1055 Bruxner Highway, Goonellabah

Ecological Assessment Report (EAR) to support the Planning Proposal

Prepared for Nimble Estates Pty Ltd

2 November 2022

Bower Ecology
Survey | Planning | Strategy

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Executive Summary

Nimble Estates Pty Ltd seeks to amend the Lismore *Local Environment Plan 2012* (LLEP 2012) to rezone 1055 Bruxner Highway, Gunnellabah (Lot 42 DP868366 and Lot 1 DP957677) from Primary Production (RU1) to a mixed-use development. The zoning amendments are proposed to facilitate future housing development consisting of multiple freehold land parcels and associated road access. This report provides the results of an ecological assessment prepared to support the assessment of the Planning Proposal under the *Environmental Planning and Assessment Act 1979*.

The report is based on a desktop assessment and a site survey. specifically, this report includes a desktop assessment of biodiversity matters (including review of previously prepared ecological assessments), results of a site survey, and an assessment of legislative requirements.

The site is approximately 76 ha and is located immediately east of and adjacent to the current eastern-most extent of residential development associated with Lismore township – just beyond the 'Urban Expansion Limit' identified in the Lismore Strategic Planning Statement (2020). Residential development is adjacent to the west of the site and agricultural land exists to the north, east and south. The site is traversed by Tucki Tucki Creek, draining west to east and its associated riparian and wetland environs, which split the site into a northern and southern section. The waterway corridors are largely cleared, as is the entire site, with the exception of scattered paddock trees and the occasional wind-row along some boundaries. Currently the site contains a dwelling and several agricultural sheds that support its use for grazing a small number of livestock. Historical aerial photography shows the site has been cleared since at least 1958.

Surveys by Bower Ecology indicates that prior to clearing, the site was likely dominated by a mixture of PCT 3001 (Lismore Basalt Subtropical Rainforest) and several forms of Wet Sclerophyll Forest. Currently the site is mostly cleared exotic pasture with scattered remnant trees and patches of Brushbox, Pink Bloodwood, and Tallowwood were observed on site (some planted), with small patches of rainforest also present. The latter appeared to be remnant, considering tree size and with reference to the earliest aerial photography available (1958).

Two vegetation communities on site meet Endangered Ecological Community determinations under the NSW *Biodiversity Conservation Act 2016* for 'lowland rainforest EEC' along Tucki Tucki Creek and the western boundary fence, but these communities would not satisfy thresholds under the Commonwealth EPBC Act for Threatened Ecological Communities (TEC).

Tucki Tucki Creek itself is considered a feature of high ecological significance as it forms an important local corridor recognised in the Lismore Biodiversity Management Strategy 2015-2035, and it is key fish habitat and likely habitat for the threatened (BC Act) southern purple-spotted gudgeon (*Mogurnda adspersa*). BioNet records and desktop based habitat assessment indicate that five threatened species of flora may occur on site. One of these species (scrub turpentine, *Rhodamnia rubescens*) was located on the western boundary during he Bower Ecology survey.

Target surveys for species of threatened grass, such as Hairy Jointgrass (*Arthraxon hispidus*) and native jute (*Corchorus cunninghamii*) will be undertaken during the appropriate season.

Habitat opportunities on site for threatened fauna are fairly limited, but the proximity and abundance of nearby records of some species indicates the site is likely utilised by some threatened frugivorous birds and bats particularly grey-headed flying fox and *Ptilinopus spp* (fruit doves). Field observations noted a relatively high number of rabbits and rodents leading to the use of the site by owls and raptors and a single black falcon (*Falco subniger*) (vulnerable BC Act) that was observed in previous studies.

Evidence of only one threatened fauna species (koala) was noted in recent surveys and it is likely that this species utilises various patches of feed trees in the area, as well as isolated paddock trees on site.

The rezoning footprint has considered the above ecological values of the site and has integrated them into riparian corridor and buffer zones as far as possible. For example, Tucki Tucki Creek will be conserved and

rehabilitated within a large green zone running centrally through the subject site (Figure 1 and Figure *2*). This represents an opportunity to enhance the local natural environment and obtain biodiversity goals outlined in several local plans (for example Urban Green Corridors and Lismore Biodiversity Management Strategy 2015-2035 and Key Habitats and Corridors). The onsite tributaries of Tucki Tucki Creek will also be retained and buffered from development.

It is acknowledged that there will be a potential loss of many large scattered remnant paddock trees, but that it is anticipated that the negative impact of the loss of these remnant trees will be adequately compensated by the retention and rehabilitation of Tucki Tucki Creek; as well as incorporation of natural values into buffers and riparian corridors. This will result in retention of some valuable paddock trees and a net gain of native vegetation and habitat on the site. Further biodiversity assessment will be required as part of any future DA phase. It is considered that the Biodiversity Offset Scheme will be triggered due to a combination of a minor impact to the Biodiversity Values Mapping (approximately 260m^2) and the native clearing threshold likely being exceeded due to clearance of native paddock trees. Based on the current design assessed within this report, the associated DA will be required to undertake a Biodiversity Development Assessment Report and calculate offset requirements in accordance with the NSW Biodiversity Assessment Method (2020).

1. Introduction

1.2 The Proposal

This Ecological Assessment report has been prepared by Bower Ecology Pty Ltd to accompany a Request for Planning Proposal (Planning Proposal) to amend the *Lismore Local Environmental Plan 2012* (LLEP) to enable mixed use development of land referred to as 1055 Bruxner Highway, Goonellabah (the site) comprising residential, employment and public open space lands

The site at 1055 Bruxner Highway has an area of approximately 76ha and is located adjoining existing urban development on the eastern fringe of Goonellabah. The site comprises two allotments being Lot 42 DP868366 and Lot 1 DP957677 and benefits from frontages to the Bruxner Highway to the north and Oliver Avenue to the west. The site is zoned RU1 Primary Production and has been used for many years for grazing purposes and is largely cleared of vegetation except for remnant trees dispersed across the site. The property is bisected by Tucki Tucki creek with several minor watercourses feeding into it. The site is free from flooding.

The Planning Proposal seeks to amend the LLEP as follows:

- Rezone the site from RU1 Primary Production to the following mix of land use zones:
    - R1 General Residential.
    - B4 Mixed Use.
    - RE1 Public Recreation.
    - IN1 General Industrial.
- Amend the Height of Buildings Map to apply a maximum building height of 13m for the proposed B4 Mixed Use zones and a maximum building height of 8.5m for the proposed R1 General Residential zone.
- Amend the Lot Size Map to remove the minimum lot size requirement of 40ha and to apply a minimum lot size of 1,500m^2 in the proposed IN1 General Industry zone.

Changes to the planning controls facilitate potential development of the site to accommodate a diversity of new housing, employment and public open space opportunities in an environmentally and socially sustainable environment.

Concept plans supporting the proposal illustrate desired development of the site in an innovative and 'contemporary' manner, comprising a mix of residential dwelling types (i.e. detached housing, multi-unit accommodation; seniors housing; group housing; live/work etc) suitable to accommodate the diverse and varying needs of the local community. The employment generating development will provide the opportunity for 'traditional' industrial type businesses along with smaller scale commercial/industrial activities including opportunities for 'incubator' type businesses.

A range of open space areas will be provided as riparian areas along key watercourses along with an additional large area for ecological conservation as well as 'pocket' parks and vegetated and open areas providing 'buffer' to adjoining agricultural activity. A local centre is planned to create a focal point for the residential community and encouraging social gathering and interaction. Proposed development of the site integrates with adjoining urban development while provide appropriate boundary treatments, including vegetation buffers and building setbacks from adjacent agricultural activities.

Future development on the site would be facilitated by a highly connected vehicle and pedestrian network with convenient access provided to public transport, public spaces, facilities, and amenities. Site development will be supported by all required infrastructure and utility services.

The potential zoning plan proposed for the site is shown in and the more detailed concept plan is shown in Figure 1 and Figure 2. In an attempt to keep the zoning plan as simple as possible the first and second-order streams and tributaries are omitted from the proposed RE1 zoning. Notwithstanding, these steams and tributaries, have been considered in the Indicative Layout Plan and will be appropriately managed at the

development application stage. At this stage, it is the intention to transfer the buffer and riparian corridor areas to Council as part of the development process.

1.2 General Description of the Site

The site is in the Lismore City Local Government Area in New South Wales (NSW). The site is approximately 76 ha and is located immediately east of and adjacent to the current eastern-most extent of residential development associated with Lismore township – just beyond the 'Urban Expansion Limit' identified in the Lismore Strategic Planning Statement (2020) (Figure 3). Residential development is adjacent to the west of the site and agricultural land (currently under crop, mainly pineapple farms and fruit orchards) exists to the north, east and south.

The site is traversed by Tucki Tucki Creek draining west to east and its associated riparian and wetland environs, which split the site into a northern and southern section. The waterway corridors are largely cleared, as is the entire site, with the exception of scattered paddock trees and the occasional wind-row along some boundaries. Currently the site contains a dwelling and several agricultural sheds that support its use for grazing a small number of livestock. Historical aerial photography shows the site has been cleared since at least 1958 (the earliest available via the NSW Government's spatial portal for historical imagery) (Figure *4* Historical imagery). With the exception of the creek lines (which are low-lying) the land is approximately 130-190m AHD with ridges in the south-west and south-east corners and in the location of the existing house (Figure 5).

1.3 Scope of this Report

Bower Ecology Pty Ltd was engaged by Nimble Estates Pty Ltd to undertake an ecological assessment of the site to inform their plans. Specifically, this report follows the list of reports and technical studies required to support the Planning Proposal (provided by Lismore City Council [July 2022]) and includes:

1. A desktop review of the site to identify existing ecological values. This will be based on:
    - Publicly available information (e.g. Biodiversity Values Mapping, Wetland SEPP mapping, BioNet records, Koala SEPP requirements, Lismore City Council mapping); and
    - the existing Flora and Fauna Assessment and Aquatic Habitat Assessment prepared for Aarian Pty Ltd (dated 2/10/2016 and 6/9/2016 respectively).

2. Undertake a site visit to:
    - check the currency of information presented in the aforementioned assessment reports prepared for Aarian Pty Ltd. (e.g. habitat values, tree surveys, vegetation mapping);
    - map and describe the ecological features and biodiversity value of the site including threatened ecological communities, threatened species and their habitat including linkages to corridors beyond the site;
    - understand the quality of habitat on the site; and
    - record incidental sightings of threatened flora or fauna.

3. A high-level constraints and opportunities analysis to inform the Planning Proposal. The legislative framework pertaining to biodiversity matters will also be discussed, including the implications of occurrences of native flora and fauna for future development of the site.

This ecological assessment will demonstrate how the proposal has taken appropriate and sufficient steps, to firstly avoid or minimise impacts to native vegetation, recommended mitigation of the ecological impacts of rezoning and (if relevant) describe compensatory restoration to address any loss of native vegetation.

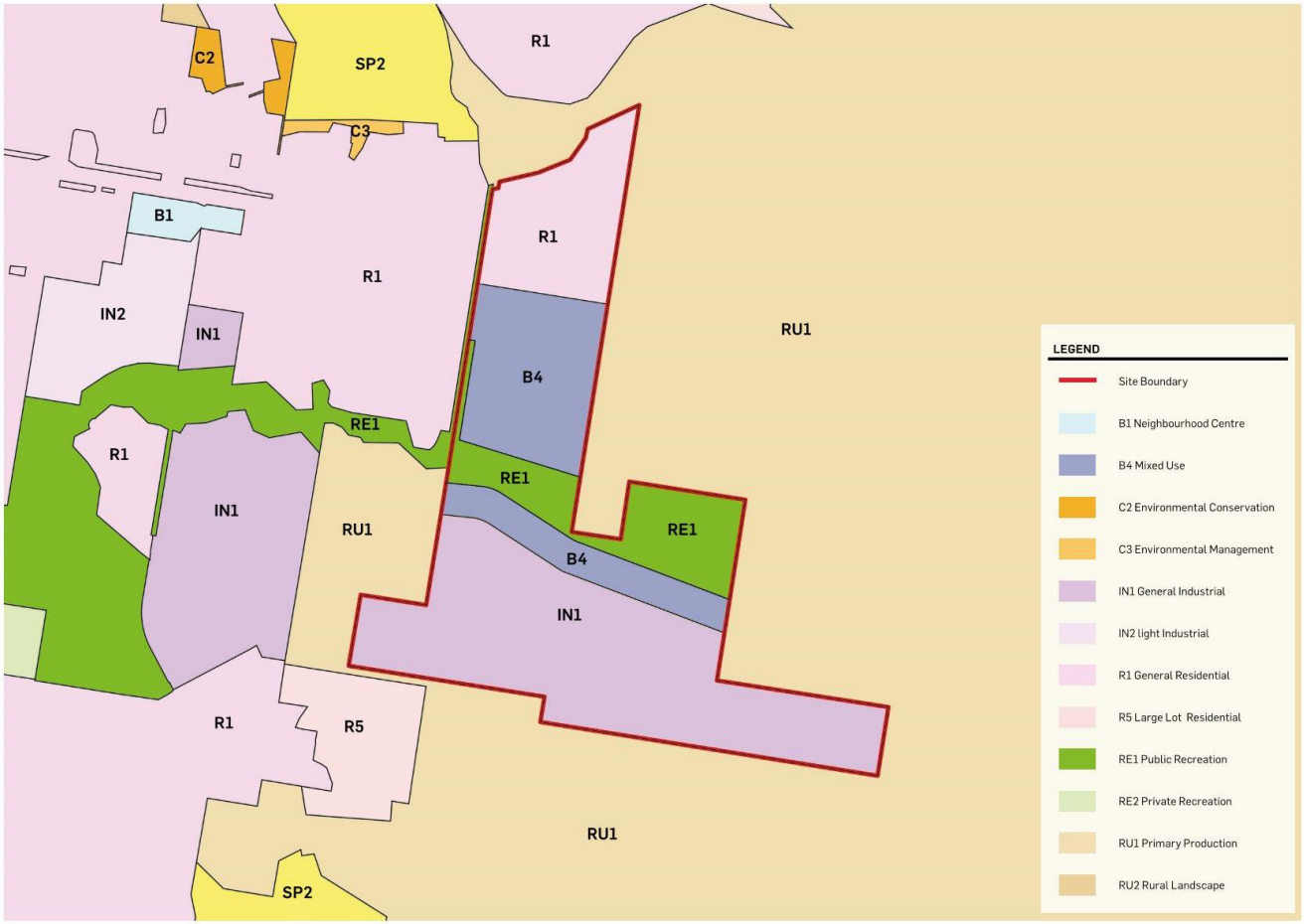

Figure 1: Study site showing proposed zoning changes (supplied by Urbis)

Figure 2 Concept plan for site (supplied by Urbis)

