Biodiversity Development Assessment Report

34 Wyndella Road, Lochinvar

Prepared by: Alex Graham (BAAS19040)
Prepared for: Commercial 7 Pty Ltd ATF Commercial 7 Investment Trust
Final Report: February 2024

East Coast Ecology

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Draft v1.0	Alex Graham (BAAS19040)	Jack Tatler (BAAS21006)	06.10.2023
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EXECUTIVE SUMMARY

East Coast Ecology Pty Ltd was commissioned by Commercial 7 Pty Ltd ATF Commercial 7 Investment Trust (the proponent) to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application for a residential manufactured home estate at 34 Wyndella Road, Lochinvar NSW 2321 (Lot 225/-/DP246447). This BDAR will assess the biodiversity impacts of the proposed development in accordance with the requirements of the *Biodiversity Conservation Act 2016* (NSW) and *Biodiversity Conservation Regulation 2017* (NSW). This BDAR is required as the proposed development will exceed the clearing threshold for entry into the Biodiversity Offset Scheme. This assessment has been completed in accordance with Appendix K of the Biodiversity Assessment Method (BAM).

The proposed development will involve the construction of a manufactured home estate, access roads and an Asset Protection Zone, hereafter referred to as the 'Subject Land'.

The proposed development will impact one (1) Plant Community Type, PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest. As the vegetation integrity (VI) score for Vegetation Zone 1: Canopy is below 15 (VI = 14.7) and Vegetation Zone 2: Grassland is below 15 (VI = 1.2), no Ecosystem Credits are required to offset the biodiversity impacts associated with either zone (**Table E1**).

Table E1. Impacts that require an offset – ecosystem credits.

PCT	Vegetation Zone	Vegetation Integrity Score Loss	Area (ha)	Credit Requirement
PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest	Zone 1: Canopy	14.7	0.21	0
	Zone 2: Grassland	1.2	9.54	0

Targeted surveys were carried out for four (4) fauna species, and two (2) flora species. These species were not detected within the Subject Land during the DPE endorsed survey period. Due to a lack of available habitat constraints, geographic limitations (DPE, 2023b), or due to the habitat being substantially degraded per section 5.2.2 and section 6.4.1.17 of the BAM respectively, no other species credits are required to be offset as a result of the proposed development.

Consideration has been given to avoiding and minimising impacts to biodiversity where possible in the preliminary design. Avoidance measures include (but are not limited to):

- Optimisation of design to accommodate all scope of works, and
- Limiting impact of design footprint.

Mitigation measures to address direct, indirect and prescribed impacts are provided in this assessment. The proposed development is not likely to result in a significant impact to species or communities listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). As such a referral to the Australian Government Minister for the Environment is not required.

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GLOSSARY

Acronym/ Term	Definition
Accredited Biodiversity Assessor	Individuals accredited by the Department of Planning and Environment to apply the Biodiversity Assessment Method
ASL	Above Sea Level
ASS	Acid Sulfate Soils
BAM	New South Wales Biodiversity Assessment Method
BAMC	New South Wales Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BC Reg	*Biodiversity Conservation Regulation 2017* (NSW)
BDAR	Biodiversity Development Assessment Report
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified
Biodiversity Offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity from the impacts of development
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats
BOS	New South Wales Biodiversity Offset Scheme
Development footprint	The area of land that is directly impacted by the proposed development
Development site	The broader area in which the Subject Land is located
DPE	New South Wales Department of Planning and Environment (formerly DPIE)
DPIE	New South Wales Department of Planning, Industry and Environment (formerly OEH)
Ecosystem credit	The class of biodiversity credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
ha	Hectares
HTE	High Threat Exotic plants defined under BAM 2020
KFH	Key Fish Habitat
km	Kilometres

Acronym/ Term	Definition
LGA	Local Government Area
m	metres
MNES	Matters of National Environmental Significance
Native Vegetation	Means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland
PCT	New South Wales Plant Community Type
Project Area	The area of land that is directly impacted on by a proposed Major Project that is under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), including access roads, and areas used to store construction materials.
Proposal	The development, activity or action proposed
SAII	Serious and Irreversible Impacts
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
SEPP	State Environmental Planning Policy
Species credit	The class of biodiversity credit that relate to threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection
Subject Land	The areas within or the combined areas of the development site, and any indirect and prescribed impacts, to which the BAM has been applied
TEC	Threatened Ecological Communities
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016
VI	Vegetation Integrity
VIS Plot	Vegetation Integrity Survey Plot

DECLARATIONS

i. Certification under clause 6.15 *Biodiversity Conservation Act 2016*

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Signature: 

Date: 9 February 2024

BAM Assessor Accreditation no.: BAAS19040

This BDAR has been prepared to meet the requirements of Appendix K in the BAM 2020.

ii. Details and Experience of Author/s and Contributors

Name	BAM Assessor Accreditation no.	Position/ Role	Tasks Performed	Relevant Qualifications
Alex Graham	BAAS19040	Principal Ecologist	Report preparation, BAM-C data entry and analysis, figure preparation, BAM plot surveys	*BSc (Biology), Grad. Dip. (Bushfire Protection)*
Jack Tatler	BAAS21006	Principal Ecologist	Document review	*BSc (Zoology & Entomology), Hons (Zoology), PhD (Ecology)*

iii. Conflict of Interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature: 

Date: 9 February 2024

BAM Assessor Accreditation no.: BAAS19040

1. INTRODUCTION

1.1 Proposed Development

1.1.1 Development Overview

Commercial 7 Pty Ltd ATF Commercial 7 Investment Trust (the proponent) commissioned East Coast Ecology (ECE) to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application (DA) for a Residential manufactured home estate at 34 Wyndella Road, Lochinvar NSW 2321 (Lot 225/-/DP246447).

This BDAR will assess the biodiversity impacts of the proposed development in accordance with the requirements of the *Biodiversity Conservation Act 2016* (NSW) (BC Act), *Biodiversity Conservation Regulation 2017* (NSW) (BC Reg) and Biodiversity Assessment Method 2020 (BAM).

East Coast Ecology have produced this report in order to assess any potential impacts associated with the proposed development and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the Consent Authority, Maitland City Council.

1.1.2 Proposed Development and the Subject Land

The proposed development will involve the construction of a manufactured home estate, access roads and an asset protection zone, hereafter referred to as the 'Subject Land'. All works associated with the proposed development are hereafter referred to as the 'Subject Land', which encompasses an area of approximately 10.78ha (**Figure 1**).

1.1.3 Location

The Subject Land is located within the suburb of Lochinvar, situated within the Maitland Local Government Area and forms part of the Mindaribba Local Aboriginal Land Council. The Subject Land is currently occupied by scattered trees on mixed native/ exotic grasses with a single private dwelling located in the central east elevation of the site. The Subject Land is situated within a rural landscape, with rural landholdings to the north and south, rural/residential land to the east and Wyndella Road to the west. The Subject Land is located on land zoned as RU2 - Rural Landscape under the Maitland Local Environmental Plan 2011, and the surrounding land use is primarily rural and residential.

