitat (ha)	Grand Total stems
Red Gum Grey Ironbark Paperbark Forest-Mod/good	17.2	4.59	79	-	-	197.9	3404	5.9	102	33.3	573.0	-	-	245.4	4221
Red Gum Grey Ironbark Paperbark Forest-Low	17.2			9.5	164	-	-	-	-	-	-	-	-	9.5	164
Spotted Gum Ironbark Forest-Mod/good	14.3	47	648	-	-	198.9	2863	1.0	15	13.2	177.0	99.8	1467	360.0	5170
Spotted Gum Ironbark Forest-Low	9.3	-	-	98.2	975	-	-	-	-	-	-	-	-	98.2	975
Grand Total	177.3	105	1,973	150	1,242	755	13,451	42	1,635	100.6	2,015	164	3,791	1,371.16	**25,535**

NB. Total areas will not correspond to those in other tables as only vegetation types that contain *E. seeana* have been included.

Table 10. *E. seeana* replanting numbers (stem rates as per Table 9)

Replanting strategy and veg type	Conservation E1 habitat (ha)	Conservation E1 stems	Conservation E2 habitat (ha)	Conservation E2 stems	Grand Total habitat (ha)	Grand Total stems
Supplementary planting (RGIB)	-	-	4.4	125	4.4	125
Restoration replanting (FR)	7.8	222	-	-	7.8	222
Restoration replanting (RGIB)	-	-	12.7	360	12.7	360
Restoration replanting (SI)	9.6	141	-	-	9.6	141
Restoration replanting (TG)	15.1	226	-	-	15.1	226
Grand Total	**32.5**	**589**	**17.1**	**485**	**49.6**	**1,074**

3.4.2 Weeds

Remnant and early regeneration areas within the Assessment Area were considered to be in a good resilient condition.

Areas that were not in good condition included:

- Derived Swamp Paperbark Thicket;
- Herbfield;
- Paddocks;
- Tracks; and
- Areas adjacent to canal works.

The common weed species within the Assessment Area were largely associated with these disturbances and included; *Andropogon virginicus, Axonopus ficifolius, Chenopodium album, Cinnamomum camphora, Cirsium vulgare, Conyza* sp., *Cyperus congestus, Hypochaeris radicata, Lantana camara, Paspalum dilatatum, Plantago lanceolata, Rubus ulmifolius, Senecio madagascariensis, Setaria parviflora, Solanum mauritianum* and *Verbena bonariensis*. Two of these species, *Lantana camara* (lantana) and *Rubus ulmifolius* (blackberry) are listed as noxious weeds within the Greater Taree Local Government Area.

3.5 Fauna

3.5.1 Trapping Results

Arboreal Elliot Trapping

The trapping effort resulted in 50 captures across the five sites which is equivalent to 8 per cent trapping success. Animals were trapped at all of the trapping sites (Figure 4).

Three ground dwelling mammal species, Brown Antechinus (*Antechinus stuartii*) Bush Rat (*Rattus fuscipes*) and Black Rat (*Rattus rattus*) were trapped during the surveys. Three

arboreal mammal species were trapped, Common Brushtail Possum (*Trichosurus vulpecula*), Brush-tailed Phascogale (*Phascogale tapoatafa*) and Sugar Glider (*Petaurus breviceps*).

Camera Traps

The vast majority of pictures taken with the camera traps were of cattle, however, overall there were many photos of small mammals. Animals were identified to species level, although for a number of photos this could not be achieved. For example, many of the pictures of rats and antechinus are assumed to be of Bush Rats (*Rattus fuscipes*) and Brown Antechinus (*Antechinus stuartii*) as these were the most common species observed through trapping, however, without having these animals in hand it is not possible to identify them definitively.

Bandicoots were observed at two of the camera trap sites, one in riparian forest and the other in Spotted Gum Grey Ironbark Open Forest. The Bandicoot recorded in the riparian forest is believed to be a Long-nosed Bandicoot (*Perameles nasuta*) as it clearly has large ears and a long snout. The other Bandicoot was much smaller and is believed to be a juvenile. It was not possible to determine the species of this individual. It is possible that it is a Northern Brown Bandicoot (*Isoodon macrourus*). The presence of medium sized ground dwelling mammals such as these is indicative of habitat complexity and confirms observations that the site is in moderate to good condition.

Positive identifications from the camera traps included Red-necked Wallaby (*Macropus rufogriseus*), Common Brushtail Possum (*Trichosurus vulpecula*), Common Ringtail Possum (*Pseudocheirus peregrinus*), Long-nosed Bandicoot, Domestic Cow and Red Fox (*Vulpes vulpes*).

Hair Tubes

Hair was recovered at all of the sites at which hair tubes were installed. Three mammal species were recorded with definite certainty; the introduced House Mouse (*Mus musculus*), Feral Cat (*Felis catus*) and Brushtail Possum (*Trichosurus sp*). It is not possible to distinguish between the hairs of Common Brushtail Possum (*Trichosurus vulpecula*) and Mountain Brushtail Possum (*Trichosurus caninus*), however, it is considered likely that the hairs were from the Common Brushtail Possum given the number of observations of this species within the Assessment Area. Species recorded with probable certainty included Feathertail Glider (*Acrobates pygmaeus*) and Swamp Rat (*Rattus lutreolus*).

3.5.2 Species Recorded

A total of 107 animal species were recorded during the field surveys, including 84 native birds, 13 native mammals, six introduced mammals and four frog species.

Eleven species listed on either the TSC or EPBC Acts were recorded from within the study area during the current surveys (see Figure 9):

- Varied Sittella (Vulnerable TSC Act);
- Little Lorikeet (Vulnerable TSC Act);
- Scarlet Robin (Vulnerable TSC Act);
- Masked Owl (Vulnerable TSC Act);
- Black-necked Stork (Endangered TSC Act);

- Comb-crested Jacana (Vulnerable TSC Act);
- Brush-tailed Phascogale (Vulnerable TSC Act);
- Koala (Vulnerable TSC Act);
- Grey-headed Flying-fox (Vulnerable TSC and EPBC Acts);
- Cattle Egret (Migratory EPBC Act); and,
- Great Egret (Migratory EPBC Act).

The following species listed on the TSC and/or EPBC Acts have been previously recorded from the study area:

- Glossy Black-cockatoo (Vulnerable TSC Act);
- Square-tailed Kite *Lophoictinia isura* (Vulnerable TSC Act);
- Powerful Owl (Vulnerable TSC Act);
- Squirrel Glider (Vulnerable TSC Act);
- Little Bentwing-bat *Miniopterus australis* (Vulnerable TSC Act);
- Eastern Bentwing-bat *Miniopterus schreibersii oceanensis* (Vulnerable TSC Act);
- Yellow-bellied Sheath-tailed Bat *Saccolaimus flaviventris* (Vulnerable TSC Act);
- East-coast Freetail Bat *Mormopterus norfolkensis* (possible) (Vulnerable TSC Act);
- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (possible) (Vulnerable TSC Act);
- Greater Broad-nosed Bat *Scoteanax rueppellii* (possible) (Vulnerable TSC Act);
- Large-footed Myotis *Myotis macropus* (possible) (Vulnerable TSC Act);
- Australian Wood Duck (Migratory EPBC Act);
- Pacific Black Duck (Migratory EPBC Act);
- Black-shouldered Kite (Migratory EPBC Act);
- Whistling Kite (Migratory EPBC Act);
- Wedge-tailed Eagle (Migratory EPBC Act);
- Nankeen Kestrel (Migratory EPBC Act); and,
- White-throated Needle-tail (Migratory EPBC Act).

In total, 20 threatened species (TSC and/or EPBC Act) and nine migratory species (EPBC Act) have been recorded from the study area. Of the threatened species, four were microchiropteran bat species that were recorded with only "possible" certainty.

3.5.3 Habitat Descriptions

Open Forest

Tree hollows of various sizes are present within this forest type providing refuge for a wide variety of vertebrates. There are some large trees with hollows (>200 mm) suitable for large forest owls. Eucalypts within the forest canopy provide direct (foliage, nectar) and indirect (invertebrates) foraging for a range of vertebrate species, particularly birds and arboreal mammals.

Although the ground layer has been disturbed by the impacts of grazing in many areas, leaf litter, fallen logs and debris are scattered throughout the open forest of the study area at varying densities. These important microhabitats provide refuge and foraging for a range of small mammals, birds, reptiles and amphibians. In isolated areas such as Trap Site 1 there is a heavy coverage of lantana in the mid storey and ground cover.

Angophora subvelutina (broad-leaved apple), *Eucalyptus amplifolia* (cabbage gum), *E. grandis* (flooded gum), *E. microcorys* (Tallowwood), *E. propinqua* (small-fruited grey gum), *E. robusta* (swamp mahogany), *E. seeana* (narrow-leaved red gum), *Eucalyptus tereticornis* (forest red gum) and *Lophostemon confertus* (brush box) are present at varying densities within the open forest of the study area. All of these species are listed as either primary or secondary Koala feed tree species for the north coast bioregion in the Koala Recovery Plan (DECC 2008).

Bird diversity within the large tracts of open forest is good. Invasive native species such as the Noisy Miner (*Manorina melanocephala*) were observed only on the edges of the larger patches and did not appear to be overabundant or occur away from forest edges. Species most commonly recorded within this habitat type included: Yellow-faced Honeyeater (*Lichenostomus chrysops*), Eastern Yellow Robin (*Eopsaltria australis*), Brown Thornbill (*Acanthiza pusilla*), Grey Fantail (*Rhipidura albiscapa*), Golden Whistler (*Pachycephala pectoralis*) and Laughing Kookaburra (*Dacelo novaeguineae*). Threatened bird species recorded in this habitat type included: Varied Sittella (*Daphoenositta chrysoptera*), Little Lorikeet (*Glossopsitta pusilla*) and Masked Owl (*Tyto novaehollandiae*).

Swamp Sclerophyll Forest

This forest type had relatively fewer large hollow bearing trees than the open forest types, although some *Eucalyptus robusta* had small hollows. The ground layer vegetation has been affected by grazing, although *Gahnia* appeared unaffected, thus the ground cover remains relatively dense providing refuge for a range of vertebrates such as small mammals, birds and reptiles. Important microhabitats such as leaf litter, fallen logs and debris are common throughout this habitat type.

Canopy trees such as *Casuarina* spp., *Melaleuca* spp. and *Eucalyptus* spp. provide direct (foliage, nectar) and indirect (invertebrates) foraging for a range of vertebrate species, particularly birds, bats and arboreal mammals. Numerous Grey-headed Flying-foxes were observed utilising this habitat type. No evidence of a Flying-fox colony was observed throughout the study area. It is likely that individuals are exploiting the abundance of foraging resources (nectar) and travelling from a nearby colony external to the study area.

Bird diversity within this forest type is good, species most commonly recorded in this habitat type included: White-browed Scrubwren (*Sericornis frontalis*), Yellow-faced Honeyeater, Lewin's Honeyeater (*Meliphaga lewinii*), Yellow Thornbill (*Acanthiza nana*), Eastern Yellow Robin, Noisy Friarbird (*Philemon corniculatus*) Grey Fantail and Brown Thornbill.

Derived Swamp Paperbark Thicket

This derived *Melaleuca ericifolia* (swamp paperbark) thicket covers a large portion of the study area. It is very dense and structurally homogenous. Native bird species recorded utilising this habitat type included edge specialists such as Superb Fairy Wrens (*Malurus cyaneus*), Grey Fantails and Australian Magpies (*Cracticus tibicen*).

Small linear stands of *Casuarina glauca* are scattered throughout the thicket landscape providing some refuge, for native bird species. Species observed utilising these small patches included Mistletoebird (*Dicaeum hirundinaceum*), Golden Whistler and Yellow-

faced Honeyeater. The threatened Scarlet Robin (*Petroica boodang*) was recorded from this habitat type.

There are a number of man-made drainage channels bordering areas of this vegetation type. These provide some limited habitat for common native amphibians and indirect foraging (invertebrates) for bird species.

Sedgeland

This habitat type consists of a wet seepage area with native sedges and exotic pasture grasses. There are pools of stagnant water up to 10-15 cm deep. This area is heavily affected by grazing, although it does provide habitat for native amphibians such as the Common Eastern Froglet (*Crinia signifera*), exotic mammals such as house mice (*Mus musculus*) and birds that specialise in open or edge environments such as raptors and butcherbirds.

Wetland

Two large dams are present within the study area providing foraging and refuge for a number of species of water birds. Species recorded using these dams included: Black Swan (*Cygnus atratus*), Great Egret (*Ardea Alba*), Grey Teal (*Anas gracilis*), Pacific Black Duck (*Anas superciliosa*), and two species listed as threatened under the NSW TSC Act, the Black-necked Stork (*Ephippiorhynchus australis*) and Comb-crested Jacana (*Irediparra gallinacea*).

3.5.4 Threatened Fauna

The relatively high diversity of animal species within the study area is considered to be a reflection of the quality and heterogeneity of habitat available. There are habitat opportunities for a range of fauna within the study area. Measures to improve the vegetation condition such as removal of grazing would be beneficial to a range of local threatened and non-threatened animal species.

A total of 57 species listed on either the TSC or EPBC Acts as threatened or migratory species or their habitat have been previously recorded from within 10 km of the study area. This section of the report discusses the local occurrence of these species and the likelihood of occurrence within the study area of species not recorded during the current study.

Bats – Grey-headed Flying Fox, Eastern Bentwing Bat, Little Bentwing Bat, Eastern Freetail Bat, Large-eared Pied Bat Greater Broad-nosed Bat, Golden-tipped Bat

Numerous individual Grey-headed Flying-foxes were recorded from within the study area. No evidence of a Flying-fox colony was observed within the study area. It is likely that individuals are exploiting the abundance of foraging resources on site from a colony located outside the study area.

Only one individual microchiropteran bat was captured during the surveys. The lack of captures is likely to be related to time of year and conditions during the surveys. It is considered highly likely that microchiropteran bat diversity is high in the study area, given the habitat heterogeneity, potential roosting structures (tree hollows) and invertebrate diversity.

The Eastern Bentwing Bat, Large-eared Pied Bat and Little Bentwing Bat are obligate cave dwelling species (Churchill 2008) and if present, would only utilise the site for foraging.

The Eastern Freetail Bat and Greater Broad-nosed Bat were not recorded within the study area, although they are considered likely to occur and could potentially utilise hollows within the study area for roosting.

The Golden-tipped Bat has not been recorded from the study area. This species has a highly specialised diet and roosting requirements, requiring Yellow-throated Scrubwren or Brown Gerygone nests for roosting (Churchill 2008). This species most often roosts in wet forest or rainforest gullies, although it has also been recorded from casuarina dominated riparian forests and coastal melaleuca forest (Churchill 2008). The Swamp Sclerophyll forest types within the study area could provide potential habitat for this species.

Arboreal Mammals – Brush-tailed Phascogale, Squirrel Glider, Koala, Yellow-bellied Glider

One individual Brush-tailed Phascogale was trapped during the surveys in open forest.

No Squirrel Gliders were recorded from within the study area. The closely related sugar glider was recorded calling during a spotlighting survey, and the species was trapped within open forest at Trap Site 3. Squirrel Gliders are much less vocal than Sugar Gliders and are rarely detected by call. Two Individual gliders were observed whilst spotlighting and a glider responded to a Squirrel Glider call during call-playback surveys, but it is not possible to definitively distinguish the two species without having them in hand. Given that Squirrel Gliders have been previously recorded in close proximity to the study area (Whelans Insites 2009), it is considered likely that they also occur within the study area.

No Individual Koalas were recorded from within the study area during the surveys, although evidence of their presence (scats) was observed and previous surveys have detected their presence on site (Whelans Insites 2009). This species has been recorded many times in habitat to the west and southwest of the study area. It is likely that individuals from the local population utilise the study area at least on a transient basis. *State Environmental Planning Policy No. 44 - Koala Habitat Protection* (SEPP 44) is addressed below.

The Yellow-bellied Glider is not considered likely to occur within the study area. This species prefers tall wet sclerophyll forest on high nutrient soils.

Terrestrial Mammals – Spotted-tailed Quoll, Long-nosed Potoroo, Brush-tailed Rock Wallaby, Parma Wallaby

The Spotted-tailed Quoll was not recorded from within the study area, but has been recorded within the locality. The habitat within the study area is considered suitable for this species.

The Long-nosed Potoroo, Parma Wallaby and Brush-tailed Rock Wallaby are not considered likely to occur within the study area.

Woodland Birds – Powerful Owl, Grass Owl, Masked Owl, Sooty Owl, Barking Owl, Bush Stone-curlew, Varied Sittella, Little Lorikeet, Square-tailed Kite, Scarlet Robin, Spotted Harrier, Little Eagle, Hooded Robin, Glossy Black Cockatoo, Black-chinned Honeyeater, Painted Honeyeater, Regent Honeyeater, Swift Parrot

The Little Lorikeet was recorded from within the study area and is known to be highly nomadic (NSW Scientific Committee 2009a). It is not known how the individuals are using the site (i.e., roosting, foraging). There are numerous suitable tree hollows which this species could utilise for nesting, and abundant forage.

The Varied Sittella was recorded from two locations within the study area (Figure 9). This species is sedentary in nature (NSW Scientific Committee 2010e) and is likely to be relatively common within the study area.

The Scarlet Robin was recorded in the derived swamp paperbark thicket within the study area. It is unknown if this species breeds within the study area.

Although not detected, the Hooded Robin is considered likely to occur within the study area at least on a transient basis.

The Masked Owl was recorded in open forest from three separate parts of the study area. Given that this species has average territory size of 500 – 1000 hectares (Kavanagh and Murray 1996) it is considered likely that the study area comprises only one pair's territory. These individuals were not recorded within or adjacent to the Certification Area.

The Grass Owl is not considered likely to occur within the study area given the lack of preferred habitat (long grass) as a result of grazing impacts. The removal of grazing from the study area would improve habitat availability for the Grass Owl.

The Powerful Owl has been previously recorded in the western section of the study area. The Sooty Owl and Barking Owl could potentially occur within the study area as suitable habitat exists.

Foraging habitat for the Little Eagle, Spotted Harrier and Square-tailed Kite is considered to be present within the study area, and these species are considered likely to occur, although they were not detected.

The Glossy Black-cockatoo is considered likely to occur within the study area as there was abundant suitable foraging habitat in the form of Allocasuarina and many suitable tree hollows for breeding.

The Regent Honeyeater, Painted Honeyeater and Swift Parrot are highly nomadic species and could potentially utilise foraging resources within the study area on a seasonal basis.

Migratory Birds – Great Egret, Cattle Egret, White-bellied Sea-eagle, Satin Flycatcher, Black-faced Monarch, Rufous Fantail, Rainbow Bee-eater, Spectacled Monarch, Fork-tailed Swift, Latham's Snipe, Australian Painted Snipe

Both the Cattle Egret and Great Egret were recorded from the study area, and are likely to be relatively common in suitable habitat such as dams, seepage and wet paddocks in and around the study area. The remaining migratory species are considered to potentially occur within the study area at least on a transient basis.

Wetland Birds – Comb Crested Jacana, Black-necked Stork, Magpie Goose

Both the Comb-crested Jacana and the Black-necked Stork were recorded from a dam/wetland within the study area. It is unknown if either species breeds within the study area. The Magpie Goose may utilise wetland habitats within the study area on a transient basis.

Habitat for the Comb-crested Jacana and the Black-necked Stork is restricted to the two large dams within the study area and the open areas subject to periodic inundation (cleared riparian areas, and Herbfield and Derived Swamp Paperbark Thicket). All these areas fall with Retained lands within the study area.

Amphibians – Wallum Froglet, Green-thighed Frog, Giant Barred Frog, Stuttering Frog, Green and Golden Bell Frog

No threatened frog species were recorded from within the study area.

The Wallum Froglet occurs in coastal acid paperback swamps (DEC 2005). The study area is considered to contain marginal potential habitat in sections of swamp sclerophyll forest.

Habitat for the Green-thighed Frog includes ephemeral streams within open forest. The habitat within the study area is not considered likely to sustain a population of this species given the lack of preferred habitat.

It is considered unlikely that the Giant Barred Frog or the Stuttering Frog would occur within the study area given the lack of preferred breeding habitat in the form of permanent streams.

The Green and Golden Bell Frog is considered unlikely to occur within the study area as existing local populations are predominantly coastal.

Reptiles – Stephen's Banded Snake

Stephen's Banded Snake was not recorded from within the study area, although this species is highly cryptic and difficult to detect. Spotlighting is the only survey that was undertaken for this species. The open forest habitat within the study area is considered to be suitable for this species.

3.5.5 SEPP 44

State Environmental Planning Policy No. 44 – Koala Habitat Protection aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline:

a) By requiring the preparation of plans of management before development consent can be granted in relation to areas of core Koala habitat; and
b) By encouraging the identification of areas of core Koala habitat; and
c) By encouraging the inclusion of areas of core Koala habitat in environment protection zones.

A number of criteria in the SEPP are to be considered during an assessment of potential Koala habitat. These criteria are set out and assessed below.

1. Does the policy apply? Does the subject land occur in a Local Government Area (LGA) identified in Schedule 1?

The subject site occurs in the Greater Taree LGA, which is listed under Schedule 1 of the SEPP.

2. Is the landholding to which the DA applies greater than 1 hectare in area?

Yes.

3. Is the land potential Koala habitat? Does the site contain areas of native vegetation where the trees of types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component?

The subject site contains forest red gum *Eucalyptus tereticornis*, grey gum *Eucalyptus punctata* and swamp mahogany *Eucalyptus robusta* which are listed as Koala feed tree species on Schedule 2 of the SEPP. Within the subject site each of these species are dominant in their relevant vegetation types and would represent at least 15% or more of the total number of trees in the upper or lower strata.

4. Is the land core Koala habitat?

Under the SEPP ***core Koala habitat*** means an area of land with a resident population of Koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.

Whilst it is clear that the Greater Taree LGA supports a healthy and viable population of Koala, three recent fauna surveys only detected one individual of the species within the subject site, and this record did not represent a juvenile or breeding female. This individual was recorded within a small patch of Grey Gum Stringybark Tallowwood Tall Open Forest within a large isolated patch of vegetation in the centre of the western part of the property (see Figure 9). Numerous Koalas have been recorded within the Conservation Area and immediately adjacent to the study area (current study and Whelans Insites 2009). Therefore, despite the dominance of Koala feed tree species within the study area, it is considered unlikely that the Certified Area represents core Koala habitat as defined in SEPP 44.