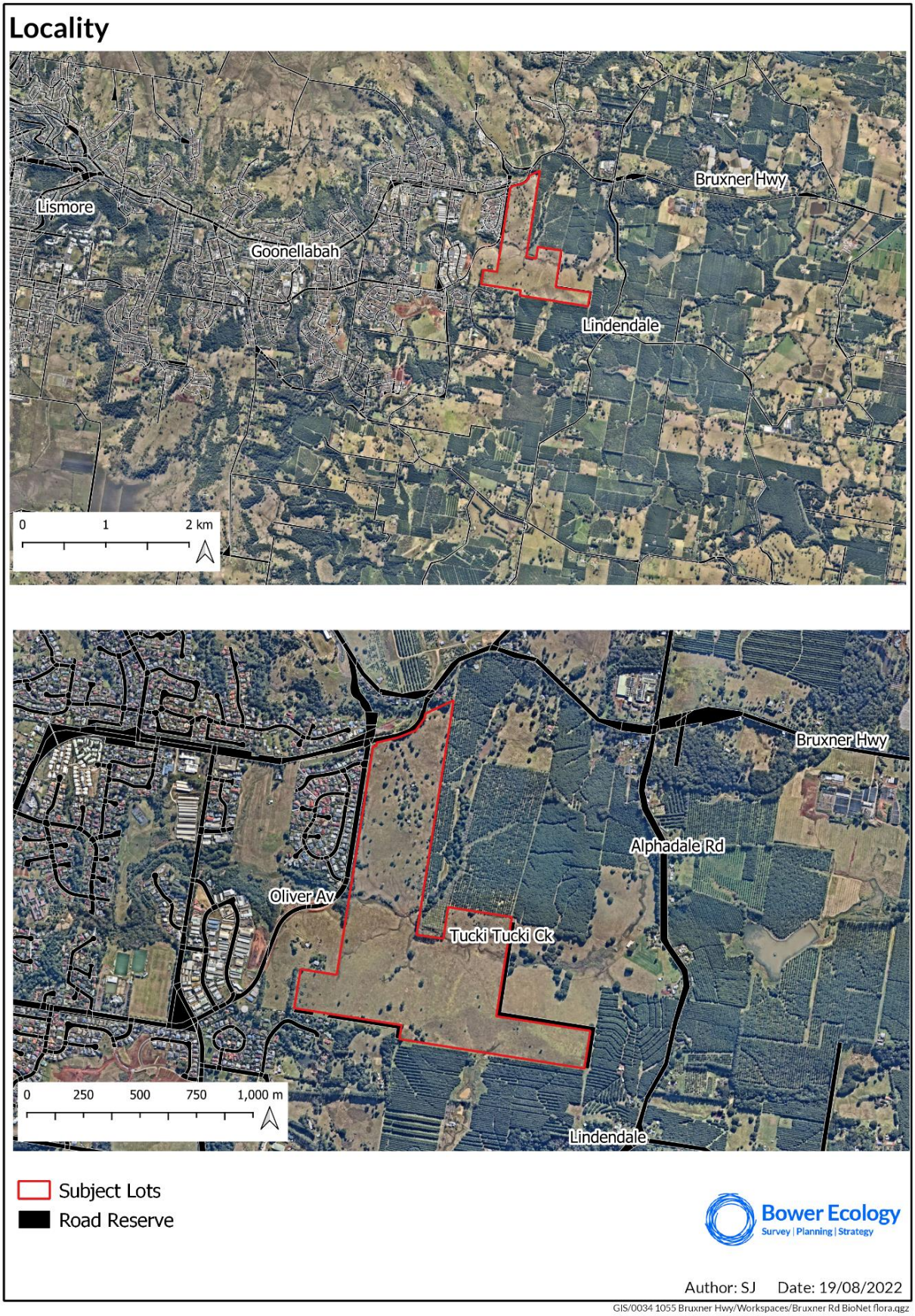

Figure 3: The site and surrounding context

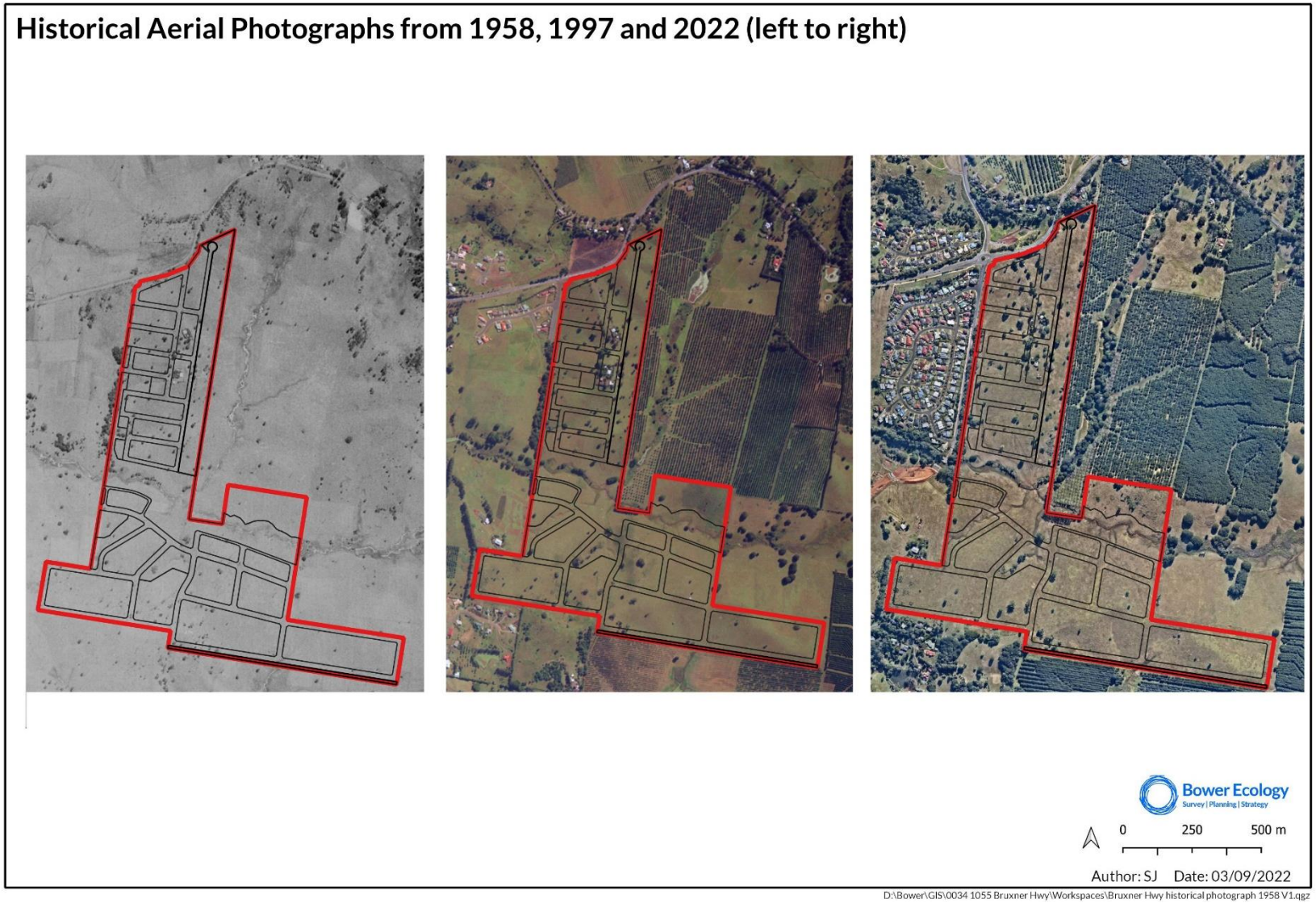

Figure 4 Historical imagery

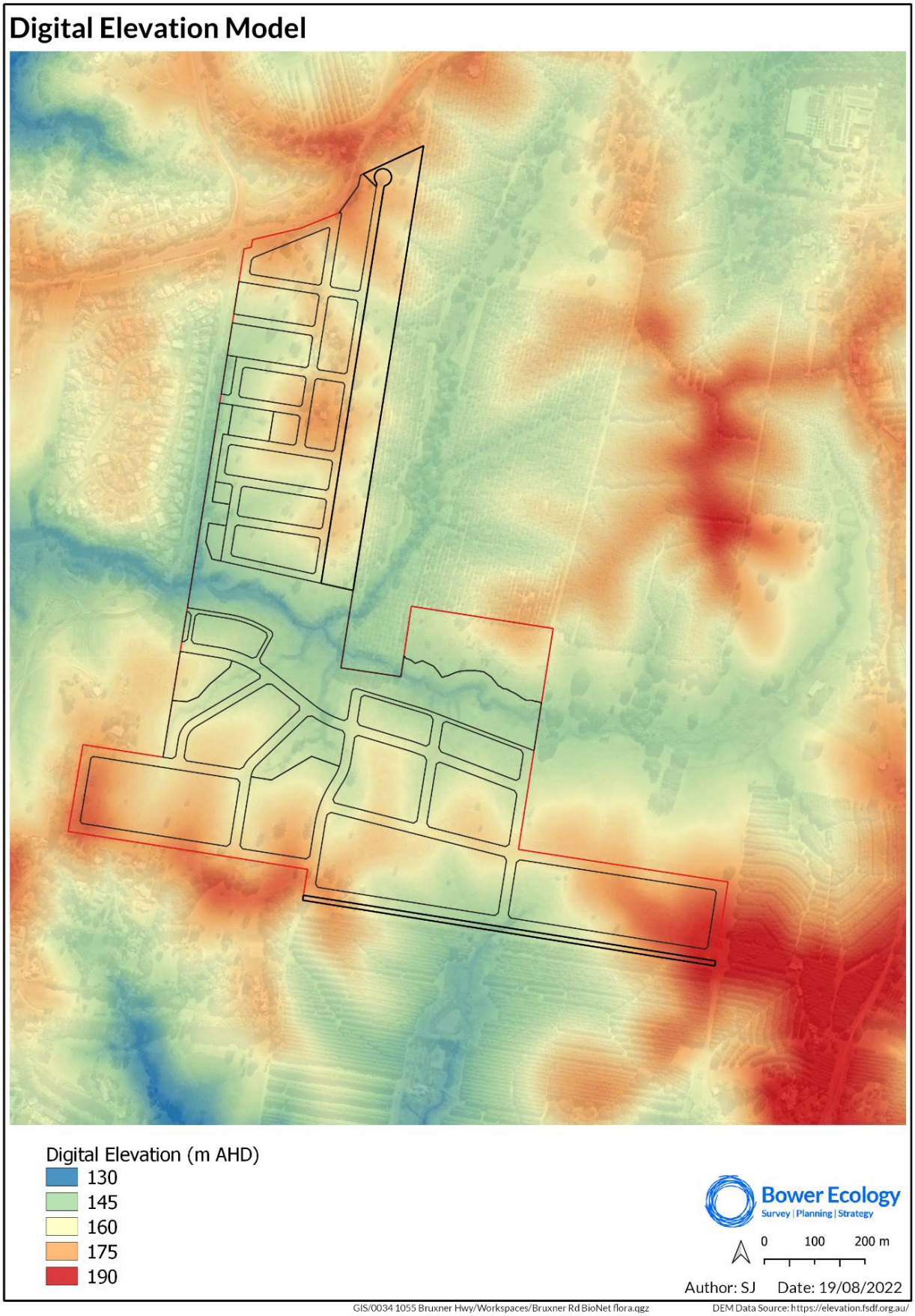

Figure 5 Digital Elevation Model

2. Methodology

This report includes a desktop assessment of biodiversity matters, results of a site survey, and an assessment of legislative requirements.

2.1. Desktop Assessment

A desktop assessment reviewed the following sources to understand the ecological values within the site:

- The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EBPC Act) and associated Species Profile & Threats (SPRAT) database;
- NSW State Government BioNet Threatened Species records within approximately 5km of the site
- *State Environmental Planning Policy (Resilience and Hazards) 2021* wetlands mapping
- *State Environmental Planning Policy (Biodiversity & Conservation) 2021* mapping
- NSW Biodiversity Values Mapping under the *Biodiversity Conservation Act 2016*
- NSW Water Management Act 2000 hydroline mapping
- *Fisheries Management Act 1994* key fish habitat mapping
- Lismore City Council Online Maps including, Zoning in the LEP 2012.
- Comprehensive Koala Plan of Management for south-east Lismore 2013 (under SEPP 44)
- Previous studies, including Flora and Fauna Assessment (Bushfire Safe (Aust) Pty Ltd, 2016) and Aquatic Habitat Assessment (Bushfire Safe (Aust) Pty Ltd, 2017).

2.2. Field Assessments

Bower Ecology undertook a site inspection to validate data collected during the desktop assessment. The following methods were employed on 17-18 August 2022:

- Survey of vegetation community to form a list of observed species, their strata, and their relative abundance into qualitative categories (dominant, sub-dominant, common, occasional, rare) to determine Plant Community Types (PCT's).
- Survey to confirm fauna habitat values across the site, including koala habitat and Spot Assessment Technique (SAT) searches (Phillips & Callaghan 2011) in all vegetation communities that had koala trees in accordance with the Comprehensive Koala Plan of Management for south-east Lismore (Lismore City Council 2013). A minimum of 10 trees were searched in each relevant community and standalone paddock trees were also searched.
- A meander of the property, to record incidental sightings of flora and fauna observed during the survey.

Further to this, a drone survey was undertaken on 6 October 2022 to determine the status of a stick nest and hollows within a habitat tree (stag) on site.

Detailed survey of standalone paddock trees (including recording species, height, diameter at breast height, and canopy width of trees with use of a GNSS GPS with accuracy to 10cm) has not been completed at this stage. However, it is recognised that this detail will be required for the future Development Application (DA) post approval of the Planning Proposal to rezone the site for urban use. Further, it is recognised that a targeted survey for Hairy Joint grass (*Arthraxon hispidus*), a threatened species under the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, will be required. It has not been completed with this assessment due to timing. The flora survey period for this report is outside the season for Hairy Joint grass, which is between September and April (DCCEEW 2022).

2.3. Limitations and notes on methodology

Biodiversity Assessment Methodology floristic plots were not undertaken as part of the scope of this study; however a list of dominant flora species was collected for each type of vegetation community on the site. Other targeted fauna survey methods (e.g., trapping, motion sensor cameras, anabat, bioacoustics records, etc) have not been included as part of this ecological assessment. However, an assessment of habitat resources and quality was undertaken to inform the ecological assessment.

Further the survey period represents one point in time and does not reflect seasonal variation in vegetation, hydrology and fauna use that may occur.

2.4. Terminology

Exotic species are marked with an asterisk * throughout this report.

The term “site” describes the footprint of the proposed rezoning area as outlined in Section 1.

The term “study area” refers to the site as well as adjacent areas that may be indirectly impacted by potential future development (e.g., due to edge effects). The study area also includes an approximate 5km buffer from the site to review local BioNet threatened species records.

Both the scientific and common name is provided for the first mention of a species in text. Common names only are then used for subsequent mentions of a species.

3. Baseline ecological information

3.1. Vegetation communities

The site is mostly cleared with scattered paddock trees and some small clumps of riparian vegetation along Tucki Tucki Creek. Historical aerial photography shows the site has been cleared since at least 1958 (the earliest available via the NSW Government's spatial portal for historical imagery). Plant Community Types (PCTs) mapping (NSW SEED 2022) indicates some small areas of vegetation that are recognisable as PCTs (Figure 6). The map shows Lismore Basalt and Lower Richmond Hills Subtropical Rainforest along Tucki Tucki Creek and tributaries; with small remnant patches of various sclerophyllous forests throughout the open paddocks (such as: Northern Hinterland Grey-gum – Mahogany Grassy Forest, Far North Ranges Red Gum Grassy Forest, Clarence Lowland Ironbark – Spotted Gum Grassy Forest and Northern Turpentine Brush Box Wet Forest).

The NSW Transitional Native Vegetation Regulatory map (which is only relevant to rural lands) indicates Category 2 (vulnerable and sensitive regulated land) associated with the main branch of Tucki Tucki Creek (Figure 7). There are also small areas of sensitive regulated land in 10m wide 'community land' corridors on the western boundary of the site. These areas also coincide with the Biodiversity Values Mapping (Figure 8).

Lismore City Council Vegetation Mapping (2022) indicates the majority of the remaining patches of vegetation on site as Coastal Valley Grassy Woodlands with a patch of North Coast Wet Sclerophyll forest and Dry Rainforest in the southern portion of the site (Figure 9). Although previous studies report that areas of mapped intact vegetation, including those which have been classed as 'Dry Rainforest', 'Wet Sclerophyll Forest' and 'Coastal Valley Grasslands' on the site had been removed prior to survey (between 2015 and 2016) (Bushfire Safe [Aust] Pty Ltd 2016). Remaining vegetation along Tucki Tucki Creek and the patch of mapped 'rainforest' in the southern portion of the site are also considered 'High Conservation Value' areas, as per Figure 10.

Previous studies utilised vegetation community descriptions in Lismore's Biodiversity Management Strategy fine scale vegetation mapping report (2015) and resulted in the classification of six vegetation types (that were described but not mapped in the associated report) identified as follows:

1. Closed grassland with scattered paddock trees (dv. Lowland Sub-tropical Rainforest)
2. Closed grassland with scattered paddock trees (dv. North Coast Wet Sclerophyll Forest)
3. North Coast Wet Sclerophyll Forest (Flooded Gum Tallowood Brush Box)
4. Tucki Tucki Creek
5. Disturbed Open Bushland
6. Riparian Urban Bushland (adjoining the site to the east along Tucki Tucki Creek and tributary in community corridor).

The latest surveys undertaken for the Planning Proposal (by Bower Ecology) make reference to Plant Community Types (PCTs) and Endangered Ecological Communities (EEC's) as recognised in the NSW BC Act. It is likely that prior to clearing, the site was dominated by a mixture of PCT 3001 (Lismore Basalt Subtropical Rainforest) and forms of Wet Sclerophyll Forest. With reference to the pre-clearing data on the NSW Government "Trees near me" application and site observations, the latter may have included the following Plant Community Types (PCT):

- PCT 3139 – Border Ranges Brush Box-Tallowwood Wet Forest
- PCT 3147 – Far North Brush Box-Bloodwood Wet Forest
- PCT 3165 – Northern Brush Box Subtropical Wet Forest
- PCT 3174 – Northern Turpentine-Brush Box Wet Forest
- PCT 3252 – Northern Hinterland Grey Gum-Mahogany Grassy Forest

Patches of Brushbox and Pink Bloodwood, and Tallowwood were observed on site, with small patches of rainforest also present. Some of these appeared to be remnant, considering tree size and with reference to the earliest aerial photography available (1958, Figure *4*).

Vegetation communities observed on site are described in Table 1. PCT descriptions have been ascribed where possible, however it is acknowledged that most of the vegetation on site is vegetation that has since been planted/seeded or regrown since initial land clearing was undertaken. These are known as 'derived communities' and hence a PCT may not be applicable. The vegetation communities are represented in Figure 11 and a list of paddock tree species is provided in Appendix 2.

Table 1 Vegetation communities identified on site in current surveys

Community Name	Description
Plant Community 1: Blackbutt Forest – Planted (Plate 1)	This community consists of *Eucalyptus pilularis* (Blackbutt) dominated forest that has been planted on the western fence line (on neighbouring property), but is overhanging the subject land. The canopy of Blackbutt is approximately 25 to 30m high. There is a subcanopy of *Corymbia torelliana*, with exotic pasture as ground cover.
Plant Community 2: Brushbox Forest (Plate 2)	In the south of the site, there is a small patch of open forest dominated by *Lophostemon confertus* (Brushbox), with *Corymbia intermedia* (Pink Bloodwood) sub-dominant. The understorey and ground layer is relatively open due to grazing, and includes *Lantana camara*, Cinnamomum camphora** (Camphor Laurel) saplings and exotic pasture grasses. *Oplismenus aemulus* (Wavy Beared Grass) and *Wikstroemia indica* are also common. Another patch of this forest exists along the northern boundary of the site, along the Bruxner Hwy. This patch is also dominated by Brushbox, with *Angophera floribunda* (Rough-barked Apple) also common as a canopy species. Other species that are common include *Cupaniopsis anarcardioides* (Tuckeroo), Camphor Laurel*, *Murraya 11denophora** (Mock orange), *Pittosporum undulatum* (Sweet Pittosporum), *Acacia melanoxylon* (Blackwood) and *Stenocarpus sinuatus* (Firewheel). This community is considered to be representative of PCT 3147 – Far North Brush Box-Bloodwood Wet Forest, for which there is no associated Endangered Ecological Community (EEC) under the BC Act.
Plant Community 3: Camphor Laurel* Forest	This community is dominated in the canopy by Camphor Laurel*, however has elements of native flora and a variety of exotic plants also. Species commonly in this community include Blackwood, *Eugenia uniflora** (Brazilian Cherry), and *Ligustrum lucidum** (Broad-leaved Privet). *Geitonoplesium cymosum* (Scrambling Lilly) is occasionally present, alongside *Adiantum* sp., *Rubus rosifolius* (Roseleaf Bramble), Wavy Beard Grass, *Ageratina* riparia* (Mistflower), and *Rubus anglocandicans** (Blackberry).
Plant Community 4: Disturbed Bushland (Plate 4)	This community occurs as a small patch of young/regrowth mostly native small trees, thick lantana, and has a very weedy ground cover. Species in this community commonly include Blackwood, Sweet Pittosporum, *Hypolepis muelleri* (Harsh Ground Fern), *Guoia semiglauca* (Guoia), *Schefflera actinophylla** (Umbrella Tree), Lantana*, *Ageratum houstonianum** (Blue Billygoat Weed), Camphor Laurel*, and *Maclura cochinchinensis* (Cockspur vine).
Plant Community 5: Flooded Gum Forest – Planted (Plate 4)	This community exists along the fence line in the south-west of the site. It consists of a row *Eucalyptus grandis* (Flooded Gum) that has been planted on the adjacent property but overhangs the subject lot. *Pinus elliotii* (Slash Pine) and *Eucalyptus microcorys* were occasionally present in the canopy. The subcanopy is made up of rainforest species, including Camphor Laurel*, *Jagera pseudorhus* (Foambark), Cockspur vine, *Pteridium esculentum* (Bracken Fern), Sweet Pittosporum, Tuckeroo, *Mallotus philippensis* (Red Kamala), *Alphitonia excelsa* (Red Ash), *Acacia podalyriifolia* (Silver Wattle), *Zieria smithii* (Sandfly Zieria), *Blechnum cartilagineum* (Gristle Fern) and Wavy Beard Grass.
Plant Community 6: Freshwater Forbland / Sedgeland	This community fringes the Tucki Tucki Creek and appears to be maintained by surface expressions of groundwater, seeping from the surrounding basalt. Species within this community include *Persicaria 11denopho, Cynodon dactylon* and

Community Name	Description
(Plate 5)	*Eleocharis equisetina* as a sub-dominant ground cover, with various other species intermingled and sparsely distributed. The latter includes *Philydrum lanuginosum* (Woolly Frogmouth), *Typha* sp., *Cuphea carthagenensis** (Brazilian Waxweed), *Ranunculus inundatus* (Buttercup), and Blue Billygoat Weed*.
Plant Community 7: Rainforest (Plate 6)	A small patch of rainforest exists on part of the northern bank of Tucki Tucki Creek. Tree / shrub species include *Cyathea cooperi* (Tree Fern), Sweet Pittosporum, *Mischocarpus australis*, *Mischocarpus pynformis* and *Sysigium leumanii*. Another small patch exists to the south-east and is of similar constitution. This community is considered to be representative of PCT 3001 – Lismore Basalt Subtropical Rainforest and meets the determination for the Endangered Ecological Community (EEC) *Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions*.
Plant Community 8: Rainforest with Camphor Laurel* (Plate 7)	Along the western boundary of the site (and along Oliver Avenue) a thin strip of Rainforest with Camphor Laurel exists within the property boundary. This differs from Plant Community 3 as it has a higher proportion of native species than Camphor Laurel*. Although the strip has an infestation of Lantana*, Camphor Laurel* and Broad-leaved Privet*, native rainforest species are also common, including: *Polyscias elegans* (Celerywood), Blackwood, Guioa, Red Ash and *Melicope elleryana* (Pink Euodia) and *Duboisia myoporoides* (Corkwood). The vine *Smilax australis* is also common. This community is considered to be representative of PCT 3001 – Lismore Basalt Subtropical Rainforest and meets the determination for the Endangered Ecological Community (EEC) *Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions* under the BC Act.
Plant Community 9: Tallowwood Forest (Plate 8)	This community is dominated by large Tallowwoods, with Brushbox also common. Various other native species are present in the shrub and sub-canopy, including Camphor Laurel*, *Myrsine variabilis* (Muttonwood), Lantana*, Tuckeroo, Sweet Pittosporum, Foambark, and Cockspur Vine. The ground layer commonly included *Ageratina Adenophora** (Crofton Weed), Mistflower*, Sandfly Zieria, Bracken fern, Wavy Beard Grass, Broad-leaved Privet*, and *Imperata cylindrica* (Blady grass). This community is considered to be representative of PCT 3139 – Border Ranges Brush Box-Tallowwood Wet Forest, for which there is no associated Threatened Ecological Community (TEC) under the BC Act.
Plant Community 10: Tallowwood Forest – Planted (Plate 9)	This community consisted of mature Tallowwoods along the fence line. They had been planted in a line on the adjacent property however the canopy overhangs the subject site. The midstory and shrub layer was open, with exotic pasture grasses within the ground layer. A few *Araucaria bidwillii* (Bunya Pine) were also present within the eastern edge of this community.
Plant Community 11: Exotic pasture in drainage lines (Plate 10)	This community was dominated almost exclusively by exotic pasture grasses adapted to slightly wetter conditions – predominantly *Axonopus compressus* (Broad-leaved Carpet Grass); however the occasional native species (e.g. *Juncus* sp.) was also present.
Plant Community 12: Exotic Pasture with scattered trees (Plate 11).	This community is dominated by pasture species such as Couch Grass, *Eragrostis tenuifolia* (Elastic Grass*), *Paspalum* sp. (probably *mandiocanum**), *Sporabolus africanus** (Parramatta Grass), Broad-leaved carpet grass*, and Blady Grass, amongst others. The scattered trees throughout this community are predominantly native rainforest species, with a few camphor laurel also. A list of paddock trees is provided in Appendix 2.

3.1.2. Threatened Ecological Communities (TECs) – Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and NSW Biodiversity Conservation Act 2016 (BC Act)

The Protected Matters Search Tool (PMST) results for the site indicated a possible four EPBC Act listed TEC's that could occur on the subject site and surrounds (Appendix 3):

- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
- Grey box-grey gum wet forest of subtropical eastern Australia
- Lowland Rainforest of Subtropical Australia

Due to extensive land clearing and grazing on the site, there are very few native trees on the site, and those remaining are generally isolated. Whilst it is apparent that the majority of the site once supported 'Lowland Sub-tropical Rainforest', there is now no areas of continuous canopy on the site that would satisfy the condition thresholds to be considered as a Threatened Ecological Communities (TEC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

However, there are two examples on site of two or more characteristic canopy trees together with other stratified vegetation that could be recognised as the 'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions – Endangered Ecological Community' listed by the NSW BC Act. These are mapped communities 7 and 8 (Figure *11*).

Plate 1 Blackbutt Forest – planted

Plate 2 A thin strip of Brushbox forest along the Bruxner Hwy

Plate 3 Disturbed bushland

Plate 4 Weed infested pasture grass in foreground with Flooded Gum plantings in the background.