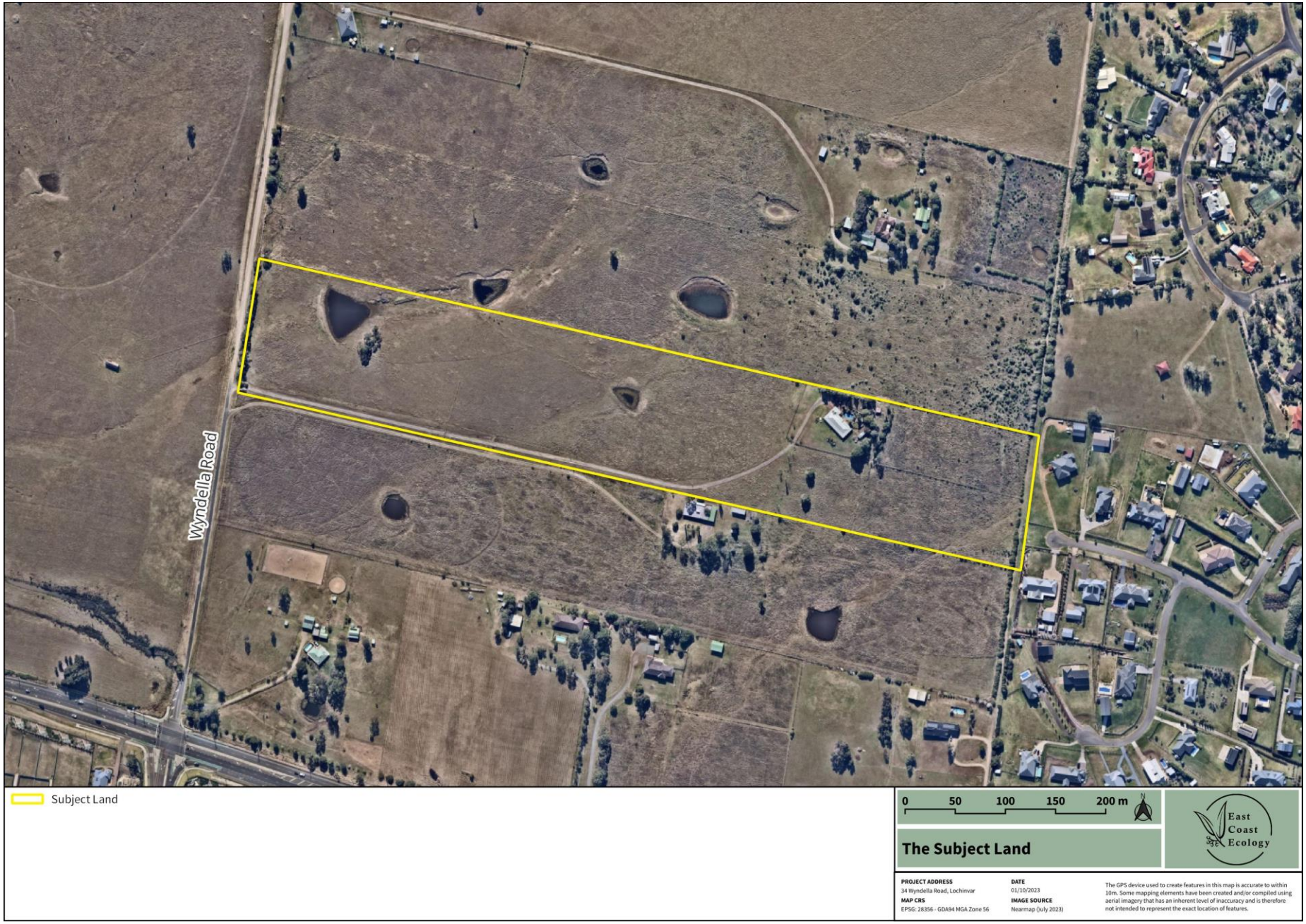

Figure 1. The Subject Land.

1.2 Information Sources

The following technical resources were utilised in the preparation of this report:

- State and Commonwealth Datasets:
    - EPBC Protected Matters Search Tool (DCCEEW, 2023)
    - NSW BioNet. The website of the Atlas of NSW Wildlife (DPE, 2023a)
    - NSW BioNet. Threatened Biodiversity Data Collection (DPE, 2023b)
    - NSW BioNet. Vegetation Classification System (DPE, 2023c)
    - NSW Government Spatial Services: Six Maps Clip & Ship (Spatial Services, 2023)
    - BAM Important Habitat Maps
    - Fish Communities and Threatened Species Distributions of NSW (DPI, 2016)
    - Freshwater Threatened Species Distributions Maps (DPI, 2013a)
    - Key Fish Habitat Maps – Central Rivers (DPI, 2023b)
- Vegetation and Soil Mapping:
    - The NSW State Vegetation Type Map (DPE, 2023f)
    - eSPADE v2.2.0 (DPE, 2023e)
- NSW State Guidelines:
    - Biodiversity Development Assessment Method (DPE, 2020a)
    - Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE, 2019)
    - Biodiversity Assessment Method Calculator Version 1.4.0.00 (DPE, 2023d)
    - Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPE, 2020b)
    - Threatened Species Survey and Assessment: Guidelines for developments and activities. Working Draft (DEC, 2004b)

1.3 Permits and Licences

The biodiversity assessment was conducted under the terms of ECE's Scientific Licence issued by the NSW Department of Planning and Environment (SL102667). Fauna survey was conducted under approval RVF22/2367 from the NSW Animal Care and Ethics Committee.

1.4 Matters of National Environmental Significance

The proposed development is not likely to significantly impact any EPBC Act listed threatened species or communities, or any Matters of National Environmental Significance. Therefore, it will not need a referral under the EPBC Act. Further detail is provided in **Section 11.2** of this report.

1.5 Biodiversity Offsets Scheme Entry

This BDAR is required as the proposed works will exceed the clearing threshold for entry into the Biodiversity Offset Scheme (1ha) (BOS). The Streamlined Assessment Module – Small Area, Appendix C of the BAM has not been applied, on the basis that:

- The cumulative impact area of the proposed development exceeds the area clearing limits specified in Table 12 of the BAM (**Table 1**).

Table 1. Area limits for application of small area development threshold.

Minimum lot size associated with the property	Maximum area limit for application of the small area development module
Less than 1ha	≤1ha
Less than 40ha but not less than 1ha	≤2ha
Less than 1000ha but not less than 40ha	≤3ha
1000ha or more	≤5ha

Dark border indicates clearing threshold relevant to this report.

2. METHODS

2.1 Site Context Methods

2.1.1 Landscape Features

An investigation of the Subject Land and surrounds (1,500m) was undertaken to provide context for the landscape features detailed in **Section 3.2**.

2.1.2 Native Vegetation Cover

Native vegetation cover and connectivity have been assessed in accordance with Sections 3.1.3 and 3.2 of the BAM (DPE, 2020a). The native vegetation cover was used to assess the habitat suitability of the Subject Land for threatened species. Areas of connectivity determined the extent of habitat that may facilitate the movement of threatened species across their range. A 1,500m buffer around the boundary of the Subject Land was assessed to determine the extent of native vegetation and habitat connectivity. Areas of native vegetation were confirmed using information collected during the site assessment, as well as aerial imagery and Google Street View. Areas not included as native vegetation included waterbodies, hardstand and exposed soil.

2.2 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity Methods

2.2.1 Existing Information

A review of the State Vegetation Type Map (DPE, 2023f) was used to assist in the identification of Plant Community Types (PCTs) within and surrounding the Subject Land. The PCT of 'best-fit' was determined based on the floristic descriptions within the Vegetation Classification System database (BioNet) (DPE, 2023c) and the vegetation integrity plot data collected from field surveys.

2.2.2 Mapping Native Vegetation Extent

The extent of native vegetation within the Subject Land was determined through a field assessment with the aid of a GPS-enabled tablet. Native vegetation assigned to a PCT was then stratified into vegetation zones based on their condition and structure.

2.2.3 Plot-based Vegetation Survey

A systematic plot-based floristic vegetation survey was undertaken in accordance with BAM subsection 4.2.1. The sampling plot locations were chosen as they were representative of the type and condition of vegetation that is proposed to be impacted for the proposed development.

2.2.4 Vegetation Integrity Survey

The vegetation integrity survey was undertaken in accordance with BAM Subsection 4.3.4. Four plots (20m x 50m) in total were required to be sampled each zone to meet the minimum number of plots required.

2.3 Threatened Flora Survey

2.3.1 Review of Existing Information

Threatened flora with potential to occur within the Subject Land and immediate surrounds were identified following review of BioNet and the PMST. Soil mapping (DPIE, 2023) and topography (Google Earth) were also used to provide further context on habitat constraints for threatened flora.

2.3.2 Field Surveys

To determine the presence of threatened flora or suitable habitat for threatened flora species were present, a survey was undertaken using parallel field traverses in accordance with the 'Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method' (DPE, 2020b).

2.4 Threatened Fauna Survey

2.4.1 Review of Existing Information

Threatened fauna with potential to occur within the Subject Land and immediate surrounds were identified following review of BioNet using a 10km x 10km search area centred on the Subject Land and were used to supplement the list of predicted and candidate species modelled by the BAM-C where a valid record since 1990 occurred within 1,500m of the Subject Land. Soil mapping (DPE, 2023e) and topography (Google Earth) were also used to provide further context on habitat constraints for threatened fauna.

2.4.2 Habitat Constraints

A field survey was undertaken to identify any habitat constraints (e.g. waterbodies, rocky areas, tree hollows), including microhabitat, present within the Subject Land and immediate surrounds. Potential habitat constraints within the broader area (1,500m buffer) were assessed using Google Earth, soil landscape mapping (DPE, 2023e) and recent vegetation mapping (DPE, 2023f).