Conclusion

Although the Certification Area is unlikely to contain core habitat for Koalas, as defined by SEPP 44, the adjacent Conservation Area does. Therefore, a plan of management for this species should be prepared.

3.5.6 Corridor Values

The Assessment Area contains a regional and sub-regional corridor as mapped by OEH. Regional corridors are primary landscape corridors which provide potential residential and dispersal habitat for many species (Scotts 2003). Preserving these corridors is important for regional conservation planning and helping to reverse historical species declines. Almost all of the regional corridor that occurs within the Brimbin property will be protected within the Conservation Area, which adds significance to the importance of the offset package.

The Lower Manning Valley regional wildlife corridor runs through the southern part of the site and connects extensive areas of vegetation east and west of the Assessment Area. There is a gap in this corridor at Lansdowne Road in the southern-central part of the property which would limit the value of the corridor for some native species such as small and medium ground-dwelling mammals. However, this gap would be replanted as part of the offset package, significantly improving the east-west connectivity within the locality. The broader corridor is considered to be highly valuable for biodiversity within the region given the links between important habitats and the suite of rare or threatened species that are known to occur, and this will be improved further by the replanting.

The Lower Manning Valley sub-regional wildlife corridor connects vegetation in the south of the Assessment Area to vegetation outside of the Assessment Area and over the Dawson River to west.

All riparian areas within the Draft Structure Plan are only local biodiversity links, as defined in the second to last point above, and have been buffered by 50 metres to form potential additions to the Conservation Area that are currently being excluded from this assessment as retained lands.

4 RED FLAGS

Under Biodiversity Certification, red flags are areas that cannot simply be offset by the retirement of biodiversity credits in order to achieve an Improve or Maintain outcome for biodiversity. Red flags include:

- Highly cleared vegetation types (70 per cent or greater);
- Endangered or critically endangered ecological communities as listed on the TSC or EPBC Acts, and are not in Low condition as defined in the BCAM;
- Threatened species (TSC Act only) that are classed as not being able to withstand further loss in the CMA;
- Land that is mapped or defined as a state or regional biodiversity link in accordance with section 3.7.2 of the BCAM ;
- A riparian buffer 40 metres either side of a major river on the coast and tablelands or 100 m either side of a major river on the western slopes and plains;
- A riparian buffer 30 metres either side of a minor river or major creek on the coast and tablelands or 60 metres either side of a minor river or major creek on the western slopes and plains;
- A riparian buffer 20 metres either side of a minor creek on the coast and tablelands or 40 m either side of a minor creek on the western slopes and plains; and
- Areas listed as a SEPP 14 wetland.

All riparian areas within the Assessment Area have been buffered by at least the riparian buffer distance noted above for Red Flags (i.e. no riparian buffer red flags are impacted) or, if they are vegetated beyond this buffer distance, the width of the adjacent vegetation. These riparian areas form additional conservation zones that are currently being withheld from the assessment as retained lands. No SEPP 14 land is present in the study area and none of the vegetation types within the Certified Area are highly cleared vegetation types as defined in the Biometric Vegetation Types database.

Further, the red flag for the *Eucalyptus seeana* Endangered Population has not been triggered due to the more appropriate local data (MALD) assessment in Appendix F of this Assessment Report. A MALD assessment is part of the BCAM that allows you to remove the red flag status of a species or community based on local data. By demonstrating that a species can "withstand temporary loss" its red flag status can be removed. For *E. seeana* there were previously only 50 known records from the LGA (the Endangered Population), but following the ecology surveys for the Brimbin project it is now know that there are more than 25,000 within the Brimbin property alone and, therefore, an even greater numbers in the LGA as a whole. Based on this "local data" the MALD assessment concludes that the *E. seeana* Endangered Population is capable of withstanding a temporary loss and will be suitably offset through the retirement of species credits.

Habitat for both Koala and Brush-tailed Phascogale will be impacted by the development, however a red flag is not triggered for either of these species.

Therefore, the following three EECs constitute the red flag issues that fall within the Certification Area:

1. The Swamp Sclerophyll Forest EEC (0.8 hectares);

2. The Subtropical Coastal Floodplain Forest EEC (3.3 hectares); and
3. The Swamp Oak Floodplain Forest EEC (3.3 hectares).

A further 10.8 hectares of Subtropical Coastal Floodplain Forest exists within the Certification Area as BCAM 'Low' condition and therefore doesn't meet the definition of a red flag.

Table 11 outlines the process that must be followed in order to demonstrate that the development of the site achieves an 'improve or maintain' outcome for biodiversity values (the 'improve or maintain test') in relation to its potential impact on red flags.

In order to answer yes to Criteria 1b), and therefore achieve an 'improve or maintain' outcome, the criteria for a red flag variation must be addressed. These criteria are provided in Section 2.4 of the BCAM and are fully addressed in Section 3.3 of the Biodiversity Certification Strategy.

Table 11. Improve or maintain test using the BCAM

Improve or maintain criteria (must answer YES to all three criteria)	YES	NO	Comment
1a) The development does not impact on the red flag, **or** 1b) The Director General has made a determination that the development does not impact on the red flag as per Section 2.4 of the BCAM	Possible		1a) is not satisfied and, therefore, to address 1b) justification must be presented to OEH using the criteria in Section 2.4 of the BCAM that the development will not impact on red flags
2. The direct impacts on the red flag are offset in accordance with the rules of Section 10 of the BCAM	Possible		Credit calculations described in detail in Section 5 of this Assessment Report and summarised in Section 4 of the Strategy).
3. The indirect impacts on the red flag are appropriately minimised in accordance with Section 6 of the BCAM	Possible		Indirect impacts have been minimised and residual incorporated into credit calculations. Section 3.7 of the Strategy addresses indirect impacts.

5 BIODIVERSITY CERTIFICATION CREDIT CALCULATIONS

5.1 Landscape value assessment

The screen-shot on the page 45 shows the landscape value scores from the Calculator given the values used for native vegetation cover, connectivity and the Adjacent Remnant Area. The landscape score calculations were conducted within a single 8,000 hectare circle for both the whole of the Assessment Area (Figure 9) and whilst the Certification Area does not impact on any biodiversity links, the Conservation Area will preserve a regional biodiversity link along the Dawson River in the western part of the site.

Native vegetation cover will be reduced by 259 hectares. Within a 8,000 hectare circle this represents only 3.2 per cent of the cover which falls within the 41-50 percentile both before and after certification (Greater Hunter vegetation mapping used to estimate cover percentile). The native vegetation of the Assessment Area is well-connected to more than 501 hectares of moderate-good condition vegetation and this is the same in both the Certification Area (i.e., the land to be certified) and the Conservation Area (i.e., the land to be offset), of which a total of 998.4 hectares will be conserved.

The result of the landscape assessment was a value of 10 for the Certification Area and 18.75 for the Conservation Area.

5.2 Vegetation Zone Assessment

The vegetation zones as listed in Table 6 and 7 were the inputs at the second stage of the Calculator. For this, the vegetation formation and class were required to be known and this is why Appendix A has been included.

One of the complications of moving from the previously utilised *BioBanking Assessment Methodology* (BBAM) to the BCAM has been the alignment of revised Biometric Vegetation Types (BVTs) with the new Plant Community Types (PCTs) as used in the BCAM.

An alignment of the parent vegetation types as mapped by Niche with PCTs, EECs and red flag vegetation greater than 70 per cent cleared and vegetation formations and classes (Keith 2004) is provided in Appendix A. The alignment between the vegetation types mapped by Niche and those of previous studies at Brimbin are presented in Appendix B.

5.2.1 Management scores for indirect impact zones

Management scores for indirect impact vegetation zones were manipulated to reflect that edge effects were likely to be the only unmitigated indirect impact and yet even these would subject to a management regime. Accordingly partial loss was assumed for three of the site attributes; Native Ground Cover Grasses, Native Ground Cover Other and Exotic Plant Cover. No loss of management score was assumed for the other seven attributes which are considered likely to be wholly unaffected in the indirect impact zone (e.g., mature native tree will be retained and therefore no loss was assumed for Native Overstorey Cover).

5.2.2 Management scores for replanting zones

Management scores for replanting vegetation zones were manipulated to reflect that, through management of these areas, full gain in biodiversity value would be achieved over time in relation to all attributes other than the Number of Trees with Hollows, for which it is unlikely that improvement would occur in the immediate future (though, in reality may occur in perpetuity). For example, management scores were optimised for Native Over-storey Cover and the reason given, 'Improvement through replanting' and for Exotic Plant Cover, 'Improvement through weed management'.

5.2.3 Management scores for direct impact zones

The default decrease in site score was accepted for all other impacted vegetation zones (i.e., direct impacts associated with removal of biodiversity habitat).

5.2.4 Impacts subject to credit requirement

Impacts are categorised as direct or indirect as described in DECC (2007), which states:

> *"**Direct impacts** are those that directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.*
>
> ***Indirect impacts** occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development."*

The direct impacts of the proposal can be classified as four key and unavoidable impacts on threatened biodiversity and its habitat:

1. The removal of native vegetation (direct impact).
2. The removal of part of the *Eucalyptus seeana* Endangered Population (direct impact).
3. The removal of habitat for Koala (direct impact).
4. The removal of habitat for Brush-tailed Phascogale (direct impact).

These four impacts cannot be avoided or mitigated against and therefore must be offset.

Indirect impacts likely to occur as a result of the Brimbin development include edge effects, deleterious hydrological changes, sedimentation and erosion, weed invasion and increased human activity within or directly adjacent to sensitive habitat areas. Other than

edge effects, each of these indirect impacts would be fully mitigated through the implementation of on-site management actions.

Furthermore indirect impacts will be absorbed through the following:

- ❒ The riparian buffers in retained lands;
- ❒ Lands to be added to the conservation area between the boundary roads and the offset lands once the former is defined by future engineering and structure plans;
- ❒ Replanting of the conservation area in selected locations; and
- ❒ Local street scape planting and retaining of native vegetation in the certified area where possible.

Edge effects

Edge effects are an indirect impact and relate to how ecological interactions are altered along the edge between two adjacent and competing land uses, in this case the zone between the proposed Certified Area, the E1 and E2 Conservation Areas and also the retained areas that will act as informal conservation areas. Such edge effects invariably result in an altered microclimate (light, heat and moisture) which can lead to a reduction in the resilience of native bushland, potential for weed invasion, potential for increased grazing of stock and altered predator-prey relationships. In respect to the mitigation of potential edge effects on site, stock will be removed, the conservation area fenced and public access will be minimised through the construction of a perimeter road in addition to a 10 metre buffer around the all areas of retained vegetationand the Conservation E1 and E2 Areas. Therefore, including private lot set backs the buffer would be effectively 20 to 25 metres. It is envisaged that this would contribute substantially to the management of uncontrolled human, pet and vehicle access into the adjacent Conservation Area and provide immunity from the consequences of edge effects.

Given the substantial buffer area, of which 10 metres will be fully revegetated along the boundary of the western E1 Conservation Area, and the mitigation measures listed above, it is anticipated that the only un-mitigated edge effect will be a minor level of weed invasion as a result of the altered microclimate and rubbish dumping by residents. Predator-prey relationships are unlikely to be exacerbated any more than currently exist on the site and it is anticipated that weed invasion would be limited to a few minor annual herbaceous weeds with, at worst the potential for some invasion of perennial exotic grasses within two or three metres of the disturbance edge. Current weed invasion within remnant vegetation within the Assessment Area generally doesn't extend more than 10 metres from an edge. Therefore, a 10 metre buffer was selected to absorb the impacts from herbaceous weed invasion and rubbish dumping. This 10 metre buffer for edge effects is considered more than adequate given mitigation, through an on-site weed management program, will prioritise weed invasion along the development edge and the exclusion zone created by the fencing of the Conservation Area would likely incorporate the buffer (i.e., in reality form a component of the Conservation Area).

Landscape Value Assessment

Done

calculate landscape value score

Assessment Circle Number / Name: BrimbinCircle

CMA Subregion

	Before certification	After certification	Size of assessment circle (certified areas) (ha circle)	Area of land as an offset in the assessment area (ha)	Size of assessment circle (offset area) (ha circle)
% Native Vegetation Cover in 1000ha Circle:	41-50%	41-50%	8000	998.4	8000

Connectivity Value

The land proposed to be certified impacts on a

Nil

The land proposed for an offset in the assessment area includes a

Regional biodiversity link

Adjacent Remnant Area (hectares)

The land proposed to be certified

501 **(ha)**

The land proposed as an offset

501 **(ha)**

Landscape value score

Certification area

10

Offset area

18.75

Status: Completed

Add Assessment Circle

Delete this Assessment Circle

5.3 Threatened Species Assessment

An assessment was completed for species requiring survey under the BCAM. Appendix E is a list of the threatened fauna predicted to occur in the PCTs at the site. These species are offset by the Ecosystem Credits generated within the Conservation Area.

Threatened species requiring survey as determined by the Calculator are discussed in Section 2.4.

Threatened species recorded within the Assessment Area that also generate Species Credits include the following:

- Brush-tailed Phascogale and Koala – 82.5 hectares of habitat in the Certification Area and 904.3 hectares of habitat in the Conservation Area;
- *Corybas dowlingii* (Red Helmet-orchid) – a single record in the Conservation Area;
- *Eucalyptus glaucina* (Slaty Red Gum) – seven records from the Conservation Area, as well as two records from the retained lands (riparian); and
- *Eucalyptus seeana* (Narrow-leaved Red Gum) – an estimated 3,215 individuals in the Certification Area and 16,160 individuals will be reserved in the E1 and E2 Conservation Areas (including replanting). A further 2,015 individuals are estimated to occur within the retained lands, 3,791 individuals are estimated to occur within the West Wallsend Offset and 195 individuals within the Vegetation 10 metre buffer.

Although the Black-necked Stork and Comb-crested Jacana were recorded from the study area, their habitat only occurs within the retained lands so species credits are not considered further for these two species.

The information as presented above is used in the third stage of the Calculator to determine the Species Credits required and those generated. Areas of habitat were determined by an examination of the appropriate vegetation types within the Assessment Area, including low-lying cleared areas for Black-necked Stork and Comb-crested Jacana.

The area of habitat within the Certification Area and Conservation Area for each of the two threatened fauna species was calculated as per Table 12 (Koala and Brush-tailed Phascogale). More habitat exists for each of these species within the non-assessable retained lands.

Table 12. Area of assessable habitat for Koala and Brush-tailed Phascogale (arboreal mammals)

Niche Veg Code	Niche Veg Type	Certification Area (ha)	Conservation Area (ha)
BT	Blackbutt Tallowwood Tall Open Forest	1.6	115.7
FG	Flooded Gum Brush Box Tall Forest	0	7.0
TG	Grey Gum Stringybark Tallowwood Tall Open Forest	4.7	141.5
RGIB	Narrow-leaved Red Gum Ironbark Woodland	32.1	89.4
RG Ang	Red Gum Angophora Mahogany Woodland	0	22.9
RGIB Mel	Red Gum Grey Ironbark Paperbark Forest	3.1	207.5
SI	Spotted Gum Ironbark Forest	39.4	188.7

SM	Swamp Mahogany Forest	0	66.9
SO	Swamp Oak Forest	1.6	64.7
	Total	**82.50**	**904.30**

5.4 Assessment Summary

The following section summarises the credits required from the Certification Area and the credits generated from the Conservation Area. Table 13, 14 and 15 should be referred to in relation to this section.

5.4.1 Ecosystem credits

Table 13 is a summary of the credit status from PCT through to Keith Class level. A deficit in credits exists for a single PCT, HU763 Tallowwood – Spotted Gum – Grey Gum grassy tall open forest (a deficit of 904 ecosystem credits). Impacts to all other eight PCTs can be fully offset on a like-for-like basis. The proposal has an overall surplus of 4,619 Ecosystem Credits.

Application of offset variation rules to Ecosystem Credits

Step 1. IBRA bioregion

The entirety of the Assessment Area and the conservation measures proposed are in the same IBRA bioregion (NSW North Coast).

Step 2. Ecosystem Credit status at vegetation class level

Under the offsetting rules of the BCAM, the shortage of 904 Ecosystem Credits for HU763, can be offset by the surpluses for either HU511 Blackbutt - Tallowwood dry grassy open forest (975 credits available) or HU762 Tallowwood - Small-fruited Grey Gum - Kangaroo Grass grassy tall open forest (1,645 credits available), as both of these PCTs occur in the same Keith Vegetation Class as HU763; Northern Hinterland Wet Sclerophyll Forests. Referring to Table 13, for the purposes of this assessment, retirement of the 904 ecosystem credit deficit for HU763 has occurred against the 975 ecosystem credit surplus for HU511, thereby reducing the credit surplus for HU511 to 71 credits. Thus the credit requirement for HU763 is reduced to 0 and therefore impacts to this PCT are considered to be offset.

Step 3. Ecosystem Credit status at vegetation formation level

Impacts to vegetation types within the Certified Area have been fully offset at PCT and Keith Class level and therefore offsetting at Keith Formation level is not required.

Minor variation to offsetting rules

Impacts to vegetation types within the Certified Area have been fully offset at PCT and Keith Class level and therefore a minor variation to the offsetting rules is not required.

Table 13. Ecosystem Credit status

Code	PCT name abbreviated	Class	Formation	Certified Area (ha)	Credits required	E2 Offset Area (ha)	E2 Credits (25%)	E1 Offset Area (ha)	E1 Credits (100%)	PCT Credit Status (Total)	Credit Status after class level retirement
HU934	Cabbage Gum - Forest Red Gum - Flax-leaved Paperbark Floodplain Forest	Coastal Floodplain Wetlands	Forested Wetlands	0	0	0	0	9.7	87	87	87
HU943	Swamp Oak swamp forest	Coastal Swamp Forests	Forested Wetlands	3.3	95	0	0	64.7	734	639	639
HU591	Paperbark swamp forest	Coastal Swamp Forests	Forested Wetlands	0.8	11	0	0	5.8	57	46	46
HU932	Swamp Mahogany - Flax-leaved Paperbark swamp forest	Coastal Swamp Forests	Forested Wetlands	0	0	0	0	66.9	802	802	802
HU703	Narrow-leaved Red Gum woodlands	Coastal Valley Grassy Woodlands	Grassy Woodlands	96.0	2,083	62.6	132	276.3	3,260	1,309	1,309
HU783	Flooded Gum - Brush Box - Tallowwood mesic tall open forest	North Coast Wet Sclerophyll Forests	Wet Sclerophyll Forests	0	0	7.0	20	0	0	20	20
HU511	Blackbutt - Tallowwood dry grassy open forest	Northern Hinterland Wet Sclerophyll Forests	Wet Sclerophyll Forests	7.0	140	0	0	116.6	1,115	975	71
HU762	Tallowwood - Small-fruited Grey Gum - Kangaroo Grass grassy tall open forest	Northern Hinterland Wet Sclerophyll Forests	Wet Sclerophyll Forests	6.4	181	0	0	179.3	1,826	1,645	1,645
HU763	Tallowwood - Spotted Gum - Grey Gum grassy tall open forest	Northern Hinterland Wet Sclerophyll Forests	Wet Sclerophyll Forests	145.5	3,135	1.0	3	208.5	2,228	-904	0
	Totals			**259**	**5,645**	**70.6**	**155**	**927.8**	**10,109**	**4,619**	**4,619**

(Shading used to indicate Keith Class alignment)

5.4.2 Species credits

The following species credits are required for the development:

1. *Eucalyptus seeana* (45,929 credits);
2. Koala (2,171 credits); and
3. Brush-tailed Phascogale (1,650 credits).

The Strategy demonstrates that the Conservation Areas can more than adequately offset each of these three species (80,706 credits created for *Eucalyptus seeana* and 5,426 credits created for both Koala and Brush-tailed Phascogale).

Table 14 shows that, subject to approval of the MALD assessment (Appendix F), *Eucalyptus seeana* can be more than adequately offset through the retirement of species credits purely within the proposed E1 Conservation Area. Niche have calculated that a further 3,180 species credits can be created for *Eucalyptus seeana* through the conservation of an additional 2,120 individuals within the proposed E2 Conservation Area, including replanting (25 per cent of full credit generation), and a further 3,534 credits generated for planting of 584 *E. seeana* in E1 Conservation areas. Therefore, the full suite of conservation measures in both E1 and E2 areas will generate 87,420 *Eucalyptus seeana* species credits.

Neither *Corybas dowlingii* nor *Eucalyptus glaucina* are impacted by the proposed development and therefore no offsetting of these species is required.

Table 14. Species Credit status (balance) – threatened flora

Species	Listing status (NSW)	No on land to be certified	Number of credits required for certification	Red flagged	No on land under offset (E1 only)	Number of credits created for offset	Status of Species Credits (Flora)
Eucalyptus glaucina Slaty Red Gum	V	0	0	No	7	42	42
Eucalyptus seeana Narrow-leaved Red Gum	EP (Taree LGA)	3,215	45,929	No	13,451 *	80,706	34,777
Corybas dowlingii Red Helmet Orchid	E	0	0	No	1	6	6

** Stems conserved in E1 remnant areas only. Additional 3,534 credits generated for planting of 584 E. seeana in E1 areas (refer to Table 10) and a further 3,180 credits can be generated through the conservation and replanting of 2,120 individuals in E2 areas.*

Two threatened fauna recorded within the Assessment Area are not predicted in ecosystem credits on the site and therefore retirement of species credits is required for each of these species. These species are the Brush-tailed Phascogale and Koala. The assessable area of habitat is used to calculate the species credits required and created for threatened fauna.

As is evident from Table 15, an excess of species credits is generated for both the Brush-tailed Phascogale and Koala.

Table 15. Species Credit status (balance) – threatened fauna

Species	Listing status (NSW)	Certified area of habitat (ha)	Number of credits required for certification	Red flag ged	Conservation area of habitat (ha)	Number of credits created for offset	Status of Species Credits (Fauna)
Phascogale tapoatafa Brush-tailed Phascogale	V	82.5	1,650	No	904.3	5,426	3,776
Phascolarctos cinereus Koala	V	82.5	2,171	No	904.3	5,426	3,275

6 CONCLUSION

This report has described the natural environment of the Assessment Area and how the developments within it will achieve an 'improve or maintain' outcome for biodiversity outcomes as required by the BCAM (DECCW 2011).