Plate 5 Freshwater Forbland / Sedgeland that fringes Tucki Tucki Creek

Plate 6 A small patch of rainforest along Tucki Tucki Creek

Plate 7 A thin strip of rainforest with Camphor Laurel along Oliver Avenue

Plate 8 Tallowwood Forest along the northern boundary of the site

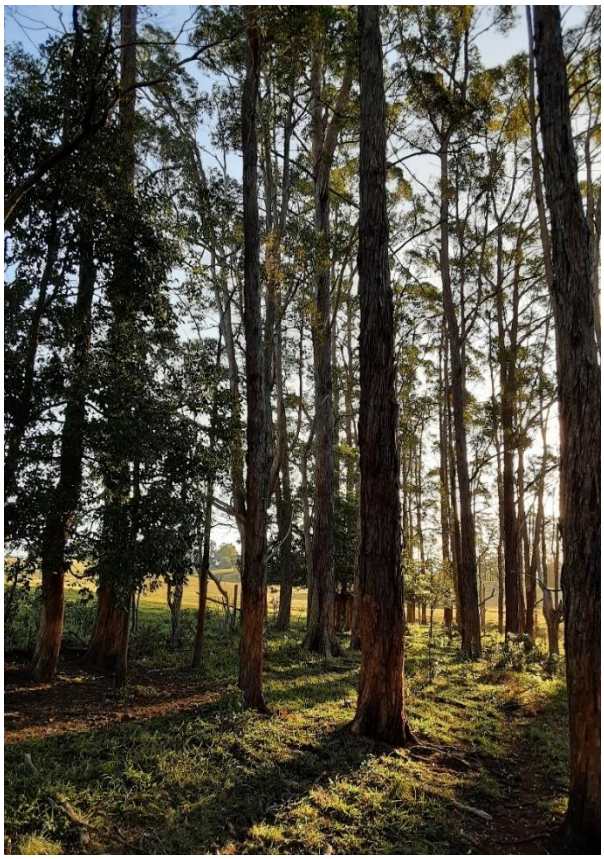

Plate 9 Tallowwood Forest – planted

Plate 10 Exotic pasture in drainage lines

Plate 11 Exotic Pasture Grass with scattered native trees

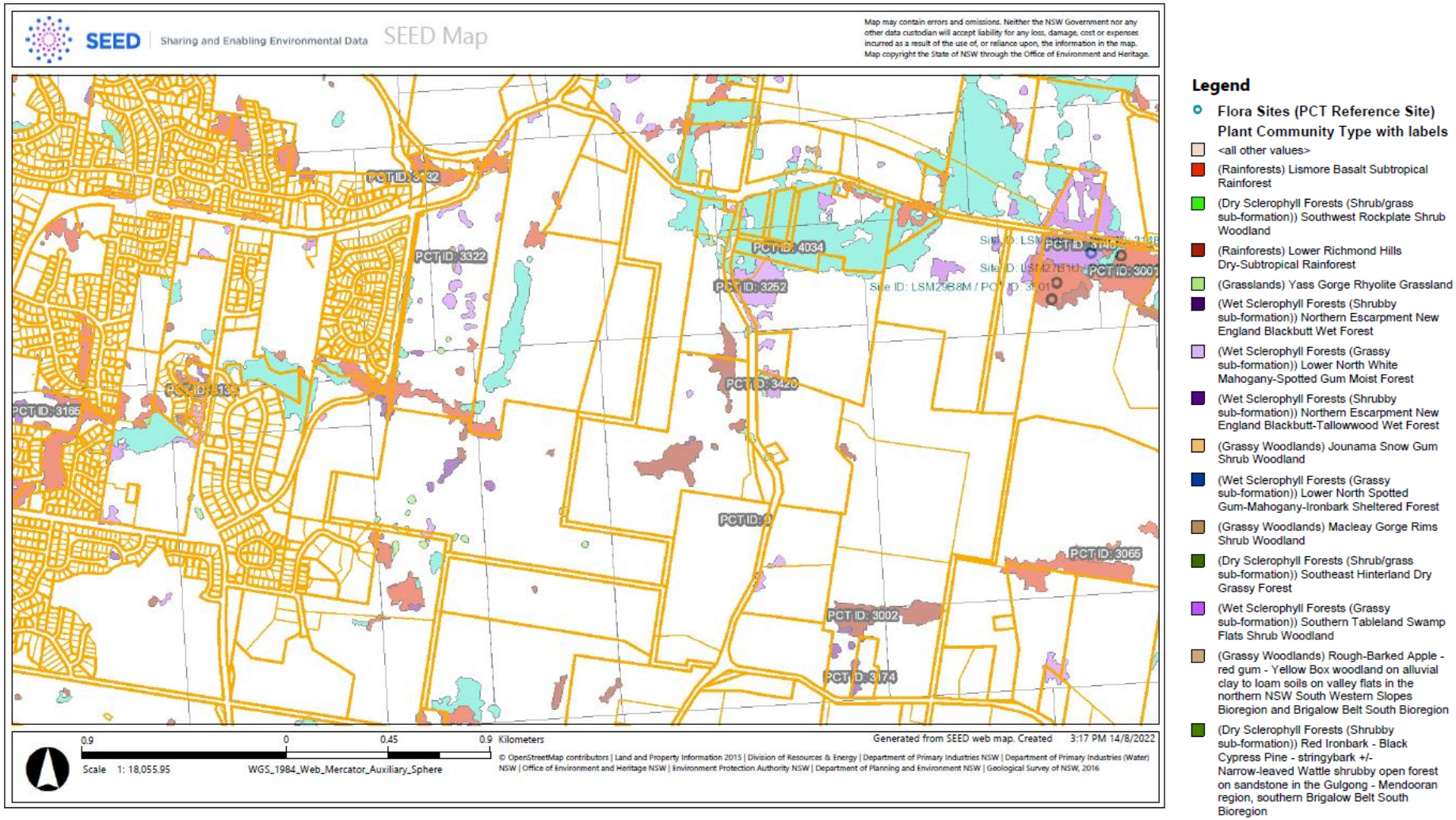

Figure 6: NSW Plant Community Types (PCT) mapping (SEED)