2.4.3 Field Surveys

Threatened fauna were recorded opportunistically however, their habitats were targeted during the parallel field traverses. Thorough searches of all trees were undertaken for any evidence of stick nests over the course of two days.

2.5 Aquatic Habitat Survey

2.5.1 Review of Existing Information

Searches using the Freshwater Threatened Species Distributions Maps (DPI, 2023a) were undertaken to produce a list of threatened freshwater fish species that may occur within the Subject Land.

2.5.2 Field Surveys

The sampling protocol used to assess the habitat features and stream condition indicators of aquatic habitat, particularly those relating to Key Fish Habitat (KFH), included assessment in accordance with the NSW Australian River Assessment System (AUSRIVAS) Sampling and Processing Manual (DEC, 2004a).

2.6 Weather Conditions

Surveys were undertaken on 6th – 7th September 2023 within the Subject Land. Weather conditions taken from the nearest weather station (Maitland Airport, station no. 067113) in the lead up and during the field survey are outlined in **Table 2**. Pre-survey weather conditions were generally conducive for identifying threatened species should they occur within the Subject Land. Rainfall in the month prior to the survey provided good conditions for the flowering and/ or emergence of the flora species. Such rainfall also allowed for optimal conditions for the emergence of groundcovers within the Subject Land, which ensured reliable species diversity was observed during the site visit.

Table 2. Weather conditions taken from the nearest weather stations (Station number 067113) in the lead up and during the field survey (BOM, 2023b).

Timing/activities	Date	Day	Temperature		Rainfall (mm)
			Min	Max	
Lead up to the survey	30/08/2023	Wednesday	5.7	27.3	0
	31/08/2023	Thursday	9.2	22.2	8.2
	1/09/2023	Friday	8.4	19.7	0.2
	2/09/2023	Saturday	6.7	20.1	0
	3/09/2023	Sunday	4.4	21.2	0
	4/09/2023	Monday	2.8	23.8	0
	5/09/2023	Tuesday	9.9	26.6	0.2
Site Assessment & Habitat Survey	6/09/2023	Wednesday	2.6	23.9	0.2
	7/09/2023	Thursday	5.0	28.7	0

Dark border indicates survey date.

2.7 Limitations

Not all flora and fauna species could be directly surveyed for during the site assessment. These species include nocturnal fauna and cryptic flora with flowering times outside of the survey period. The presence of nocturnal and cryptic species was assessed based on habitat constraints and historical records.

3. SITE CONTEXT

3.1 Assessment Area

The area assessed as part of this BDAR consisted of the Subject Land and a 1,500m buffer zone (**Figure 2**).

3.2 Landscape Features

3.2.1 IBRA Bioregions and IBRA Subregions

The Subject Land occurs within the 'Hunter' Interim Biogeographic Regionalisation for Australia (IBRA) Subregion, which is part of the 'Sydney Basin' IBRA Bioregion (**Figure 2**).

3.2.2 Rivers, streams, estuaries and wetlands

The Subject Land is bifurcated by four mapped, unnamed waterbodies (**Figure 3**). Each watercourse is 1st order, and flows south out of the Subject Land, eventually joining a tributary of Lochinvar Creek. Lochinvar Creek, a 4th order watercourse occurs approximately 1,200m west of the Subject Land. Several 1st, 2nd and 3rd order watercourses along with their associated riparian buffers, are located within the 1,500m buffer.

3.2.3 Habitat Connectivity

Negligible terrestrial habitat connectivity between the Subject Land and the broader surrounds was detected. Aquatic habitat connectivity may exist during flooding events, however all watercourses were dammed or otherwise dry at the time of site inspection (**Figure 3**).

3.2.4 Karst, Caves, Crevices, Cliffs, Rocks or Other of Geological Features of Significance

The Subject Land did not contain any areas of geological significance, such as karsts, caves, cliffs or crevices. There are no areas of geological significance within the 1,500m buffer area. The Subject Land was not mapped as occurring on acid sulfate soils nor mapped as having risk/probability of exhibiting occurrence of Acid Sulfate Soils. No areas within the 1,500m buffer are mapped as occurring on acid sulfate soils.

3.2.5 Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value occur on the Subject Land or surrounding 1,500m buffer area.

3.2.6 NSW (Mitchell) Landscapes

NSW (Mitchell) Landscapes (Mitchell, 2002) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided location information and a meaningful descriptive landscape term. The Subject Land occurs within the 'Newcastle Coastal Ramp' Mitchell Landscape Ecosystem (**Figure 2**). This landscape is described as undulating lowlands and low to steep hills on complex patterns of faulted and gently folded Carboniferous conglomerate, lithic sandstone, felspathic sandstone, and mudstone, general elevation 50 to 275m, local relief 40 to 150m. Stony red texture-contrast soils on steep slopes, yellow and brown texture-contrast soils on lower slopes and deep dark clay loams along streams. Woodland of Spotted Gum (*Corymbia maculata*), Forest Red Gum (*Eucalyptus tereticornis*), Red Ironbark (*Eucalyptus sideroxylon),* White Mahogany (*Eucalyptus acmenoides*), Large-fruited Grey Gum (*Eucalyptus canaliculata*),

with sub-tropical rainforest elements in sheltered gullies. Similar eucalypts with Forest Oak (*Allocasuarina torulosa)* and grasses on lower slopes, merging to forest of Smooth-barked Apple (*Angophora costata*), Red Bloodwood (*Corymbia gummifera*), Blackbutt (*Eucalyptus pilularis*) with Bracken (*Pteridium esculentum*) and grasses nearer the coast.

3.2.7 Topography, Geology and Soils

The Subject Land is mapped as occurring on the 'Rothbury' soil landscape (DPE, 2023e). This soil landscape is typically characterised by undulating and rolling low hills south and south-east of Singleton. Red podzolic soils occur on upper slopes with yellow podzolic soils on midslopes, yellow solodic soils and brown soloths occur on lower slopes and prairie soils in the drainage lines. The Subject Land occurs on a west-facing slope, gently rising from 48m above sea level (ASL) in the western elevation to 68m ASL in the eastern elevation (Google Earth).

3.3 Native Vegetation Cover

Native vegetation cover and connectivity have been assessed in accordance with Section 3.1.3 and 3.2 of the BAM (DPE, 2020a). Native vegetation covers approximately 692.26ha within the 1,500m buffer area (total area = 986.44ha) (**Figure 3**) and was assigned to the >70% native vegetation cover class. Areas of native vegetation were confirmed using information collected during the site assessment, as well as aerial imagery and Google Street View. Areas not assessed as native vegetation included waterbodies, hardstand and exposed soil. **Table 3** summarises the extent of native vegetation cover within the assessment area.

Table 3. Native vegetation cover in the assessment area.

Assessment Area (ha)	986.44
Total Area of Native Vegetation Cover (ha)	692.26
Percentage of Native Vegetation Cover (%)	70.1
Class (0-10, >10-30, >30-70 or >70%)	>70