Ecosystem and species credit calculations using the Biodiversity Certification Credit Calculator have shown that, subject to approval of red flag variations for three EECs (Swamp Sclerophyll Forest, Subtropical Coastal Floodplain Forest and Swamp Oak Floodplain Forest) and approval of the MALD Assessment for the *Eucalyptus seeana* Endangered Population (Appendix F), retirement of ecosystem and species credits will achieve an improved outcome from the conferral of Biodiversity Certification on the Brimbin Draft Structure Plan.

A *Biodiversity Certification Strategy* has been prepared to describe the conservation measures proposed and also provide a justification in relation to impacts on red flags through an address of the red flag criteria.

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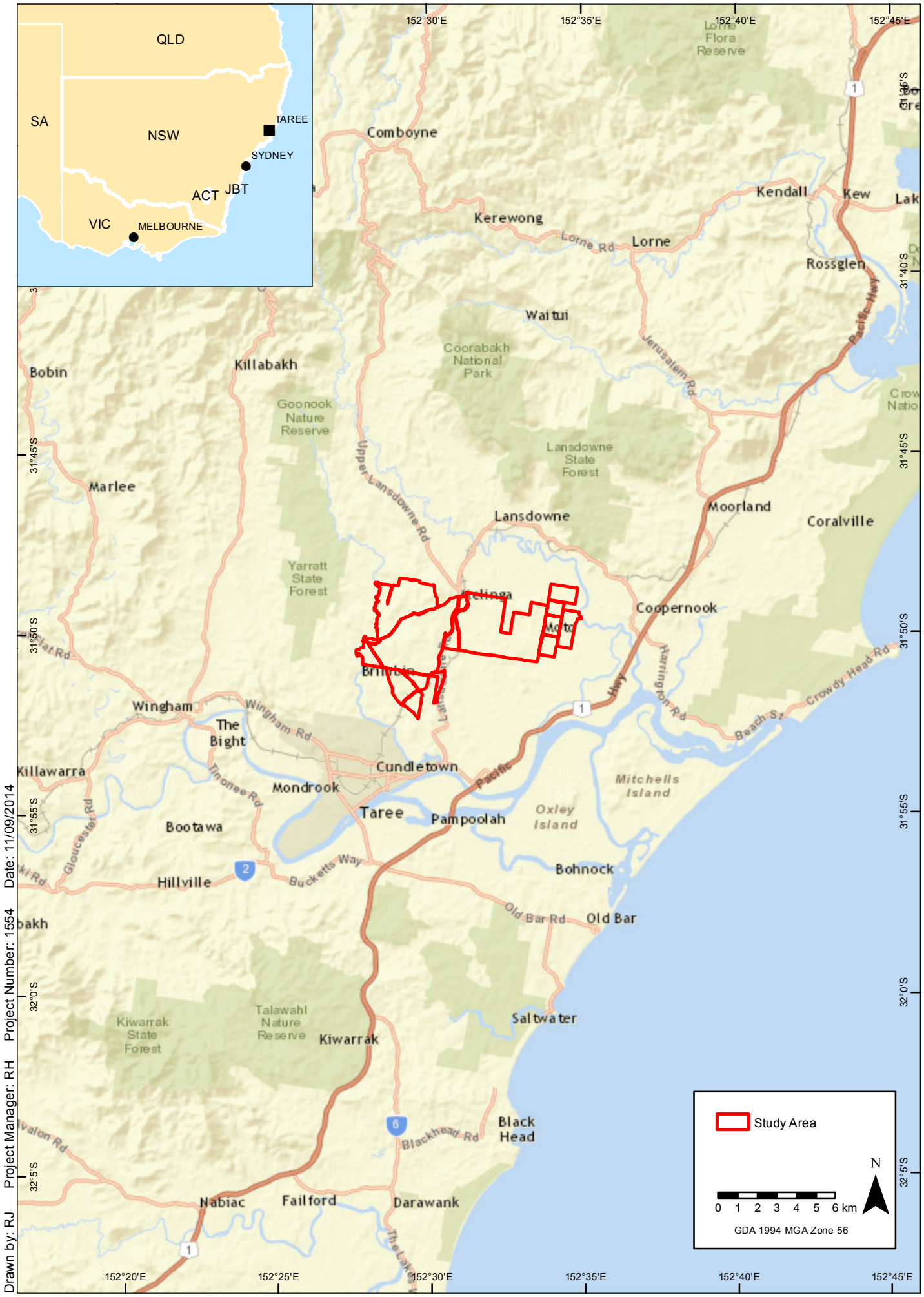
FIGURES



Location of the Biodiversity Certification Assessment Area

Brimbin Biocertification Assessment

FIGURE 1

niche Environment and Heritage

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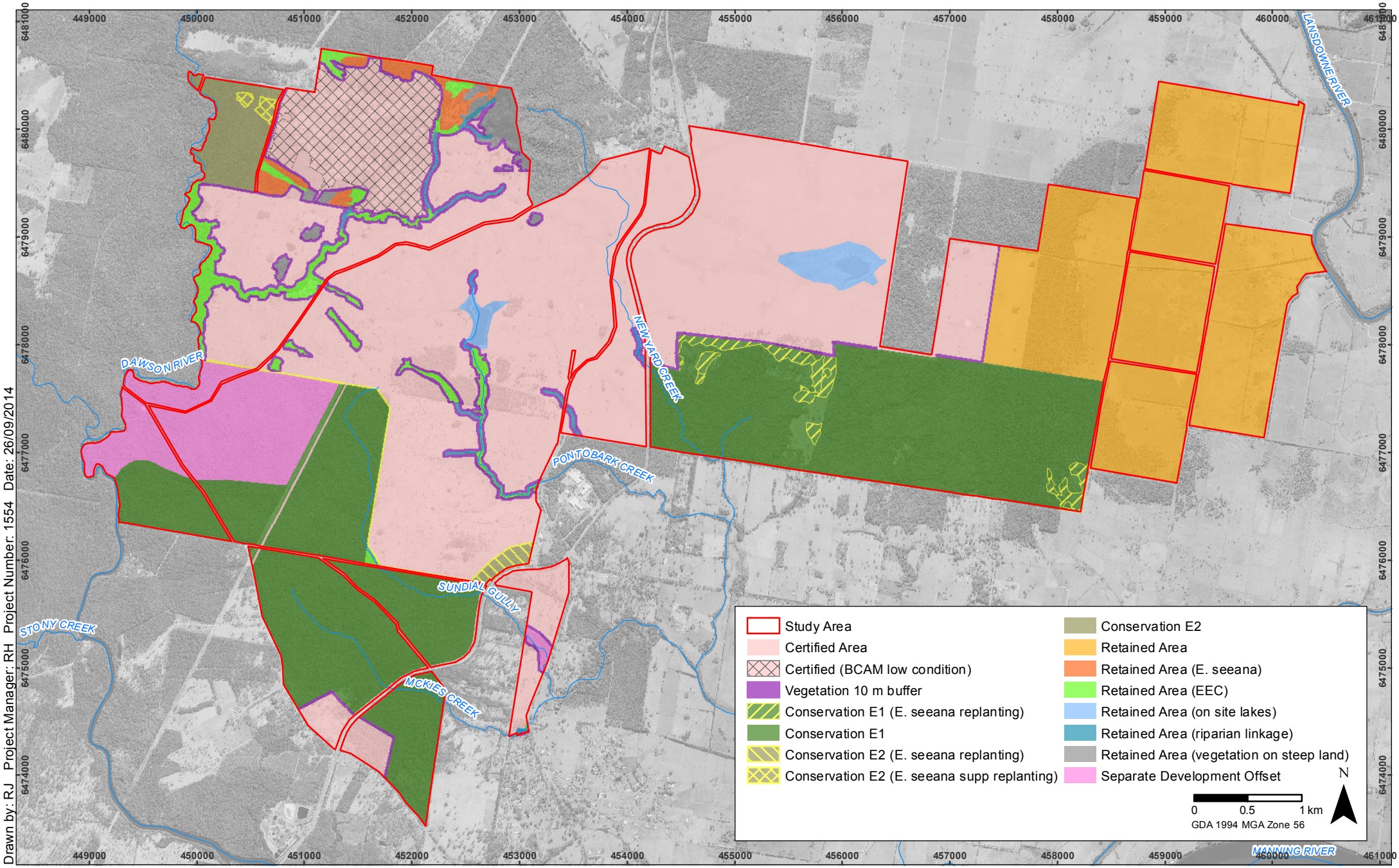

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Biodiversity Certification Assessment Area

Brimbin Biocertification Assessment

FIGURE 2

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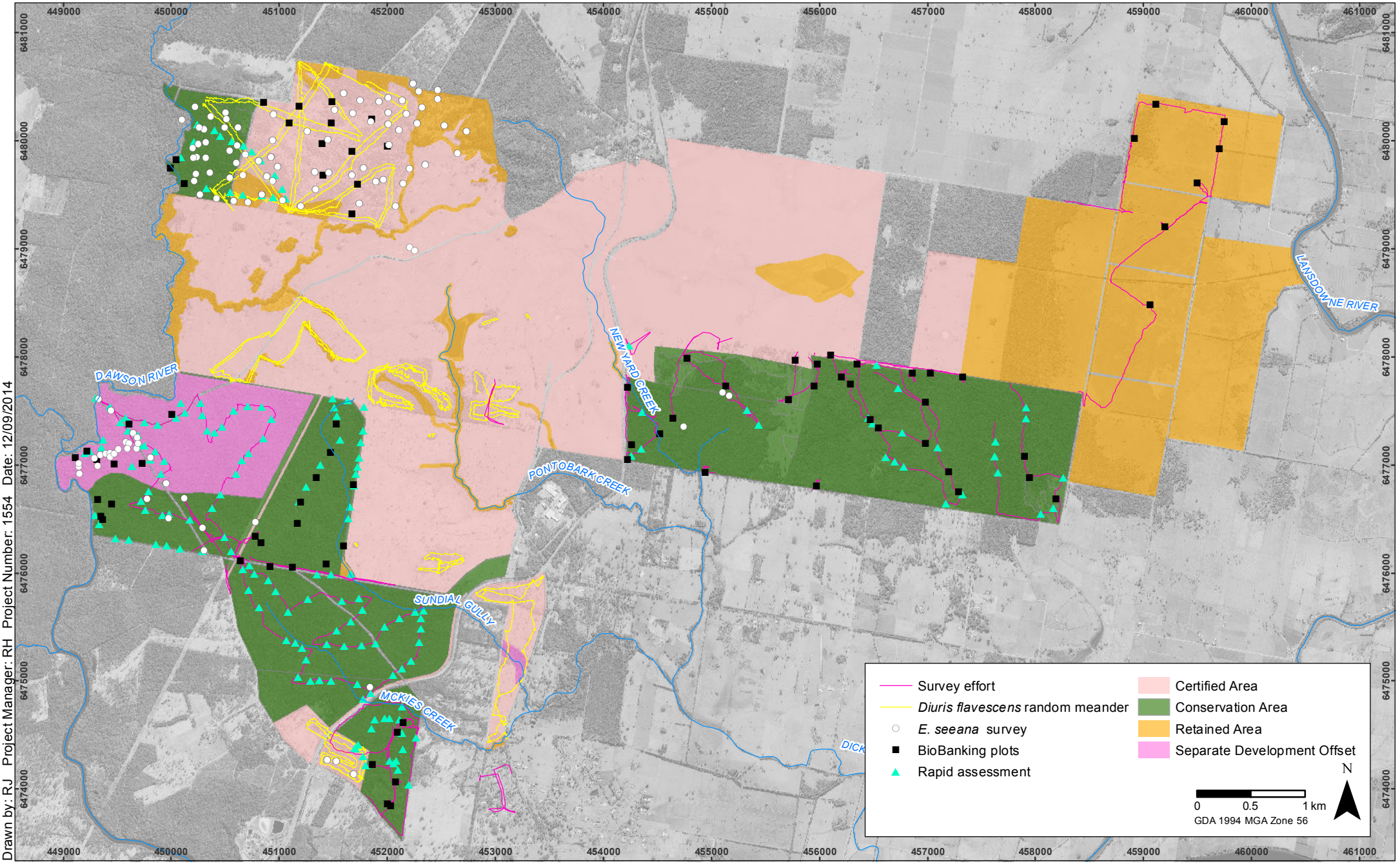

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Flora survey effort

Brimbin Biocertification Assessment

FIGURE 3

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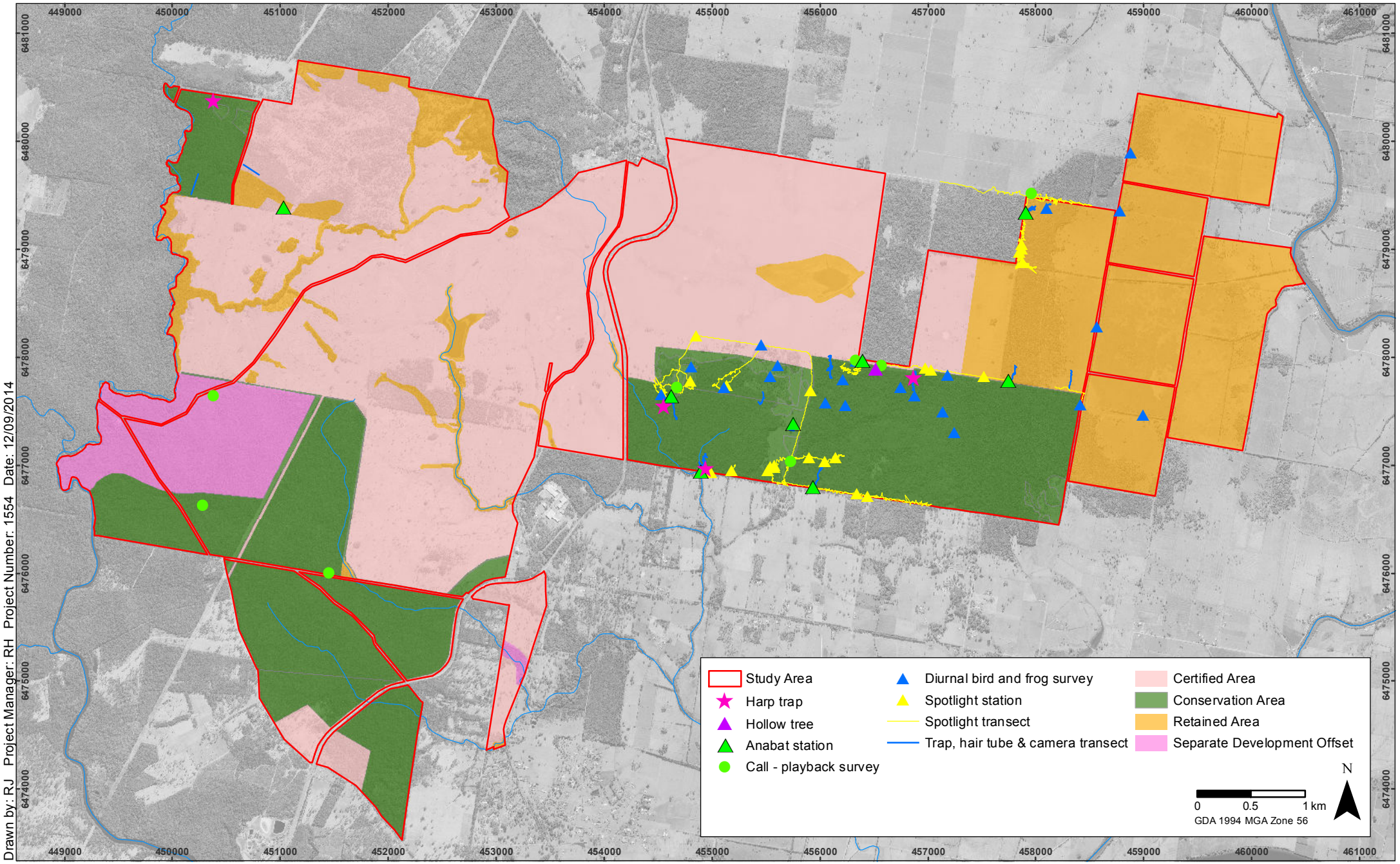

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Fauna survey effort

Brimbin Biocertification Assessment

FIGURE 4

niche Environment and Heritage

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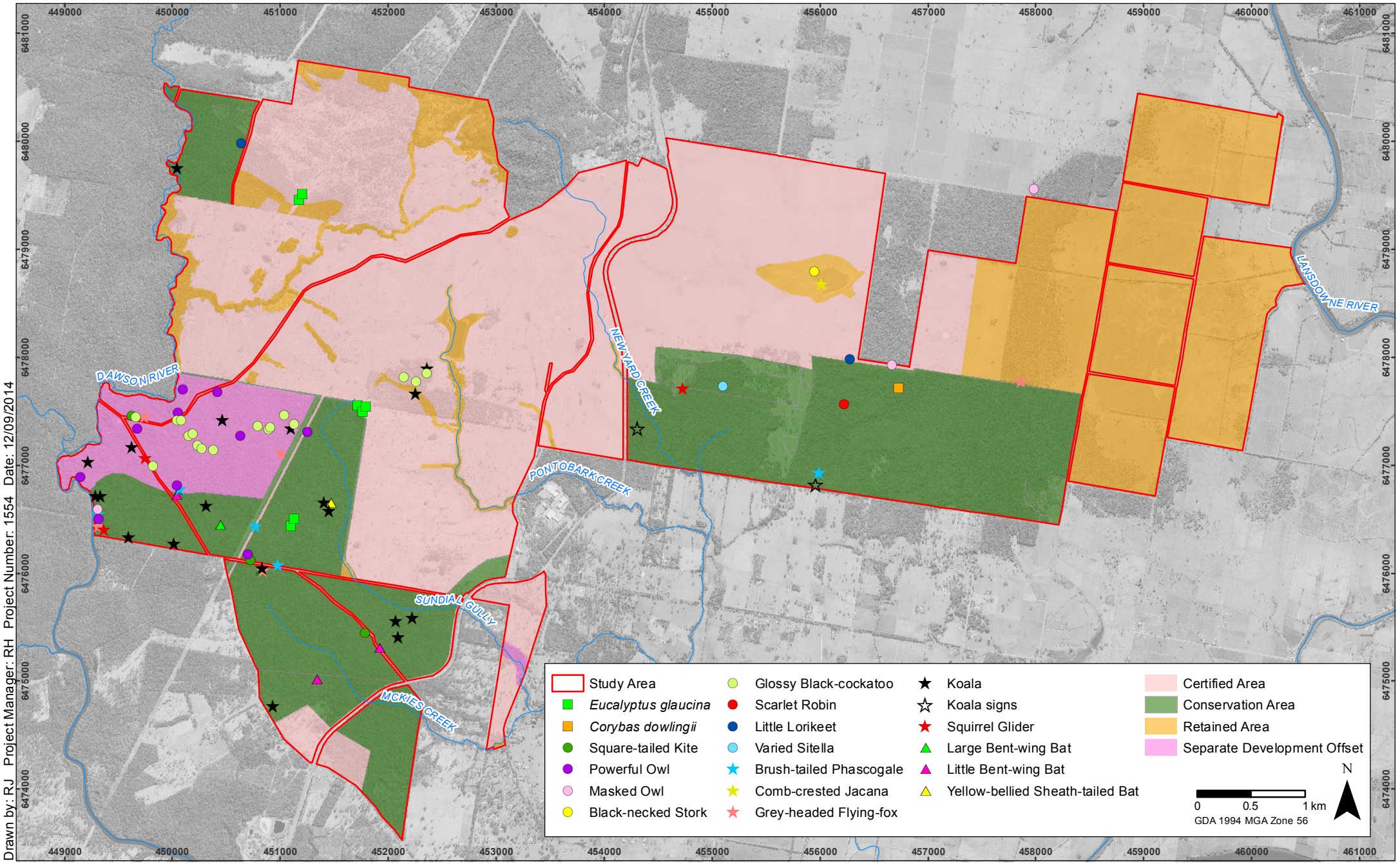


Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 12/09/2014

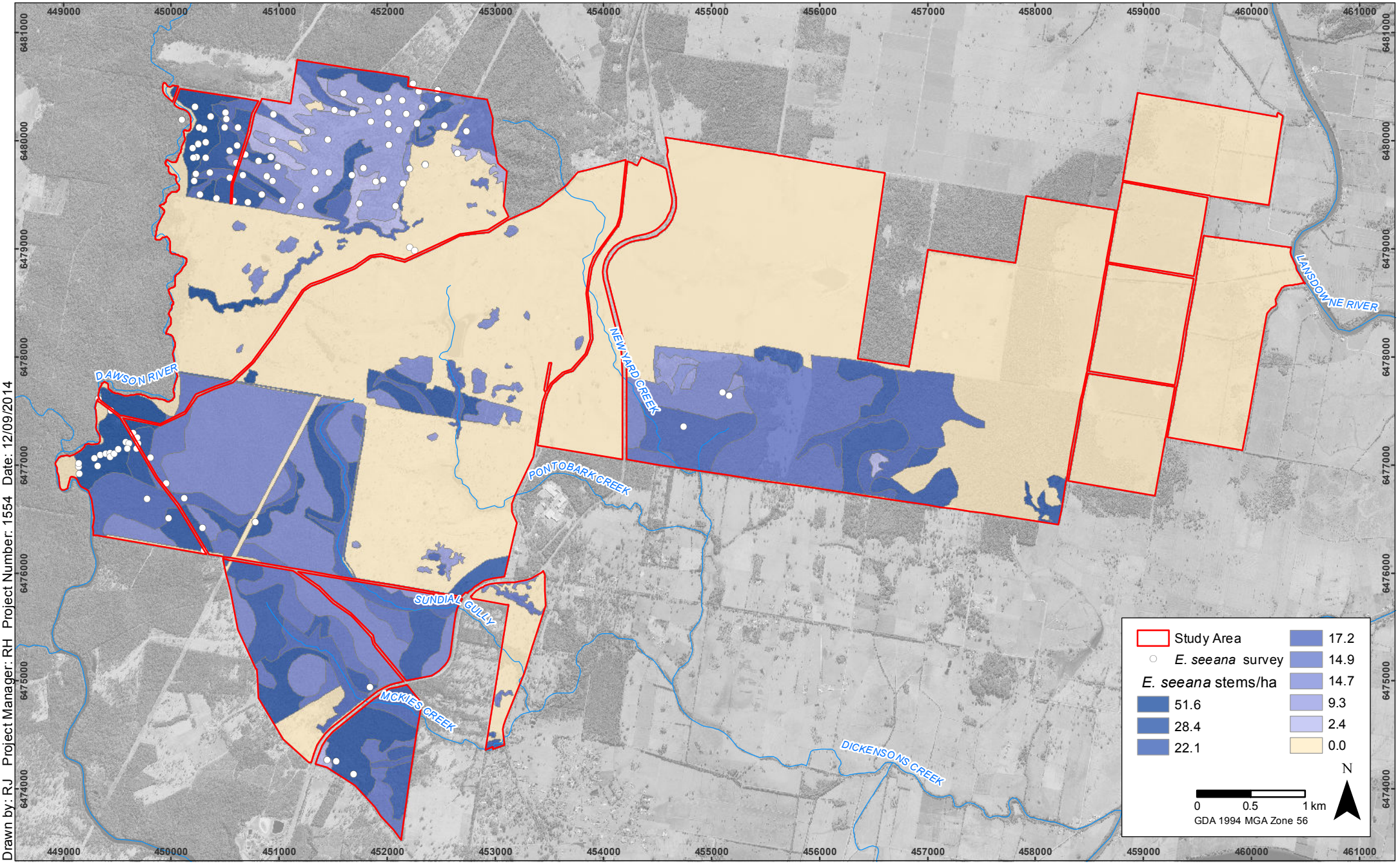
Threatened flora and fauna located during survey