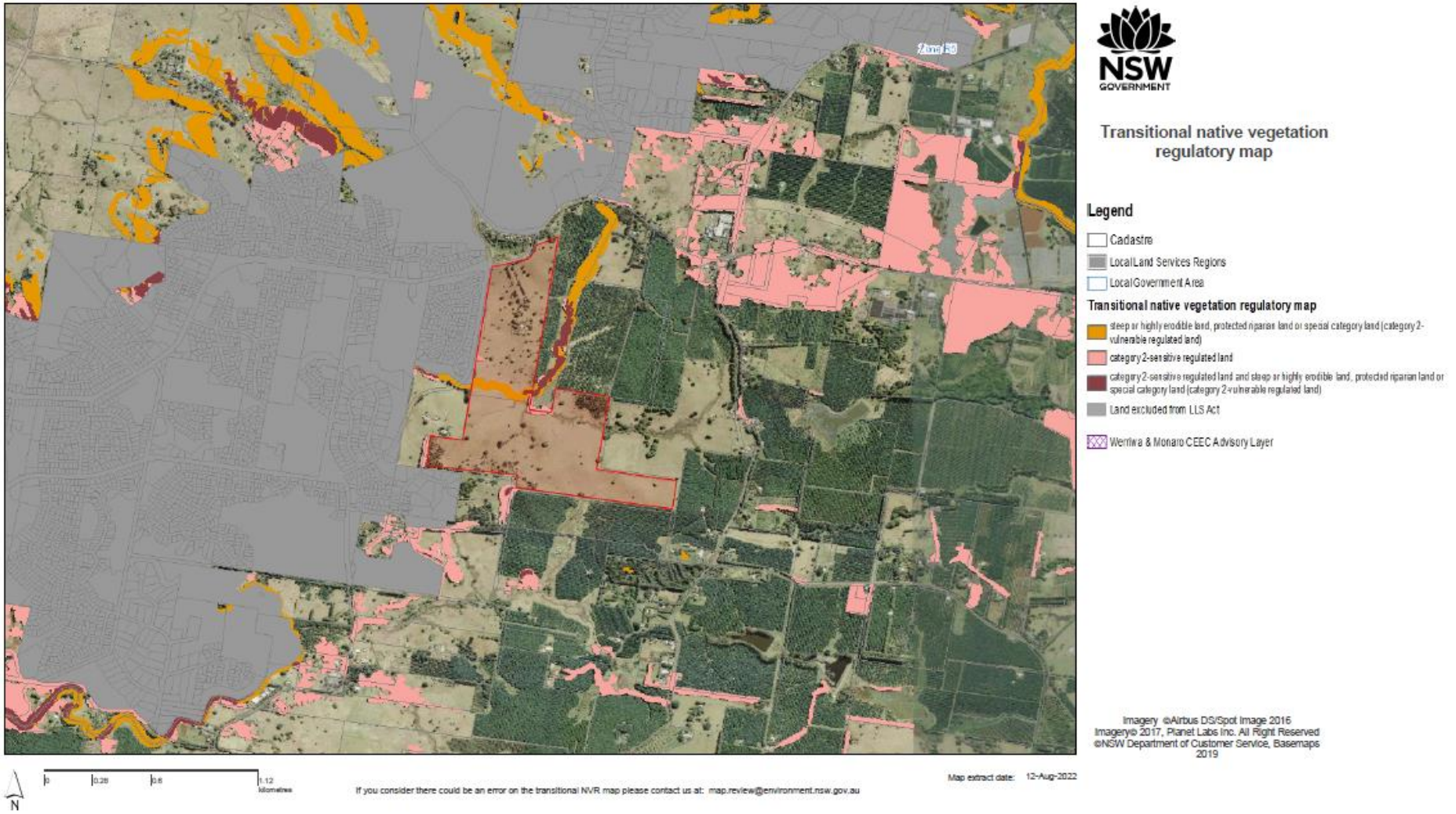

Figure 7: NSW Transitional Native Vegetation Regulatory Map

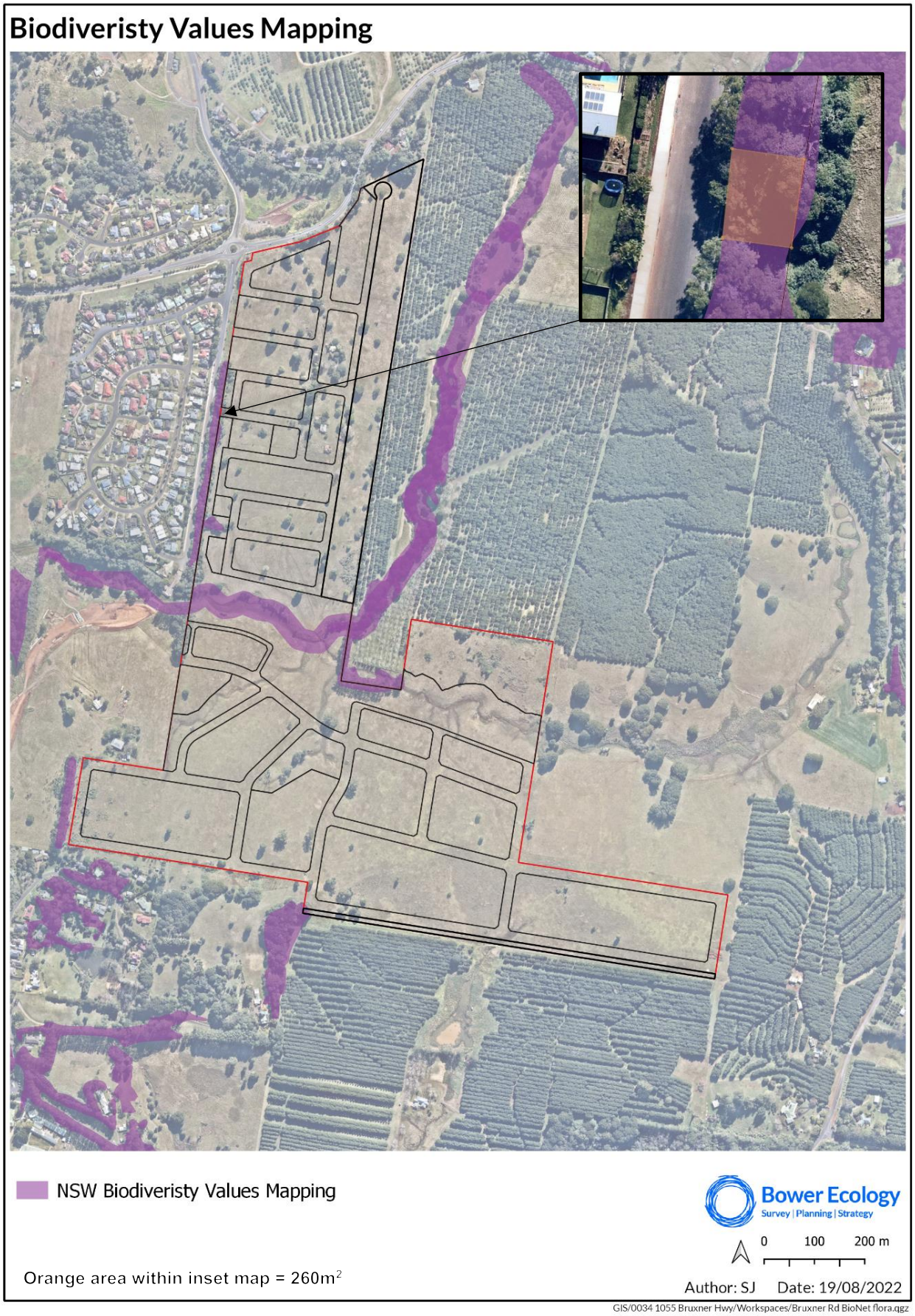

Figure 8: Biodiversity Values Mapping

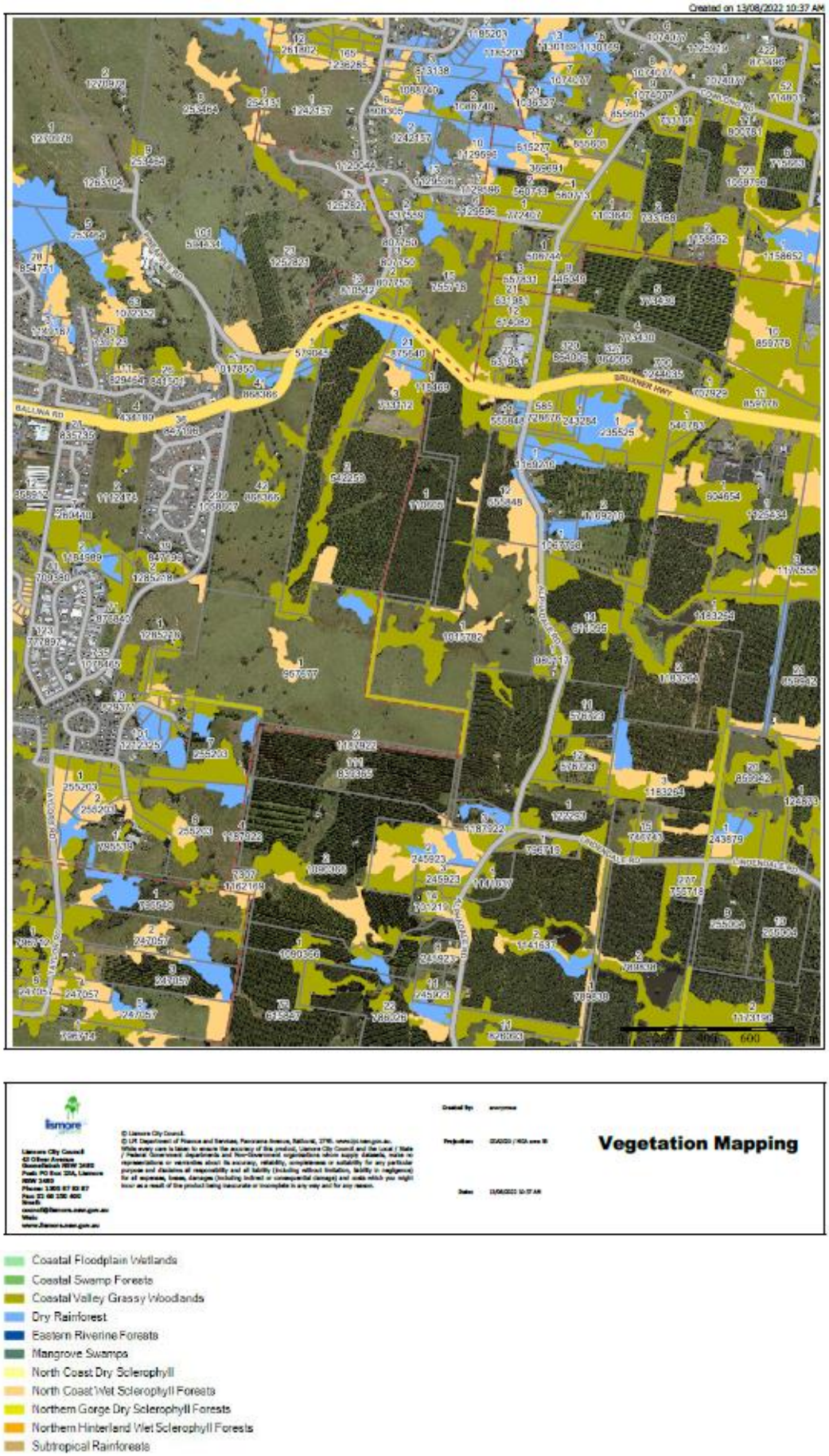

Figure 9: Lismore City Council – Vegetation Mapping

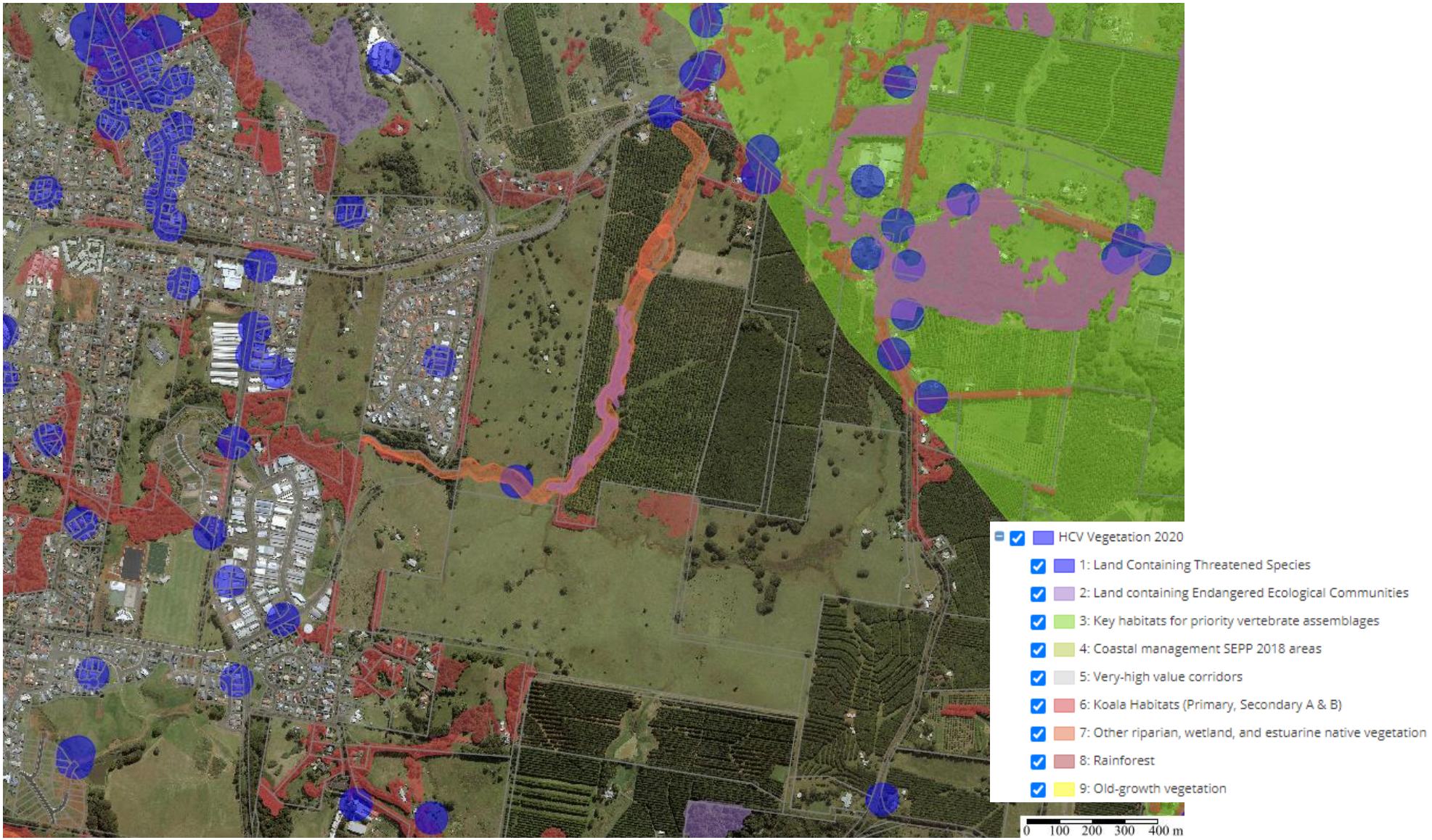

Figure 10: Lismore City Council – High Conservation Value areas

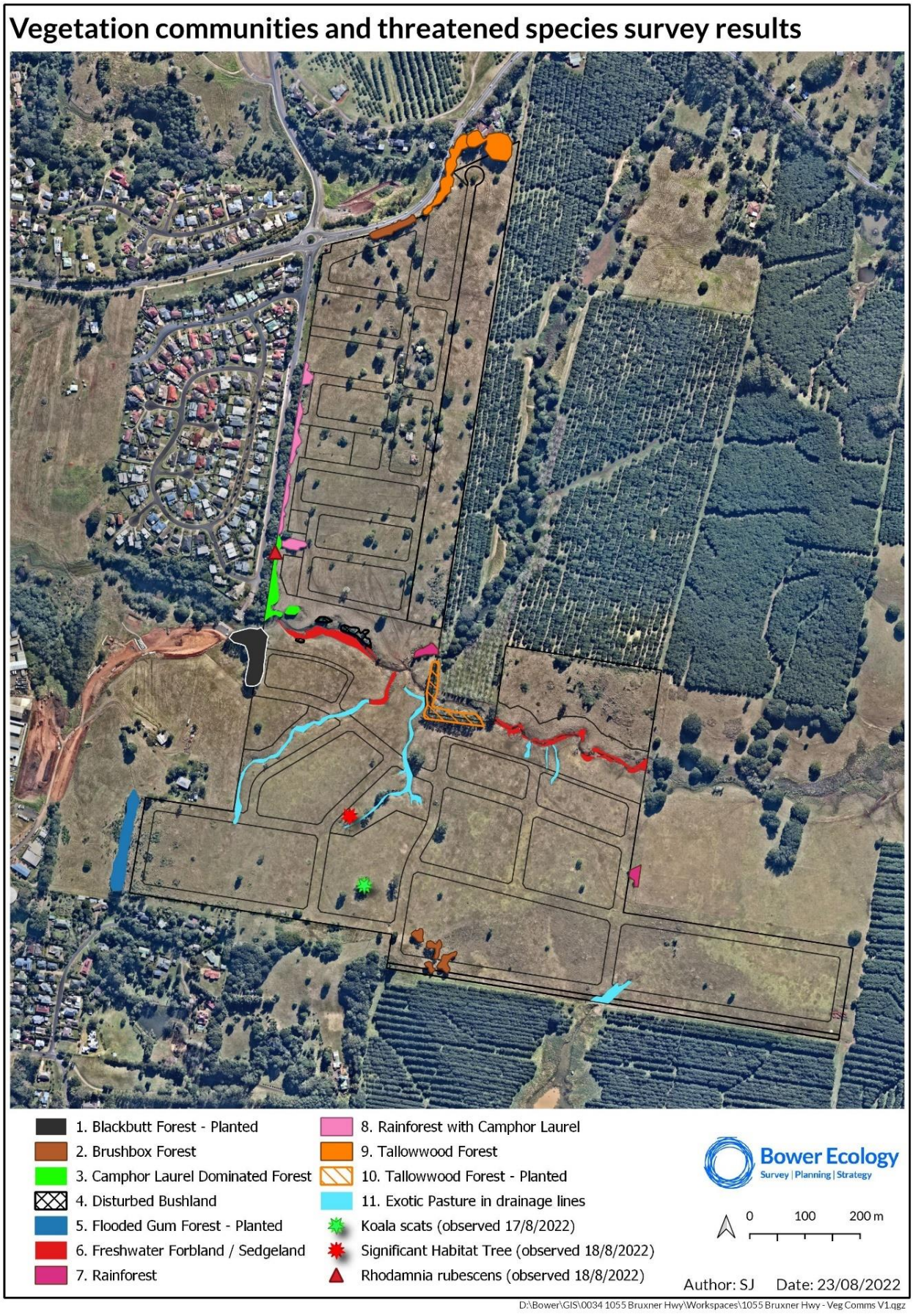

Figure 11: Field verified vegetation communities

3.2. Waterways

Tucki Tucki Creek is a significant ecologically feature of the site. It splits the site centrally, draining to the west as a 3rd and 4th order stream (as per NSW Hydrolines and Stream Order mapping), and forming a northern and southern portion of the site. There are also a number of 1st and 2nd order tributaries of Tucki Tucki Creek distributed across the site (Figure 12).

Tucki Tucki Creek is mapped as a Key Fish Habitat under the *Fisheries Management Act 1994* (FM Act) (Figure *13*). The Freshwater Fish Community status is indicated as Poor, in the Fisheries NSW Spatial Data Portal (2022), despite also being mapped as habitat for the Southern Purple Spotted Gudgeon (which has not been located at the site itself, but in upstream environs) in the Fish Freshwater Threatened Species (DPI 2022). The *Guidelines for Fish Habitat Conservation and Management* (DPI 2013), Section 3.2.1 Habitat Sensitivity indicates the main channel of Tucki Tucki Creek is a 'Type 1 Highly Sensitive Key Fish Habitat' due to it being a freshwater habitat that contains in-stream native aquatic plants and expected protected or threatened species habitat under the FM Act. Section 3.2.2 Waterway Classification (of the guidelines) indicates the main channel of Tucki Tucki Creek is a 'Class 1 Major Fish Habitat' due to its permanent nature and potential habitat for threatened fish species. Protection of in-stream and riparian vegetation along coastal and inland streams of NSW has been identified as a primary action to reduce threats to fish in NSW and "Degradation of native riparian vegetation along NSW water courses" has been listed as a 'key threatening process' under the FM Act in recognition of its role in the decline of several threatened species of fish (DPI 2013).

T*he Guidelines for Fish Habitat Conservation and Management* (DPI 2013), 3.2.4.2 Policy and guidelines for riparian and freshwater aquatic vegetation recommends the following specific policies apply to riparian and freshwater aquatic vegetation:

1. NSW DPI will generally not approve or support works that may harm freshwater aquatic vegetation (TYPE 1 and 2 habitats), unless adequate mitigation, rehabilitation and/or demonstrated compensation measures are in place.
2. NSW DPI will generally require riparian buffer zones to be established and maintained for developments or activities in or adjacent to TYPE 1 or 2 habitats or CLASS 1-3 waterways. Riparian buffer zones shall be measured from the top of the bank/drainage depression. NSW DPI will assess the width of the riparian buffer zone based on the habitat TYPE and waterway CLASS, the possible extent of the disturbance and the susceptibility of the riverbank to erosion. *As a guide* the following are recommended:
    - TYPE 1, CLASS 1: 100 metres
    - TYPE 2, CLASS 2-3: 50 metres
    - TYPE 3, CLASS 3-4: 10-50 metres
3. NSW DPI will require the design of riparian buffer zones to incorporate the maintenance of lateral connectivity between aquatic and riparian habitat. Installation of infrastructure, terraces, retaining walls, cycle ways, pathways and grass verges within the riparian buffer zone shall be avoided or minimised.
4. Riparian buffer zones should be clearly delineated (e.g. fences or other markers) and well managed to avoid degradation (e.g. weed and stock access management), ensure that existing native riparian vegetation is retained to the greatest extent possible and include revegetation of disturbed areas with local native species.

Lismore City Council also recognises the significance of Tucki Tucki Creek in several Council documents and management plans. It is indicated as an 'Urban Green Corridor containing rainforest regrowth and sclerophyll forest with established walking tracks that provides habitat for resident platypus, birds and koalas', in the *Inspire Lismore 2040 – Lismore Strategic Planning Statement* (2020).

In the *Biodiversity Management Strategy* for the Lismore Local Government Area 2015-2035 (2015), Tucki Tucki Creek is recognised as a 'High Conservation Value (HCV) Area' for containing native riparian vegetation and as a riparian corridor requiring a 50m buffer, as per *Figure 5 Ranked corridor significance for vertebrate assemblages in the Lismore LGA* (Lismore LGA Key Habitats and Corridors System, Milledge 2012). It is mapped

as a 50m riparian corridor, connecting two major corridors of high significance, i.e. Richmond Hill Connector in north-east (sub-regional) and Gundurimba-Tucki Tucki Creek Connector (local) in south-west (see Figure 14).

The Landmark Floodplain EEC Type map (Lismore City Council Map 2022) has indicated a small part of Tucki Tucki Creek on the north-eastern border (and off-site to the eat) as 'sub-tropical coastal floodplain forest', but the remaining vegetated areas are classified as 'ecotonal types, not discernible due to disturbance' or are not stated (Figure 15).

Previous studies by Bushfire Safe (Aust) (2015) provide detailed information for the creek, and this is summarised below:

The studies indicate the site is located near the head waters of Tucki Tucki Creek and due to the limited catchment area, flood events are not major and most of the average flow is derived from springs located above the site. Groundwater flow would be expected to reflect surface flows with gradients towards the north and south away from the elevated areas. The substrate of the Tucki Tucki Creek is a clay or thin mud with areas of bed rock in the east of the site (where the creek is 3rd order). The streams suffer from lack of flow during the drier months, but have not been recorded as failing and could therefore be considered 'permanent'. This affect is possibly related to the presence of a weir on Tucki Tucki Creek at Holland Avenue, about 600 meters downstream from the western boundary of the site. The pH of the creek on site is 6 and is influenced the acidity (PH 4.3- 5.0) found in the site basalt soils.

The creek generally occurs without a well-defined bank, being subject to trampling and sediment deposition. Tucki Tucki Creek is heavily infested with aquatic plants and weeds including including: Azolla (*Azolla filiculoides*) and Water Hyacinth (*Eichornia crassipes*), Blue Water Lily (**Nymphaea caerulea*), Woolly Frogmouth (*Philydrum lanuginosum*), *Juncus spp*., Smart weed (*Persicaria spp*.), Bull Rush and *Cyperus eragrostis*. At the boundary with Oliver Avenue, Tucki Tucki Creek is joined by an un-named second order stream that was reshaped, relocated east and revegetated in places to allow for the construction of Oliver Avenue. This remains the only significant native riparian vegetation along Tucki Tucki Creek on or adjacent to the site.

The banks of Tucki Tucki Creek at the eastern margin of the site where it enters the property has a small pocket of riparian vegetation heavily dominated by Camphor Laurel (**Cinnamomum camphora*), with native species including Black Wood (*Acacia melanoxylon*), Small-leaved Lillipilli (*Syzigium leumannii*), Brush Apple (*Mischocarpus pyriformis*), Red Pear-fruit (*Mischocarpus australis*), Prickly Rasp Fern (*Doodia aspera*), Sweet Pittosporum (*Pittosporum undulatum*), Tree Fern (*Cyathea cooperi*), Soft Bracken (*Calochlaeana dubia*), Whip Vine (*Flagellaria indica*), Mistletoe (*Amyema congener*) also occurring. Other weed species include Lantana (**Lantana camara*), Tobacco Bush (**Solanum mauritianum*), Crofton Weed (**Ageratina 26denophora*) and Blue Billygoat Weed (**Ageratum houstonianum*). For the majority of its length the creek edge is sparsely vegetated. Species include occasional coast banksia, sweet pittosporum and silky oak, with mostly dead or dying young camphor laurels. Field surveys undertaken recently by Bower Ecology have found that the condition of Tucki Tucki Creek remains generally unchanged since surveys in 2015.

Figure 12: NSW Hydrolines and Stream Order

Figure 13 *Key Fish Habitat (DPI NSW)*

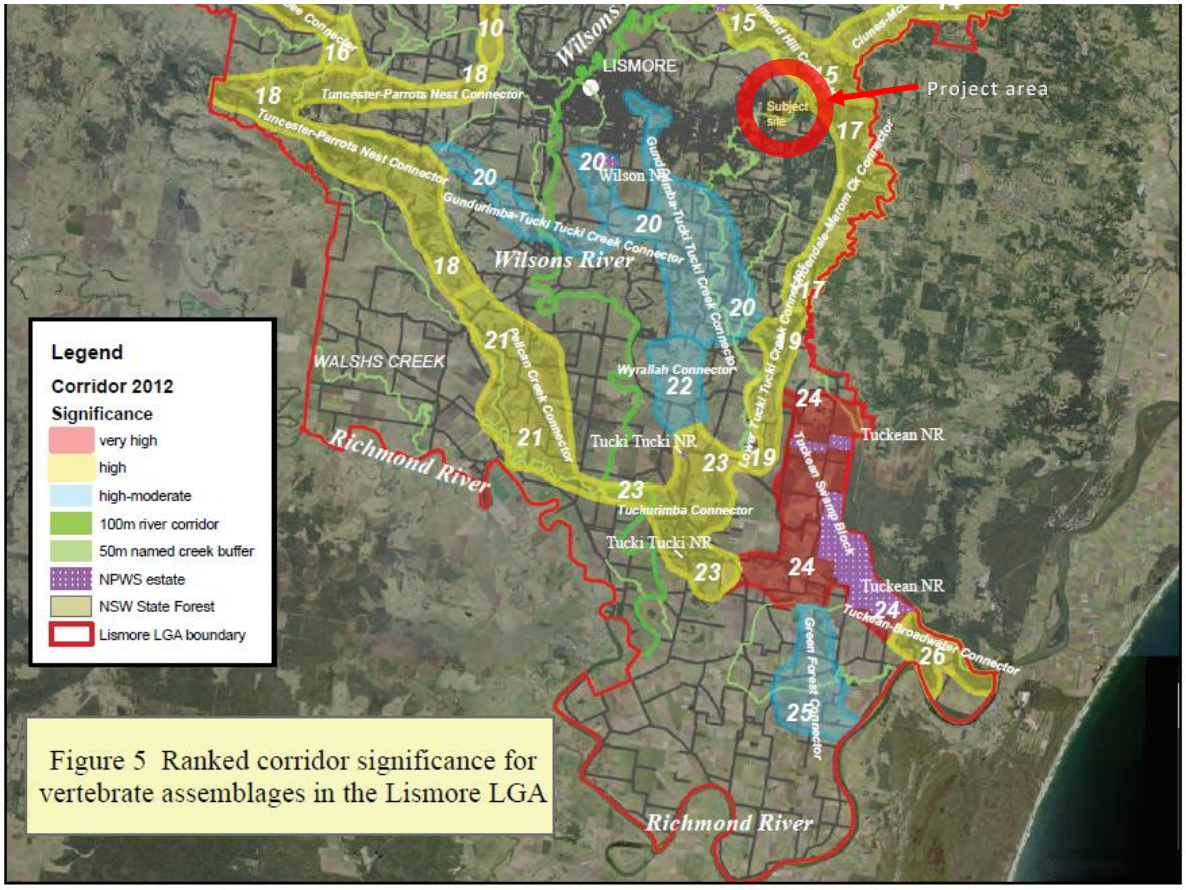

Figure 5 Ranked corridor significance for vertebrate assemblages in the Lismore LGA

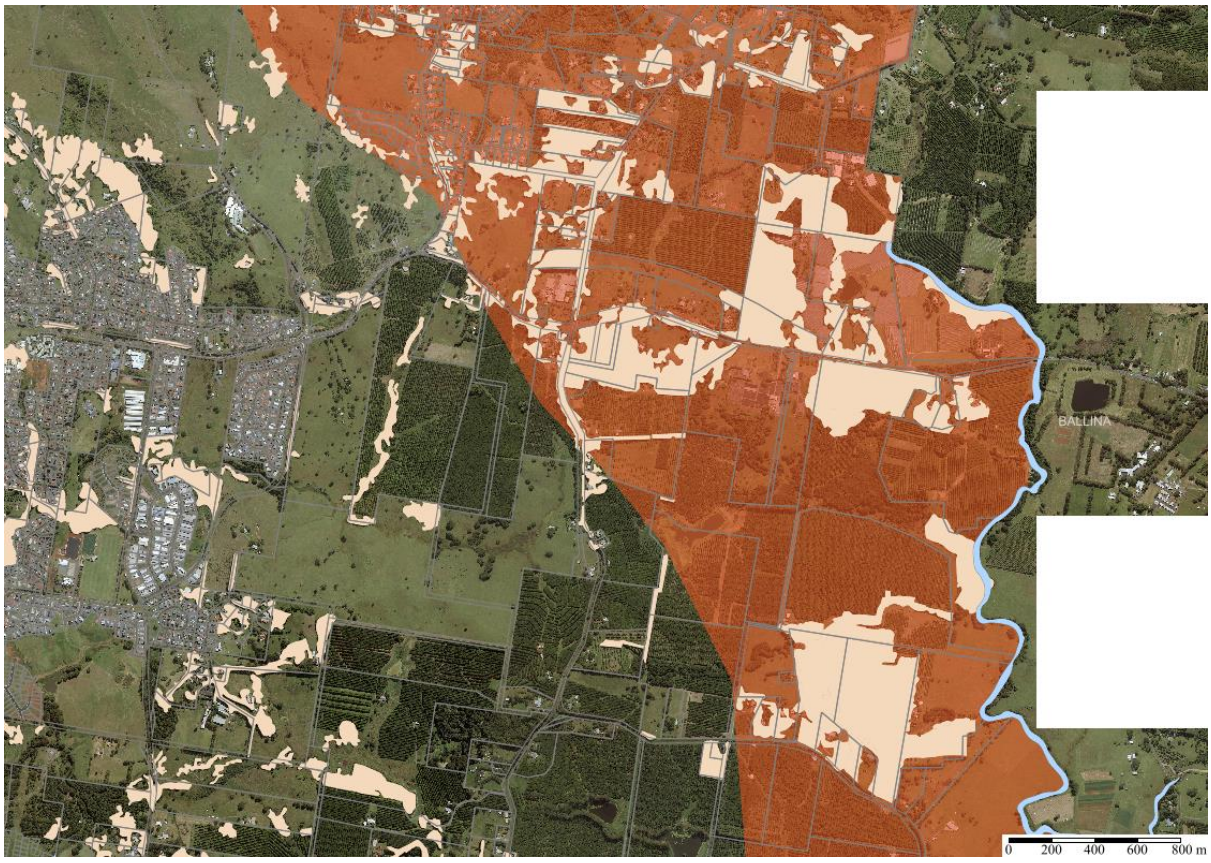

Figure 14: Key Habitats & Corridors System – Tucki Tucki Creek

Figure 15: Landmark Floodplain EEC Types – Lismore Council Map

3.3. Wetlands

The elevation of the site is between 150 – 180m above sea level and it exists on predominantly Lismore Basalts, and metamorphics of the Neranleigh-Fernvale Group that occur along the margins of the plateau. The elevation of the site and it's geology are not synonymous with supporting broadscale wetlands, though it is acknowledged that local bogs can be common in paddock areas where they are associated with surface expressions of groundwater (i.e. groundwater seepage areas, usually due to interflow). No broadscale wetland vegetation is mapped on site and none was observed during site surveys. Nonetheless, there are small areas of wetland vegetation associated with the riparian corridor, where surface expression of ground water seep into the creek (see Figure *11* and Plate 5). It is likely that the floristics of these areas change significantly during wet/dry climate cycles such as El Nino and La Nina.

3.4. Threatened Flora

A PMST (Appendix 3) and BioNet records search have indicated a number of threatened flora species (46) that may occur within a 5km radial buffer of the site (Figure 17). An analysis of the habitat requirements of these species reveals that the majority are associated with rainforest habitat, which does occur on site but in very small and highly disturbed patches. Further some of the species are known from very few specimens and in highly restricted distributions. Considering the habitat available on site, it was determined that only five (of 46) threatened flora species have a likelihood of being located on the site as these species are locally abundant and relatively tolerant of disturbance (Appendix 4). These species are:

- *Arthraxon hispidus* (Hairy joint grass)
- *Corchorus cunninghamii* (Native jute)
- *Desmodium acanthocladum* (Thorny pea)
- *Gossia fragrantissima* (Sweet myrtle)
- *Rodamnia rubescens* (Scrub turpentine)

Previous studies (Bushfire Safe (Aust) 2016) did not locate any threatened flora species on site during surveys, however, they did note that there was one specimen of a 'myrtle-like' plant on the upper ridge of the north facing slope, which may have been *G. fragrantissima* but could not be adequately identified at the time of survey. This has since been identified by Bower Ecology as silky myrtle *Decaspermum humile*.

Field investigations by Bower Ecology (as part of this report) also located two specimens of scrub turpentine (*Rodamnia rubescens*) in one location just within the north-western boundary of the site, associated with the patch of vegetation in the community space along Oliver Avenue (Figure 11). They are small individuals 2-2.5m high and 2-3cm DBH and they are both mildly affected by myrtle rust (Figure 16). These specimens will be incorporated into the riparian corridor within the planning proposal (Figure 2).

It is recognised that a targeted survey for Hairy Joint grass (*Arthraxon hispidus*), a threatened species under the NSW *Biodiversity Conservation Act 2016* and Commonwealth EPBC Act, will be required as part of any future development application process. It has not been completed with this assessment due to timing. The flora survey period for this report is outside the season for Hairy Joint grass, which is between September and April (DCCEEW 2022); however the later in the season, the easier it is to detect the species.