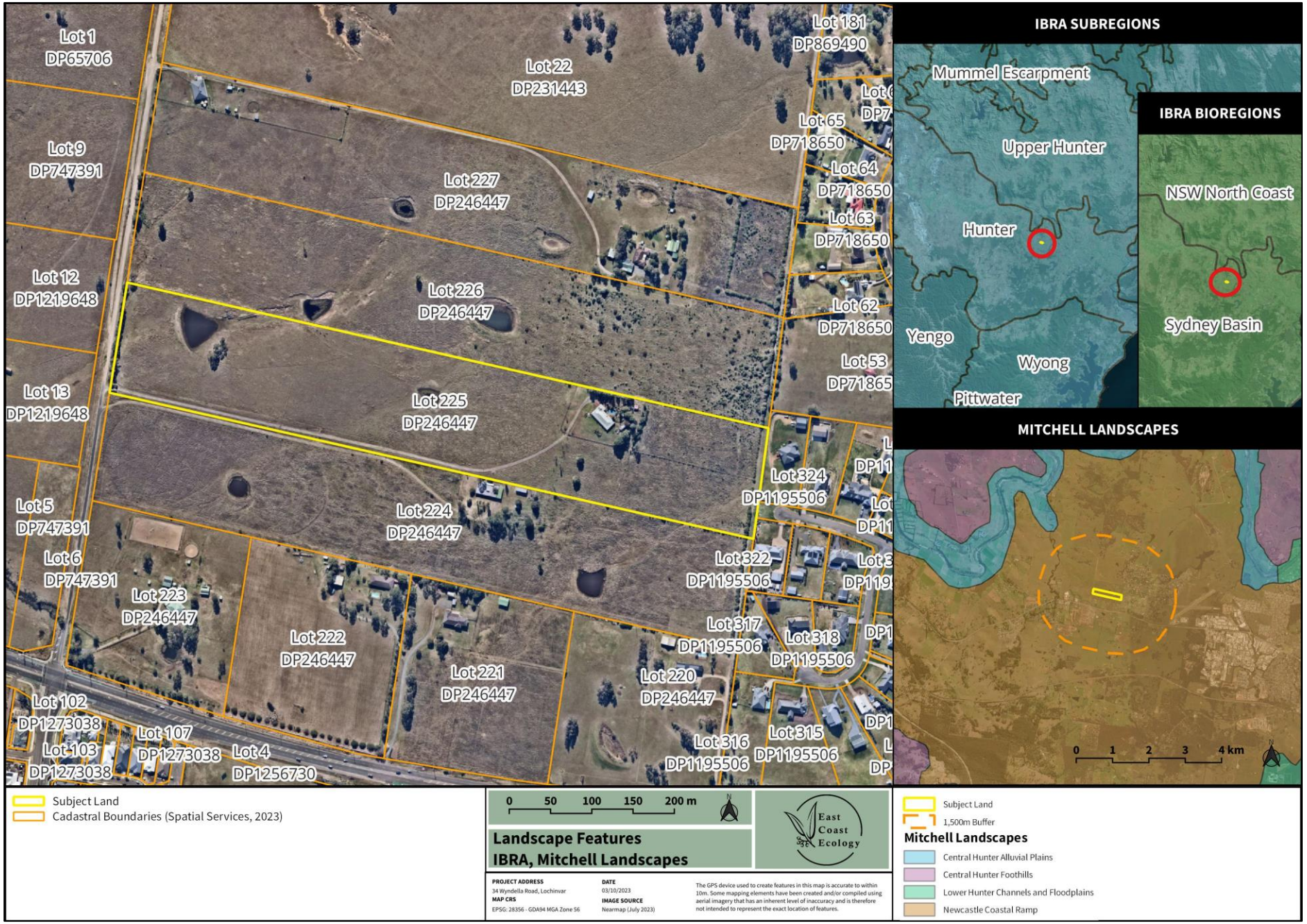

Figure 2. IBRA Bioregion and Subregion of the Subject Land, and within a 1,500m buffer.

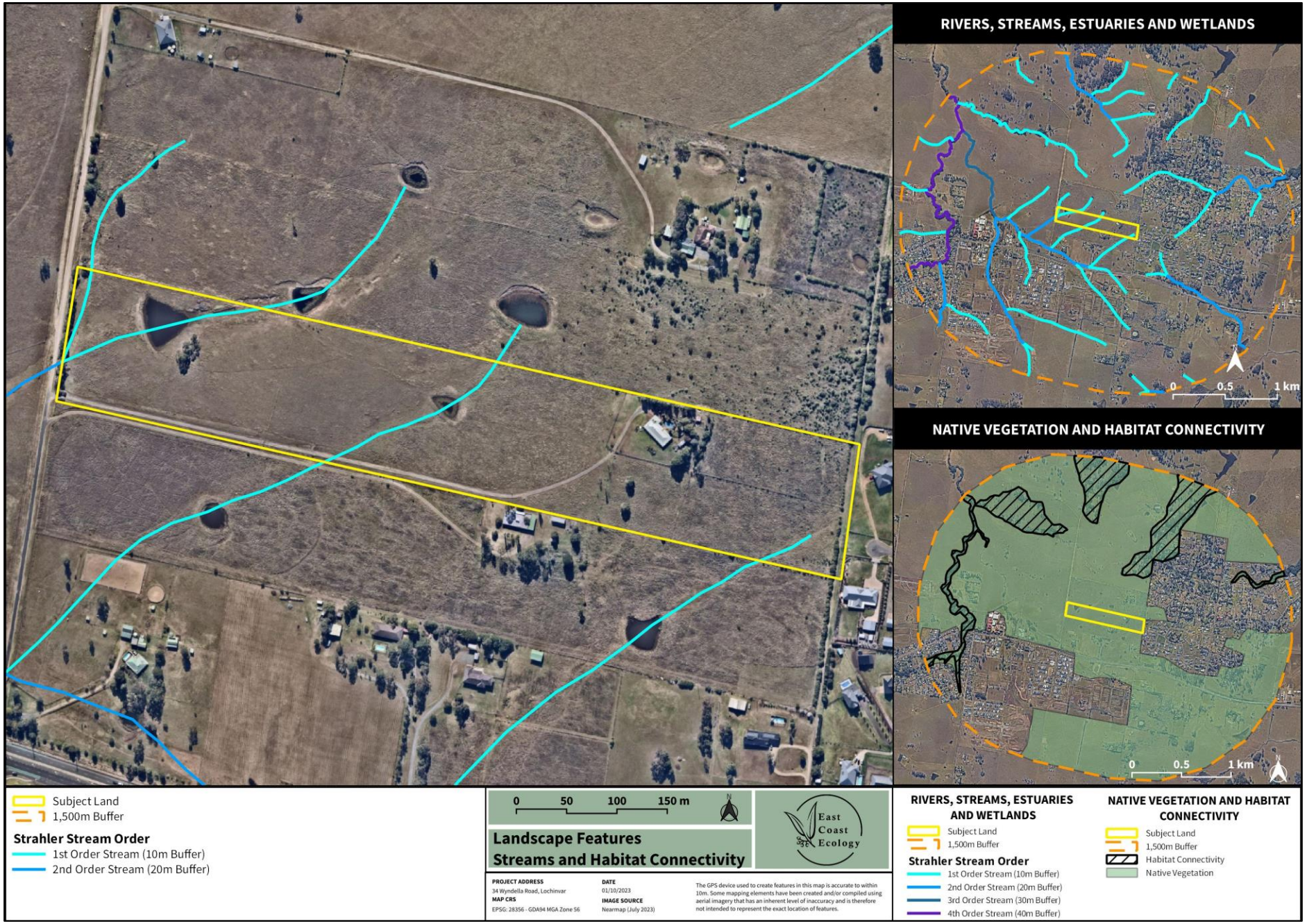

Figure 3. Strahler stream order, waterbodies, native vegetation and habitat connectivity.

4. NATIVE VEGETATION, THREATENED ECOLOGICAL COMMUNITIES AND VEGETATION INTEGRITY

4.1 Plant Community Types

4.1.1 Historically Mapped Vegetation

The State Vegetation Type Map (DPE, 2023f) indicated the presence of five Plant Community Types (PCT) in proximity (800m) to the Subject Land (**Figure 4**):

- PCT3083: Lower Hunter Tuckeroo Riparian Rainforest
- PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest
- PCT 3433: Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
- PCT 3442: Lower Hunter Lowland Ironbark-Paperbark Forest, and
- PCT 4023: Coastal Valleys Swamp Oak Riparian Forest.

All vegetation within the Subject Land was designated as PCT 0: Not Classified.

Anecdotal information provided by the landowner suggests that the Subject Land was fully cleared of trees prior to replanting of select native species within the gardens surrounding the existing dwelling, and/ or trees provided by Forestry NSW for planting within the property (*Eucalyptus botryoides*).