Brimbin Biocertification Assessment

FIGURE 5

niche Environment and Heritage

Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_5_OnsiteThreatFF.mxd



Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 12/09/2014

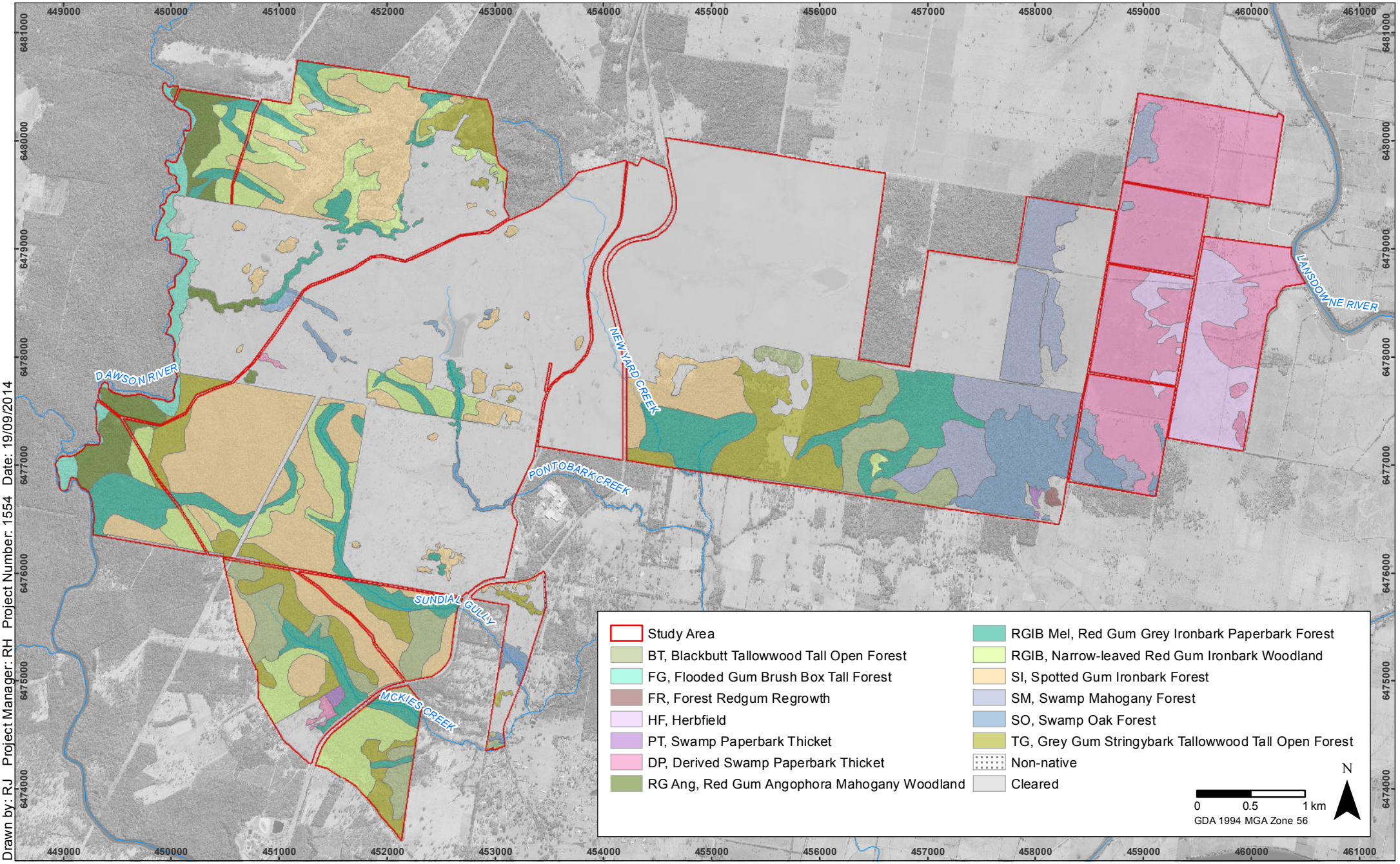
Eucalyptus seeana calculated stem density

Brimbin Biocertification Assessment

FIGURE 6

niche Environment and Heritage

Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_6_SeeanaStems.mxd



Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 19/09/2014

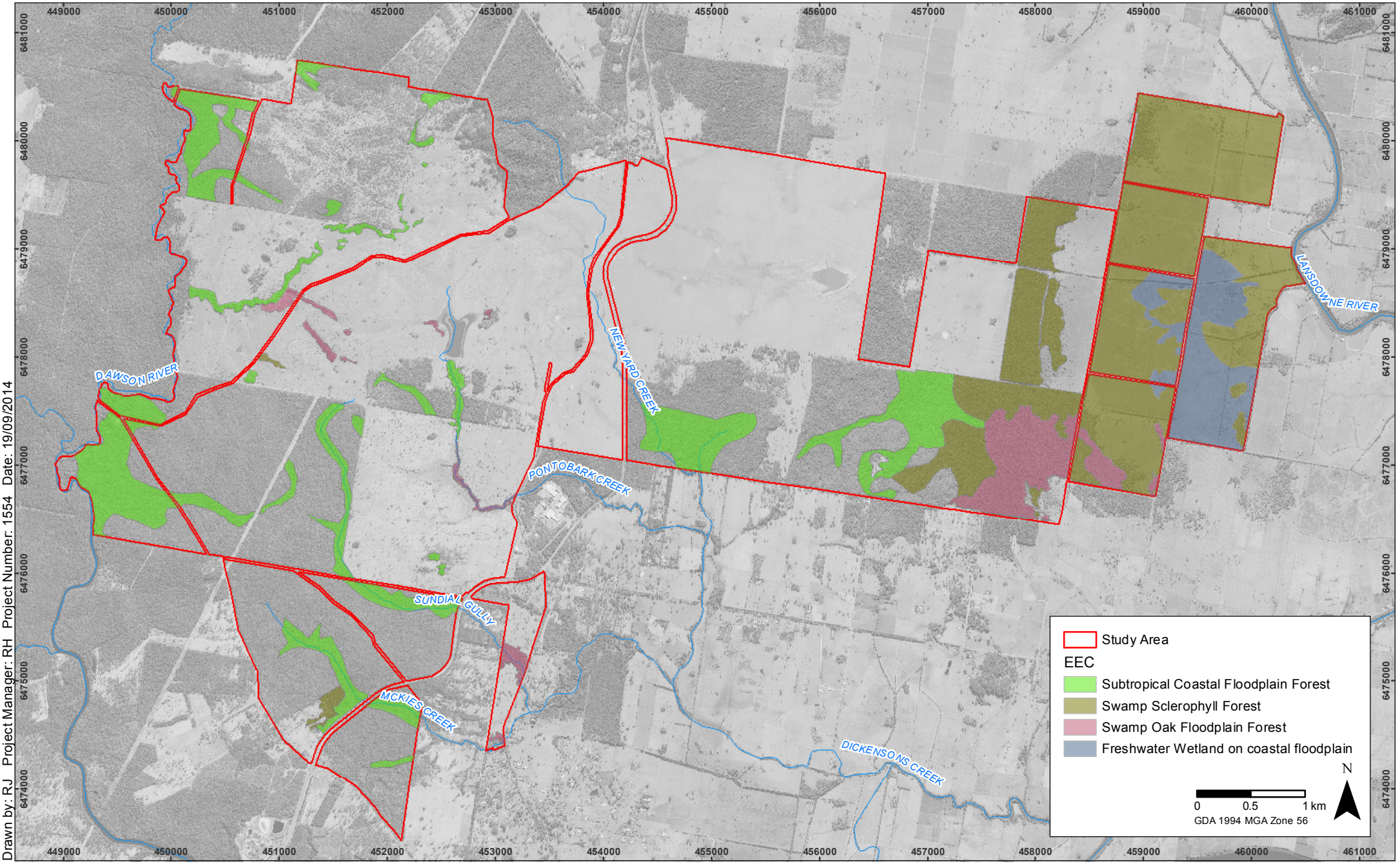
Vegetation mapping (Niche 2011)

Brimbin Biocertification Assessment

FIGURE 7

niche Environment and Heritage

Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_7_Vegetation.mxd



Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 19/09/2014

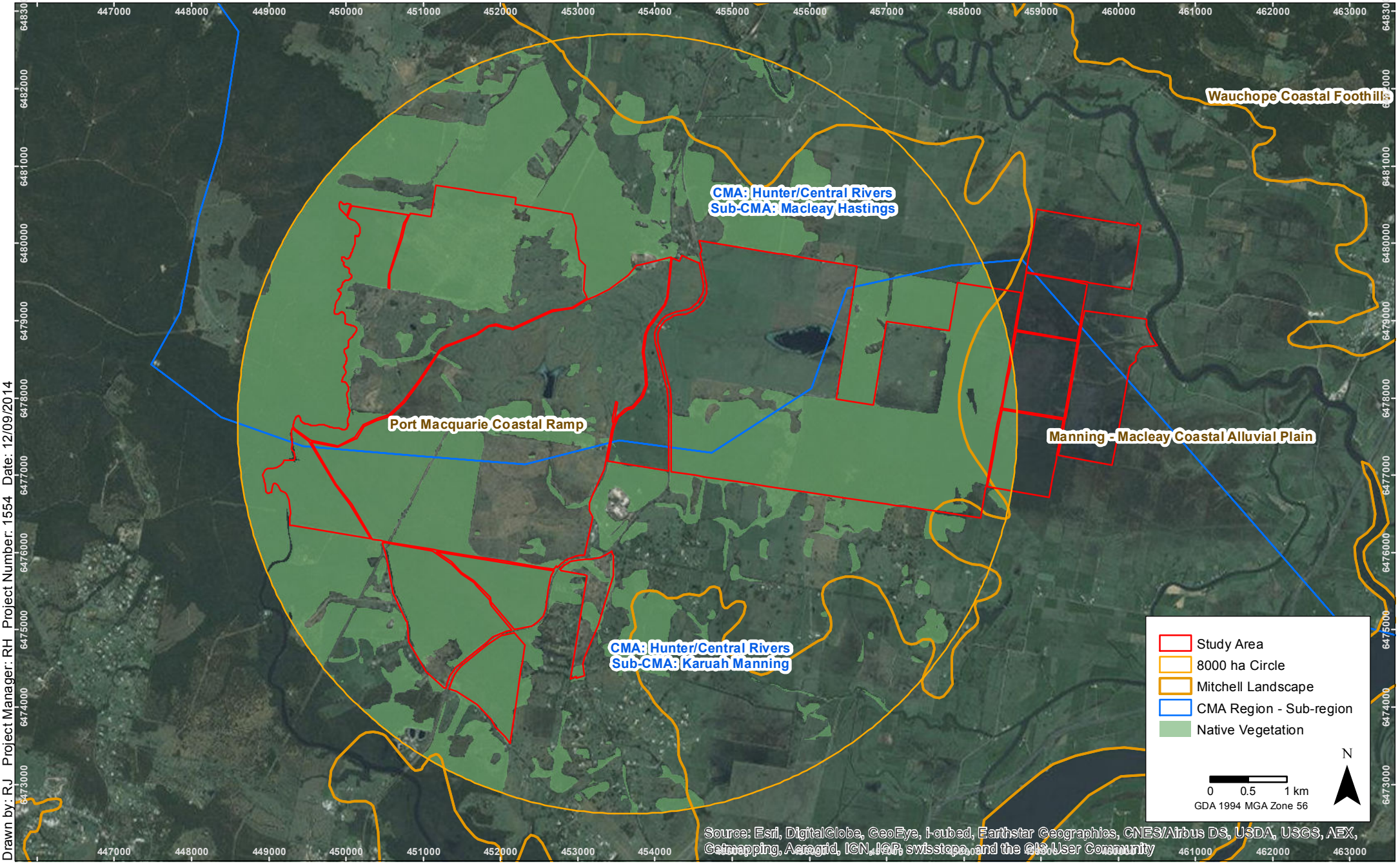
Endangered Ecological Communities

Brimbin Biocertification Assessment

FIGURE 8

niche Environment and Heritage

Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_8_EEC.mxd



Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 12/09/2014

Landscape and connectivity assessment

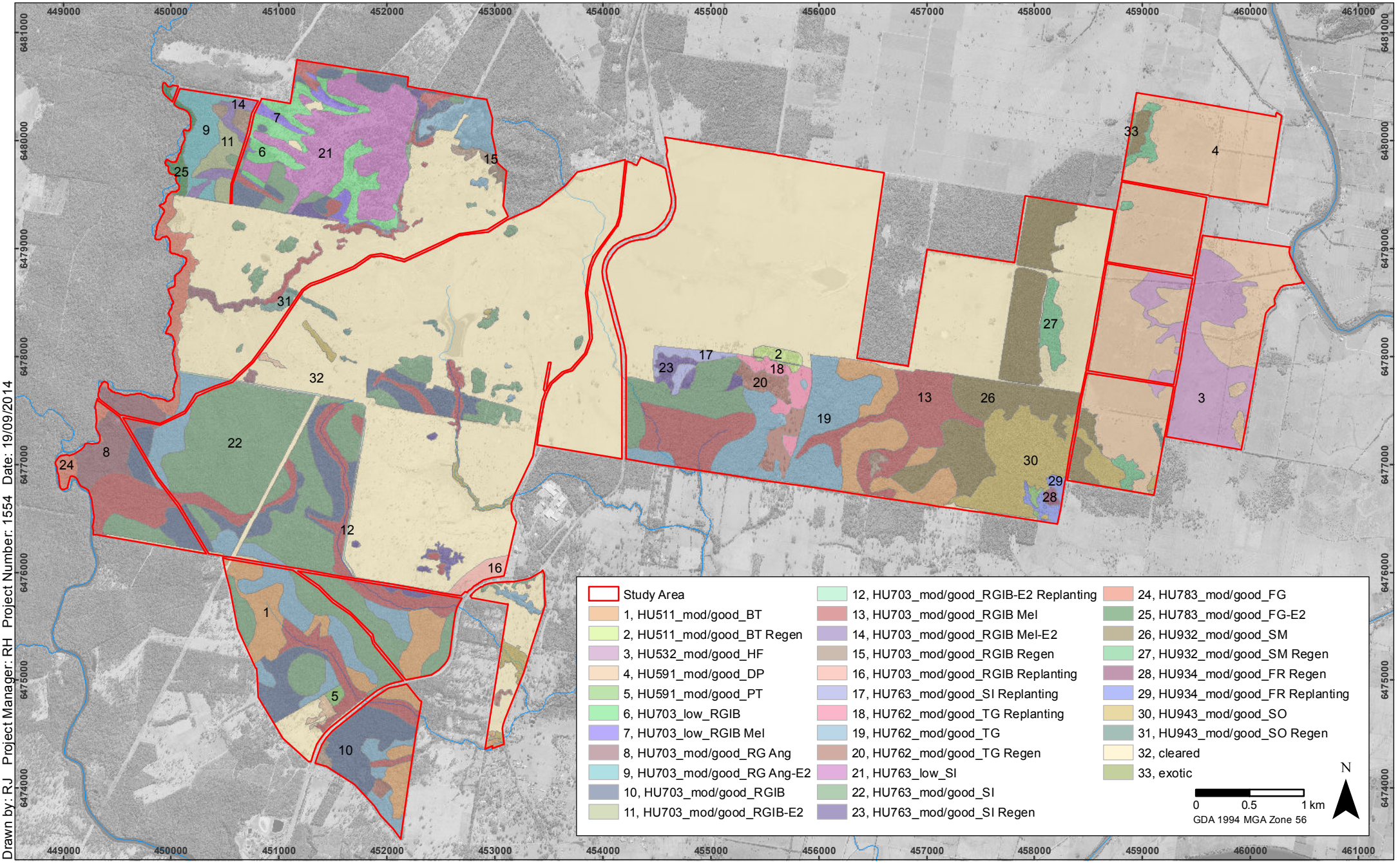
Brimbin Biocertification Assessment

FIGURE 9

niche Environment and Heritage

Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_9_Landscape.mxd

Imagery: (c) OEH 2010 - 2013



Vegetation zones

Brimbin Biocertification Assessment

FIGURE 10

Note: Five vegetation zones within the indirect impact area are too fine a scale to map.
They occur within a ten metre buffer around the Conservation Area

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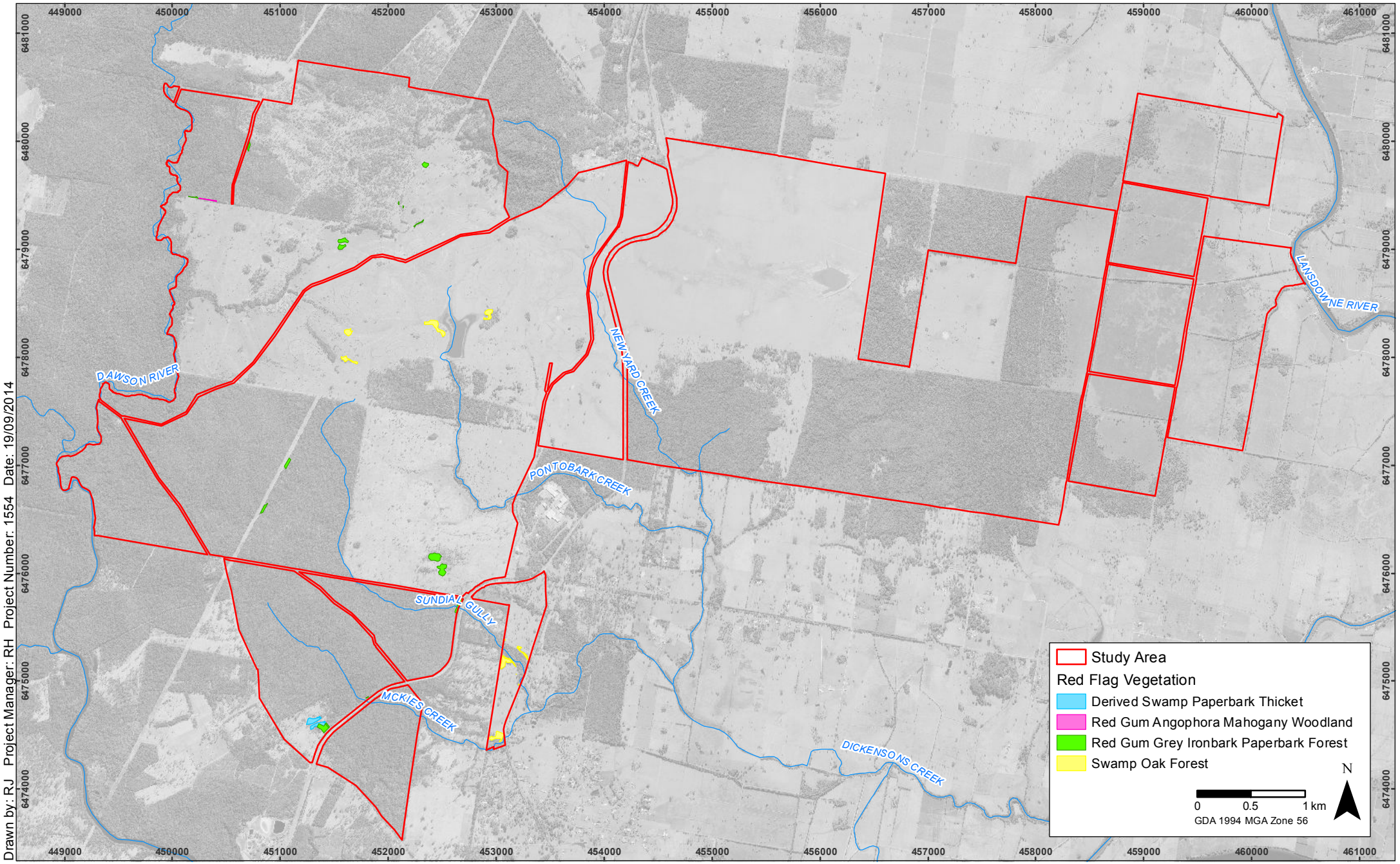
Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_10_VegZones.mxd



Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 19/09/2014

Red Flag vegetation that requires a variation

Brimbin Biocertification Assessment

FIGURE 11

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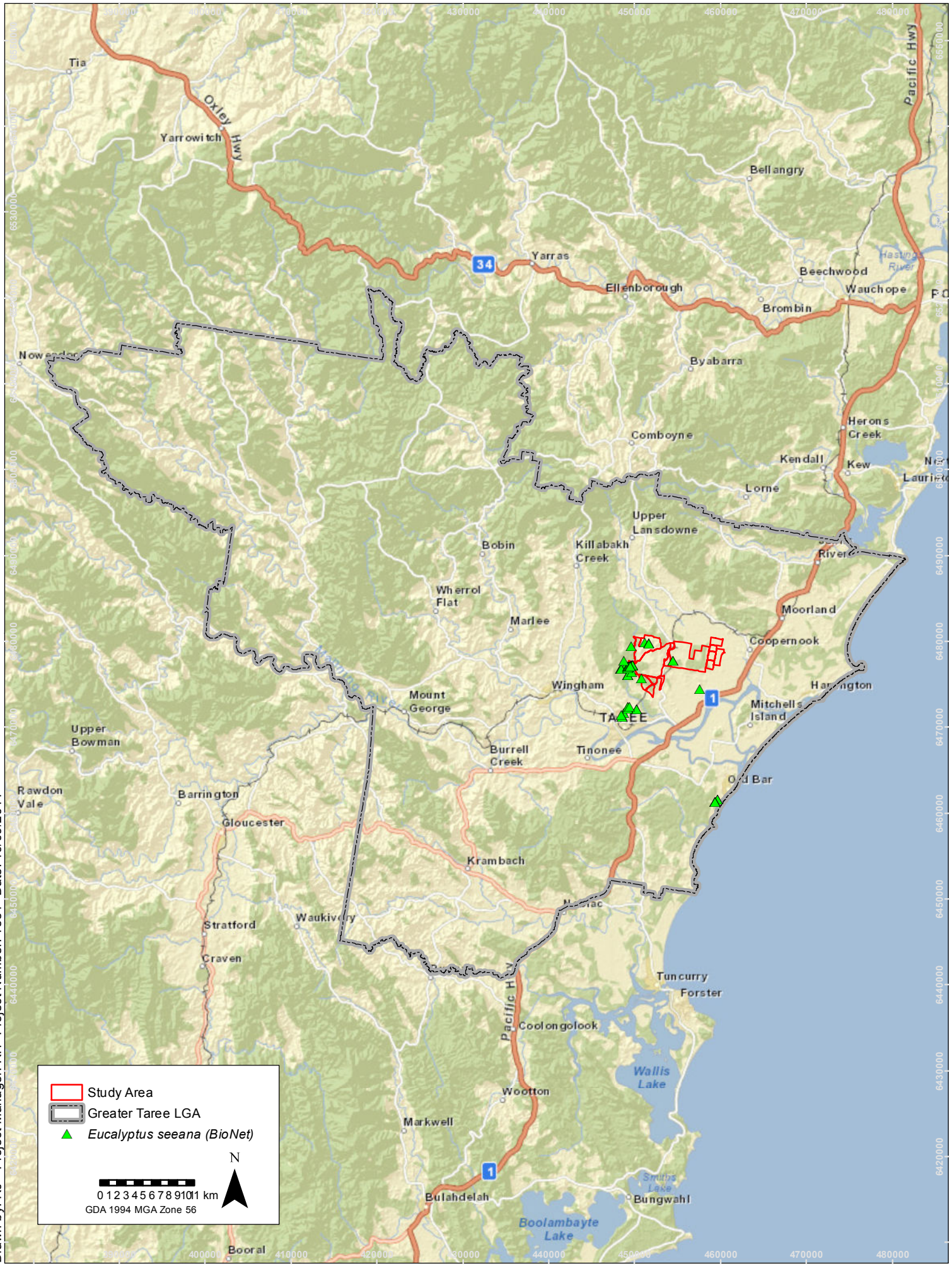
Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_11_RedFlag.mxd



Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 19/09/2014

Eucalyptus seeana Endangered Population within Greater Taree LGA

Brimbin Biocertification Assessment

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Atlas of NSW Wildlide: 2014-09-11

FIGURE 12

Path: T:\spatial\projects\a1500\a1554_BrimbinStructurePlan\Maps\Report_20140911\1554_Figure_12_SeeanaLGA.mxd

APPENDICES

Appendix A: Alignment of parent Niche Vegetation Types to PCTs, EECs, Class and Formation (sorted by Formation and Class)

Vegetation Code	Niche Vegetation Type	EEC	PCT Code	PCT Name (abbreviated)	Keith Formation	Keith Class
FR	Forest Redgum (early regeneration)	Not an EEC (but highly cleared vegetation type, 90 %)	HU934	Cabbage Gum - Forest Red Gum - Flax-leaved Paperbark Floodplain Forest	Forested Wetlands	Coastal Floodplain Wetlands
HF	Herbfield	Freshwater Wetland	HU532	Coastal floodplain sedgelands, rushlands, and forblands	Forested Wetlands	Coastal Floodplain Wetlands
DP	Derived Swamp Paperbark Thicket	Swamp Sclerophyll Forest	HU591	Paperbark swamp forest	Forested Wetlands	Coastal Swamp Forests
PT	Swamp Paperbark Thicket	Swamp Sclerophyll Forest	HU591	Paperbark swamp forest	Forested Wetlands	Coastal Swamp Forests
SM	Swamp Mahogany Forest	Swamp Sclerophyll Forest	HU932	Swamp Mahogany - Flax-leaved Paperbark swamp forest	Forested Wetlands	Coastal Swamp Forests
SO	Swamp Oak Forest	Swamp Oak Forest	HU943	Swamp Oak swamp forest	Forested Wetlands	Coastal Swamp Forests
RG Ang	Red Gum Angophora Mahogany Woodland	Subtropical Coastal Floodplain Forest	HU703	Narrow-leaved Red Gum woodlands	GW	Coastal Valley Grassy Woodlands
RGIB	Narrow-leaved Red Gum Ironbark Woodland	Not an EEC	HU703	Narrow-leaved Red Gum woodlands	GW	Coastal Valley Grassy Woodlands
RGIB Mel	Red Gum Grey Ironbark Paperbark Forest	Subtropical Coastal Floodplain Forest	HU703	Narrow-leaved Red Gum woodlands	GW	Coastal Valley Grassy Woodlands
FG	Flooded Gum Brush Box Tall Forest	Not an EEC	HU783	Flooded Gum - Brush Box - Tallowwood mesic tall open forest	Wet Sclerophyll Forests (shrubby sub-formation)	North Coast Wet Sclerophyll Forests
BT	Blackbutt Tallowwood Tall Open Forest	Not an EEC	HU511	Blackbutt - Tallowwood dry grassy open forest	Wet Sclerophyll Forests (grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests
SI	Spotted Gum Ironbark Forest	Not an EEC	HU763	Tallowwood - Spotted Gum - Grey Gum grassy tall open forest	Wet Sclerophyll Forests (grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests
TG	Grey Gum Stringybark Tallowwood Tall Open Forest	Not an EEC	HU762	Tallowwood - Small-fruited Grey Gum - Kangaroo Grass grassy tall open forest	Wet Sclerophyll Forests (grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests

Appendix B: Niche vegetation types compared to previous on-site vegetation mapping

Niche Vegetation Type (2011)	Whelans Insites (2009)	Connell Wagner (2004)	Greater Taree City Council Types	Forest Ecosystems (NPWS 1999)
Blackbutt Tallowwood Tall Open Forest	-	Dry Grassy Blackbutt Tallowwood Complex	4	FE 34
Small-fruited Grey Gum Stringybark Tallowwood Tall Open Forest	Grey Gum Tallowwood Forest	Grey Gum Complex	3b, 3c	FE 36
Flooded Gum Brush Box Tall Forest	Flooded Gum Turpentine Forest	Flooded Gum Complex	1a	FE 154
Spotted Gum Ironbark Forest	Spotted Gum Ironbark Forest	Spotted Gum Complex	4b	-
Grey Box Red Gum Grey Ironbark Woodland	-	Grey Box, Red Gum, Grey Ironbark Complex	3h	FE 54
Forest Red Gum Open Woodland	-	-	Loosely 6	FE 36
Narrow-leaved Red Gum Ironbark Woodland	Grey Gum Ironbark Forest	Part of Grey Gum Complex	Loosely 6	-
Narrow-leaved Red Gum Angophora Mahogany Woodland	Grey Gum Ironbark Forest	Redgum – Apple Complex	Loosely 3b	-
Narrow-leaved Red Gum Grey Ironbark Paperbark Forest	Grey Gum Ironbark Forest	-	Loosely 3b	-
Herbfield	-	-	-	FE 141
Swamp Paperbark Thicket and Derived type	-	-	15	FE 112
Swamp Mahogany Forest	-	Swamp Mahogany Complex	14a	FE 142
Swamp Oak Forest	-	Swamp Oak Complex	7	FE 143

Appendix C: Flora Recorded During the Field Survey

Acacia blakei ssp. diphylla
Acacia floribunda
Acacia maidenii
Acacia myrtifolia
Acacia ulicifolia
Acianthus fornicatus
Acmena smithii
Acronychia oblongifolia
Allocasuarina littoralis
Alphitonia excelsa
*Andropogon virginicus**
Angophora subvelutina
Aristida vagans
*Axonopus fissifolius**
Banksia spinulosa var. collina
Baumea articulata
Billardiera scandens
Blechnum indicum
Breynia oblongifolia
Brunoniella australis
Caesia parviflora
Caladenia catenata
Callistemon citrinus
Callistemon salignus
Calochlaena dubia
Carex appressa
Cassine australis
Casuarina glauca
Centella asiatica
Cheilanthes sieberi
*Chenopodium album**
Chorizandra cymbaria
Christella dentata
*Cinnamomum camphora**
*Cirsium vulgare**
Convolvulus erubescens
*Conyza sp.**
Corybas dowlingii
Corymbia intermedia
Corymbia maculata
Cryptocarya microneura
Cryptostylis sp.
Cymbopogon refractus
Cynodon dactylon
*Cyperus congestus**
Cyperus sp.
Daviesia genistifolia
Daviesia ulicifolia
Desmodium gunnii
Desmodium rhytidophyllum
Dianella caerulea var. producta
Dianella revoluta
Dichondra repens
Digitaria parviflora
Echinopogon caespitosus
Entolasia marginata
Entolasia stricta
Eragrostis benthamii
Eragrostis brownii
Eucalyptus amplifolia
Eucalyptus carnea
Eucalyptus eugenioides
Eucalyptus glaucina
Eucalyptus globoidea
Eucalyptus grandis
Eucalyptus microcorys
Eucalyptus pilularis
Eucalyptus propinqua
Eucalyptus resinifera
Eucalyptus robusta
Eucalyptus seeana
Eucalyptus siderophloia
Eucalyptus tereticornis
Euchiton sphaericus
Eustrephus latifolius
Exocarpus cupressiformis
Fimbristylis dichotoma
Gahnia clarkei
Gahnia sieberiana
Galium sp.
Geitonoplesium cymosum
Glochidion ferdinandi var. ferdinandi
Glochidion ferdinandi var. pubens
Glycine clandestina
Glycine microphylla
Glycine tabacina
Gonocarpus teucrioides
Goodenia sp.
Gymnostachys anceps
Hemarthria uncinata
Hibbertia aspera
Hibbertia riparia
Hibbertia scandens
Hybanthus monopetalus
Hydrocotyle peduncularis
Hypericum gramineum
*Hypochaeris radicata**
Hypolepis muelleri
Imperata cylindrica
Jacksonia scoparia
Juncus usitatus
Lagenophora gracilis
Lagenophora stipitata
*Lantana camara**
Leptospermum polygalifolium
Leucopogon juniperinus
Lomandra filiformis spp. filiformis
Lomandra longifolia
Lomandra multiflora ssp. multiflora
Lophostemon confertus
Marsdenia suaveolens
Melaleuca ericifolia
Melaleuca linariifolia
Melaleuca nodosa
Melaleuca quinquenervia
Melaleuca sieberi
Melaleuca styphelioides
Microlaena stipoides
Mitrasacme sp.
Morinda jasminoides
Myrsine howittiana
Myrsine variabilis
Neolitsea dealbata
Notelaea longifolia
Notothixos incanus
Opercularia sp.
Oplismenus aemulus
Oplismenus imbecillus
Oxalis exilis
Oxalis perennans
Ozothamnus diosmifolius
Pandorea pandorana
Panicum simile
Parsonsia straminea
Paspalidium distans
*Paspalum dilatatum**
Persicaria sp.
Persoonia linearis
Philydrum lanuginosum
Pimelea linifolia
Pittosporum revolutum
Pittosporum undulatum
*Plantago lanceolata**
Platycerium bifurcatum
Plectorrhiza tridentata
Poa labillardierei var. labillardierei
Podolobium scandens
Pomaderris sp.
Pratia purpurascens
Pseuderanthemum variabile
Pteridium esculentum
Pterostylis sp.

Pultenaea rosmarinifolia
Ranunculus inundatus
Rubus moluccanus
*Rubus ulmifolius**
Sannantha similis
Schoenus paludosus
*Senecio madagascariensis**
*Setaria parviflora**
Smilax glyciphylla
*Solanum mauritianum**
Stephania japonica
Syncarpia glomulifera
Tricoryne elatior
*Verbena bonariensis**
Vernonia cinerea
Veronica calycina
Viola betonicifolia
Viola hederacea

Appendix D: Fauna Recorded During the Field Survey

Common Name	Scientific Name	Observation Type
Mammals - Native		
Brown Antechinus	*Antechinus stuartii*	T
Bush Rat	*Rattus fuscipes*	T
Swamp Rat*	*Rattus lutreolus*	I
Brush-tailed Phascogale	*Phascogale tapoatafa*	T
Eastern Grey Kangaroo	*Macropus giganteus*	O
Red-necked Wallaby	*Macropus rufogriseus*	O
Feathertail Glider*	*Acrobates pygmaeus*	I
Sugar Glider	*Petaurus breviceps*	IHT
Long-nosed Bandicoot	*Perameles nasuta*	C
Brushtail Possum	*Trichosurus vulpecula*	IOT
Ringtail Possum	*Pseudocheirus peregrinus*	C
Little Forest Bat	*Vespadelus vulturnus*	T
Grey-headed Flying Fox	*Pteropus poliocephalus*	OH
Mammals - Introduced		
Hare	*Lepus europaeus*	O
Rabbit	*Oryctolagus cuniculus*	O
Black Rat	*Rattus rattus*	T
House Mouse	*Mus musculus*	IO
Red Fox	*Vulpes vulpes*	O
Feral Cat	*Felis catus*	I
Frogs		
Common Eastern Froglet	*Crinia signifera*	H
Striped Marsh Frog	*Limnodynastes peronii*	H
Wallum Rocket Frog	*Litoria freycineti*	O
Verreaux's Tree Frog	*Litoria verreauxii*	H
Birds		
Australasian Grebe	*Tachybaptus novaehollandiae*	O
Australasian Shoveler	*Anas rhynchotis*	O
Australian Hobby	*Falco longipennis*	O
Australian Magpie	*Cracticus tibicen*	OH
Australian Owlet Nightjar	*Aegotheles cristatus*	H
Australian Raven	*Corvus coronoides*	H
Australian Wood Duck	*Chenonetta jubata*	O

Common Name	Scientific Name	Observation Type
Barn Owl	*Tyto javanica*	OH
Black Duck	*Anas superciliosa*	O
Black Swan	*Cygnus atratus*	O
Black-faced Cuckoo Shrike	*Coracina novaehollandiae*	OH
Black-necked Stork	*Ephippiorhynchus australis*	O
Black-shouldered Kite	*Elanus axillaris*	O
Brown Falcon	*Falco berigora*	O
Brown Gerygone	*Gerygone mouki*	H
Brown Thornbill	*Acanthiza pusilla*	H
Buff-rumped Thornbill	*Acanthiza reguloides*	O
Cattle Egret	*Ardea ibis*	O
Comb-crested Jacana	*Irediparra gallinacea*	O
Eastern Rosella	*Platycercus eximius*	OH
Eastern Spinebill	*Acanthorhynchus superciliosus*	OH
Eastern Whipbird	*Psophodes olivaceus*	H
Eastern Yellow Robin	*Eopsaltria australis*	O
Fan-tailed Cuckoo	*Cacomantis flabelliformis*	H
Galah	*Eolophus roseicapillus*	OH
Golden Whistler	*Pachycephala pectoralis*	OH
Golden-headed Cisticola	*Cisticola exilis*	O
Great Egret	*Ardea alba*	O
Grey Butcherbird	*Cracticus torquatus*	H
Grey Fantail	*Rhipidura albiscapa*	OH
Grey Goshawk	*Accipiter novaehollandiae*	O
Grey Shrike Thrush	*Colluricincla harmonica*	OH
Grey Teal	*Anas Gracilis*	O
Laughing Kookaburra	*Dacelo novaeguineae*	H
Lewin's Honeyeater	*Meliphaga lewinii*	H
Little Black Cormorant	*Phalacrocorax sulcirostris*	O
Little Lorikeet	*Glossopsitta pusilla*	OH
Little Wattlebird	*Anthochaera chrysoptera*	H
Magpie Lark	*Grallina cyanoleuca*	OH
Masked Lapwing	*Vanellus miles*	OH
Masked Owl	*Tyto novaehollandiae*	H
Mistletoebird	*Dicaeum hirundinaceum*	H
Musk Lorikeet	*Glossopsitta concinna*	OH
Nankeen Kestrel	*Falco cenchroides*	O

Common Name	Scientific Name	Observation Type
New Holland Honeyeater	*Phylidonyris novaehollandiae*	OH
Noisy Friarbird	*Philemon corniculatus*	H
Noisy Miner	*Manorina melanocephala*	OH
Peregrine falcon	*Falco peregrinus*	O
Pheasant Coucal	*Centropus phasianinus*	O
Pied Butcherbird	*Cracticus nigrogularis*	OH
Pied Cormorant	*Phalacrocorax varius*	O
Purple Swamphen	*Porphyrio porphyrio*	O
Rainbow Lorikeet	*Trichoglossus haematodus*	OH
Red Wattlebird	*Anthochaera carunculata*	OH
Red-browed Finch	*Neochmia temporalis*	OH
Richards Pipit	*Anthus novaeseelandiae*	O
Rose Robin	*Petroica rosea*	H
Royal Spoonbill	*Platalea regia*	O
Rufous Whistler	*Pachycephala rufiventris*	OH
Scarlet Robin	*Petroica boodang*	O
Silvereye	*Zosterops lateralis*	H
Southern Boobook Owl	*Ninox novaeseelandiae*	H
Spangled Drongo	*Dicrurus bracteatus*	O
Spotted Pardalote	*Pardalotus punctatus*	H
Straw-necked Ibis	*Threskiornis spinicollis*	O
Striated Pardalote	*Pardalotus striatus*	H
Striated Thornbill	*Acanthiza lineata*	OH
Superb Fairy Wren	*Malurus cyaneus*	H
Superb Lyrebird	*Menura novaehollandiae*	OH
Tawny Frogmouth	*Podargus strigoides*	O
Torresian crow	*Corvus orru*	H
Varied Sittella	*Daphoenositta chrysoptera*	OH
Weebill	*Smicrornis brevirostris*	H
Welcome Swallow	*Hirundo neoxena*	O
White-browed Scrubwren	*Sericornis frontalis*	H
White-cheeked Honeyeater	*Phylidonyris nigra*	OH
White-faced Heron	*Egretta novaehollandiae*	O
White-throated Treecreeper	*Cormobates leucophaeus*	OH
White-winged Chough	*Corcorax melanorhamphos*	O
Willie wagtail	*Rhipidura leucophrys*	O
Wonga Pigeon	*Leucosarcia melanoleuca*	OH

Common Name	Scientific Name	Observation Type
Yellow Thornbill	*Acanthiza nana*	O
Yellow-billed Spoonbill	*Platalea flavipes*	O
Yellow-faced Honeyeater	*Lichenostomus chrysops*	OH
Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*	H

Key: O = Observed, H = Heard, T = Trapped, C = Camera Trap I = Indirect Evidence such as scats, hair or feeding signs. * indicates probable identification through hair analysis.

Appendix E: Threatened fauna predicted

Common Name	*Scientific Name*	Tg value
Barking Owl	*Ninox connivens*	0.33
Barred Cuckoo-shrike	*Coracina lineata*	0.68
Bush Stone-curlew	*Burhinus grallarius*	0.38
Common Blossom-bat	*Syconycteris australis*	0.83
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	0.75
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	0.45
Eastern Freetail-bat	*Mormopterus norfolkensis*	0.45
Flame Robin	*Petroica phoenicea*	0.75
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	0.55
Greater Broad-nosed Bat	*Scoteanax rueppellii*	0.45
Grey-headed Flying-fox	*Pteropus poliocephalus*	0.93
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	0.6
Little Bentwing-bat	*Miniopterus australis*	0.75
Little Eagle	*Hieraaetus morphnoides*	0.73
Little Lorikeet	*Glossopsitta pusilla*	0.58
Long-nosed Potoroo	*Potorous tridactylus*	0.75
Masked Owl	*Tyto novaehollandiae*	0.33
Powerful Owl	*Ninox strenua*	0.33
Red-legged Pademelon	*Thylogale stigmatica*	0.38
Scarlet Robin	*Petroica boodang*	0.75
Southern Myotis	*Myotis macropus*	0.45
Speckled Warbler	*Chthonicola sagittata*	0.38
Spotted Harrier	*Circus assimilis*	0.73
Spotted-tailed Quoll	*Dasyurus maculatus*	0.38
Square-tailed Kite	*Lophoictinia isura*	0.73
Squirrel Glider	*Petaurus norfolcensis*	0.45
Superb Fruit-Dove	*Ptilinopus superbus*	0.75
Swift Parrot	*Lathamus discolor*	0.75
Varied Sittella	*Daphoenositta chrysoptera*	0.75
Wompoo Fruit-Dove	*Ptilinopus magnificus*	0.75
Yellow-bellied Glider	*Petaurus australis*	0.43
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	0.45

Appendix F: Assessment of Certified Local Data under the BCAM in relation to the *Eucalyptus seeana* Endangered Population (MALD Assessment)

Background

Under section 3.4 of the BCAM the use of certified local data is permissible under the following conditions:

> *The Director General may certify that more appropriate local data can be used instead of the data in the Vegetation Types Database, Vegetation Benchmarks Database and the Threatened Species Profile Database. Local data may be used if the Director- General is of the opinion that the data more accurately reflects local environmental conditions. In certifying the use of local data, the Director General must provide reasons for this opinion.*
>
> *Benchmark data that more accurately reflect the local environmental conditions for a vegetation type may be collected from local reference sites, or obtained from relevant published sources using the procedures set out in Appendix 2* [of the BCAM].
>
> *The certified local data can then be used in applying the methodology in accordance with any procedures outlined in the Biodiversity Certification Operational Manual.*

This assessment requests the use of certified local data for the *Eucalyptus seeana* Endangered Population in the application of the BCAM for the proposed certification of the Brimbin Draft Structure Plan. The use of certified, local data for the Endangered Population has been considered as it:

- More accurately reflects local environmental conditions; and
- Is more appropriate to the assessment of the proposed biodiversity certification of the Brimbin Draft Structure Plan, which is considered to provide a suitable outcome in relation to the conservation of the species in perpetuity.