Figure 16 Rhodamnia rubescens recorded on site during surveys associated with this report

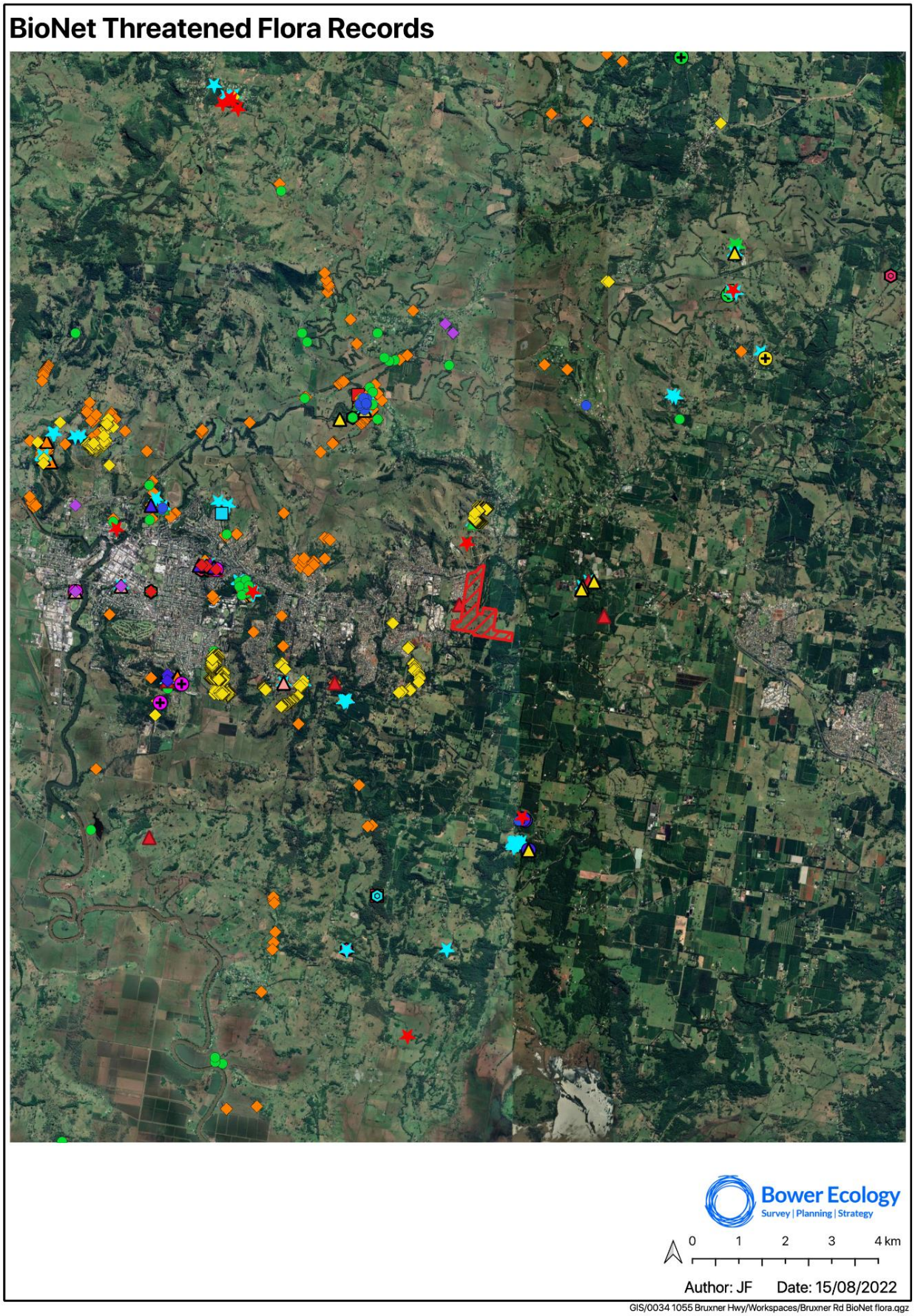

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Figure 17: Threatened flora recorded within 5km buffer of the site (BioNet)

3.5. Threatened Fauna

A PMST (Appendix 3) and BioNet records search have indicated a number of threatened fauna species (66) that may occur within a 5km radial buffer of the site (Figure 18). An analysis of the habitat requirements of these species reveals that the majority are associated with rainforest habitat, which does occur on site but in very small and highly disturbed patches. Further some of the species are known from very few specimens and in highly restricted distributions. Considering the habitat available on site, it was determined that only four (of 66) threatened fauna species have a likelihood of being located on the site as these species are locally abundant and relatively tolerant of disturbance (Appendix 4). These species are:

- *Phascolarctos cinereus* (koala)
- *Mogurnda adspersa* (purple spotted gudgeon)
- *Pteropus poliocephalus* (Grey headed flying fox)
- *Ptilinopus regina* (Rose-crowned Fruit-Dove)

Previous studies (Bushfire Safe (Aust) 2016) located evidence of koala on site and a single black falcon (*Falco subniger*) listed as vulnerable under the NSW *Biodiversity Conservation Act 2016,* but no other threatened fauna species were noted on site during detailed fauna surveys (incorporating spot lighting, bat detection, bird surveys, call playback, stag watching, herpetofauna searches but no trapping).

The previous report did note the presence of fruiting flora, with many of paddock tree species producing fleshy fruits favoured by birds, including some large fig trees (strangler and deciduous figs), Sweet Pittosporum, Lillipilli, Native Tamarind, Red Bean, Celerywood, Red Ash, White Beech, Red Pear-fruit, Brush Apple and exotic/weed species Lantana, Camphor Laurel and Mulberry. This highlights the potential importance of the site as a food source for frugivores such as the grey-headed flying fox and *Ptilinopus spp*. (particularly the locally common rose-crowned fruit dove), although limited roosting/nesting habitat exists on site.

The presence of a high number of European rabbits and rats on site (noted in previous and current surveys) is likely to attract raptors (particularly black falcon, spotted harrier *Circus assimilis*, red goshawk *Erythrotriorchis radiatus*, little eagle *Hieraaetus morphnoides*) and owls (particularly masked owl *Tyto novaehollandiae* and barking owl *Ninox connivens*) to the site to access this food resource, as part of a much larger home range, and a single empty/abandoned nest (potential crow or small raptor) was observed in the recent surveys (Plate 14). The recent surveys undertaken for this assessment also located an owl pellet at the entrance to a rabbit warren.

Several threatened bat species (such as eastern false pipistrelle *Falsistrellus tasmaniensis*, bentwing bats *Miniopterus spp*. And Eastern Long-eared Bat *Nyctophilus bifax*) recorded nearby are noted to have roosting opportunities on site (such as hollow trees), but the absence of intact vegetation is likely to preclude them from the site itself, restricting them to adjacent areas.

A similar situation exists for the white-eared monarch *Carterornis leucotis*, whereby it is likely in the more intact urban riparian bushland occasionally foraging in more open areas.

Any future rehabilitation along Tucki Tucki Creek may present an opportunity to many of these aforementioned threatened species. Field investigations by Bower Ecology did not incorporate detailed fauna investigations and are generally supportive of previous findings. A list of observed bird species observed during the current survey is located in Appendix 5.

3.5.1. Purple Spotted Gudgeon

As mentioned above, Tucki Tucki Creek is mapped as habitat for the Purple Spotted Gudgeon (*Mogurnda adspersa*) in the Freshwater Threatened Species mapping associated with the *Fisheries Management Act* (DPI 2022). The species has not been located at the site, but there are records in upstream and downstream environs implying that the species is highly likely to traverse the site (Figure 18). It is possible that the absence of records on site reflects the lack of survey effort. Studies suggest *M. adspersa* distribution is influenced by

varying degrees of depth (<600mm), riparian cover (1-60%), riparian shading (40-60%), macrophyte cover (>21%), substrate (mud or rock), channel habitat (pools and backwaters) and water velocity ("stagnant"). Habitat features that *M. adspersa* was most commonly associated with appeared to be macrophytes and boulders (NSW DPI 2017). From this description it is apparent that Tucki Tucki Creek, as it occurs on site, may contain some areas of sub-optimal habitat for the species and its presence cannot be excluded. Future rehabilitation along Tucki Tucki Creek may assist with local recovery of this species.

3.5.2. Koala

The site within the Koala Planning Area as defined in the *Comprehensive Koala Plan of Management for south-east Lismore (2013) (CKPoM)* and contains some *Primary – preferred koala habitat* along Tucki Tucki Creek and the north-western boundary in accordance with *Map 2 Indicative map of Preferred Koala Habitat within the Koala Planning Area* (Figure *19*). Primary preferred koala habitat refers to vegetation associations and/or communities wherein "primary food tree species" comprise the dominant or co-dominant (i.e. >50%) overstorey tree species. Primary food trees in the area are:

- Orange gum *Eucalyptus bancroftii*
- Forest red gum *E. tereticornis* (including hybrids and *E. patentinervis*)
- Tallowwood *E. microcorys*
- Swamp mahogany *E. robusta*

Secondary or supplementary food trees in the area are:

- Grey gum E. punctata (including *E. biturbinata*)
- Thin-leaved stringybark *E. eugenoides*
- White stringybark *E. globoidea*
- Small-fruited grey gum *E. propinqua*
- Narrow-leaved red gum *E. seeana*

The survey by Bower Ecology noted that the koala habitat on site differs slightly from CKPoM mapping. The primary habitat mapped adjacent to Oliver Avenue on the north-western boundary of the site did not contain koala food trees and is not considered 'primary koala habitat'. Instead the small patch of riparian tallowwood forest on the southern bank of Tucki Tucki Creek and immediately adjacent (west) to the site, does contain primary food trees and should be mapped as primary habitat (Vegetation Community 10 in Figure *11*). Another small patch in the north-east corner (near Bruxner Highway) of the site contains several tallowwood and should also be mapped as primary koala habitat. This is indicated as Vegetation Community 9 in Figure *11*.

A few scattered remnant Eucalyptus trees exist on site, that have been identified as primary and secondary food trees, including tallowwood and small-fruited grey gum. Other species likely to be used by koala include: pink bloodwood *Corymbia intermedia,* brush box *Lophostemon confertus,* white gum *Eucalyptus dunnii* and flooded gum *Euclayptus grandis*.

There are a large number of records of koala on BioNet close to the site (Figure 20) and the species is known to exist on site. Previous studies (Bushfire Safe (Aust) 2016) have indicated a large number of Koala scats (in estimate 300-400) below solitary tree species (*Eucalypytus dunnii*) occurring at the southern area of the site on north-facing slopes. Very few (<10) scats below known food trees that occur in the moist open tallowwood forest at north of the site. Field investigations by Bower Ecology also identified a number of scats (approximately 20) below the single *E. dunnii* in the south of the site (Plate 12) (Figure *11*). Despite searches for scats and scratches over the remainder of the site, no further evidence of the species was found.

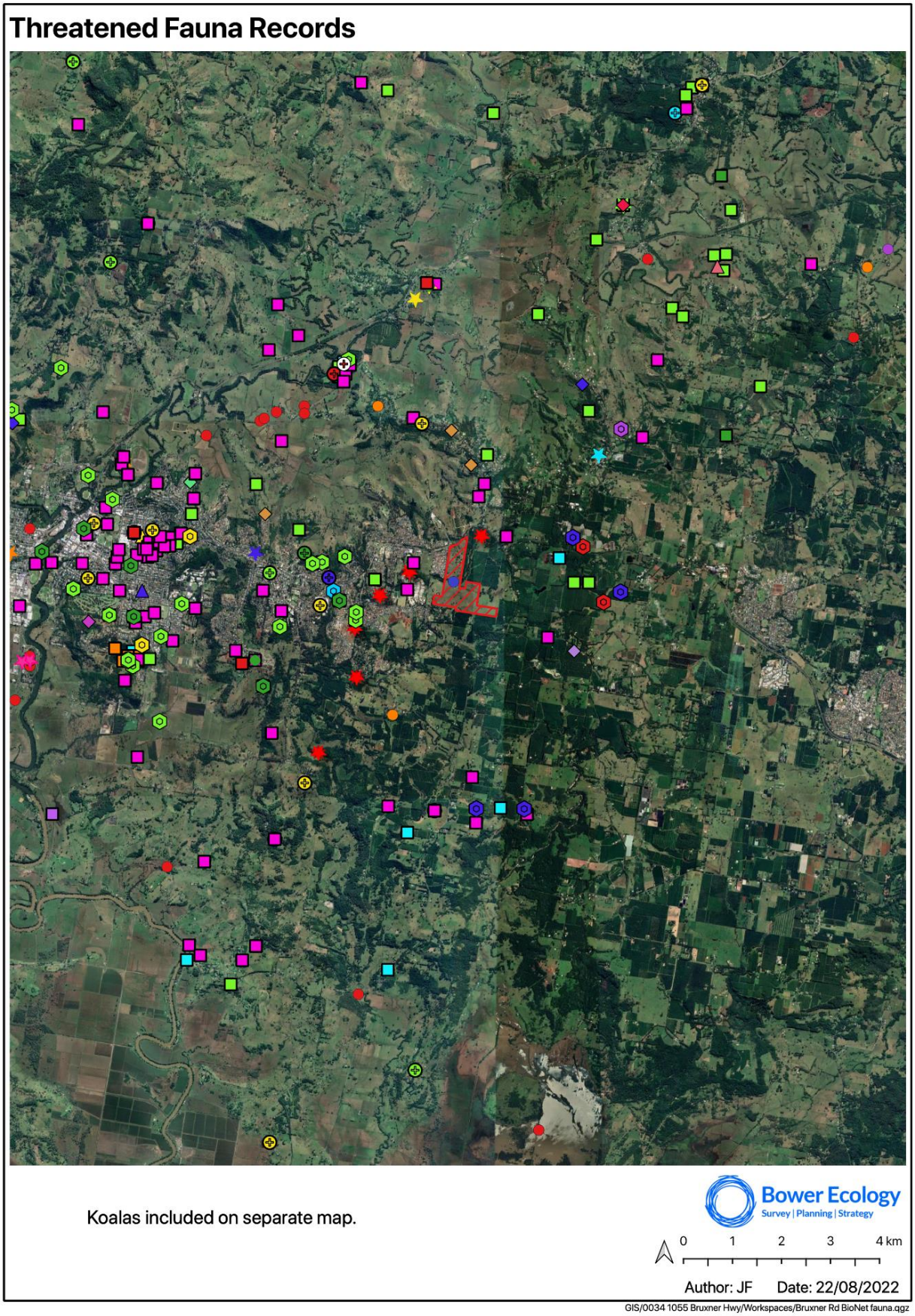
3.5.3. Habitat trees

There are a number of habitat trees on the subject site as standalone paddock trees. One of these trees (Plate 13 and) is indicated in Figure 11 as it contained a number of habitat values as follows:

- 1 hollow with rainbow lorikeets nesting (active)

- 1 hollow with Scaley Breasted Lorikeets nesting (active)
- 1 hollow with Galah nesting (active)
- 1 stick nest (empty/abandoned at time of the initial survey in August as well as follow up drone survey in October, despite being surveyed during the breeding season. This is evidenced by the absence of finer weaving and down feathers. The nest may have supported crow or a small raptor in the past, and will be monitored into the future).

There are also two abandoned houses and sheds on the property that could be utilised for roosting by bats, although these were not surveyed.



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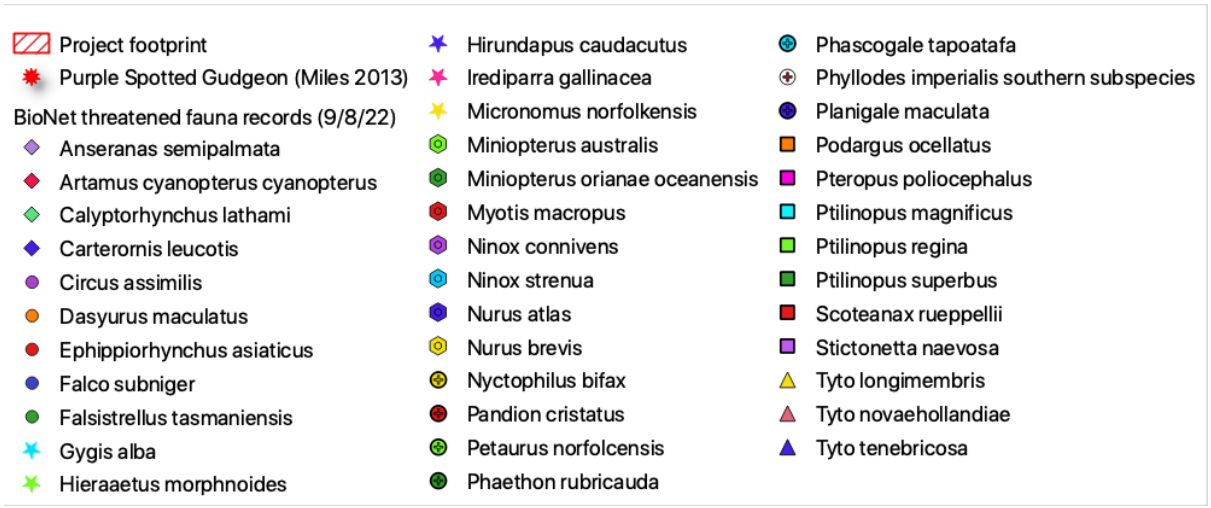

Figure 18: Threatened fauna recorded within 5km buffer of the site (BioNet)

Plate 12 Tree with koala scats (Eucalyptus dunnii)

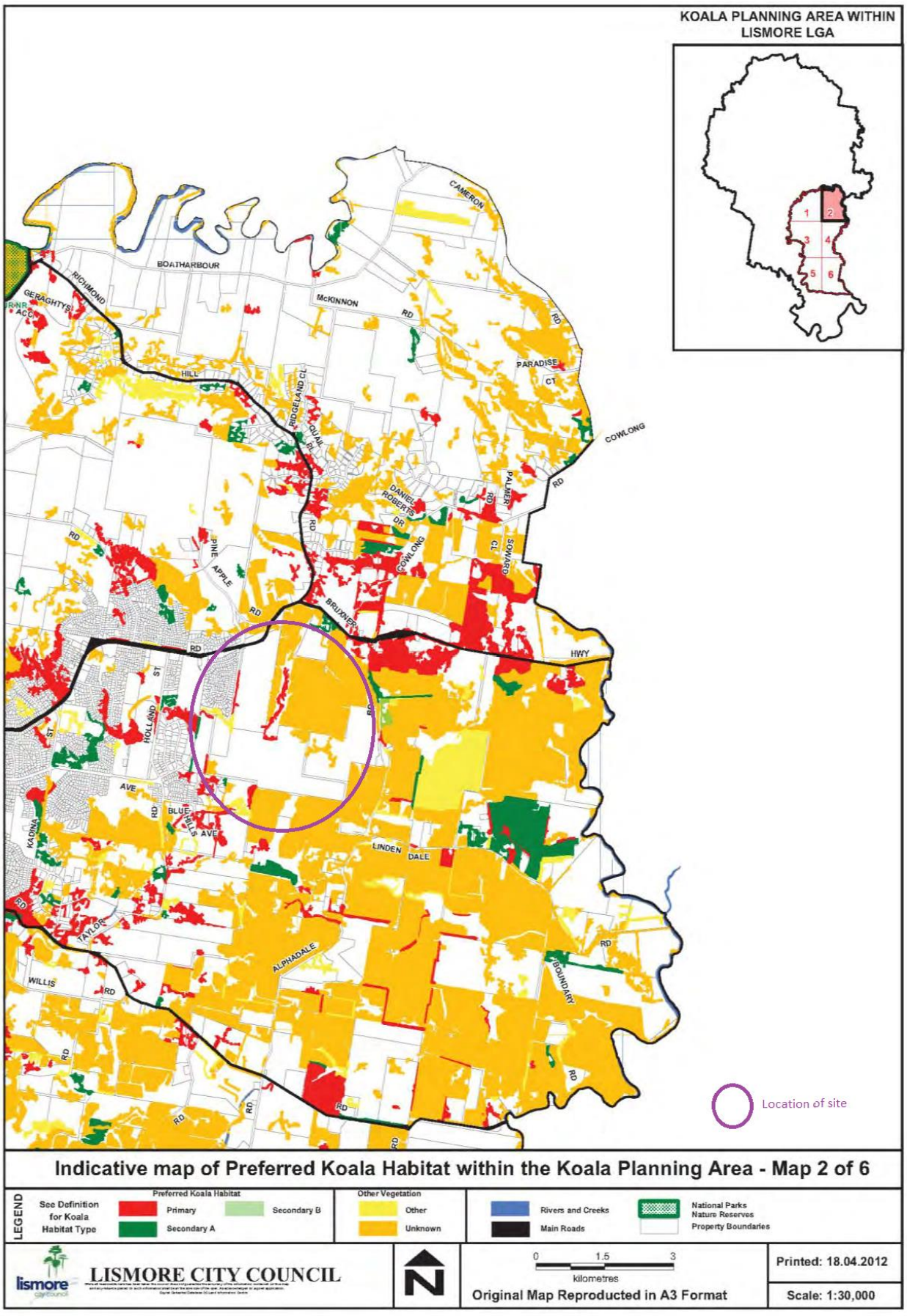

Figure 19: Koala habitat mapping CKPoM (Lismore City Council 2013)

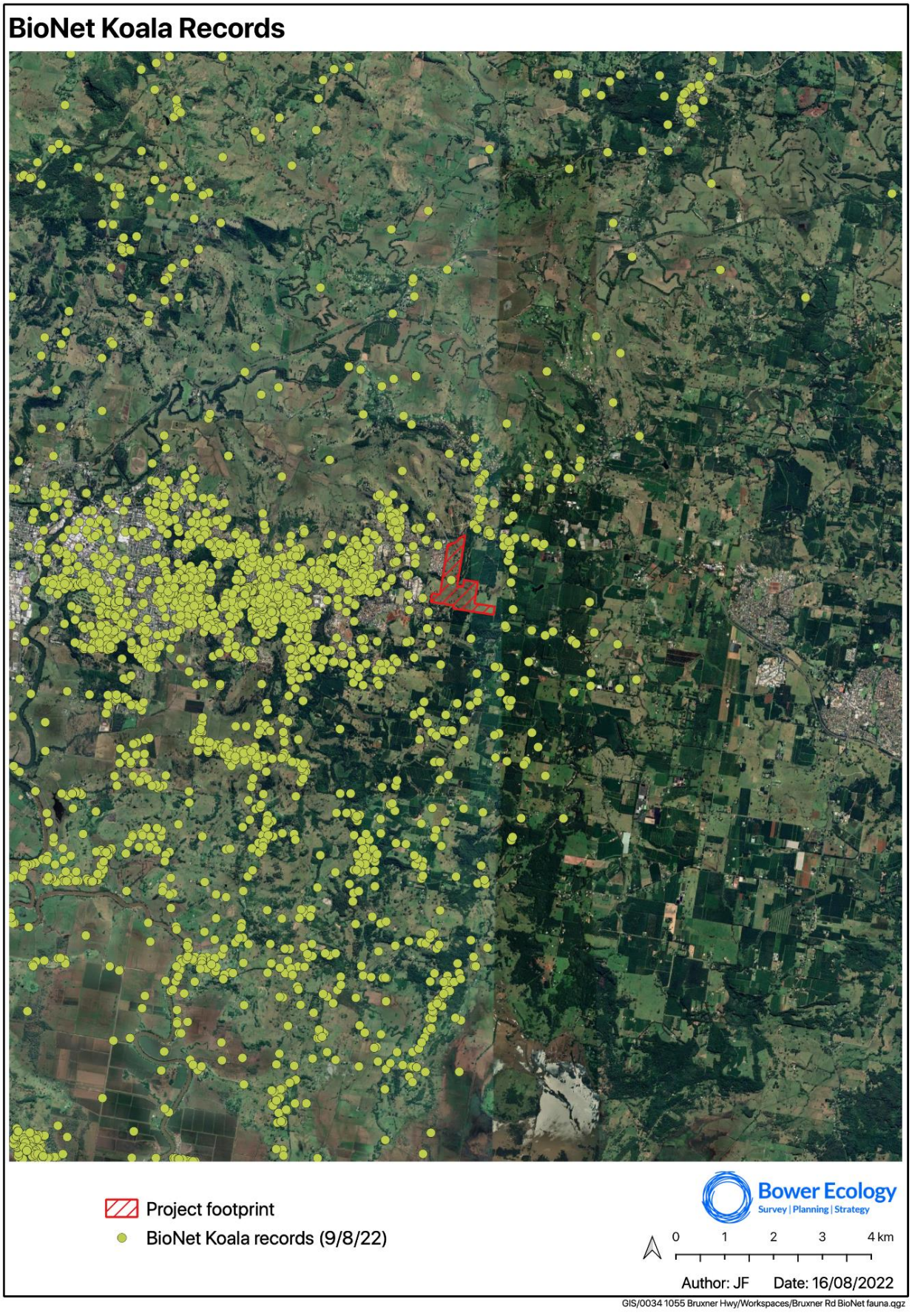

Figure 20: BioNet Koala records

Plate 13 Habitat tree with multiple hollows and nests – including an empty stick nest (circled and zoomed in), as mapped on Figure 11.