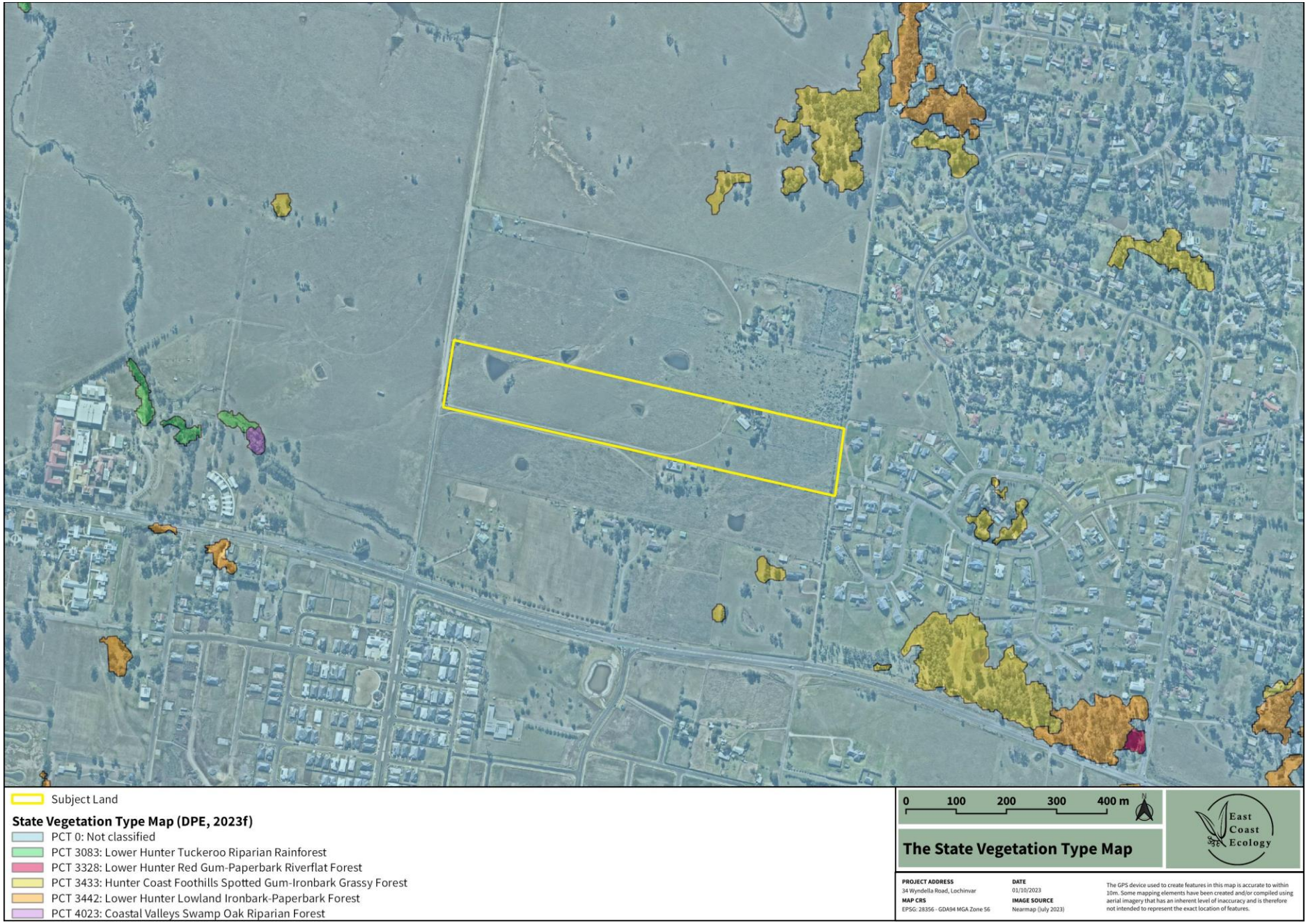

Figure 4. Vegetation Mapping (State Vegetation Type Map) in proximity to the Subject Land.

4.1.2 Field-validated Vegetation

Vegetation within the Subject Land has been assessed as aligning with the BioNet Vegetation Classification PCT identified within **Table 4** and depicted in **Figure 7**. Detailed description of the PCT is provided in the following subsections.

Table 4. PCTs identified within the Subject Land.

PCT ID	PCT Scientific Name	Area within the Subject Land (ha)
3328	Lower Hunter Red Gum-Paperbark Riverflat Forest	9.75
	Total Area	**9.75**

4.1.3 Justification for PCT Selection

PCT selection for native vegetation was undertaken using information and databases provided in the BioNet Vegetation Classification System (DPE, 2023c). The following selection criteria were used in the PCT Filter Tool to develop a PCT shortlist:

- IBRA Bioregion: Sydney Basin
- IBRA Subregion: Hunter
- LGA: Maitland
- Dominant Species: *Eucalyptus botryoides, Grevillea robusta, Callistemon saligna*

This process delivered a selection of one PCT that occur within the Maitland LGA, the Hunter IBRA Subregion (and Sydney Basin Bioregion) and that has the dominant species (**Table 5**). The steps taken to justify the presence/ absence of the candidate PCT within the Subject Land are detailed in **Table 5**.

Table 5. Output from the PCT Filter Tool (DPE, 2023c) and subsequent shortlisting of candidate PCTs.

Plant Community Type (PCT)	Subject Land within known distribution/suitable geology and landscape position
PCT 4028: Estuarine Swamp Oak Twig-rush Forest	No. This PCT is a tall to very tall open forest or woodland featuring *Casuarina glauca* and usually *Baumea juncea* and *Juncus kraussii subsp. australiensis*, occurring on the edges of tidal estuarine flats and tidal creek flats along the NSW coast, usually at elevations of below 10 metres asl.

In addition to the candidate PCT identified through the PCT Filter Tool (DPE, 2023c), all mapped PCTs (DPE, 2023f) occurring within proximity to the Subject Land were assessed for suitability. Of these, none contain the dominant species identified within the Subject Land. Based on the landscape position of the Subject Land, occurring on undulating rises adjoined by four watercourses, ECE have assigned the vegetation to one PCT and one novel community type:

- PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest (**Table 6**), and
- Exotic Vegetation.

Table 6. Criteria of the selected PCT.

Candidate PCT	Characteristics (DPE, 2023c)
PCT3328: Lower Hunter Red Gum-Paperbark Riverflat Forest	**Landscape position/ geology**
	A tall to very tall sclerophyll open forest with a sub-canopy of Melaleuca trees and a grassy ground layer found on low-lying alluvial soils in the lower Hunter Valley. This PCT occurs in drier and warmer environments than coastal river flat eucalypt forests to the east (PCT 4042) which share some structural and species characteristics, however have more mesophyll species because of the higher rainfall. It occurs on creek-lines draining low-elevation Permian sediments, generally at elevations of less than 130 metres asl and is currently restricted to small isolated remnants, or narrow creek flats in larger patches in the Cessnock district. Native vegetation on alluvial soils in the region has been depleted and current remnants are likely to represent a small proportion of the original extent in the wider lower Hunter Valley.
	Characteristic canopy
	The tree canopy very frequently includes a high cover of *Eucalyptus amplifolia* which is rarely replaced by *Eucalyptus tereticornis*. Other rarely occurring eucalypts include *Eucalyptus moluccana*, *Eucalyptus canaliculata* <--> *punctata* or *Eucalyptus siderophloia*.
	Characteristic mid-storey/ shrub
	The mid-stratum is characterised by a sparse to mid-dense cover of mid-high Melaleuca trees, including commonly, *Melaleuca nodosa*, occasionally *Melaleuca linariifolia* and *Melaleuca styphelioides* and rarely *Melaleuca decora*. A lower layer of shrubs very frequently includes *Bursaria spinosa*, commonly *Breynia oblongifolia* or occasionally *Acacia parvipinnula*.
	Characteristic groundcover
	The ground layer has a mid-dense to dense and diverse cover of grasses, forbs, twiners and small ferns. *Cheilanthes sieberi subsp. sieberi* is almost always present, very frequently with *Microlaena stipoides*, *Oxalis perennans*, *Glycine tabacina*, *Themeda triandra* and *Lobelia purpurascens*, commonly with *Aristida ramosa* and *Cymbopogon refractus.*

4.1.4 PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest

One PCT was determined to occur within the Subject Land:

- PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest (**Table 7**)

Table 7. PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest

PCT ID	3328
PCT Name	Lower Hunter Red Gum-Paperbark Riverflat Forest
Vegetation Formation	Grassy Woodlands
Vegetation Class	Coastal Valley Grassy Woodlands
Percent Cleared Value (%)	83.92%
Extent within Subject Land (ha)	9.75

4.1.4.1 Condition States

Native vegetation (PCT 3328) was determined to be represented by two condition classes within the Subject Land:

- Vegetation Zone 1: Canopy
- Vegetation Zone 2: Grassland

Each zone is detailed in **Table 8**, and displayed in **Figure 8**.

Table 8. Native vegetation identified within the Subject Land.