The information in this report is not yet certified local data and will from here on be referred to as more appropriate local data (MALD) and this assessment, in general terms, as the MALD assessment.

Aim of the MALD assessment

The MALD assessment aims to replace the data available in the Threatened Species Profile Database (TSPD) for the following field:

- "Ability to withstand loss?" - change the data for the *Eucalyptus seeana* Endangered Population within the TSPD from "No" to "Yes" (able to sustain a temporary reduction in numbers).

Reasons for the assessment of More Appropriate Local Data

The reasons for the application for the use of local data are provided below. The information demonstrates that the *Eucalyptus seeana* Endangered Population is able to withstand a temporary reduction in numbers from the proposed biodiversity certification of the Brimbin Draft Structure Plan based on:

1. The relatively small number of individuals impacted by the proposed biodiversity certification compared to the number of individuals within the Taree LGA;
2. The conservation of a relatively high number of the local population within the Assessment Area, adjacent conservation reserves and offsets, compared to the number impacted by the proposed certification;
3. The degraded nature of a substantial portion of the habitat to be impacted within the Certified Area. It will be demonstrated that this is portion is regrowth since the late 80s and has been subject to heavy grazing, stick-raking and additional land clearance activities (such as burning);
4. The majority of old growth trees with hollows are conserved within the Conservations Areas;
5. The immaturity of many of the individuals which leads to an over-abundance in previously disturbed habitats; and
6. The Credit Calculations have demonstrated that the proposed conservation measures more than adequately provides offset the impacts to the species.

Provided below is an outline of the species ecology, conservation status, its abundance within the Taree LGA. A description of the impact on the species and the offsets required are provided.

Assessment of More Appropriate Local Data – *Eucalyptus seeana* Endangered Population

Description and conservation status

The population of *Eucalyptus seeana* (narrow-leaved red gum) in the Greater Taree LGA is listed as an endangered population on Part 2 of Schedule 1 of the TSC Act (NSW Scientific Committee 2002). Neither the species nor the population are listed on the EPBC Act.

The Flora of NSW v.2 (Harden 2002) classifies the species as a red gum (Section *Exsertaria*) and describes it as a tree to 40 metres high with smooth white or grey bark that sheds in plates or flakes. The species has a wide distribution from Taree to Caloundra and the population in the Greater Taree LGA is disjunct and at or near the southern limit of the range of the species (NSW Scientific Committee 2002).

Within the Assessment Area, the species was clearly recognisable from other species in the red gum group, including the common *Eucalyptus tereticornis* (forest red gum), by its distinctively smaller and narrower leaves and bark type (Author pers. comm.). Compared to other red gums in the Assessment Area, the species had a distinctively sparse and open crown due to the smaller foliage. The species was observed in large numbers, both as mature remnant trees and immature regrowth and in general, was in greater densities within lower parts of the landscape associated with periodic inundation (e.g. flow channels and floodplains). This latter association is consistent with the description for the species in the OEH on-line profile (OEH Threatened Species Profiles, accessed September 2014).

Distribution and extent

Eucalyptus seeana is distributed from the Taree LGA north through Port Macquarie to South-west Rocks, where there is then a gap in the distribution until Wooli, north of Coffs Harbour. It is then common from Wooli to the NSW border and to Caloundra in the southern

Sunshine Coast of Queensland. No extensive count information exists for the species as a whole, though it is considered common where it occurs north of Taree LGA.

Within the Greater Taree LGA, the Atlas of NSW Wildlife lists 50 records for the species for which there are no reliable count data or population estimates. It is clear though, from the distribution of the species within the LGA, that the Brimbin locality is a hotspot for the Endangered Population. In this sense, the population estimates provided for *Eucalyptus seeana* in the Assessment Report are ahead of current published information on the species within the Greater Taree LGA and significant in terms of quantifying the extent and size of the population. Niche has estimated that 25,535 individuals exist within the local population, not including unknown numbers from locations other than the Brimbin Assessment Area within the LGA. Of these, 21,744 exist within the Assessment Area (i.e., the Certified Area, E1 and E2 Conservation Areas, retained lands and the Vegetation 10 metre buffer). The difference between the local population and that of the Assessment Area is 3,791 individuals and represents the portion of the population that occurs in the West Wallsend separate development offset area. For the purposes of this assessment, given that there is no reliable count information specified in either the Atlas of NSW Wildlife records or in the Final Determination (NSW Scientific Committee 2002), the size of the entire population within the Taree LGA is taken as 25,535 individuals. This estimate is based on the best available local data from rigorous field assessment, however is clearly an underestimate given the much broader extent of habitat within the entire LGA, other than in the Assessment Area.

Avoid and mitigate

The Draft Structure Plan has been subject to numerous revisions that have been based on avoiding impacts to the *Eucalyptus seeana* Endangered Population. The impacts to the population has been minimised through these revisions.

Details regarding the Weed Management Plan and Master Plan are provided in the Biodiversity Certification Strategy. Both will be implemented to minimise the overall impacts of conferring Biodiversity Certification at Brimbin.

Impacts on the Eucalyptus seeana *Endangered Population*

The area of *Eucalyptus seeana* habitat that will be removed in the Certified Area is 105 hectares, while 842.2 hectares will be conserved (including 45.2 hectares of replanting) in perpetuity as a result of the proposal (Section 3.4.1). This equates to the estimated formal conservation of 13,451 existing individuals in E1 lands and 1,635 in E2 lands, for the loss of 3,215 individuals in the Certified Area. A further 1,074 individuals will be planted in E1 and E2 revegetation zones (i.e., formally conserved), 2,015 individuals are estimated to occur within retained lands, 3,791 individuals are estimated to occur within the West Wallsend Offset and 195 individuals are estimated to occur within the buffer that has been allowed for indirect impacts but will be retained in this zone. On this basis, the number of individuals that will come under formal conservation in the E1 and E2 Conservation Areas for this Biodiversity Assessment only (16,160 plants including replanting) represents 63.3 per cent of the local population. The number of plants that are, or will be, conserved in retained lands, the West Wallsend offset and the vegetated buffer (6,001 individuals) represents a further 23.5 per cent of the local population.

The loss of 3,215 individuals represents 12.6 per cent of the local population and 15 per cent of the individuals within the Assessment Area. Of these, at least 1,242 occur as regrowth as recent as the late 80s, in land that has been assessed as being in BCAM 'Low condition' (refer to Section 3.2 of this Assessment Report). This area is mapped in Figure 2 and has been substantially altered in the past with the regrowth occurring almost in its entirety since 1989 (Section 3.1.3). As a result, the *Eucalyptus seeana* trees are mostly mid-storey regrowth to a maximum height of between 10 and 15 metres. Given the land use history in this area, it is considered that these trees are at artificially high densities in hillside and ridge-top habitats. Furthermore, if land use was to continue in its current form, numbers would be likely to decline and ecosystem resilience lost due to grazing pressure, clearing, burning off and pasture improvement. On this basis, it is likely that they are unsustainable at these densities and would naturally senesce as they age and because the habitat is considered to be less than ideal for the species.

Restoration and on-going management of vegetation which contain *Eucalyptus seeana* in the BCAM Low condition areas (1,242 immature individuals) would be prohibitively expensive due to the high inputs required to restore such non-resilient habitat. The potential gain to *Eucalyptus seeana* would be negligible given that the population is unlikely to be sustained at current densities in these areas.

If the estimated 1,242 individuals in the BCAM Low condition area are removed from consideration, then the remaining 1,973 individuals within the Certified Area represents 7.7 per cent of the local population, which is considered "minor".

Whilst it is acknowledged that the actual percentage change is not quantifiable, it is considered that the percentage impact on the total population of the species is likely to be much lower than 7.7 per cent as:

1. Many more plants are known to exist in adjacent private and public lands (Author pers. obs.);
2. Many local occurrences, other than in the Assessment Area, would be protected in local conservation reserves (e.g., Brimbin Nature Reserve);
3. The species is considered common elsewhere in its broader distribution;
4. This assessment has assumed full loss for *Eucalyptus seeana* plants within the Certified Area. In all likelihood, the loss is likely to be substantially less than this as, where possible, individuals of *Eucalyptus seeana* within the certified area will be retained for street trees, open space and landscaping (e.g., parklands, golf courses); and
5. The proponent has agreed that *Eucalyptus seeana* will be utilised in all landscape planting to occur within the Certified Area.

Offsetting of the Eucalyptus seeana *Endangered Population*

The species credit requirement for *Eucalyptus seeana* is 45,929 credits for the loss of 3,215 individuals within the Certified Area (refer to Section 5.4.3). As a minimum for the conservation measures proposed (i.e., conservation and replanting), the E1 Conservation Area alone generates 80,706 species credits. Therefore, on the basis of creating the E1 Conservation Area as an offset, a credit surplus of 34,777 species credits exists for *Eucalyptus seeana* and therefore, subject to approval of this MALD Assessment, the

proposed conservation measures exceed the improve or maintain outcome requirement for the species.

An additional 3,534 species credits will be created in the E1 Conservation Area from replanting of 589 individuals and 3,180 species credits will be created for the E2 Conservation Area (which includes 1,635 existing individuals and 485 planted). This would bring the total number of species credits generated for *Eucalyptus seeana* to 87,420 and a surplus of 41,491 species credits. The table below provides a complete breakdown of the individuals conserved and the credits generated for the conservation measures proposed.

Conservation Measure	Credits per Individual	Remnant stems conserved	Remnant stems credits	Planted stems	Planted stems credits	Total E. seeana species credits
E1	6	13,451	80,706	589	3,534	84,240
E2	1.5*	1,635	2,452	485	668	3,180
Total		15,086	83,158	1,074	4,202	87,420

** 25 % credit generation for E2 lands*

The E1 Conservation Area will be secured and managed as a transfer to National Parks Estate and thereby attracts 100 per cent credit value for the conservation measures proposed. The E2 Conservation Areas will be secured through conversion to an E2 Planning Instrument and therefore the conservation measures in this area attracts 25 per cent of the full credit amount, as is required in the BCAM. Although the retained lands do not provide a formal addition to the species credits generated for *Eucalyptus seeana*, they will provide protection for an additional 2,015 individuals.

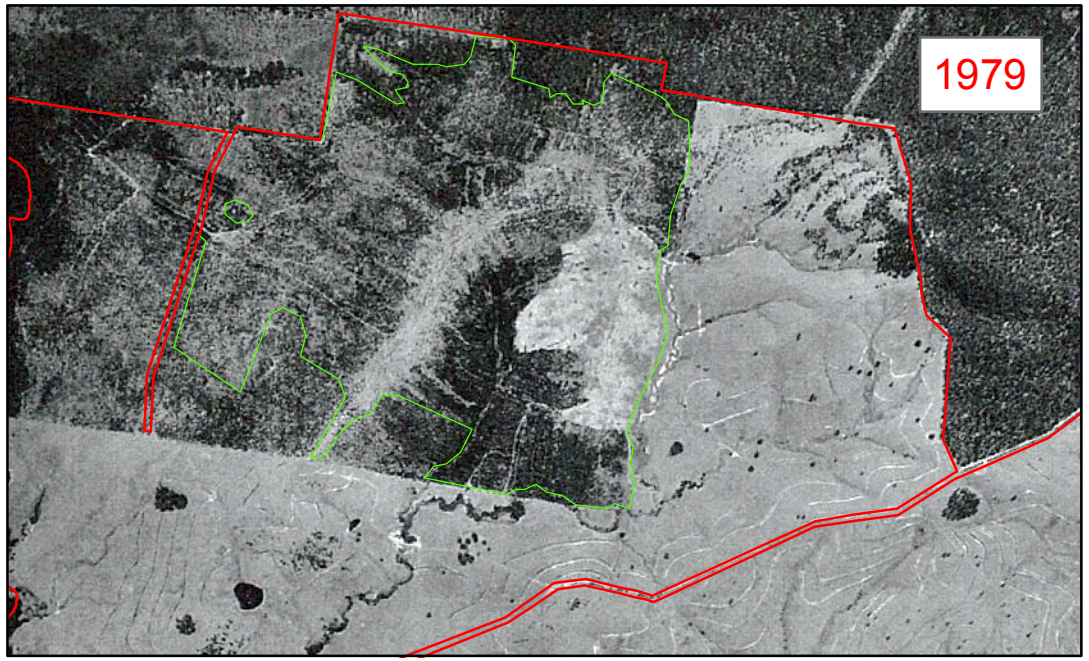
Conclusion

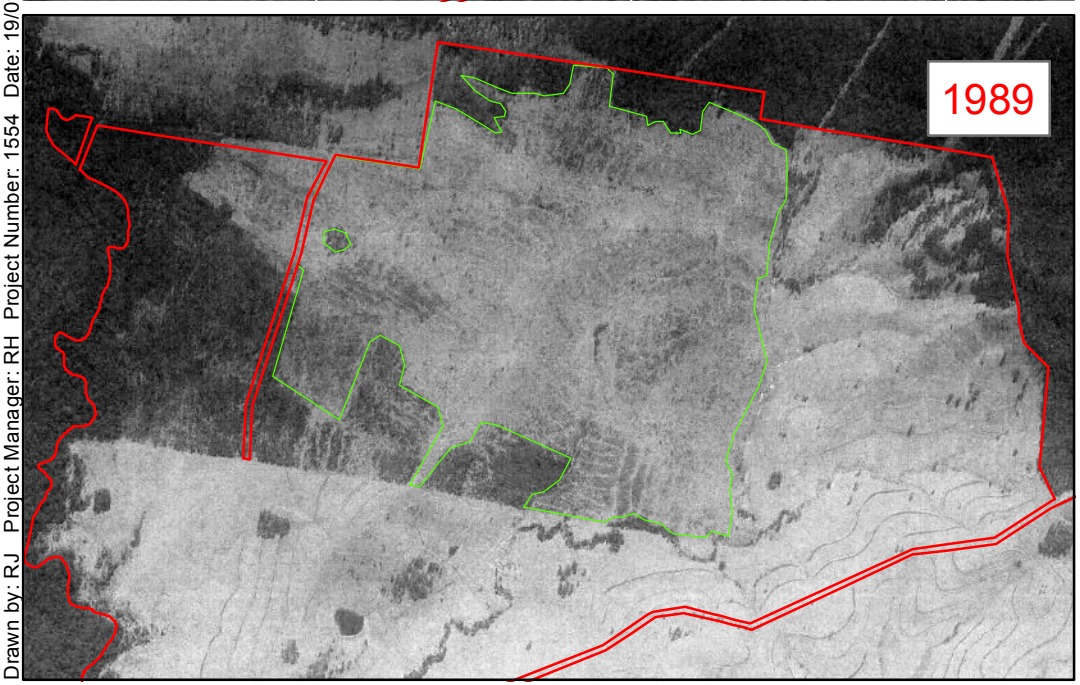
Previous knowledge of the extent of the *Eucalyptus seeana* Endangered Population and its protection in conservation reserves was limited. The size of the population to be protected, secured and managed within the Conservation Area in perpetuity, as a result of conferring Biodiversity Certification for the Brimbin Draft Structure Plan, is considered to be a significant contribution to threatened biodiversity values. The securing of the proposed Conservation Area will lead to the sustainable protection of a significant Endangered Population in perpetuity.

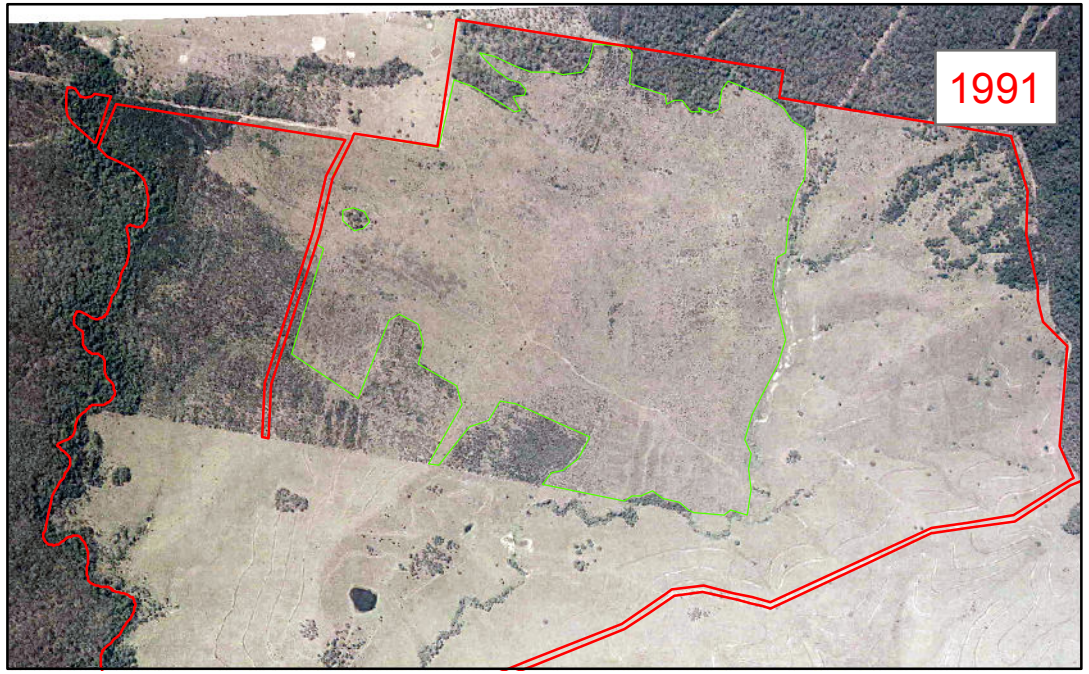
This assessment provides a justification for the use of more appropriate local data for the assessment of impacts on the *Eucalyptus seeana* Endangered Population associated with the proposed Biodiversity Certification of the Brimbin Draft Structure Plan. It is the opinion of the assessor that this data more accurately reflects the local environmental conditions within the study area, and this information should replace the data available in the Threatened Species Profile Database (TSPD) for the following field:

- "Ability to withstand loss?" - change the data for the *Eucalyptus seeana* Endangered Population within the TSPD from "No" to "Yes" (able to sustain a temporary reduction in numbers).

Appendix G (i): Image interpretation 1969 – 1991, Certified Area with modified vegetation







Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 19/09/2014

Image interpretation 1969 - 1991: Certified Area with modified vegetation

Brimbin Biocertification Assessment

Appendix G - i

Study Area

'Low condition' zone

0 250 500 m

GDA 1994 MGA Zone 56

N

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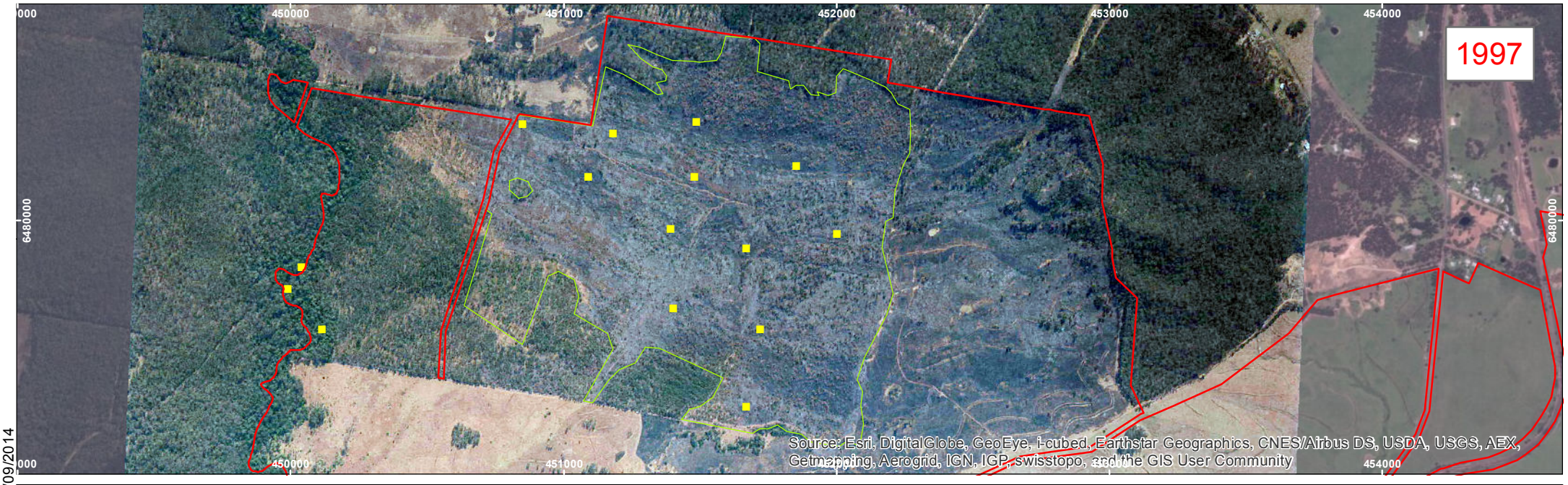
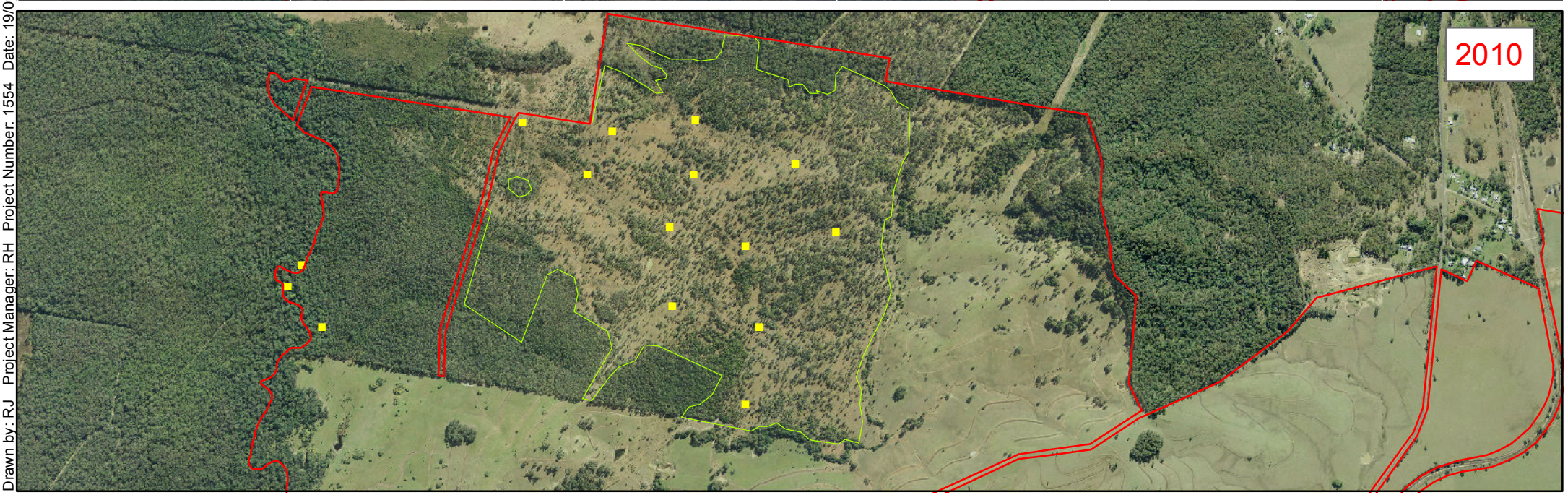
Appendix G (ii): Image interpretation 1997 – 2010, Certified Area with modified vegetation