4. Impacts of Rezoning

The Planning Proposal aims to facilitate eventual development of the site into a mixed use area. At this stage, it is possible to provide a high-level assessment of the likely impacts this planning proposal may eventually facilitate. An in-depth assessment will be required as part of any future Development Application. Potential impacts are identified and assessed within Table 2 alongside proposed mitigation measures.

Table 2: A high-level assessment of potential impacts to biodiversity matters

Environmental Aspect	Description of Potential Impact	Proposed Mitigation
Vegetation and Habitat Clearing (construction and subsequent use)	If the rezoning facilitates eventual development of the site, it is expected that vegetation clearing associated with the project could result in a minor adverse impact on biodiversity values overall. This is because the proposed development footprint overlays many scattered remnant paddock trees that have some value as food or habitat resources to native wildlife, potentially including some threatened species. However, it is anticipated that the negative impact of the loss of these remnant trees will be adequately compensated by the retention and rehabilitation of Tucki Tucki Creek; as well as incorporation of natural values into buffers and riparian corridor zones. This will result in retention of some valuable paddock trees and a net gain of native vegetation and habitat on the site. There will be a potential minor impact to the Biodiversity Values Mapping (Figure 8) where the proposed street connects to Oliver Avenue, with most of the area BV mapping avoided. The area of impact has been calculated as 260m^2 (0.026 ha) of disturbed rainforest, however the impact area may be slightly more or less depending on final road design.	With the exception of the minor impact to the BV Mapping along Oliver Av, direct impacts to all other mapped recognisable vegetation communities (as shown in Figure 11) have been avoided. Detailed survey of this BV Mapping area for threatened flora will be required as part of any future Development Application. Retain and rehabilitate Tucki Tucki Creek, with suitable buffers. Buffers will also be established along the tributaries of Tucki Tucki Creek. Incorporation of valuable native paddock trees (especially fruiting and habitat trees) into environmental, buffers and riparian corridor zones – where possible. Future Development Application to incorporate a Vegetation Management Plan identifying trees for retention. Tree protection zones implemented around vegetation / trees to be retained. Future Development Applications plan to include use of locally native species in street landscaping. If the BV mapping is impacted along Oliver Avenue, offsets will likely be required for impacts across the site.
Habitat connectivity (during construction and subsequent use)	If the rezoning facilitates eventual development of the site, it is expected that Tucki Tucki Creek and tributaries will be retained with adequate buffers. Tucki Tucki Creek will also be revegetated with native riparian rainforest / wet eucalypt forest. The planning proposal provides an opportunity to increase the biological value of an existing locally important wildlife corridor and contribute to the aims of the *Biodiversity Management Strategy 2015-2035:* Revised 2nd Edition, which highlights the importance of the corridor.	Retain and rehabilitate Tucki Tucki Creek, with suitable buffers. Buffers will also be established along the tributaries of Tucki Tucki Creek. Avoid road crossings over the main branch of Tucki Tucki Creek. If minor pedestrian crossings are to be investigated in the future, they are to be designed so as not to interrupt connectivity along the waterway. If road crossings cannot be avoided over minor (1st order) tributaries, bridges or culverts allowing aquatic and terrestrial fauna passage are to be considered.

Environmental Aspect	Description of Potential Impact	Proposed Mitigation
Potential harm to threatened flora species (during construction)	There are two specimens of scrub turpentine (critically endangered EPBC Act & NSW BC Act) in one location along the north-western boundary of the site, that have the potential to be impacted by the development. The specimens are affected by myrtle rust. It is possible that hairy joint grass (vulnerable EPBC Act & NSW BC Act) could occur on the site, but detailed surveys have not yet been conducted.	Incorporate the specimens of scrub turpentine into the riparian corridor along the north-western boundary of the site. Investigate potential to treat specimens for myrtle rust and manage the issue to prevent spread to revegetated areas. Include scrub turpentine in planting schedule for creek revegetation. Undertake targeted flora survey for hairy joint grass during appropriate season and prior to lodgement of DA.
Potential impact to threatened terrestrial fauna species habitat (during construction and subsequent use)	Construction on the site will result in the removal of the majority of the scattered paddock trees that hold some value as habitat trees (with hollows) and feed trees for koalas (gum trees) and some threatened species of frugivorous bats and birds (native fruit trees). At present these trees are likely acting as supplementary habitat in the presence of more intact patches of vegetation in the local area. It is anticipated that the impact of their removal will be minor and temporary given the degree of revegetation anticipated on site. The site is also noted as being valued in its current state as a raptor and owl feeding ground, due to the high number of rabbits and rats (which are exotic vermin). The development of the site for mixed use purposes will likely reduce the availability of vermin on site for these predators. However, there is likely to be plentiful sources in surrounding farmlands to the east. Currently, the habitat tree identified in Figure *11* is proposed to be conserved in a riparian within the tributary buffer area area (Figure *2*); however ongoing indirect impacts (disturbance of noise and light, and human activity) could result in ongoing impacts such as low breeding productivity or further abandonment. Such impacts will be specific to the surrounding uses/businesses.	Retention and rehabilitation along Tucki Tucki Creek, with suitable buffers. Buffers will also be established along the tributaries of Tucki Tucki Creek. A Rehabilitation Plan will be prepared and submitted as part of any future Development Application. The rehabilitation will incorporate a mixture of koala food trees and riparian rainforest and will also consider bushfire APZ requirements for low flammability species and associate managed understories. The rehabilitation plan will aim to reflect the intent of Lismore's Urban Green Corridors Plan for Tucki Tucki Creek. Incorporation of valuable native paddock trees (especially fruiting and habitat trees) into buffers and riparian corridors – where possible. Incorporation of nest boxes, bat boxes and hollow logs into replanted areas to supplement habitat resources in new growth areas. If the stick nest (currently empty/abandoned) is re-established in the future by a threatened species, mitigation of impacts to the nest will most likely include buffering of the nest and/or installation of a nesting platform in an area of rehabilitation / potential relocation. The level of mitigation will be determined by the nest use and the conservation significance of the species using the nest. If the nest is re-established, construction can also be timed to occur outside of the breeding season. Use of the nest will be monitored to assist with the Development Application process.
Edge Effect – Noise and light impacts to wildlife (during	Construction noise will be temporary and is unlikely to result in significant disturbance to fauna. Light disturbance during construction is not expected to be an issue	Implement directional lighting along roads and within proposed allotments to avoid shining light directly on the Tucki Tucki Creek area.

Environmental Aspect	Description of Potential Impact	Proposed Mitigation
construction and subsequent use)	due to construction hours being limited to periods of daylight. If the site is developed, a degree of light and noise will spill into the Tucki Tucki Creek corridor.	Limit night lighting or operational times in lots directly adjacent to Tucki Tucki Creek.
Risk of vehicular strike to wildlife (during construction and subsequent use)	Due to the low habitat value of the site, a lack of functioning wildlife corridors in the area, and predicted low abundance of fauna on site, the potential impacts of any future construction or operations is likely to be negligible.	Demarcate construction zones from areas of ecological value for retention with exclusion fencing to minimise the potential for interaction between wildlife and machinery during construction. Consolidation of areas retained for biodiversity values and avoidance of roadways within or crossing these areas. Streets will be designed for low-speed travel. Signage will raise awareness of potential presence of wildlife, particularly koalas.
Tucki Tucki Creek (during construction and subsequent use)	The future development is adjacent to Tucki Tucki Creek and has the potential to impact upon riparian vegetation, weed cover, bank stability, creek structure, water quantity and quality and aquatic habitat values. It is considered likely that the threatened southern purple-spotted gudgeon (*M. adspersa*) traverses the creek at the site. The provision of an adequate buffer area and appropriate management of the buffer has the ability to protect and enhance the quality of the Tucki Tucki Creek environment.	Retention and protection of Tucki Tuki Creek with an adequate buffer. The buffers are proposed to be at least 50m either side for the main branch (3rd/4th order creek), and a minimum of 10/20m either side for first and second order tributaries, respectively. This is considered appropriate for the following reasons: • It meets recommendations in the Lismore DCP, Chapter 14 Vegetation Protection; • It is in accordance with the recommendations to maintain corridor values outlined the Lismore Biodiversity Management Strategy 2015-2035, key habitats and corridors document; • The current condition of the riparian zones on site are extremely poor and at risk of further degradation. • The development provides an opportunity to protect and enhance the natural values of Tucki Tucki Creek system on site and provide habitat for threatened aquatic species (such as *M. adspersa*). The Tucki Tucki Creek riparian corridor will be rehabilitated as part of any future Development Application, in accordance with a Rehabilitation Plan that will be prepared and submitted at that time. The rehabilitation will incorporate a mixture of koala food trees and riparian rainforest and will also consider bushfire APZ requirements for low flammability species and associate managed understories. The rehabilitation plan will seek to reflect the intent of Lismore's Urban Green Corridors Plan for Tucki Tucki Creek.

Environmental Aspect	Description of Potential Impact	Proposed Mitigation
Water quality and hydrology (during construction and subsequent residential use)	It is likely that future development will result in a high proportion of impermeable surfaces (e.g., rooftops, roads) across the site. This will result in greater overland flow that needs to be directed and/or stored on site. When released into the environment, the water may have an impact to water quality and hydrology of the adjacent wetland.	To help improve runoff water quality, an erosion and sediment control plan shall be prepared and implemented during earthwork and clearing. It is recommended that future stormwater design (water quality and hydrological design) responds to environmental requirements and the results of any further ecological studies. Engineering design for hydrology and water quality will seek to ensure habitat values for the purple spotted gudgeon is not impacted, for example maintaining or improving creek flows and reducing sedimentation.

5. Legislative Background

The following relevant legislation and planning instruments have been reviewed to support the planning proposal:

- The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EBPC Act);
- The NSW *Biodiversity Conservation Act 2016* (BC Act) and subordinate regulations
- The NSW *State Environmental Planning Policy (Biodiversity and Conservation) 2021*
- The NSW *State Environmental Planning Policy* (Resilience and Hazards) 2021
- The NSW *Water Management Act 2000* (WM Act)
- The NSW *Fisheries Management Act 1994*
- The NSW *Biosecurity Act 2015*
- The NSW *Local Land Services Act 2013*
- Lismore City Council LLEP 2012 and DCP 2012.
- Comprehensive Koala Plan of Management for south-east Lismore 2013 (under SEPP 44)

A comprehensive analysis of Commonwealth and State legislation appears in Table 4 and local legislation appears in Table 5.

5.1 Assessment of significance (BC Act)

In the case of the NSW *Biodiversity Conservation Act 2016* (BC Act), Section 7.3 sets out a "Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats". There are a number of factors to consider for the assessment of the site under the BC Act. There is one threatened ecological community (TEC) on site, Lowland rainforest, which is represented by communities 7 and 8 and two specimens of the threatened scrub turpentine (*R. rubescens*) on the western boundary (Figure 11).

Further there is evidence of koala utilizing the site, and given the presence of purple spotted gudgeon records upstream and downstream of the site it is highly likely that the threatened fish traverses the waterways on site. At the planning proposal stage, it is not possible to undertake a thorough assessment of significance as the detailed design of the development is unknown and some data is lacking with regards to the threatened grassland species (e.g. Hairy Jointgrass) indicated as potentially occurring on the site. The following analysis (Table 3) represents a high-level assessment of significance for the TEC and threatened species known or indicated as highly likely within this report.

Table 3 Assessment of significance

Criteria	Response
(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.	Only a small area of the rainforest vegetation community is proposed to be removed (Figure *8*; 260m^2) and therefore the likelihood that threatened species will be directly impacted is low. Further detailed survey of this small area will be required as part of any future Development Application. Further investigation into threatened grass species is also pending. A local population of purple spotted gudgeon is likely making use of the sites waterways, which are planned to be protected within riparian corridors and habitat values enhanced through restoration. No adverse effect on life-cycle is anticipated. A local population of koalas is likely making some use of the site, evidenced by scats under one tree in the south. The development will likely result in the removal of some koala feed trees on site in the short to medium term. In the long term there is likely to be a net gain of koala habitat on site.

Criteria	Response
	Due to the availability of surrounding habitat no adverse effect on life-cycle is anticipated.
(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity— (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,	With exception of the 260m2 of clearing area associated with the road entry on to Oliver Avenue (Figure *8*), the Lowland Rainforest EEC represented by communities 7 and 8 on the site are planned to be retained in their entirety in the zoning plan and concept layout. Given the current state of these communities and their situation (isolated, fragmented) within a highly disturbed environment, it is not anticipated that the development will lead to further significant modification of the composition of the ecological community overall. The development represents an opportunity for restoration of further areas of Lowland Rainforest TEC along Tucki Tucki Creek.
(c) in relation to the habitat of a threatened species or ecological community— (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.	The waterways on site are likely to provide habitat for the threatened purple spotted gudgeon. This habitat is not planned to be removed as a result of the development. Tucki Tucki Creek is known locally as an important wildlife corridor and this is recognised by its planned protection within the planning proposal and concept layout. The development plans to conserve and enhance this corridor through restoration. Not habitat will become further fragmented as a result of the development, but an existing wildlife connection is planned to be enhanced. A local population of koalas is likely making some use of the site, evidenced by scats under one tree in the south. The development will likely result in the removal of some koala feed trees on site in the short to medium term. In the long term there will likely be a net gain of koala habitat on site through the rehabilitation of Tucki Tucki Creek and incorporation of koala feed trees.
(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	There are no areas of outstanding biodiversity value on site.
(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	Clearing of vegetation and habitat is listed as a key threatening process for many TEC's and threatened species under the BC Act. In this case, the project will result in a small area of clearing of the lowland rainforest EEC. No impact to threatened flora or fauna is anticipated, however. For these values the development represents an opportunity for biodiversity gain through the protection and restoration of Tucki Tucki Creek. The development will likely result in the removal of some koala feed trees on site in the short to medium term, with other feed trees remaining (e.g. the stands of planted Blackbutt and Tallowwood - Figure 11). In the long term there is likely to be a net gain of koala habitat on site.

Table 4: Commonwealth and State Legislative Requirements

Statute	Trigger / Background	Relevance
Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	Actions (projects) that are likely to significantly impact Matters of National Environmental Significance (MNES) are required to be referred to the Department of Climate Change, Energy, the Environment and Water.	Desktop studies indicated a number of threatened flora and fauna species listed under the EPBC Act that could potentially utilise the site, namely scrub turpentine (*Rhodamnia rubescens*), Hairy joint grass (*Arthraxon hispidus*), native jute (*Corchorus cunninhamii*) and koala and grey headed flying fox. Recent surveys located two specimens of *R. rubescens* on the north-west boundary and these will be retained within green space. Targeted surveys for threatened grass species are anticipated to occur later in 2022 / early 2023 (when the season is appropriate). It is likely that koalas and grey-headed flying fox traverse the site and utilise food resources, but the amount of habitat present on site is very limited (to stand alone paddock trees). Due to the condition of the habitat and retention of existing threatened flora, it is not anticipated that the development will require a referral to DCCEEW under the EPBC Act.
NSW *Biodiversity Conservation Act 2016* (BC Act)	Development applications trigger the requirement for Biodiversity Development Assessment Reports (BDAR) and the Biodiversity Offsets Scheme where the following thresholds are met: • Land mapped on the Biodiversity Values Map (BV Map) is impacted; • Native vegetation area clearing thresholds are exceeded; • Significant impacts to matters listed under the BC Act (threatened species or ecological communities) are likely to occur, pursuant to section 7.3 of the BC Act; • Impacts to Areas of Outstanding Biodiversity Value (AOBV) are likely to occur, and/or • 'Serious and irreversible impacts' (SAII) are likely to occur. Principles relating to SAII are set out in Clause 6.7 of the *Biodiversity Conservation Regulation 2017* and OEH's Guidance to assist a decision maker to determine a serious and irreversible impact document (OEH 2017).	• The site and immediate surrounds contains BV Mapping. A small area of BV mapping is proposed to be impacted (approximately 260m^2) by the proposed road that connects to Oliver Av (see inset in Figure *8*). Otherwise, the proposed rezoning plans to retain BV Mapping areas. Due to the impact on the BV Map, **the project will trigger entry into the BOS**. • The Threshold for native vegetation clearing, above which the BAM and offsets scheme apply is currently 1ha for the subject land. However, the planning proposal aims to change the zoning from rural to residential and amend the minimum lot size. Once this occurs, the native vegetation clearing threshold for this site will be 0.25 ha. A BDAR/the BOS will be triggered as part of the development application process if the clearing of native vegetation is above this threshold. Given the extent of scattered native trees and the associated canopy area (as per aerial photography), the native vegetation clearing threshold is likely to be exceeded and therefore **the BOS is likely to be triggered.** • During any future DA, further assessment is required under the BC Act to ascertain if the project will result in a significant impact to any threatened species or ecological communities. Based on what is

Statute	Trigger / Background	Relevance
		currently known about the site and the proposed layout, a significant impact is considered unlikely based on the significant retention of EEC's (Vegetation communities 7 & 8) and endangered species (scrub turpentine). Hence it is not likely that offsets will be required due to this trigger. • There are no AOBV mapped on site. • The project is unlikely to result in any SAII, and therefore the BOS is unlikely to be triggered by this matter. Future development applications will be required to re-assessed and re-confirm this.
NSW *State Environmental Planning Policy (Biodiversity and Conservation) 2021* and *NSW State Environmental Planning Policy (Koala Habitat Protection) 2021*	The provision for koala habitat protection apply to the subject land; however, requirements are devolved to the approved Koala Plan of Management for the area. This is the *Comprehensive Koala Plan of Management for south-east Lismore (CKPoM) 2013*.	The site is within the Koala Planning Area as defined in the Comprehensive Koala Plan of Management for south-east Lismore (2013) (CKPoM) and contains some *Primary – preferred koala habitat* along Tucki Tucki Creek and the north-western boundary in accordance with *Map 2 Indicative map of Preferred Koala Habitat within the Koala Planning Area*. See Table 5 below for proposed outcomes.
NSW *State Environmental Planning Policy (Coastal Management) 2018* replaced by NSW *State Environmental Planning Policy (Resilience and Hazards) 2021*	The aim of the SEPP is to promote an integrated and co ordinated approach to land use planning in the coastal zone. This is achieved by managing development in the coastal zone and protecting the environmental assets of the coast, and by establishing a framework for land use planning to guide decision-making in the coastal zone.	The site is not mapped as Coastal Environment Area or Coastal Wetland or Littoral Rainforest by the SEPP. No further action required.
NSW *Water Management Act 2000* (WM Act)	The object of the WM Act is to provide for the sustainable and integrated management of the water sources of the state. Some activities are "controlled activities" under the act. For example, works on waterfront land. Waterfront land means the bed of any river, lake or estuary, and the land within 40 metres of the riverbanks, lake shore or estuary mean high-water mark. The *Water Management (General) Regulation 2018* hydro line spatial data is a dataset of mapped watercourses and waterbodies in NSW. It is based on the Spatial Services (Department of Finance, Services & Innovation) NSW Hydro Line dataset.	The Hydro Line spatial data (Figure 12) identifies Tucki Tucki Creek and its tributaries on the site. As the waterway has been identified in the mapping, there is the prospect of any works done to the waterways to be determined as 'controlled activities' requiring approval through NSW government or the DA process. Examples of controlled activities relevant to development, include: • modifications to a watercourse, such as erosion control works and channel realignment • construction of bed control measures • construction of watercourse crossings such as bridges, causeways and bed level crossings, and ancillary works, such as roads