PCT3328: Lower Hunter Red Gum-Paperbark Riverflat Forest		
Vegetation Zone	**Zone 1: Canopy**	**Zone 2: Grassland**
Extent within Subject Land	0.21ha	9.54ha
Field survey effort	One 20m x 50m BAM plot was established. Due to the irregular shape of the vegetation zone, the BAM plot was partially situated outside the Subject Land (**Figure 7**). The location chosen was however indicative of the vegetation community and condition class within the vegetation zone.	Three 20m x 50m BAM plots were established. The locations chosen were indicative of the vegetation community and condition class within the vegetation zone, with the 20m x 20m floristic quadrat centred on the vegetation zone.
Description of vegetation	The vegetation within this zone was characterised by regenerating canopy (*Eucalyptus botryoides* and *Grevillea robusta*), shrub-layer (*Callistemon salignus*). Four High Threat Exotics (HTE) were identified in the ground layer of this zone, including *Senecio madagascariensis, Olea europaea,*	The vegetation within this zone has been historically cleared of canopy and mid-storey, however exhibited a mixed native/ exotic understorey (*Sporobolus creber*, *Asperula conferta*, *Austrostipa spp.*, *Briza minor*, *Eragrostis curvula*, *Axonopus fissifolius*) (**Figure 6**). Numerous HTEs were

PCT3328: Lower Hunter Red Gum-Paperbark Riverflat Forest		
Vegetation Zone	**Zone 1: Canopy**	**Zone 2: Grassland**
	Eragrostis curvula, and *Chloris gayana* (**Figure 5**).	identified in the ground layer of this zone, including *Eragrostis curvula, Cenchrus clandestinus, Axonopus fissifolius, Olea europaea, Pyracantha angustifolia, Paspalum dilatatum, Senecio madagascariensis* etc.
Structure of vegetation	A moderate native canopy cover was evident within the BAM plot, with native trees totalling 35% cover. Native shrub coverage was almost absent at 0.1%. The native ground layer was moderate with 45% grasses. No forbs, ferns or 'other' were identified. A low coverage of leaf litter (8.4%) was present. The BAM plot contained a low diversity of tree stem sizes, with only three tree stem size recorded, and no fallen logs.	No native canopy or shrub species were present within any of the three BAM plots. Native grass cover ranged from 15 - 63%, whereas other groundcovers were almost absent. A low coverage of leaf litter (1-2%) was also apparent. No BAM plots contained tree stems, hollow-bearing trees or fallen logs.
BC Act 2016 Status	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions – endangered ecological community listing (**Section 4.1.5**).	
EPBC Act 1999 Status	Does not meet eligibility criteria (**Section 4.1.6**).	

Figure 5. PCT 3328 – typical condition (Zone 1) within the Subject Land.

Figure 6. PCT 3328 – typical condition (Zone 2) within the Subject Land.

4.1.5 Listing under the *Biodiversity Conservation Act 2016* – Hunter lowland redgum forest in the Sydney Basin and NSW North Coast bioregions - endangered ecological community listing

The NSW Scientific Committee (2011) has determined that the endangered ecological community, Hunter lowland redgum forest in the Sydney Basin and NSW North Coast bioregions, is associated with:

- gentle slopes arising from depressions and drainage flats on permian sediments of the Hunter Valley floor in the Sydney Basin and NSW North Coast Bioregions, and
- an open forest with most common canopy trees species being *Eucalyptus tereticornis* and *Eucalyptus punctata* although other frequently occurring canopy species are *Angophora costata, Corymbia maculata, Eucalyptus crebra* and *Eucalyptus moluccana,* with a number of other eucalypts being less frequently recorded.

Although the vegetation within the Subject Land is likely planted (specifically the canopy), it is the remaining semi-native grasslands that have been determined to loosely conform to the Final Determination (Scientific Committee, 2011). Out of an abundance of caution, the vegetation within the Subject Land has therefore been determined to form a part of the endangered ecological community.

4.1.6 Listing under the *Environmental Protection and Biodiversity Conservation Act 1999* – River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria – critically endangered ecological community

The vegetation within the Subject Land does not conform to the EPBC Act listed Critically Endangered Ecological Community, River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria ecological community. As this community does not occur as a derived grassland (i.e. it must have trees), areas of grassland within the Subject Land do not meet the Key Diagnostic Characteristics for the nationally-listed ecological community. All areas of vegetation within the Subject Land that meet the Key Diagnostic Characteristics (i.e. canopy present) do not meet the minimum patch size (i.e. 0.5ha) for the nationally-listed ecological community (**Table 9**).

Table 9. Condition thresholds for patches of River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (DAWE, 2020).

Patch size thresholds → / Biotic thresholds ↓	**Large patch** Patch size ≥ 2 ha	**Small contiguous[7] patch** Patch size ≥ 0.5 ha within a larger area of native vegetation ≥ 5 ha	**Small patch** Patch size ≥ 0.5 ha
High condition ≥ 80% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness[2] ≥ 10 native species per sample plot AND ≥ 20 large trees[3] per ha	CLASS A1 Large or contiguous patch in high condition		CLASS B1 Small patch in high condition
Good condition with arboreal mammals ≥ 50% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness[2] ≥ 6 native species per sample plot AND At least 10 large trees[3] per ha AND Evidence of 4 or more species of arboreal mammals[4] detected[5] in the patch	CLASS A2 Large or contiguous patch in good condition with arboreal mammals		CLASS B2 Small patch in good condition with arboreal mammals
Good condition ≥ 50% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness[2] ≥ 6 native species per sample plot AND At least 10 large trees[3] per ha	CLASS B3 Large or contiguous patch in good condition		CLASS C1 Small patch in good condition
Moderate condition ≥ 30% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness ≥ 4 native species per sample plot[2]	CLASS C2 Large or contiguous patch in moderate condition		

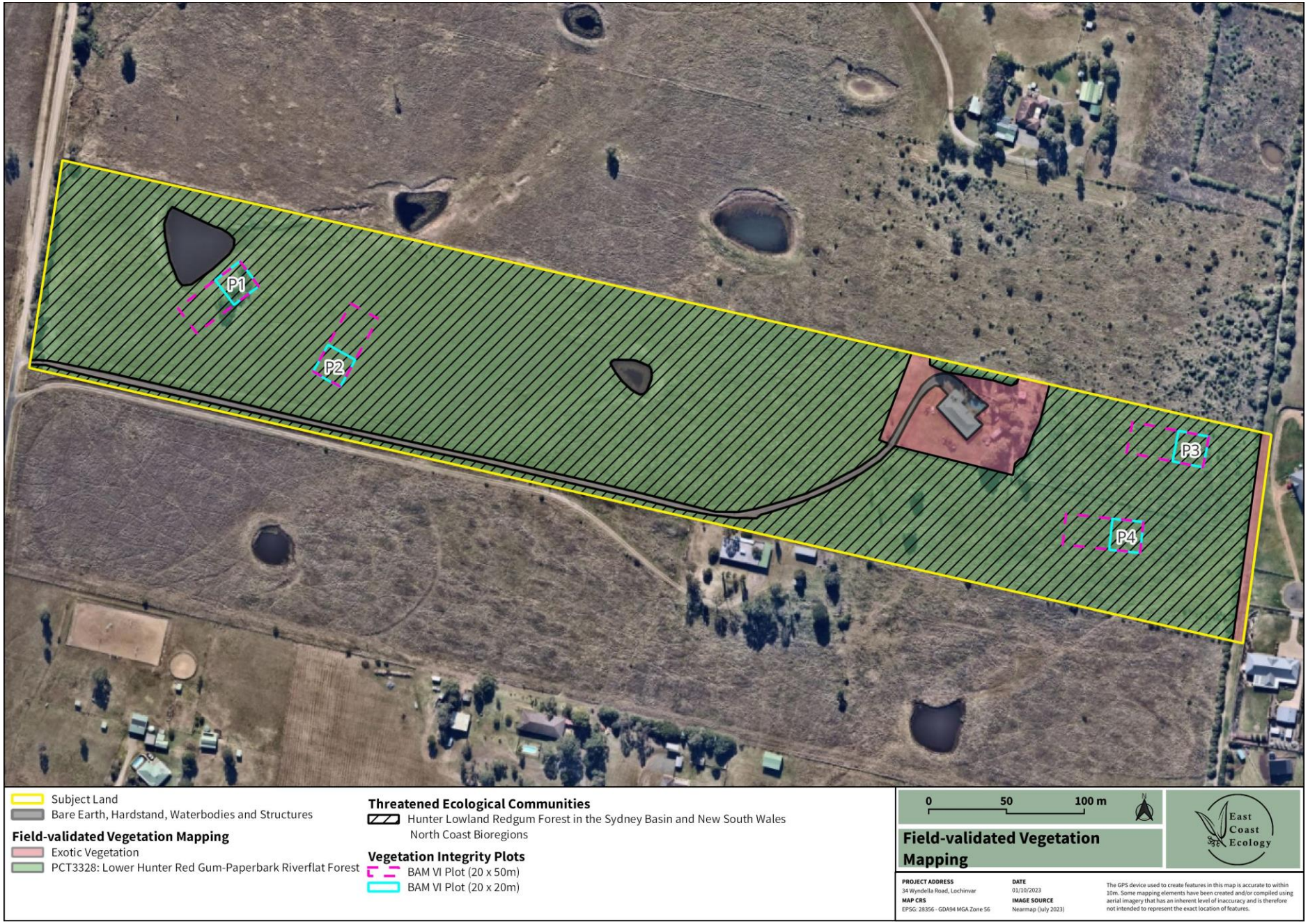

Figure 7. Field-validated vegetation mapping and location of BAM plots within the Subject Land.