Drawn by: RJ Project Manager: RH Project Number: 1554 Date: 19/09/2014

Image interpretation 1997 - 2010: Certified Area with modified vegetation

Brimbin Biocertification Assessment

Appendix G - ii

Study Area
'Low condition' zone
BioBanking plots

0 250 500 m

GDA 1994 MGA Zone 56

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Appendix B: EPBC Protected Matters Search

Australian Government

Department of the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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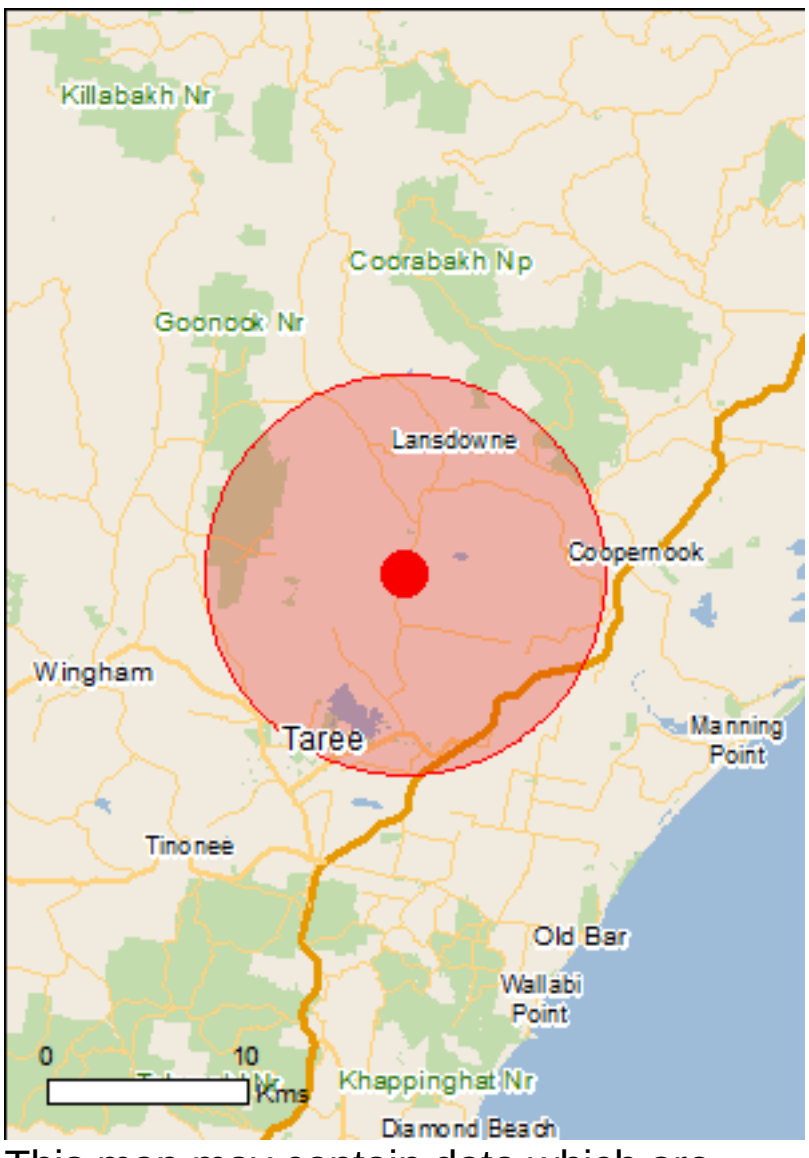
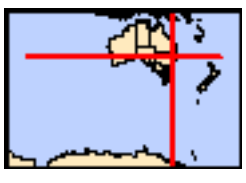


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	47
Listed Migratory Species:	35

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	34
Whales and Other Cetaceans:	1
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	4
State and Territory Reserves:	4
Regional Forest Agreements:	1
Invasive Species:	39
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat likely to occur within area
Diomedea epomophora epomophora Southern Royal Albatross [25996]	Vulnerable	Species or species habitat likely to occur within area
Diomedea epomophora sanfordi Northern Royal Albatross [82331]	Endangered	Species or species habitat likely to occur within area
Diomedea exulans antipodensis Antipodean Albatross [82269]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans exulans Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Diomedea exulans gibsoni Gibson's Albatross [82271]	Vulnerable	Species or species habitat likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta salvini Salvin's Albatross [82343]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Species or species habitat likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris impavida Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat known to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus		
Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Allocasuarina defungens		
Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat likely to occur within area
Asperula asthenes		
Trailing Woodruff [14004]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana		
Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Cynanchum elegans		
White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Eucalyptus glaucina		
Slaty Red Gum [5670]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta		
[4325]	Critically Endangered	Species or species habitat may occur within area
Hakea archaeoides		
[66702]	Vulnerable	Species or species habitat likely to occur within area
Melaleuca biconvexa		
Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area
Phaius australis		
Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Streblus pendulinus		
Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum		
Magenta Lilly Pilly, Magenta Cherry, Pocket-less Brush Cherry, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		

Name	Status	Type of Presence
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea dabbenena		
Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto)		
Southern Royal Albatross [1072]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea exulans (sensu lato)		
Wandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area
Diomedea gibsoni		
Gibson's Albatross [64466]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered*	Species or species habitat likely to occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri		
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita		
Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche impavida		
Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Migratory Marine Species		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lamna nasus		
Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta birostris		
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission
Defence - TAREE GRES DEPOT ; MACQUARIE DEPOT-41 RNSWR-TAREE

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea dabbenena		
Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto)		
Southern Royal Albatross [1072]	Vulnerable*	Species or species habitat likely to occur within area
Diomedea exulans (sensu lato)		
Wandering Albatross [1073]	Vulnerable	Species or species habitat likely to occur within area
Diomedea gibsoni		
Gibson's Albatross [64466]	Vulnerable*	Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered*	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable*	Species or species habitat likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE		[Resource Information]

Note that not all Indigenous sites may be listed.

Name	State	Status
Natural		
Kendall Forestry Management Area State Forests	NSW	Indicative Place
Lansdowne - Comboyne Escarpment	NSW	Indicative Place
Lansdowne Reserve	NSW	Indicative Place
Historic		
Taree Showground	NSW	Indicative Place

State and Territory Reserves	[Resource Information]
Name	State
Brimbin	NSW
Coorabakh	NSW
Lansdowne	NSW
Unnamed FMZ2	NSW

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Bufo marinus Cane Toad [1772]		Species or species habitat likely to occur within area
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Lepus capensis](#) Brown Hare [127]		Species or species habitat likely to occur within area
[Mus musculus](#) House Mouse [120]		Species or species habitat likely to occur within area
[Oryctolagus cuniculus](#) Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
[Rattus norvegicus](#) Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
[Rattus rattus](#) Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
[Vulpes vulpes](#) Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
[Alternanthera philoxeroides](#) Alligator Weed [11620]		Species or species habitat likely to occur within area
[Anredera cordifolia](#) Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
[Asparagus aethiopicus](#) Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
[Asparagus plumosus](#) Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
[Cabomba caroliniana](#) Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
[Chrysanthemoides monilifera](#) Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
[Chrysanthemoides monilifera subsp. rotundata](#) Bitou Bush [16332]		Species or species habitat likely to occur within area
[Dolichandra unguis-cati](#) Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
[Eichhornia crassipes](#) Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
[Genista sp. X Genista monspessulana](#) Broom [67538]		Species or species habitat may occur within area
[Lantana camara](#) Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
[Opuntia spp.](#) Prickly Pears [82753]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

Coordinates

-31.83303 152.50995

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Appendix C: Assessment under the EPBC Act

BRIMBIN

Matters of National Environmental Significance Assessment

June 2014

DOCUMENT CONTROL

Business unit	Niche Environment and Heritage, Hunter Office		
Project no.	1554		
Document description	Matters of National Environmental Significance Report: Brimbin		
	Name	**Signed**	**Date**
Supervising manager(s)	Rhidian Harrington		5/06/2013

Person managing this document	**Person(s) writing this document**
Rhidian Harrington	Anna Senior

Document revision no.	**Date prepared**	**Reviewed by**	**Date**
Rev0	3/06/2014	Rhidian Harrington	4/06/2014
Rev1	5/06/2014	Wes van der Gardner	5/06/2014

Prepared for:	**Organisation**
	Roche Group PO Box 325 Double Bay NSW 1360

Front cover photograph: View of the lake in the western section of the Brimbin property

EXECUTIVE SUMMARY

Context

Niche Environment and Heritage Pty Ltd was commissioned by Roche Group to prepare an assessment for Matters of National Environmental Significance (MNES) affected by the proposed development of the Brimbin site (The Project). The Brimbin site is located approximately eight kilometres north of Taree in the lower Manning River catchment.

Aims

This report aims to assess the impacts of the Project on MNES as required by the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). Specifically, the assessment aims to determine whether the Project will have a significant impact on a MNES and require referral to the Commonwealth Department of the Environment.

Methods

Relevant MNES listed under the EPBC Act were assessed in accordance with the *MNES Significant Impact Guidelines v1.1* (DoE 2013). This assessment has relied on targeted survey and habitat assessment completed in June-August 2010.

Key Results – flora

One Commonwealth listed threatened species, *Eucalyptus glaucina* (Slaty Red Gum), was observed within the study area. Nine individuals of *E. glaucina* were detected in the Conservation Area and Riparian and Steep lands (retained lands), but will not be impacted by the Project and have not been considered further.

Key Results - fauna

Six Commonwealth listed species were detected or have a moderate to high potential to occur. Impacts to these species by the Project have been considered using the MNES Significant Impact Criteria (see below). These include the Grey-headed Flying-fox, Spotted-tailed Quoll, Large-eared Pied Bat, Swift Parrot, Regent Honeyeater and Koala.

A further six Commonwealth listed species were detected or have moderate to high potential to occur but will not be directly impacted by the Project and have not been considered further. These include the New Holland Mouse, Hastings River Mouse, Australasian Bittern, Giant Barred Frog, Stuttering Frog and Square-tailed Kite.

Impact avoidance and mitigation

A range of avoidance and mitigation measures have been developed in consultation with OEH to minimise the impact of the Project on MNES, including avoiding EECs and threatened species habitat, maintaining connectivity through the development site by excluding development from riparian and steep land and buffering the offset lands so that they are not exposed to indirect impacts.

CONTENTS

TABLES

APPENDICES

1 INTRODUCTION

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Roche Group to prepare an assessment for Matters of National Environmental Significance (MNES) affected by the proposed development of the Brimbin site (the Project). The Brimbin site is located approximately eight kilometres north of Taree in the lower Manning River catchment.

1.1 The Project

The Project will involve the development of the area generally in accordance with the Brimbin Draft Structure Plan (Figure 1), and outlines the various land uses for the proposed development, including conservation. Areas set aside for conservation within the Brimbin Draft Structure Plan are divided into four categories:

1. Conservation (E1 National Park and Nature Reserves);
2. Conservation Replanting (E2 Environmental Conservation);
3. Riparian Land; and
4. Steep Land.

1.2 The development site and study area

1.2.1 Location

The study area is located between 8 and 15 km to the north-east of Taree, NSW (figure 1). It is situated on the low coastal hills and floodplains of the lower Manning River catchment, between Melinga in the north, Brimbin Road to the south, the Lansdowne River to the east and Brimbin and Dawson River to the west. The study area is 3,615.62 hectares, of which:

- 1,486.26 hectares is cleared exotic pasture;
- 1,455.07 hectares is relatively intact native vegetation;
- 517.25 hectares is regrowth native vegetation; and
- 157.6 hectares is proposed replanting to compliment the offsetting strategy by filling in unvegetated areas within the Conservation Land and enhancing biodiversity values.

1.3 Legislative context

1.3.1 EPBC Act

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on 'matters of national environmental significance' undergo an assessment and approval process. Under the EPBC Act, an action includes a project, undertaking, development or activity. An action that 'has, will have or is likely to have a significant impact on a matter of national environmental significance' is deemed to be a 'controlled action' and may not

be undertaken without prior approval from the Commonwealth Minister for the Environment.

The EPBC Act identifies matters of national environmental significance (MNES) as:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

1.4 Purpose of this report

The purpose of this report is to assess the impact of the proposal on MNES and determine if the Project should be considered an 'action' requiring referral to the Commonwealth Department of the Environment (DoE).

This report recommends a number of avoidance and mitigation strategies and provides significant impact assessments for 13 MNES based on the impacts from the Project.

2 METHODS

2.1 Field survey

2.1.1 Flora Survey and Identification of Vegetation Communities

Base vegetation maps utilising information from previous studies and reports and aerial photography were utilised in the field for typing the vegetation communities on site. An array of equidistant survey locations was defined using GIS and a rapid assessment of structure and composition of the vegetation was conducted at as many of these locations as possible. Full floristic plots, Braun-Blanquet cover-abundance scores and dissimilarity analyses were viewed as unnecessary for the purposes of this assessment. In the process of accessing the study area during the field survey to conduct vegetation validation and BioBanking plots, opportunistic random meanders were carried out to locate and record threatened plant species.

Detailed methods are provided in the Brimbin Biodiversity Certification Assessment report (Niche 2014).

2.1.2 Fauna Survey

Fauna surveys were conducted from 21 June to 1 July 2010 by two zoologists, Rhidian Harrington and Matt Swan. Surveys were conducted across all habitat types within the Brimbin east study area and complimented those previously conducted by other consultants (see Niche 2014).

Detailed methods are provided in the Brimbin Biodiversity Certification Assessment report (Niche 2014).

2.2 Likelihood of Occurrence

2.2.1 Literature and Database Review

The literature and database review informed the development of the consideration of threatened flora and fauna likelihood of occurrence and the subsequent assessment of affected species.

Database searches were conducted in May 2014. The following were used in preparing this review:

- OEH Atlas of NSW Wildlife, 10 x 10 km around study area;
- OEH Threatened Species Profile Database;
- SEWPaC EPBC Act Protected Matters Search Tool, 10 x 10 km around study area;
- Niche Environment and Heritage - Brimbin Flora and Fauna Report (2011); and

- Niche Environment and Heritage - Brimbin Biocertification Assessment Report (2014).

2.2.2 Threatened Flora Likelihood of Occurrence

Five categories for 'likelihood of occurrence' (Table 1) were attributed to species after consideration of criteria such as known records, presence or absence of important habitat features within the study area, results of the field surveys and professional judgement. This process was completed on an individual species basis. The list of target flora and their associated likelihood of occurrence are provided in Appendix A.

Species that would need to be considered as subject species within the study area are those in the Moderate, High or Known categories. Where impacts on potentially occurring threatened flora species could be reasonably expected to occur, these species are considered further for formal impact assessment as affected threatened flora (see Section 3).

Table 1. Likelihood of Occurrence Criteria – Threatened Flora

Likelihood Rating	Threatened Flora Criteria
Known	The species was observed within the study area
High	It is likely that a species inhabits or utilises habitat within the study area
Moderate	Potential habitat for a species occurs on the site. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the study area
Low	It is unlikely that the species inhabits the study area
None	The habitat within the study area is unsuitable for the species

2.2.3 Threatened Fauna Likelihood of Occurrence

Appendix A contains a list of threatened fauna species as scheduled under the EPBC Act, derived from a review of the databases and literature as outlined in Section 2.2.1.

Five categories for 'likelihood' are used to determine the final list of subject threatened fauna. Subject threatened fauna considered in the impact assessment are those species in the Moderate, High or Known categories. This likelihood criteria considers known records, presence or absence of important habitat features within the study area, results of the field surveys and professional judgement. The list of affected threatened fauna is determined from this analysis.

The categories are outlined in Table 2 below.

Table 2. Likelihood of Occurrence Criteria – Threatened Fauna

Likelihood rating	Criteria
Known	the species was observed within the study area
High	it is likely that a species inhabits or utilises habitat within the study area
Moderate	potential habitat for a species occurs on the site and the species may occasionally utilise that habitat. Species unlikely to be dependent on the habitat present within the study area
Low	it is unlikely that the species inhabits the study area. If present at the site the species would likely be a transient visitor. The site contains only very common habitat for this species which the species would not rely on for its ongoing local existence
None	the habitat within the study area is unsuitable for the species

3 IMPACT ASSESSMENT

3.1 Significant Impact Criteria

As part of this assessment significant impact criteria have been addressed for all MNES for which the study area is known or potential habitat (Appendix C). This equates to a total of 6 assessments. All the assessments concluded that the Project would not have a significant impact on each relevant MNES, and thus a referral to the Commonwealth is not required.

REFERENCES

DECCW (undated). Threatened Species Profiles for threatened species, endangered populations and endangered ecological communities listed under the NSW Threatened Species Conservation Act 1999. New South Wales Office of Environment and Heritage. Sydney, Australia, 2005. Online profiles found at http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.asp

DoE (2013). Significant Impact Guidelines 1.1 - Matters of National Environmental Significance. Commonwealth Department of the Environment, Canberra.Niche (2011). *Brimbin Flora and Fauna Assessment*. Unpublished report for Roche Group. Niche Environment and Heritage Pty Ltd, Umina Beach NSW, March 2011.

Niche (2014). *Brimbin Biodiversity Certification Assessment Report*. Unpublished report for Greater Taree City Council and Roche Group. Niche Environment and Heritage Pty Ltd, Umina Beach NSW, 4 June 2014.

APPENDICES

Appendix A: Threatened Flora Likelihood of Occurrence

Scientific Name	Common Name	Conservation Status[1]		Habitat	Likelihood
		TSC Act	EPBC Act		
Allocasuarina defungens	Dwarf Heath Casuarina	E	E	Grows in tall heath on sand, clay soils or sandstone. Endemic to NSW, this species is found from the Forster area north to Byron Bay n the North coast (DEC 2005).	Low
Asperula asthenes	Trailing Woodruff	V	V	This species is found in damp sites often along river banks, from Buladelah north to Near Kempsey (DEC 2005).	Low
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	This species occurs in a range of habitat types including heath and woodland. In NSW this species is distributed from the Gibraltar Range in the North to the South Coast (DEC 2005).	Low
Cynanchum elegans	White-flowered Wax Plant	E	E	This species usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree *Leptospermum laevigatum* – Coastal Banksia *Banksia integrifolia* subsp. *integrifolia* coastal scrub; Forest Red Gum *Eucalyptus tereticornis* aligned open forest and woodland; Spotted Gum *Eucalyptus maculata* aligned open forest and woodland; and Bracelet Honeymyrtle *Melaleuca armillaris* scrub to open scrub. Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region (DEC 2005).	Low
Euphrasia arguta	-	CE	CE	Occur in eucalypt forest with a mixed grass and shrub understorey within Nundle State forest. Sites that have either been logged in the last few decades, or appear to have regrown from past clearing.	Low
Eucalyptus glaucina	Slaty Red Gum	V	V	Grows in grassy woodland and dry eucalypt forest on deep, moderately fertile and well-watered soils. Found in two areas of the north coast of NSW, near Casino and from Taree to Broke (DEC 2005).	**Known** (occurs in conservation areas only)
Grevillea obtusiflora	-	E	E	There are two subspecies of G. obtusiflora. Subspecies *obtusiflora* occurs as scattered groups in the understorey of low open eucalypt forest at an altitude of 730 metres above sea level. Subspecies *fecunda* occurs in clusters within low, open scrub beneath open, dry sclerophyll forest, on orange, sandy loam soils with sandstone boulders, at an altitude of 570 metres. Subspecies *obtusiflora* occurs near Rylstone, while subspecies fecunda occurs in the Capertee Valley, north-west of Lithgow, and in the Gardens of Stone National Park (DEC 2005).	Low
Hakea archaeoides	Big Nellie Hakea	V	V	Restricted to near-coastal ranges, above 230 m altitude, between Taree and Wauchope in north-eastern NSW. Reserved in Big Nellie Flora Reserve and Six-B Flora Reserve, each with less than 1000 plants. Occurs in a composite of wet sclerophyll forest and rainforest on hill slopes, on Triassic conglomerate. Plants are lignotuberous. Fowering occurs from Oct. to Dec.	Low
Melaleuca biconvexa	Biconvex Paperbark	V	V	This species generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Found only in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north (DEC 2005).	Low
Phaius australis	Southern Swamp Orchid	E	E	Swampy grassland or swampy forest including rainforest, eucalypt or paperbark forest, mostly in coastal areas	Low
Streblus pendulinus	Siah's Backbone		E	Siah's Backbone is a tree or large shrub that grows to 6 m in height. Found in warmer rainforests, chiefly along watercourses.	Low

Scientific Name	Common Name	Conservation Status[1]		Habitat	Likelihood
		TSC Act	EPBC Act		
Syzygium paniculatum	Magenta Lilly Pilly	E	V	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State forest. On the south coast the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities	Low
Thesium australe	Austral Toadflax	V	V	Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on kangaroo grass tussocks but has also been recorded within the exotic coolatai grass.	Low