Statute	Trigger / Background	Relevance
		• constructing stormwater outlets and spillways • construction of boat ramps and sea walls • laying pipes and cables • sand and gravel extraction. Approvals usually contain conditions to minimise the impact of the activity or works on the waterway and adjoining land.
NSW *Fisheries Management Act 1994*	The FM Act relates to the management of fishery resources. It is administered by the Minister for Primary Industries, except Part 7 (Division 2), which is administered by the Minister for Climate Change, Environment and Water. The FM Act maps areas of key fish habitat - those aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally, and the survival and recovery of threatened aquatic species. The objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. Under Part 4 of the EP&A Act, NSW DPI is a 'determining authority' for local development that requires one or more of the following permits under the FM Act: • Section 144 - aquaculture permit • Section 201 - permit to carry out works of dredging or reclamation (i.e. any excavation within, or filling or draining of, water land or the removal of woody debris, snags, rocks or freshwater native aquatic vegetation or the removal of any other material from water land that disturbs, moves or harms these in-stream habitats), • Section 205 - permit to harm (cut, remove, injure, destroy, shade etc) marine vegetation, • Section 219 – permit to obstruct the free passage of fish,	Tucki Tucki Creek is mapped as a Key Fish Habitat under the *Fisheries Management Act 1994* (Figure 13) and potential habitat for threatened Purple-spotted Gudgeon. That indicates that any construction activities within Tucki Tucki Creek could potentially trigger permitting under the FM Act, particularly: • Construction of a pedestrian bridge • Bank stabilisation works • Works to any existing culverts • Installation of any stormwater outlets or bioretention basins • Interfering with habitat of a threatened species The necessity for a permit for works to Tucki Tucki Creek will be revisited at the DA stage. Further, given that Tucki Tucki Creek is indicated as Key Fish Habitat that is Type 1, Class 1 generally associated with a *recommendation* of a 100m buffer, it is likely that DPI will be involved in the assessment of the Planning Proposal. Currently, Tucki Tucki Creek is proposed to be contained within a riparian buffer that varies in width but is between approximately 100m and 240m wide in total (Figure 12). With rehabilitation of this riparian corridor and appropriate controls for stormwater quality, a net benefit to the key fish habitat can be achieved. For NSW DPI to assess whether a proposal will have an impact on the environment, proponents must provide adequate and relevant environmental assessment information. In addition to information on the development activity, proponents will be required to provide detailed information in regard to the fish habitats and fish species present. The above information would normally be provided in the form of a Review of Environmental Factors (REF), Statement of Environmental Effects (SEE) or an

Statute	Trigger / Background	Relevance
	• licence to harm threatened species or damage their habitat (Part 7A)	Environmental Impact Statement (EIS). The Department of Planning and Infrastructure has developed a document entitled Aquatic Ecology in Environmental Impact Assessment (Lincoln-Smith 2003) which should be referred to by any planners or consultants in assessing aquatic flora and fauna impacts during the preparation of a REF, SEE or EIS.
NSW *Biosecurity Act 2015*	The *Biosecurity Act 2015* includes a general biosecurity duty for biosecurity matters such as the introduction, presence, spread or increase of a pest. This general biosecurity duty provides that any person who deals with biosecurity matter has a biosecurity duty to ensure that the biosecurity risk is prevented, eliminated, or minimised, so far as is reasonably practicable.	Any future development is likely to satisfy the biosecurity duty via the removal and appropriate disposal of weeds during clearing. Further, no biosecurity matters will be brought on to the site as part of any future DA.
NSW *Local Land Services Act 2013*	The Local Land Service Act 2013 (LLS Act) governs clearing of native vegetation on rural lands that is otherwise uncontrolled by local Councils. It is associated with mapping that determines land categories land categorisation under the Land Management Framework and what that means for native vegetation management. Rural land in NSW is categorised into three main categories: Category 1 (exempt land), Category 2 (regulated land) and Excluded land. There are different native vegetation management options for each category. A native vegetation regulatory map is maintained by the Department of Planning, Industry and Environment.	Currently the LLS Act applies to the site, as a rural property (Figure 7). The site contains some mapped Native Vegetation. Along Tucki Tucki Creek, where the creek splits the lot) the vegetation is mapped as protected riparian land (Category 2 vulnerable regulated land). Part of the smaller tributary (as it heads east) is mapped as Category 2 sensitive regulated land. There are also small areas of Category 2 sensitive regulated land mapped over the wind-rows along the north-west and south-west boundaries (also mapped by the Biodiversity Values Map). Once rezoned for non-rural purposes the LLS Act will no longer apply to the site.

Table 5: Relevant Lismore City Council Requirements (for DAs)

Note: to avoid confusion, it is noted that the requirements set out below are only relevant to future DA phases. They are included here to demonstrate that future DAs are likely to be able to meet council DA requirements. However, further assessment will be required during any future DA phase, once project design is finalised. It should be noted that that the DCP provisions are not legally binding; however, they are given weight in the assessment of all development applications.

Relevant Requirement	Trigger / Requirement	Relevance
Lismore Local Environmental Plan (LLEP) 2012	The Lismore Local Environmental Plan 2012 (LLEP 2012) contains maps that detail land use zones, minimum lot sizes and other development standards to guide development within the Lismore Local Government Area (LGA).	The entire site is currently zoned as Primary Production (RU1), which is intended for a rural use. The client wishes to rezone the land to allow for a mixed-use development. The zoning amendments are proposed to facilitate future housing development consisting of multiple freehold land parcels and associated road access. Further assessment is provided by the Town Planning report associated with the Planning Proposal.
Lismore City Development Control Plan (DCP) 2012 **DCP 2012, Part A, Chapter 6 – Village, Large Lot Residential and Rural Subdivision**	The purpose of this chapter is to identify Council's requirements for the subdivision of village, large lot residential and rural land. Specific requirements for aspects of Village, Large Lot Residential and Rural subdivision development are divided into primary Elements. Each Element includes the relevant Subdivision Development Principles, Performance Criteria and Acceptable Solutions. In some cases, both Performance Criteria and Acceptable Solutions are specified; however, in other cases only Performance Criteria are specified. Development proposals must be consistent with the specified Subdivision Development Principles. This will usually be achieved by meeting the Acceptable Solutions. Alternatively, Council may be prepared to approve development proposals that can meet the relevant Subdivision Development Principles and the Performance Criteria. Section 4.1.4 discusses the element of Biodiversity Conservation.	The following provisions apply to rural subdivisions that are on or adjacent to sites that support or contain remnant native vegetation (including scattered remnant trees); threatened native flora and/or fauna species, endangered ecological communities or their habitats; or watercourses. **Performance Criteria (P38.1):** The subdivision design: • retains and enhances areas of significant ecological value; • provides for rehabilitation areas to offset vegetation removal; • provides appropriately sized riparian vegetation zones if the land contains watercourses; • includes revegetation buffer areas around ecologically vegetation; sensitive • accommodates corridor connectivity for areas of ecologically significant vegetation. These criteria have been considered in the current proposed lot layout, and more detailed information can be provided as part of any future DA phase. To address the criteria a Vegetation Management Plan (VMP) and, where necessary, a Threatened Species Management Plan is to demonstrate how areas of significant ecological value are to be retained as part of any future DA. A VMP should be prepared in accordance with the *Guidelines for the preparation of Vegetation Management Plans* (Lismore City Council, 2010).

Relevant Requirement	Trigger / Requirement	Relevance
Lismore City Development Control Plan (DCP) 2012, Chapter 14 – Vegetation Protection	This chapter of the DCP applies whenever any vegetation is proposed to be removed or disturbed; from a single tree to more extensive clearing. It aims to promote the retention of trees and tree cover to conserve as far as practicable the existing landscape quality and natural ecosystems. The provisions of this chapter are separated into three distinct parts based on the different characteristics of land across the Lismore LGA and different legislative requirements. Section 3 sets out when vegetation removal or pruning is exempt from Council approval. Section 4 applies to vegetation removal in Non-Rural Areas and Section 5 applies to Rural and High Biodiversity Value Areas. Vegetation removal exempt from requiring approval by Council, includes: removing dead or dying trees, vegetation posing an immediate danger, routine maintenance around buildings, fire safety, weed removal, impeding pedestrian access, planted food trees and Any tree, shrub or grass (such as bamboo) under 4m in height that is not located in a heritage conservation area and not protected under the provisions of the *Biodiversity Conservation Act 2016*. On 14 July 2020, Council voted to place on public exhibition changes to its DCP, including a new DCP Chapter 14 (Vegetation Protection) that is intended to replace the existing Chapter 14 (Preservation of Trees or Vegetation). The main changes between the current Chapter 14 DCP and the proposed new chapter are: • that the new chapter covers all areas of the LGA, whereas the current one is limited in its application; • the list of what is 'exempt" from requiring an approval is more detailed; and • the requirements for information from applicants and the issues for consideration by assessors in	At this stage, it is predicted that the DA will trigger the Biodiversity Offsets Scheme under the BC Act. Therefore, Section 5 of this DCP chapter is likely to apply to the management of vegetation. Chapter 14, Section 5, Table 4 (Appendix 1) provides details of High Conservation Value (HCV) 'Red Flag' areas, which are ecological assets that must generally be retained on site. The table also identifies ecological setbacks, which is an area of land that is required to separate the development envelope from a HCV area. Relevant to the site is: • Threatened species (30m buffer). At this stage, the two *Rhodamnia rubescens* in the west of the site are proposed to be conserved within a broader riparian corridor area (Figure 2). The DCP's requirement for a 30m buffer is partially met; however it is not expected that the proposed layout will cause impact to these plants. Further, as part of any future DA, alternative measures can compensate for any potential risks of impact, such as planting of the species within the wider rehabilitation area that is proposed. Details can be confirmed during any future DA phase. • EECs (30m buffer). Although Rainforest EEC exists on site (Figure 11), Community 7 will be preserved within the riparian corridor whilst Community 8 is a thin strip of disturbed rainforest, with camphor laurel and other weed species common. The latter will be buffered by at least 15m, with riparian rehabilitation of wet sclerophyll and rainforest communities expected to compensate for potential impacts to the EEC on the whole. • Preferred or core koala habitat (20m buffer). The proposed layout plans to provide ample areas of rehabilitated (planted) koala habitat, providing a net benefit for the species. • Tucki Tucki Creek is both a recognised wildlife corridor within Council's Biodiversity Management Strategy and a 3rd/4th order creek. In this instance the greater buffer requirement of 50m will apply, as per *Figure 5 Ranked corridor significance for vertebrate assemblages in the Lismore LGA* (Milledge 2012). This has been considered in the current layout plan. Isolated hollow bearing native trees (20m buffer), and raptor nests (50m buffer). A single tree of significance (due to the number of hollows) that is

Relevant Requirement	Trigger / Requirement	Relevance
	rural and high biodiversity value areas are more significant.	proposed to be retained was identified during the current survey and is mapped on Figure 11. Further consideration regarding this tree can be undertaken during any future DA phase, including potential buffering and installation of compensatory nest boxes in other parts of the site. Currently, the tree is planned to be located in a buffer. Other approval requirements may apply under the *Local Land Services Act 2013* and the *Biodiversity Conservation Act 2016,* as discussed in Table 4.
Comprehensive Koala Plan of Management in south-east Lismore (2013) – under NSW SEPP 44	With regards to the *State Environmental Planning Policy (Koala Habitat Protection) 2021 (SEPP 44)*, under Schedule 1 south-east Lismore is indicated as a Koala Management Area (KMA). As such Lismore City Council has developed a *Comprehensive Koala Plan of Management in south-east Lismore (2013)*, which indicates the location of Important Populations, Core Habitat and Preferred Habitat.	The site within the Koala Planning Area as defined in the Comprehensive Koala Plan of Management for south-east Lismore (2013) (CKPoM) and contains some *Primary – preferred koala habitat* along Tucki Tucki Creek and the north-western boundary in accordance with *Map 2 Indicative map of Preferred Koala Habitat within the Koala Planning Area* (Figure 19). The survey by Bower Ecology noted that the koala habitat on site differs slightly from CKPoM mapping. The primary habitat mapped adjacent to Oliver Avenue on the north-western boundary of the site did not contain koala food trees and is not considered 'primary koala habitat'. Instead the small patch of riparian vegetation on the southern bank of Tucki Tuck Creek and immediately adjacent (west) to the site, does contain primary food trees and should be mapped as primary habitat (see Vegetation Community 1 on Figure *11*). Another small patch in the north-east corner (near Bruxner Highway) of the site contains several tallowwood and should also be mapped as primary koala habitat. This is indicated as Vegetation Community 9 in Figure 11. A few scattered remnant Eucalyptus trees exist on site, that have been identified as primary and secondary food trees, including tallowwood and small-fruited grey gum. A number of scats were found (approximately 20) below the single *E. dunnii* in the south of the site (Plate 13) (Figure 11). Despite searches for scats and scratches over the remainder of the site, no further evidence of the species was found. The future development of the site will trigger the Development Assessment Framework of the CKPoM, which aims to avoid, minimise or mitigate the impact of development on *preferred koala food trees* and *koala movement corridors*. It is

Relevant Requirement	Trigger / Requirement	Relevance
		understood that the future development of the site would be considered a 'small impact development' due to the nature of the potential koala habitat on site (i.e. scattered food trees). A Koala Habitat Assessment Report (Assessment Report) for small impact development must be included in the documentation supporting the development application, which will include a map of preferred koala habitat trees and assessment of koala activity to define *core koala habitat* (as per *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44)). Council may grant approval for development if it is satisfied that the development will result in *no net loss* of food trees, such that any food trees removed must be compensated in accordance with the *food tree replacement ratio*, preferably on-site. It is likely that any future DA can meet this type of requirement.

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6. Conclusions

Nimble Estates Pty Ltd seeks to amend the Lismore Local Environment Plan 2012 (LLEP 2012) to rezone 1055 Bruxner Highway, Gunnellabah (Lot 42 DP868366 and Lot 1 DP957677) from Primary Production (RU1) to a mixed use development. The zoning amendments are proposed to facilitate future housing development consisting of multiple freehold land parcels and associated road access. This report provides the results of an ecological assessment prepared to support the assessment of the Planning Proposal under the *Environmental Planning and Assessment Act 1979*.

The site is approximately 76 ha and is located immediately east of and adjacent to the current eastern-most extent of residential development associated with Lismore township – just beyond the 'Urban Expansion Limit' identified in the Lismore Strategic Planning Statement (2020). Residential development is adjacent to the west of the site and agricultural land (currently under crop, mainly macadamia, and also pineapple farms and fruit orchards) exists to the north, east and south.

Evidence observed by Bower Ecology during surveys indicate that the site was likely dominated by a mixture of Subtropical Rainforest and several forms of Wet Sclerophyll Forest prior to clearing (pre-1958). Currently the site is mostly cleared exotic pasture with scattered remnant trees and patches of Brushbox, Pink Bloodwood, and Tallowwood were observed on site (some planted), with small patches of rainforest also present. The ecological values of the site can be summarised as follows:

- Two vegetation communities on site meet Endangered Ecological Community determinations under the NSW *Biodiversity Conservation Act 2016* for 'lowland rainforest EEC' along Tucki Tucki Creek and the western boundary fence,
- Tucki Tucki Creek itself is considered a feature of high ecological significance as it forms an important local corridor recognised in the Lismore *Biodiversity Management Strategy 2015-2035*, it is key fish habitat and it is likely habitat for the threatened (BC Act) southern purple-spotted gudgeon (*Mogurnda adspersa*).
- One threatened flora species (scrub turpentine, *Rhodamnia rubescens*) was located on the western boundary.
- There are many scattered remnant paddock trees that have some value as food or habitat resources to native wildlife, including some threatened species; however this generally does not represent core habitat for threatened wildlife.
- Habitat opportunities on site for threatened fauna are fairly limited, but the proximity and abundance of nearby records of some species indicates the site is likely utilised by some threatened frugivorous birds and bats particularly grey-headed flying fox and *Ptilinopus spp.* (fruit doves).
- Evidence of only one threatened fauna species (koala) was noted in recent surveys showing that this species utilises feed trees on the site.

The rezoning footprint has considered the above ecological values and provides a riparian corridor zone (Figure 2) with the intention of achieving a net benefit to wildlife habitat and connectivity. For example, Tucki Tucki Creek is planned to be conserved and rehabilitated within a large riparian corridor zone running centrally through the subject site (Figure *2*). This represents an opportunity to enhance the local natural environment and obtain biodiversity goals outlined in several local plans (for example Urban Green Corridors and Lismore Biodiversity Management Strategy 2015-2035 and Key Habitats and Corridors). The tributaries of Tucki Tucki Creek will also be buffered from development. The area of rehabilitation will be further designed (e.g. extent and type of rehabilitation) as part of a plan that shall be provided as part of any future development application process.

It is acknowledged that there will be a potential loss of approximately 260m^2 of disturbed rainforest along the western boundary fence, as well as many large scattered remnant paddock trees. However, it is anticipated that the negative impact of the loss of these remnant trees will be adequately compensated by the retention and rehabilitation of Tucki Tucki Creek; as well as incorporation of natural values into buffers and riparian corridor zones. This will result in retention of some valuable paddock trees and a net gain of native vegetation and habitat on the site. Further biodiversity assessment will be required as part of any future DA phase, as the project (as per current design) will trigger the BOS due to the minor impact on the BV mapping as well as the exceedance of the native vegetation clearing thresholds. This will allow for survey of Hairy Jointgrass and also likely result in further mitigation (due to requirements for offsets under the BOS).

7. References

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Appendix 1 Lismore DCP (2012) – Chapter 14, Section 5, Table 4

Table 4 – High Conservation Value 'Reg Flag' areas

Criteria / HCV 'Red Flag' Features	Ecological Setback
High Conservation Value vegetation and habitat – as per criteria in the Lismore Biodiversity Management Strategy	
Areas of land identified as containing **threatened species or populations** listed under the *Biodiversity Conservation Act 2016* or *EPBC Act 1999*	30m
Areas of land identified as containing **endangered ecological communities (EECs)** listed under the *Biodiversity Conservation Act 2016* or *EPBC Act 1999*	30m
Areas of land identified as **key habitat for threatened species** under the *Biodiversity Conservation Act 2016* or *EPBC Act 1999* or for species of local conservation priority (as identified by Milledge 2012).	30m
Coastal wetlands under **State Environmental Planning Policy** Coastal Management 2018.	50m
Areas of vegetation on land identified as being **key habitat and/or in a wildlife corridor** of **very high significance linking key habitats and refuges for priority assemblages in Lismore LGA.** *(As identified in Appendix 8 and Fig 5 Milledge 2012 Key Habitat and Corridors report with Council's Biodiversity Management Strategy 2015-2035. **Note:** These areas are shown as 'wildlife corridors' in Council's GIS mapping).*	20m
Areas of land identified as **preferred or core Koala habitat** as defined the by the LCC CKPoM or **core Koala habitat** under the SEPP Koala Habitat Protection (2019).	20m
Areas of land identified as supporting **riparian, wetland and**	1st order – 10m
estuarine native vegetation other than Coastal Management SEPP 2018 mapped wetlands.	2nd order – 20m 3rd order – 30m 4th and 5th order - 40m 6th order stream – 50 m Local wetland – 20m Important Wetland - 50m Estuarine area – 50m
Areas of land identified as supporting any type of **rainforest**.	20m
Areas of land identified as supporting native vegetation defined as **old-growth forest**.	30m
Other areas:	
Bushland on slopes greater than 18 degrees.	10m
Isolated hollow bearing native trees	20m
Flying fox camps	50m
Raptor Nest	50m

Appendix 2 List of paddock tree species

Acacia implexa

Acacia melanoxylon

Alphitonia excelsa

Angophora floribunda

Araucaria bidwillii

Arytera distylis

Banksia melanoxylon

Bridelia exaltata

Callitris sp.

Castanospermum australe

Celtis sinensis

Cinnamomum camphora

Commersonia fraseri

Corymbia intermedia

Cryptocarya spp.

Cupaniopsis parvifolia

Cyathea cooperi

Decaspermum humile

Denhamia celastroides

Diploglotis australis

Dysoxylon rufum

Eriobotrya japonica

Erythrina sykesii

Eucalyptus dunnii

Eucalyptus grandis

Eucalyptus microcorys

Eucalyptus propinqua

Ficus macrophylia

Ficus macrophylla

Ficus obliqua

Ficus oppisita

Ficus superba

Ficus virens var. Sublanceolata

Flindersia australis

Flindersia bennetii

Flindersia schottiana

Fraxinus spp.

Geijera salicifolia

Glochidion sumatranum

Glochidion sumetranum

Gmelina leichhardii

Grevillea robusta

Guioa semiglauca

Helica glabrifolia

Jagera pseudorhus

**Lantana camara*

Lophostemon confertus

Mallotus discolor

Mallotus philippensis

Mischocarpus australis

Mischocarpus pynformis

Pentaceras australis

**Pinus elliottii*

Pittosporum undulatum

Polyscias elegans

**Schefflera actinophylla*

Stenocarpus sinutus

Syzygium luehmannii

Syzygium smithii

Wikstroemia indica

Xanthostemon chrysanthus

Appendix 3 PMST Search Results

Australian Government
Department of Agriculture, Water and 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.