4.2 Assessing Patch Size

A patch is defined by the BAM (DPE, 2020a) as an area of native vegetation that occurs on the Subject Land and includes native vegetation that has a gap of less than 100m from the next area of native vegetation (or ≤ 30m for non-woody ecosystems). A patch may extend onto adjoining land. For each vegetation zone, the assessor must determine the patch size in hectares and assign it to one of the following classes:

- <5ha
- 5–<25ha
- 25–<100ha, and
- ≥100ha.

The patch size class is used to assess habitat suitability on the Subject Land for threatened species. The assessor may assign more than one patch size class to the vegetation zone if both of the following apply:

- A vegetation zone comprises two or more discontinuous areas of native vegetation, and
- The areas of discontinuous native vegetation have more than one patch size class.

The patch size class of the vegetation in the Subject Land is shown in **Table 10** below.

Table 10. Patch size classes that the PCT and associated vegetation zone fall into.

Plant Community Type	Category	Vegetation Zone	Patch Size Class	No. of Plots	Plot IDs used in assessment
PCT 3328	Woody Ecosystems	Zone 1: Canopy	<5ha	1	Plot 1
PCT 3328	Non-woody Ecosystems	Zone 2: Grassland	≥100ha	3	Plot 2, 3 and 4

4.3 Vegetation Integrity (Vegetation Condition)

4.3.1 Vegetation Integrity Survey Plots

One and three BAM Vegetation Integrity (VI) plots were established within vegetation zones 1 and 2, respectively. The location chosen was indicative of the vegetation community and condition class within the vegetation zone (**Appendix A**).

4.3.2 Scores

The VI scores of Zone 1 and Zone 2, including composition, structure and function are detailed in **Table 11**.

Table 11. Vegetation integrity scores.

Vegetation Zone ID	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score	Hollow Bearing Trees Present?
Zone 1: Canopy	2.9	70.6	15.2	14.7	No
Zone 2: Grassland	2.4	31.9	0	1.2	No

4.3.3 Use of Benchmark Data

The site value attributes were then assessed against the BAM-C default benchmark data.

4.3.4 Determining Future Vegetation Integrity Scores

Most projects will result in complete clearing of vegetation and threatened species habitat within the development footprint. In this scenario, the assessor must assess the proposed future value of each of the VI attributes as zero in the BAM-C. However, in circumstances where partial clearing of vegetation is proposed and remaining vegetation will be maintained, the assessor may determine that the future value of the relevant VI attributes are greater than zero (DPE, 2020a).

It is expected that the Subject Land will experience complete clearing (i.e. complete removal of native vegetation) and therefore the future VI score was entered as 0. The attributes influencing the vegetation score within the vegetation zone are detailed in **Table 12**.

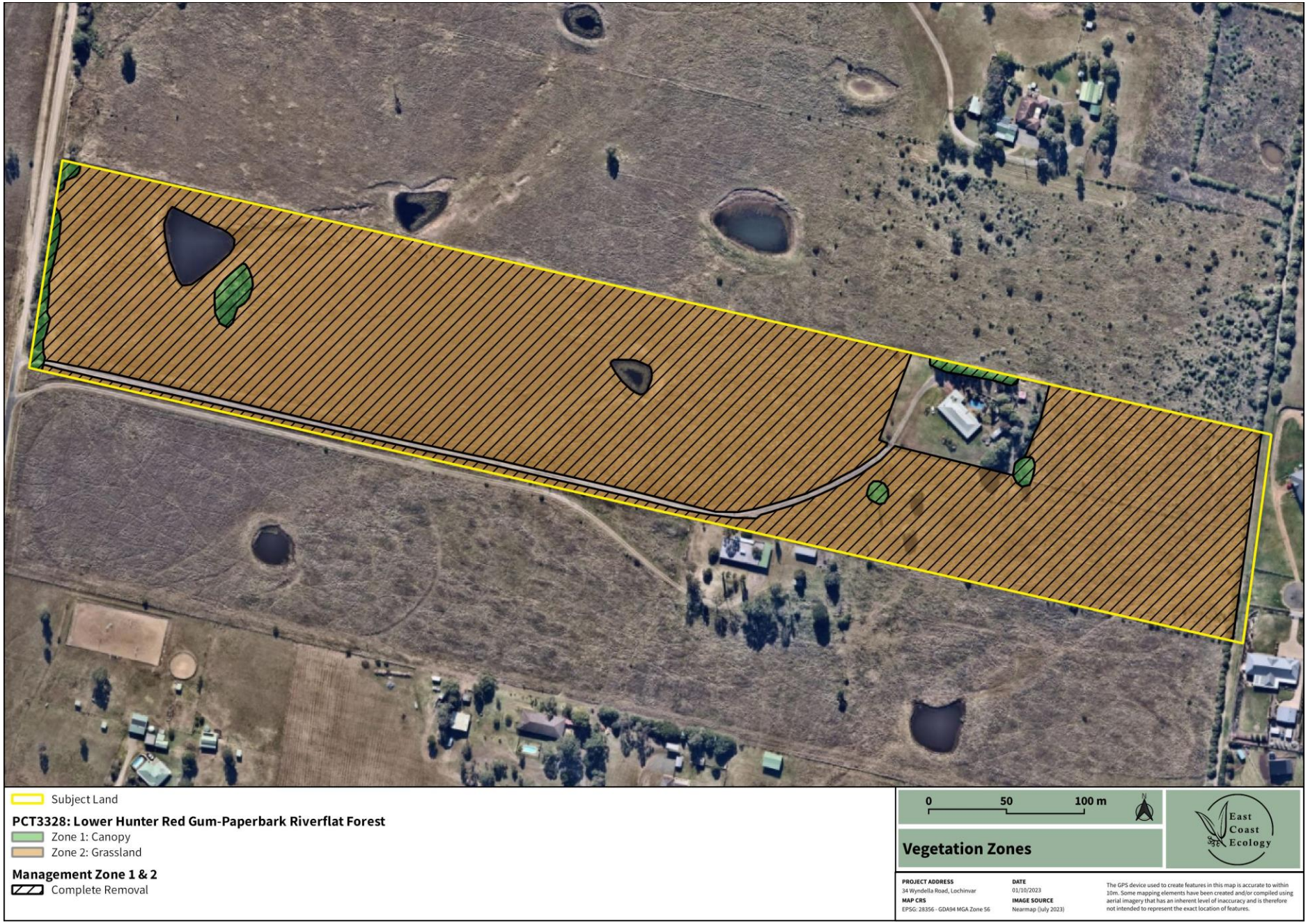

Figure 8. Vegetation Zones within Subject Land.

Table 12. Vegetation integrity scores for each vegetation zone.

Vegetation Zone	Management Zone	Area (ha)	Survey Effort	Composition Condition Score	Structure Condition Score	Function Condition Score	VI Score	Future VI Score	Total VI Loss	Hollow bearing trees
Zone 1: Canopy	MZ1 – Complete removal	0.21	1 x 1000m^2 (20m x 50m) VIS Plot	2.9	70.6	15.2	14.7	0	-14.7	Absent
Zone 2: Grassland	MZ2 – Complete removal	9.54	3 x 1000m^2 (20m x 50m) VIS Plot	2.4	31.9	0	1.2	0	-1.2	Absent

5. HABITAT SUITABILITY FOR THREATENED SPECIES

5.1 Identification of Threatened Species for Assessment

The BAM (DPE, 2020a) is the assessment manual that outlines how an accredited person assesses impacts on biodiversity at development sites. The BAM provides:

- A consistent method for the assessment of biodiversity on a proposed development or major project, or clearing site
- Guidance on how a proponent can avoid and minimise potential biodiversity impacts
- The number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity.