Appendix B: Threatened Fauna Likelihood of Occurrence

Scientific Name	Common Name	Conservation Status[1]		Habitat	Likelihood of Occurrence
		TSC Act	EPBC Act		
Amphibians					
Litoria aurea	Green and Golden Bell Frog	E	V	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Often occurs in highly disturbed areas. Known from coastal or near coastal populations in NSW (DEC 2005).	Low
Mixophyes balbus	Stuttering Frog	E	V	Occurs in rainforest and wet open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Breeding occurs in summer after heavy rain in large rainforest streams. Distributed from southern Queensland to Victoria (DEC 2005).	**Moderate** (Potential habitat not impacted by the Project)
Mixophyes iteratus	Giant Barred Frog	E	E	Inhabit deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000 m. They breed around shallow, flowing rocky streams from late spring to summer. Distributed along the coast from south-east Queensland to the Hawkesbury River (DEC 2005).	Moderate (potential habitat not impacted by the Project)
Mammals					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Occur in a range of forest types, including wet and dry sclerophyll forest and woodland, rainforest edges, sub alpine woodland and sandstone outcrop country (Churchill 2008). Roosts preferentially in the twilight areas of caves, crevices in cliffs and mines in colonies of three to 40 individuals, and has also been found roosting in abandoned fairy martin nests (Churchill 2008). In NSW this species is found north of Bungonia in the Southern Highlands including the Coast and inland ranges (Churchill 2008).	**Moderate**
Mammals					
Dasyurus maculatus	Spotted-tailed Quoll	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock crevices, boulder fields and rocky-cliff faces as den sites (DEC 2005).	**Moderate**
Mammals					

Scientific Name	Common Name	Conservation Status[1]		Habitat	Likelihood of Occurrence
		TSC Act	EPBC Act		
Phascolarctos cinereus	Koala	V	V	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (DEC 2005).	**Known**, recorded from the study area
Potorous tridactylus	Long-nosed Potoroo	V	V	Inhabits coastal heaths and dry and wet sclerophyll forests, prefers dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature (DEC 2005). A predominantly coastal species is south eastern Australia (DEC 2005).	Low
Pseudomys oralis	Hastings River Mouse	E	E	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, Casuarina-dominated riparian forest and coastal Melaleuca forests. A patchy distribution spanning the Great Dividing Range from the Hunter Valley, south of Mt Royal, north to the Bunya Mountains near Kingaroy in south-east Queensland, at elevations between 300 m and 1100 m (DEC 2005).	**Moderate** (potential habitat not impacted by the Project)
Pseudomys novaehollandiae	New Holland Mouse		V	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	**Moderate** (potential habitat not impacted by the Project)
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Form camps or colonies numbering up to thousands in dense vegetation such as mangrove, rainforest, sclerophyll forest, Casuarina stands and Melaleuca stands usually near water (Churchill 2008). Distributed from central Queensland to south-western Victoria (DEC 2005).	**Known**, recorded from the study area but roosting sites not present
Birds					
Birds					
Lathamus discolor	Swift Parrot	E	EM	This species is an autumn and winter migrant to mainland Australia, breeding occurs only in Tasmania (Pizzey and Knight 1997). In NSW this species is found in areas with heavily flowering Eucalypts or lerp infested trees. Favoured feed trees include *Eucalyptus robusta, Corymbia maculata, C. gummifera, E. sideroxylon, E. albens, E. microcarpa, E. moluccana* and *E. pilularis* (DEC 2005).	**Moderate**
Rostratula benghalensis australis	Australian Painted Snipe	E	V	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber (DEC 2005).	Low

Scientific Name	Common Name	Conservation Status[1]		Habitat	Likelihood of Occurrence
		TSC Act	EPBC Act		
Xanthomyza phrygia	Regent Honeyeater	E	EM	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises : *E. microcarpa*, *E. punctata*, *E. polyanthemos*, *E. mollucana*, *Corymbia robusta*, *E. crebra*, *E. caleyi*, *Corymbia maculata*, *E. mckieana*, *E. macrorhyncha*, *E. laevopinea*, and *Angophora floribunda*. (DEC 2005).	Moderate
Dasyornis brachypterus	Eastern Bristlebird	E	E	Found in coastal woodlands, dense scrub and heathlands, particularly where it borders taller woodlands.	None
Migratory Birds					
Lophoictinia isura	Square-tailed Kite	V	M	Found in dry woodlands, open forests, rainforest and timbered watercourses (DEC 2005). In NSW this species is resident in the north, north-east and along major west flowing river systems and is a breeding migrant to the south coast (DEC 2005).	Moderate
Haliaeetus leucogaster	White-bellied Sea-eagle		M	Found in coastal areas, terrestrial wetlands and major rivers and has been observed foraging in a number of other habitats (DEWHA 2010a). Distributed along the coastline of mainland Australia and Tasmania and along major rivers (Pizzey and Knight 2007).	Moderate (potential habitat not impacted by the Project)
Hirundapus caudacutus	White-throated Needletail		M	In Australia this species is almost exclusively aerial, and in NSW is found in coastal areas and to the western slopes of the Great Dividing Range (DEWHA 2010b).	Moderate
Apus pacificus	Fork-tailed Swift		M	Aerial species, observed from a range of habitats in Australia. Summer migrant to Australia, found all over the country (Pizzey and Knight 2007).	Moderate
Merops ornatus	Rainbow Bee-eater		M	Occurs in grassland, open woodland, rainforest and shrublands. Often associated with water. Distributed throughout much of Australia (DEWHA 2010c)	Moderate
Monarcha melanopsis	Black-faced Monarch		M	Occurs in rainforest, adjacent eucalypt woodland and coastal scrub. Distributed coastally in eastern Australia (Pizzey and Knight 2007).	Moderate

Scientific Name	Common Name	Conservation Status[1]		Habitat	Likelihood of Occurrence
		TSC Act	EPBC Act		
Symposiarchus trivirgatus	Spectacled monarch		M	Occurs in understorey of lowland rainforest, thickly wooded gullies, and waterside vegetation including mangroves. Distributed in coastal eastern Australia (Pizzey and Knight 2007).	**Moderate**
Myiagra cyanoleuca	Satin Flycatcher		M	Inhabit heavily vegetated gullies in forests and tall woodlands, also coastal forests, woodlands, mangroves and gardens during migration (Pizzey and Knight 2007). Distributed from Cape York to Tasmania, breeding occurs in south eastern Australia (Pizzey and Knight 2007).	**Moderate**
Rhipidura rufifrons	Rufous Fantail		M	Inhabit rainforest, gullies in Eucalypt forest, monsoon forest, paperbark forest and more open habitats during migration (Pizzey and Knight 2007). Mostly found east of the Great Dividing Range.	**Moderate**
Ardea alba	Great Egret		M	Found in the shallows of estuaries, mudflats, rivers, freshwater wetlands, sewage ponds and irrigation areas (Pizzey and Knight 2007). Distributed across most of Australia except the Western Desert.	**Moderate** (potential habitat not impacted by the Project)
Ardea ibis	Cattle Egret		M	Found in grassland, paddocks and terrestrial wetlands, generally a spring migrant to south eastern Australia (Pizzey and Knight 2007).	Known, recorded from a large dam within the study area but habitat not impacted
Gallinago hardwickii	Latham's Snipe		M	Found in terrestrial wetlands, wet parts of paddocks and irrigated areas. Summer migrant to Australia, mostly found in the East (Pizzey and Knight 2007).	**Moderate** (potential habitat not impacted by the Project)
Haliaeetus leucogaster	White-bellied Sea-eagle		M	Found in coastal areas, terrestrial wetlands and major rivers and has been observed foraging in a number of other habitats (DEWHA 2010a). Distributed along the coastline of mainland Australia and Tasmania and along major rivers (Pizzey and Knight 2007).	**Moderate** (potential habitat not impacted by the Project)

Appendix C: EPBC Act Significance Impact Criteria

Significant Impact Criteria assessments have been conducted below for the following MNES:

1. Regent Honeyeater;
2. Swift Parrot;
3. Large-eared Pied Bat;
4. Spotted-tailed Quoll;
5. Koala; and
6. Grey-headed Flying-fox

Note: Unless otherwise stated, the habitat and general ecological information contained in these assessments has been taken from the NSW Office of Environment and Heritage (OEH) Threatened Species Profiles database (DECC 2008) and/or the Commonwealth SPRAT database (SEWPaC 2012):

- http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/; and
- http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

Definitions

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) to maintain genetic diversity and long term evolutionary development; or
- for the reintroduction of populations or recovery of the species or ecological community.

Such habitat may be, but is not limited to; habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community, and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

An 'important population' is one that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans, and/or that are:

- key source populations either for breeding or dispersal;
- populations that are necessary for maintaining genetic diversity; and/or
- populations that are near the limit of the species range.

Vulnerable Species

Large-eared Pied Bat		
Criteria (Vulnerable Species)	**Address of Criteria**	**Likelihood**
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
• lead to a long-term decrease in the size of an important population of a species	No impacts are expected to occur on known occurrences of this species or its roosting habitat. The Project would not significantly decrease the availability of habitat for an important population within the region.	Low
• reduce the area of occupancy of an important population	No impacts are expected to occur on known occurrences of occupied habitat. No caves or suitable roosts would be removed by the Project. The Project would not result in a reduced area of occupancy of an important population.	Low
• fragment an existing important population into two or more populations	The Project would not result in an impact of magnitude that would otherwise result in the fragmentation of an important population into two or more populations.	None
• adversely affect habitat critical to the survival of a species	No caves or roosts that would be suitable for this species would be removed by the Project. Suitable foraging habitat identified for this species within the development site is widespread throughout the region and is not regarded as habitat crucial to the survival of this species.	Low
• disrupt the breeding cycle of an important population	The Project would not remove any known occurrences of this species or potential breeding sites. It is considered that the Project is unlikely to disrupt breeding cycles of an important population.	Low
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The removal of suitable unoccupied habitat identified within the site would not decrease habitat availability or quality to the extent that the species is likely to decline.	Low
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project would not lead to the incursion of invasive species into the habitat of the Large-eared Pied Bat.	Unlikely
• introduce disease that may cause the species to decline, or	The Project would not introduce disease that may cause the species to decline.	Unlikely
• interfere substantially with the recovery of the species.	The foraging habitat to be lost from the development site is largely low quality regrowth and isolated within a large area of occurrence for this species. Accordingly it is concluded that the Project would not interfere substantially with the recovery of the species.	Unlikely
Conclusion: The proposed action is **unlikely** to have a significant impact on the **Large-eared Pied Bat**.		

Koala		
Criteria (Vulnerable Species)	**Address of Criteria**	**Likelihood**
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
• lead to a long-term decrease in the size of an important population of a species	It is considered that the study area supports an important population of Koala, although females with young were not recorded. However, only one record of this species was made within the development area, while numerous records were made from the offset lands. The Project would remove 132 ha of habitat for the Koala, but this area generally contains disturbed, isolated and/or regrowth vegetation and is considered sub-optimal, particularly when compared to the 848 ha of optimal habitat contained within the offset lands. Therefore, the Project is unlikely to lead to a long-term decrease in the size of an important population.	Low
• reduce the area of occupancy of an important population	Numerous records of Koala occur on adjacent lands, but only one within the subject area. Although, the Project is likely to result in a reduced area of occupancy of an important population through the removal of 132 ha of sub-optimal habitat, this is countered through the protection and enhancement of over848 ha of prime habitat in the offset areas.	Moderate
• fragment an existing important population into two or more populations	The Project is unlikely to fragment an existing important population into two or more populations, particularly given that riparian habitat would not be impacted and that a 200 m wide link will be replanted to connect the western and eastern parts of the property.	None
• adversely affect habitat critical to the survival of a species	The impacts of the Project are not likely to adversely affect habitat critical to the survival of the Koala. Suitable foraging habitat identified for this species within the development site is widespread throughout the region and is not regarded as habitat crucial to the survival of this species. Habitat conserved within the offset areas is of greater importance to the local population than that within the development areas.	Low
• disrupt the breeding cycle of an important population	Given that the habitat to be impacted is of much lesser quality than that within the offset areas it is considered that the Project is unlikely to disrupt breeding cycles of an important population.	Low
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project would remove 132 ha of low quality habitat for the Koala. Better quality habitat occurs on adjacent land and within the offset areas. It is considered unlikely that the Project would result in habitat degradation leading the species to decline.	Low
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in invasive species associated with housing projects such as domestic dogs becoming established in potential habitat for the Koala. A management plan, including fencing and feral animal control, would be implemented on site to reduce these impacts.	Unlikely
• introduce disease that may cause the species to decline, or	The Project would not introduce disease that may cause the species to decline.	Unlikely
• interfere substantially with the recovery of the species.	Although the Project would remove 132 ha of low quality habitat for the Koala, but conserve over 848 ha of optimal habitat for the species and increase linkages. The project would also result in an improvement of remaining habitat through exclusion of stock and management of threats	Low

Koala	
	through the implementation of a management plan. Therefore, the Project is unlikely to interfere substantially with the recovery of the species. .
Conclusion: The proposed action is **unlikely** to have a significant impact on the **Koala.**	

Grey-headed Flying-fox		
Criteria (Vulnerable Species)	**Address of Criteria**	**Likelihood**
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
• lead to a long-term decrease in the size of an important population of a species	Although the species is known from the site and 132 ha of sub-optimal foraging habitat would be impacted, no impacts are expected to occur to known breeding habitat for this species. The Project is unlikely to decrease the size of an important population of the species.	Low
• reduce the area of occupancy of an important population	The species has been recorded from the study area. Although, the Project is likely to result in a reduced area of occupancy of an important population through the removal of 132 ha of sub-optimal habitat, this is countered through the protection and enhancement of over 848 ha of prime habitat in the offset areas.	None
• fragment an existing important population into two or more populations	The Project is unlikely to fragment an existing important population into two or more populations, particularly given that riparian habitat would not be impacted and that a 200 m wide link will be replanted to connect the western and eastern parts of the property.	None
• adversely affect habitat critical to the survival of a species	No colonies would be removed by the Project. Suitable foraging habitat identified for this species within the development site is widespread throughout the region and is not regarded as habitat crucial to the survival of this species.	Unlikely
• disrupt the breeding cycle of an important population	The Project would not remove any known colonies of this species or potential breeding sites. It is considered that the Project is unlikely to disrupt breeding cycles of an important population.	Unlikely
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The removal of foraging habitat identified within the site is unlikely to decrease habitat availability or quality to the extent that the species is likely to decline.	Unlikely
• result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project is unlikely to lead to the incursion of invasive species into the habitat of the Grey-headed Flying Fox	Unlikely
• introduce disease that may cause the species to decline, or	The Project is unlikely to introduce disease that may cause the species to decline.	Unlikely
• interfere substantially with the recovery of the species.	The loss of sub-optimal foraging habitat from the development site is relatively small and isolated within a large area of occurrence for this species. There would be no reduction in the area of occupancy for this species. Accordingly it is concluded that the Project would not interfere substantially with the recovery of the species.	Unlikely
Conclusion: The proposed action is **unlikely** to have a significant impact on the **Grey-headed Flying-fox**		

Critically Endangered and Endangered Species

Spotted-tailed Quoll		
Criteria (Critically Endangered and Endangered Species)	**Address of Criteria**	**Likelihood**
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
• lead to a long-term decrease in the size of a population	The study area is not known to support a population of Spotted-tailed Quoll. Potential habitat will be impacted by the Project, although it is largely regrowth and not considered of high value. The Project would not significantly decrease the availability of habitat and it is considered unlikely that the Project would lead to a long-term decrease in the size of a population.	Unlikely
• reduce the area of occupancy of the species	The subject site supports potential habitat for this species, although it is largely regrowth and not considered of high value. The Project is unlikely to significantly decrease the availability of habitat and it is unlikely that the proposal will reduce the area of occupancy of the species.	Unlikely
• fragment an existing population into two or more populations	The study area is not known to support a population of Spotted-tailed Quoll. The Project would not result in an impact of magnitude that would otherwise result in the fragmentation of an existing population into two or more populations.	None
• adversely affect habitat critical to the survival of a species	It is not anticipated that the study area contains habitat critical to the survival of the species.	Unlikely
• disrupt the breeding cycle of a population	The impacts of the Project are unlikely to impact the breeding cycle of a population. potential habitat will be impacted by the Project, although it is largely regrowth and not considered of high value, and more suitable breeding habitat will be conserved and enhanced within the offset areas.	Unlikely
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The study area is not known to be habitat for the Spotted-tailed Quoll, but contains potential habitat, although it is largely regrowth and not considered high value. Therefore, it is not considered that the proposal would impact the habitat of this species such that the species is likely to decline.	Unlikely
• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	The proposed action is unlikely to result in invasive species associated with housing projects, such as domestic dogs and cats, becoming established in potential habitat for the species. A management plan, including fencing and feral animal control, would be implemented on site to reduce these impacts.	Unlikely
• introduce disease that may cause the species to decline, or	The proposed action is unlikely to result in introduced disease that may cause the decline of the Spotted-tailed Quoll.	Unlikely
• interfere substantially with the recovery of the species.	The impacts of Project are limited in extent and intensity and it s not anticipated that the Project would interfere with the recovery of the species.	Unlikely
Conclusion: The proposed action is **unlikely** to have a significant impact on the **Spotted-tailed Quoll.**		

Swift Parrot		
Criteria (Critically Endangered and Endangered Species)	**Address of Criteria**	**Likelihood**
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
• lead to a long-term decrease in the size of a population	There are no identified populations of this species in the study area. Suitable foraging habitat is present, but it is largely regrowth and not considered high value. The proposal is unlikely to result in a long-term decrease in the size of a population.	Unlikely
• reduce the area of occupancy of the species	The study area is not known to be habitat for a population of this species. Potential foraging habitat is present, but it is largely regrowth and not considered high value. Thus it is unlikely that the proposal will reduce the area of occupancy of the species.	Unlikely
• fragment an existing population into two or more populations	The Project would not result in an impact of magnitude that would otherwise result in the fragmentation of an existing population into two or more populations.	None
• adversely affect habitat critical to the survival of a species	Potential seasonal foraging habitat is available for this species within the subject site. The habitat within the subject site is not unique in the context of the adjoining lands. The Project is unlikely to adversely affect habitat critical to the survival of the Swift Parrot.	Unlikely
• disrupt the breeding cycle of a population	The study area represents potential foraging habitat only. The Project would not disrupt the breeding cycle of an important population.	Unlikely
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Some potential foraging habitat is present within the study area for this species. The vegetation of the subject site is largely regrowth, and is limited in value for the species. The extent of the modification of good quality habitat for this species is minimal with most being protected within the offset lands, thus it is unlikely disturbance to this habitat will lead to a decline in the species.	Unlikely
• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	The impacts of the Project are unlikely to result in the incursion of invasive species into the habitat of the Swift Parrot.	Unlikely
• introduce disease that may cause the species to decline, or	The Project is unlikely to introduce disease that may cause the species to decline.	Unlikely
• interfere substantially with the recovery of the species.	The study area contains foraging habitat for the Swift Parrot, however the impacts of the proposal on the habitat of this species is considered negligible. It is unlikely that the Project would interfere with the recovery of the species.	Unlikely
Conclusion: The proposed action is **unlikely** to have a significant impact on the **Swift Parrot**		

Regent Honeyeater		
Criteria (Critically Endangered and Endangered Species)	**Address of Criteria**	**Likelihood**
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
• lead to a long-term decrease in the size of a population	There are no identified populations of this species in the study area. Potential foraging habitat is present, but it is largely regrowth and not considered of high value. The proposal is unlikely to result in a long-term decrease in the size of a population.	Low
• reduce the area of occupancy of the species	The study area is not known to be habitat for a population of this species. Potential foraging habitat is present, but it is largely regrowth and not considered of high value. Thus it is unlikely that the proposal will reduce the area of occupancy of of the species.	Low
• fragment an existing population into two or more populations	The Project would not result in an impact of magnitude that would otherwise result in the fragmentation of an existing population into two or more populations.	None
• adversely affect habitat critical to the survival of a species	Suitable seasonal foraging habitat is available for this species within the subject site. The habitat within the subject site is not unique in the context of the adjoining lands. The Project is unlikely to adversely affect habitat critical to the survival of the Regent Honeyeater.	Unlikely
• disrupt the breeding cycle of a population	The study area is unlikely to provide breeding habitat for the species. Therefore, the Project is unlikely to disrupt the breeding cycle of an important population.	Unlikely
• modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Some potential foraging habitat is present within the study area for this species. The vegetation of the study site is largely regrowth, and is limited in value for the species. The extent of the modification of good quality habitat for this species is minimal, thus it is unlikely disturbance to this habitat will lead to a decline in the species.	Unlikely
• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	The impacts of the Project are unlikely to result in the incursion of invasive species into the habitat of the Regent Honeyeater.	Unlikely
• introduce disease that may cause the species to decline, or	The Project is unlikely to introduce disease that may cause the species to decline.	Unlikely
• interfere substantially with the recovery of the species.	The study area contains potential foraging habitat for the Regent Honeyeater, however the impacts of the proposal on the habitat of this species is considered low. It is unlikely that the Project would interfere with the recovery of the species.	Unlikely
Conclusion: The proposed action is **unlikely** to have a significant impact on the **Regent Honeyeater**		

GLOSSARY AND SHORTENED FORMS

GLOSSARY

Direct impacts	Impacts that directly affect the habitat and/or individual plants and animals and cannot be avoided or mitigated. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat (DEC 2007).
Indirect impacts	Impacts that affect species, populations or ecological communities in a manner other than through direct loss or disturbance. These can usually be avoided or mitigated. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas (DECC 2007).
Local occurrence	The distribution of an ecological community within the study area and continuous with it.
Local population	The population that occurs in the study area and contiguous with it.
Locality	The area within 10 km of the study area.
Study area	The site and any additional areas which may potentially be affected by the proposal either directly or indirectly.
Site	The area directly affected by the proposal.
Subject species	List of threatened species considered in the assessment
Threatened biodiversity	Threatened species, populations, ecological communities or their habitats listed on the EPBC Act.

SHORTENED FORMS

CMA	Catchment management authority
EEC	Endangered ecological community
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPI	Environmental planning instrument
LGA	Local government area
MNES	matters of national environmental significance.
OEH	NSW Office of Environment and Heritage
RDP	Rapid data point
SEPP	State environmental planning policy
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
TEC	Threatened ecological community as listed on the TSC and or EPBC Acts. Includes vulnerable, endangered and critically endangered ecological communities.
TSC Act	NSW *Threatened Species Conservation Act 1995*