Report created: 13/08/22 09:00:58

No Image Available

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates
Buffer: 5.0Km

No Image Available

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 Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	59
Listed Migratory Species:	15

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. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

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:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	37
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
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community likely to occur within area
Grey box-grey gum wet forest of subtropical eastern Australia	Endangered	Community may occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area
Fish		
Maccullochella ikei Clarence River Cod, Eastern Freshwater Cod [26170]	Endangered	Species or species habitat may occur within area
Nannoperca oxleyana Oxleyan Pygmy Perch [64468]	Endangered	Species or species habitat may occur within area
Frogs		
Mixophyes fleayi Fleay's Frog [25960]	Endangered	Species or species habitat may occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Vulnerable	Species or species habitat may occur within area
Insects		
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Breeding may occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to 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
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely 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]	Endangered	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (northern) [66645]	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		

Name	Status	Type of Presence
Acronychia littoralis Scented Acronychia [8582]	Endangered	Species or species habitat may occur within area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat known to occur within area
Baloghia marmorata Marbled Balogia, Jointed Baloghia [8463]	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat may occur within area
Bulbophyllum globuliforme Miniature Moss-orchid, Hoop Pine Orchid [6649]	Vulnerable	Species or species habitat may occur within area
Clematis fawcettii Stream Clematis [4311]	Vulnerable	Species or species habitat likely to occur within area
Corchorus cunninghamii Native Jute [14659]	Endangered	Species or species habitat likely to occur within area
Cryptocarya foetida Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Davidsonia jerseyana Davidson's Plum [67219]	Endangered	Species or species habitat may occur within area
Desmodium acanthocladum Thorny Pea [17972]	Vulnerable	Species or species habitat known to occur within area
Diploglottis campbellii Small-leaved Tamarind [21484]	Endangered	Species or species habitat may occur within area
Endiandra floydii Floyd's Walnut, Crystal Creek Walnut [52955]	Endangered	Species or species habitat may occur within area
Floydia praealta Ball Nut, Possum Nut, Big Nut, Beefwood [15762]	Vulnerable	Species or species habitat known to occur within area
Gossia fragrantissima Sweet Myrtle, Small-leaved Myrtle [78867]	Endangered	Species or species habitat known to occur within area
Hicksbeachia pinnatifolia Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Boppel Nut, Ivory Silky Oak [21189]	Vulnerable	Species or species habitat likely to occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat known to occur within area
Marsdenia longiloba Clear Milkvine [2794]	Vulnerable	Species or species habitat known to occur within area
Myrsine richmondensis Purple-leaf Muttonwood, Lismore Muttonwood [83888]	Endangered	Species or species habitat known to occur within area
Ochrosia moorei Southern Ochrosia [11350]	Endangered	Species or species habitat known to occur within area
Owenia cepiodora Onionwood, Bog Onion, Onion Cedar [11344]	Vulnerable	Species or species habitat likely to occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
Randia moorei Spiny Gardenia [10577]	Endangered	Species or species habitat likely to occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat known to occur within area
Syzygium hodgkinsoniae Smooth-bark Rose Apple, Red Lilly Pilly [3539]	Vulnerable	Species or species habitat likely to occur within area
Syzygium moorei Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple [12284]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
Tylophora woollsii [20503]	Endangered	Species or species habitat may occur within area
Reptiles		
Coeranoscincus reticulatus Three-toed Snake-tooth Skink [59628]	Vulnerable	Species or species habitat likely to 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
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to 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
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to 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
Commonwealth Land - Commonwealth Bank of Australia
Commonwealth Land - Defence Housing Authority

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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to 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]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely 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

Name	Threatened	Type of Presence
		habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat 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 likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Boatharbour	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, Northern 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

Name	Status	Type of Presence
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
Pycnonotus jocosus Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove, Spotted 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
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known 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
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,		Species or species

Name	Status	Type of Presence
Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425] Asparagus africanus		habitat likely to occur within area
Climbing Asparagus, Climbing Asparagus Fern [66907] Asparagus plumosus		Species or species habitat likely to occur within area
Climbing Asparagus-fern [48993] Cabomba caroliniana		Species or species habitat likely to occur within area
Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Chrysanthemoides monilifera		Species or species habitat likely to occur within area
Bitou Bush, Boneseed [18983] Chrysanthemoides monilifera subsp. rotundata		Species or species habitat likely to occur within area
Bitou Bush [16332] Dolichandra unguis-cati		Species or species habitat likely to occur within area
Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119] Eichhornia crassipes		Species or species habitat likely to occur within area
Water Hyacinth, Water Orchid, Nile Lily [13466] Genista sp. X Genista monspessulana		Species or species habitat likely to occur within area
Broom [67538] Hymenachne amplexicaulis		Species or species habitat may occur within area
Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754] Lantana camara		Species or species habitat likely to occur within area
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Pinus radiata		Species or species habitat likely to occur within area
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] Rubus fruticosus aggregate		Species or species habitat may occur within area
Blackberry, European Blackberry [68406] Sagittaria platyphylla		Species or species habitat likely to occur within area
Delta Arrowhead, Arrowhead, Slender Arrowhead [68483] Salvinia molesta		Species or species habitat likely to occur within area
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665] Senecio madagascariensis		Species or species habitat likely to occur within area
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area

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 and National Heritage properties, Wetlands of International and National 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.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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.

Coordinates

-28.81893 153.35636

Appendix 4 Threatened species likelihood assessment (5km radius)

Species	Number of Records in search area	Likelihood of Occurrence within the proposed rezoning footprint
Flora		
Acronychia littoralis Scented Acronychia	0	Unlikely as no records within 5km
Arthraxon hispidus Hairy Jointgrass	>10	**Potential to occur on edges of rainforest and in wet eucalypt forest, near creeks or swamps.**
Baloghia marmorata Marbled Baloghia	0	Unlikely as no records within 5km
Bosistoa transversa Three-leaved bosistoa	0	Unlikely as no records within 5km
Bulbophyllum globuliforme Miniature moss orchid	0	Unlikely as no records within 5km
Clematis fawcettii Stream clematis	2-10	Low potential to occur in riparian rainforest areas due to condition of available habitat.
Coatesia paniculate Axe breaker	2-10	Low potential to occur in dry subtropical rainforest and vine scrub, along rivers due to condition of available habitat.
Corchorus cunninghamii Native jute	2-10	**Potential to occur in ecotone of wet sclerophyll forest and dry to dry-subtropical rainforest.**
Cryptocarya foetida Stinking laurel	0	Unlikely as no records within 5km
Cryptostylis hunteriana Leafles tongue-orchid	0	Unlikely as no records within 5km
Cynanchum elegans White-flowered wax plant	0	Unlikely as no records within 5km
Davidsonia jerseyana Davidson's plum	0	Unlikely as no records within 5km
Desmodium acanthocladum Thorny Pea	>10	**Potential to occur in dry rainforest and fringes of riverine subtropical rainforest on basalt-derived soils at low elevations.**
Diploglottis campbellii Small-leaved tamarind	0	Unlikely as no records within 5km
Doryanthes palmeri Spear lily	1	Unlikely to occur due to lack of exposed rocky outcrops in wet sclerophyll forest.
Endiandra floydii Floyd's walnut	0	Unlikely as no records within 5km
Endiandra hayesii Rusty Rose Walnut	1	Not observed during survey. Unlikely due to historical clearing and condition of rainforest habitat.
Floydia praealta Ball Nut	2-10	Low potential to occur in riverine and subtropical rainforest on soils derived from basalt due to condition of available habitat.
Gossia fragrantissima Sweet myrtle	2-10	**Potential to occur in dry subtropical and riverine rainforest. As it can coppice from roots left in the ground when rainforest is cleared, it is found at several sites as isolated plants in paddocks or regrowth.**
Hicksbeachia pinnatifolia Red Boppel Nut	1	Unlikely to occur in subtropical rainforest, moist eucalypt forest and Brush Box forest due to disturbance levels.

Species	Number of Records in search area	Likelihood of Occurrence within the proposed rezoning footprint
Isoglossa eranthemoides -	2-10	Unlikely due to the condition of the understorey of lowland subtropical rainforest, in moist situations on floodplains and slopes.
Macadamia integrifolia Macadamia nut	1	Unlikely as it is not known to occur naturally in the wild in N.S.W.
Macadamia tetraphylla Rough-shelled Bush Nut	2-10	Low potential to occur in riverine and subtropical rainforest due to condition of available habitat.
Marsdenia longiloba Clear milkvine	1	Unlikely due to the condition of the understorey of lowland subtropical rainforest, lowland moist or open eucalypt forest adjoining rainforest.
Melicope vitiflora Leatherwood	1	Unlikely as it reaches its southern limit in NSW, where it is restricted to the far north east corner of the State, in coastal areas around the Brunswick Heads and Broken Head.
Myrsine richmondensis Purple-leaf muttonwood	1	Unlikely as species is currently known from only 4 individual plants in rainforest and is not tolerant of disturbance.
Oberonia complanata Yellow-flowered King of the Fairies	1	Unlikely due to condition of littoral rainforest, subtropical rainforest, dry rainforest, wet or dry eucalypt forests.
Ochrosia moorei Southern Ochrosia	1	Not observed during survey. Unlikely due to historical clearing and condition of rainforest habitat.
Owenia cepiodora Onion cedar	2-10	Low potential to occur in Subtropical and dry rainforest on or near soils derived from basalt due to condition of available habitat.
Persicaria elatior knotweed	0	Unlikely as no records within 5km
Phaius australis Lesser swamp orchid	0	Unlikely as no records within 5km
Psilotum complanatum -	1	Unlikely due to condition of littoral rainforest, subtropical rainforest, dry rainforest.
Randia moorei Spiny gardenia	2-10	Low potential to occur in subtropical, riverine, littoral and dry rainforest due to condition of available habitat.
Rhodamnia maideniana Smooth-scrub turpentine	1	Unlikely due to condition of littoral rainforest, subtropical rainforest, dry rainforest.
Rhodamnia rubescens Scrub Turpentine	2-10	**Know to occur on site. High potential to occur in other areas across the site - in rainforest and on rainforest margins.**
Rhodomyrtus psidiodes Native guava	2-10	Low potential to occur in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines due to condition of available habitat.
Rhynchosia acuminatissima Pointed trefoil	1	Unlikely due to condition of littoral rainforest, subtropical rainforest, dry rainforest.
Sarcochilus dilatatus Brown butterfly orchid	1	Unlikely due to condition of littoral rainforest, subtropical rainforest, dry rainforest.
Senna acclinis Rainforest cassia	1	Unlikely due to condition of littoral rainforest, subtropical rainforest, dry rainforest.
Syzygium hodgkinsoniae Red Lilly Pilly	2-10	Low potential to occur in rainforest and on rainforest margins due to condition of available habitat.

Species	Number of Records in search area	Likelihood of Occurrence within the proposed rezoning footprint
Syzygium moorei Durobby	0	Unlikely as no records within 5km
Thesium australe Austral toadflax	1	Unlikely to be found in grassland and grassy woodland due to the condition. Often found in association with Kangaroo Grass (*Themeda australis*).
Tinospora smilacina -	2-10	Low potential to be found in dry rainforest and along the boundaries of dry rainforest and dry eucalypt forest due to condition of available habitat.
Tinospora tinosporoides Arrow-head Vine	>10	Low potential to be found in wetter rainforest due to condition of available habitat.
Triflorensia cameronii Cameron's Terenna	1	Unlikely due to condition of understorey of littoral rainforest, subtropical rainforest, dry rainforest.
Tylophora woollsii -	0	Unlikely as no records within 5km
Fauna		
Anseranas semipalmata Magpie goose	1	Unlikely given the lack of shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.
Anthochaera phrygia Regent honeyeater	0	Unlikely given the lack records within 5km buffer.
Artamus cyanopterus Dusky woodswallow	1	Unlikely given lack of dry, open eucalypt forests and woodlands, including mallee associations.
Arygynnis hyperbius inconstans Australian fritillary	0	Unlikely given the lack records within 5km buffer.
Botaurus poiciloptilus Australasian bittern	0	Unlikely given the lack records within 5km buffer.
Calidris ferruginea Curlew sandpiper	0	Unlikely given the lack records within 5km buffer.
Calyptorhynchus lathami Glossy black cockatoo	1	Unlikely due to lack of black she-oak food trees.
Carterornis leucotis White eared monarch	2-10	**Potential in the ecotone between rainforest and other open vegetation types or the edges of rainforest, such as along roads.**
Chalinolobus dwyeri Large-eared pied bat	0	Unlikely given the lack records within 5km buffer.
Circus assimilis Spotted Harrier	1	**Potential to occur in the wider area, though the site would not represent core habitat or breeding habitat for this species.**
Coeranoscincus reticulatus Three-toed snake tooth skink	0	Unlikely given the lack records within 5km buffer.
Cyclopsitta diophtalma coxeni Coxen's fig parrot	0	Unlikely given the lack records within 5km buffer.
Dasyornis brachypterus Eastern bristlebird	0	Unlikely given the lack records within 5km buffer.
Dasyurus maculatus Spotted-tailed Quoll	2-10	Unlikely given the lack of closed rainforest with fallen hollow bearing logs.
Ephippiorhynchus asiaticus Black-necked Stork	>10	Unlikely given the lack of wetland habitat on the site.

Species	Number of Records in search area	Likelihood of Occurrence within the proposed rezoning footprint
Erythrotriorchis radiatus Red goshawk	1	**Potential to occur in the wider area, though the site would not represent core habitat or breeding habitat for this species.**
Flaco hypoleucos Grey falcon	0	Unlikely given the lack records within 5km buffer.
Falco subniger Black falcon	1	Potential visitor to site. One record from Tucki Tucki Creek on the site.
Falsistrellus tasmaniensis Eastern false pipistrelle	1	**Potential in moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.**
Gygis alba White tern	1	Marine species.
Hieraaetus morphnoides Little Eagle	1	**Potential to occur in the wider area, though the site would not represent core habitat or breeding habitat for this species.**
Hirundapus caudacutus White-throated needletail	1	Aerial species. Likely fly over but unlikely to directly use habitat on site.
Irediparra gallinacean Comb-crested jacana	1	Unlikely given the lack of permanent freshwater wetlands.
Lathamus discolor Swift parrot	0	Unlikely given the lack records within 5km buffer.
Maccullochella ikei Clarence River Cod	0	Unlikely given the lack records within 5km buffer.
Micronomus norfolkensis Eastern coastal free tail bat	1	**Potential in dry sclerophyll woodland where it may roost in tree hollows or under bark or in man-made structures.**
Miniopterus australis Little Bent-winged Bat	>10	**Potential use of the site due to many nearby records, but generally prefers well-timbered areas.**
Miniopterus orianae oceanensis Large bent-winged bat	2-10	**Potential use of the site due to many nearby records, but generally prefers well-timbered areas.**
Mogurnda aspera Purple spotted gudgeon	2-10	**Highly likely as the species has been recorded in several places upstream and downstream within Tucki Tucki Creek.**
Myotis macropus Southern myotis	1	Unlikely to forage over streams and pools due to lack of riparian vegetation.
Mixophyes fleayi Fleay's frog	0	Unlikely given the lack records within 5km buffer.
Mixophyes iteratus Giant barred frog	0	Unlikely given the lack records within 5km buffer.
Nannoperca oxleyana Oxleyan pygmy perch	0	Unlikely given the lack records within 5km buffer.
Ninox connivens Barking owl	1	**Potential to occur in woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed**

Species	Number of Records in search area	Likelihood of Occurrence within the proposed rezoning footprint
		along timbered watercourses in heavily cleared habitats
Ninox strenua Powerful owl	1	Unlikely given it roosts by day in dense vegetation and there is none on site.
Numenius madagascariensis Eastern curlew	0	Unlikely given the lack records within 5km buffer.
Nurus atlas Atlas rainforest ground beetle	2-10	Unlikely due to low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Not disturbance tolerant.
Nurus brevis Shorter rainforest ground beetle	2-10	Unlikely due to low-elevation rainforest and wet eucalypt forest with a well-developed rainforest understorey. Not disturbance tolerant.
Nyctophilus bifax Eastern Long-eared Bat	2-10	**Potential use of the site due to many nearby records, but generally prefers well-timbered areas.**
Pandion cristatus Eastern Osprey	1	**Potential to occur in the wider area, though the site would not represent core habitat or breeding habitat for this species.**
Petaurus australis Yellow-bellied glider	0	Unlikely given the lack records within 5km buffer.
Petaurus norfolcensis Squirrel glider	2-10	Unlikely given lack of mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest.
Petauroides volans Greater glider	0	Unlikely given the lack records within 5km buffer.
Phaethon rubricauda Red-tailed tropic bird	1	Marine species. Unlikely.
Phascogale tapoatafa Brush-tailed phascogale	1	Unlikely given lack of intact dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter.
Phascolarctos cinereus Koala	>20	**Known to use extant remnant gum trees on site. Known to occur in area based on BioNet records**.
Phyllodes imperialis southern subspecies Southern Pink Underwing Moth	1	Habitat present but unlikely due to historical clearing and condition of rainforest habitat. Species does not like disturbance.
Planigale maculata Common planigale	1	Low potential in rainforest, eucalypt forest, grassland where there is surface cover, close to water.
Podargus ocellatus Marbled frogmouth	2-10	**Potential in riparian vegetation.**
Potorous tridactylus Long nosed pototroo	0	Unlikely given the lack records within 5km buffer.
Pteropus poliocephalus Grey-headed Flying-fox	>20	**Highly likely to forage along Tucki Tucki Creek and fly over the site. No roosts were observed during surveys.**
Ptilinopus magnificus Wompoo Fruit-Dove	2-10	**Potential in sub-tropical rainforest and in fruiting trees in the paddock, although the species prefers dense vegetation cover.**
Ptilinopus regina Rose-crowned Fruit-Dove	>10	**High potential in sub-tropical rainforest and in fruiting trees within the paddocks. Species seems tolerant of open spaces.**

Species	Number of Records in search area	Likelihood of Occurrence within the proposed rezoning footprint
Ptilinopus superbus Superb fruit dove	2-10	**Potential in sub-tropical rainforest and in fruiting trees in the paddock, although the species prefers dense vegetation cover.**
Rostratula australis Australian painted snipe	0	Unlikely given the lack records within 5km buffer.
Scoteanax rueppellii Greater broad-nosed bat	1	Unlikely in woodland, dry eucalypt forest and rainforest, in tree hollows due to disturbed nature of site and lack of cover.
Stictonetta naevosa Freckled duck	1	Unlikely given lack of freshwater wetlands.
Turnix melanogaster Black-breasted button quai	0	Unlikely given the lack records within 5km buffer.
Tyto longimembris Eastern grass owl	1	Unlikely given lack of tall grassy, swampy areas on site.
Tyto novaehollandiae Masked owl	1	**Potential to hunt on site in dry eucalypt forests and woodlands. A forest owl, but often hunts along the edges of forests, including roadsides. No roost habitat present.**
Tyto tenebricosa Sooty owl	1	Unlikely in dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests on site due to high level of disturbance.

Appendix 5 Observed bird species from recent Bower Ecology surveys 2022

Common Name	**Species Name**
Australian Magpie	*Gymnorhina tibicen*
Galah	*Eolophus roseicapilla*
Cattle Egret	*Bubulcus ibis*
Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*
Noisy Miner	*Manorina melanocephala*
Little Corella	*Cacatua sanguinea*
Masked Lapwing	*Vanellus miles*
Pied Butcherbird	*Cracticus nigrogularis*
Australian White Ibis	*Threskiornis molucca*
Straw-necked Ibis	*Threskiornis spinicollis*
Laughing Kookaburra	*Dacelo novaeguineae*
Willie Wagtail	*Rhipidura leucophrys*
Currawong	*Strepera graculina*
Pacific Black Duck	*Anas superciliosa*
Eastern Rosella	*Platycercus eximius*
Magpie Lark	*Grallina cyanoleuca*
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*
Australasian pippit	*Anthus novaeseelandiae*
Crested Pigeon	*Ocyphaps lophotes*
Welcome Swallow	*Hirundo neoxena*
Australian Wood Duck	*Chenonetta jubata*
Purple Swamp Hen	*Porphyrio porphyrio*
Rainbow Lorikeet	*Trichoglossus haematodus*
Grey Fantail	*Rhipidura albiscapa*
Lewin's Rail	*Lewinia pectoralis*
White-throated Gerygone	*Gerygone olivacea*
Wonga Pigeion	*Leucosarcia melanoleuca*
Black Shouldered Kite	*Elanus axillaris*
Superb Fairy Wren	*Malurus cyaneus*
Toresian Crow	*Corvus orru*
White-breasted Woodswallow	*Artamus leucorynchus*
Blue-face Honeyeater	*Entomyzon cyanotis*
Pheasant Coucal	*Centropus phasianinus*
White-headed Pigeon	*Columba leucomela*
Spangled Drongo	*Dicrurus bracteatus*
Scarlet Honeyeater	*Myzomela sanguinolenta*
Lewin's Honeyeater	*Meliphaga lewinii*
Black-faced Cuckooshrike	*Coracina novaehollandiae*
Green Figbird	*Sphecotheres viridis*