A BDAR identifies how the proponent proposes to avoid and minimise impacts, any potential impact that could be characterised as serious and irreversible (according to specified principles) and the offset obligation required to offset the likely biodiversity impacts of the development or clearing proposal, expressed in biodiversity credits.

5.1.1 Candidate Ecosystem Credit Species

All Ecosystem Credit species associated with the Subject Land were included within the assessment (**Table 13**). No species predicted by the BAM-C as potential Ecosystem Credits were excluded from the assessment.

Table 13. Candidate Ecosystem Credit species predicted to occur within the Subject Land.

Scientific Name (italics) and common name	BC Act Status
Anthochaera phrygia Regent Honeyeater (Foraging)	Critically Endangered
Artamus cyanopterus cyanopterus Dusky Woodswallow	Vulnerable
Callocephalon fimbriatum Gang-gang Cockatoo (Foraging)	Vulnerable
Calyptorhynchus lathami Glossy Black-Cockatoo (Foraging)	Vulnerable
Chthonicola sagittata Speckled Warbler	Vulnerable
Circus assimilis Spotted Harrier	Vulnerable
Climacteris picumnus victoriae Brown Treecreeper (eastern subspecies)	Vulnerable
Daphoenositta chrysoptera Varied Sittella	Vulnerable
Ephippiorhynchus asiaticus Black-necked Stork	Endangered
Falco subniger Black Falcon	Vulnerable
Glossopsitta pusilla Little Lorikeet	Vulnerable

Scientific Name (italics) and common name	BC Act Status
Haliaeetus leucogaster White-bellied Sea-Eagle (Foraging)	Vulnerable
Hieraaetus morphnoides Little Eagle (Foraging)	Vulnerable
Hirundapus caudacutus White-throated Needletail	Not Listed (EPBC Act only)
Lathamus discolor Swift Parrot (Foraging)	Endangered
Lophoictinia isura Square-tailed Kite (Foraging)	Vulnerable
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	Vulnerable
Ninox connivens Barking Owl (Foraging)	Vulnerable
Ninox strenua Powerful Owl (Foraging)	Vulnerable
Pandion cristatus Eastern Osprey (Foraging)	Vulnerable
Petroica boodang Scarlet Robin	Vulnerable

5.2 Candidate Species Credit Species Summary

This section provides a summary of the Candidate Species Credit fauna and flora species for the Subject Land derived from BAMC (DPE, 2023d) (**Table 14**). A summary of the targeted survey effort applied to each species is provided along with the results of the survey effort, specifically whether the species credit needs to be offset through retiring of Biodiversity Offset Credits.

Habitat constraints are essential habitat features that must be present for the species to occupy or periodically use the Subject Land. Habitat constraints include, but are not limited to, caves, rocky areas, hollow bearing trees, swamps (DPE, 2020a). Habitat constraints are determined by the Threatened Biodiversity Database Collection (DPE, 2023b)

Table 14. Candidate Fauna Credit Species predicted to occur within the Subject Land.

Scientific Name (italics) and common name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Anthochaera phrygia Regent Honeyeater (Breeding)	No. Habitat Constraints absent. Habitat Constraint: Important Habitat Map.	No	N/A	Very High	No
Burhinus grallarius Bush Stone-curlew	No. Habitat Constraints absent. Habitat Constraint: Fallen/ standing dead timber including logs	No	N/A	High	No
Callocephalon fimbriatum Gang-gang Cockatoo (Breeding)	No. Habitat Constraints absent. Habitat Constraint: Hollow bearing trees. Eucalypt tree species with hollows at least 3m above the ground and with hollow diameter of 7cm or larger	No	N/A	High	No
Calyptorhynchus lathami Glossy Black-Cockatoo (Breeding)	No. Habitat Constraints absent. Habitat Constraint: Hollow bearing trees. Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground	No	N/A	High	No
Cercartetus nanus Eastern Pygmy-possum	No. Habitat degraded. No suitable habitat for this species occurs, nor are nearby records known, nor is suitable connectivity present that would allow this species to utilise the Subject Land as a	No	N/A	High	No

Scientific Name (italics) and common name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
	wildlife corridor. It was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land in accordance with section 6.4.1.17 of the BAM.				
Chalinolobus dwyeri Large-eared Pied Bat	No. Habitat Constraints absent. There are no rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, old mines or tunnels, within two kilometres of the Subject Land. Habitat Constraint: Cliffs. Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	No	N/A	Very High	No
Diuris tricolor - endangered population Pine Donkey Orchid population in the Muswellbrook local government area	No. Subject Land does not occur within geographic distribution. Geographic Limitation: Muswellbrook LGA	No	N/A	Moderate	No
Dromaius novaehollandiae - endangered population Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	No. Subject Land does not occur within geographic distribution. Geographic Limitation: Port Stephens LGA	No	N/A	Moderate	No
Haliaeetus leucogaster White-bellied Sea-Eagle (Breeding)	Yes. Habitat Constraint: Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Yes	No	High	No
Hieraaetus morphnoides	Yes.	Yes	No	Moderate	No

Scientific Name (italics) and common name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Little Eagle (Breeding)	Habitat Constraint: Nest trees - live (occasionally dead) large old trees within vegetation.				
Lathamus discolour Swift Parrot (Breeding)	No. Habitat Constraints absent. Habitat Constraint: Important Habitat Map.	No	N/A	Moderate	No
Litoria aurea Green and Golden Bell Frog	No. Habitat degraded. The man-made dams within the Subject Land offer aquatic habitat with no emergent vegetation. These waterbodies are used primarily for livestock which significantly lowers the quality of the habitat. It was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land in accordance with section 6.4.1.17 of the BAM. Habitat Constraint: Within 1km of wet areas, swamp or waterbody.	No	N/A	High	No
Litoria brevipalmata Green-thighed Frog	No. Habitat degraded. The man-made dams within the Subject Land offer aquatic habitat with no emergent vegetation. These waterbodies are used primarily for livestock which significantly lowers the quality of the habitat. It was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land in accordance with section 6.4.1.17 of the BAM. Habitat Constraint: Semi-permanent/ephemeral wet areas, Swamps, Waterbodies	No	N/A	Moderate	No
Lophoictinia isura Square-tailed Kite (Breeding)	Yes. Habitat Constraints: Nest trees. Breeding habitat is live large old trees within suitable vegetation.	Yes	No	Moderate	No

Scientific Name (italics) and common name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
Ninox connivens Barking Owl (Breeding)	No. Habitat Constraints absent. The Subject Land contained no hollow-bearing trees. A search for hollow-bearing trees within 100m of the Subject Land (per species polygon) was undertaken, and no 20cm diameter hollows were identified. This is reflective of the young age of the trees in the Subject Land. Habitat Constraints: Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	No	N/A	High	No
Ninox strenua Powerful Owl (Breeding)	No. Habitat Constraints absent. The Subject Land contained no hollow-bearing trees. A search for hollow-bearing trees within 100m of the Subject Land (per species polygon) was undertaken, and no 20cm diameter hollows were identified. This is reflective of the young age of the trees in the Subject Land. Habitat Constraints: Living or dead trees with hollows greater than 20 cm diameter.	No	N/A	High	No
Pandion cristatus Eastern Osprey (Breeding)	Yes. Habitat Constraint: Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting	Yes	No	Moderate	No
Persoonia pauciflora North Rothbury Persoonia	Yes. Note: Although this species has been included (applying precautionary principle), the habitat within the Subject Land is substantially degraded such that the species is unlikely to utilise the Subject Land in accordance with section 6.4.1.17 of the BAM. Geographic Limitation: Within 10km of North Rothbury.	Yes	No	High	No
Petauroides volans Southern Greater Glider	No. Habitat degraded. No suitable habitat for this species occurs, nor are nearby records known, nor is suitable connectivity present that would allow this species to utilise the Subject Land as a wildlife corridor. As the Subject Land and surrounds (100m) do not	No	N/A	High	No

Scientific Name (italics) and common name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
	contain large trees with hollows it was determined that the habitat is substantially degraded such that the species is unlikely to utilise the Subject Land in accordance with section 6.4.1.17 of the BAM.				
Pterostylis chaetophora	Yes. Note: Although this species has been included (applying precautionary principle), the habitat within the Subject Land is substantially degraded such that the species is unlikely to utilise the Subject Land in accordance with section 6.4.1.17 of the BAM.	Yes	No	High	No

5.3 Surveys for Confirmed Species Credit Species and their Habitats

Surveys for Species Credit species and their habitats were undertaken for species considered likely to have suitable habitat within the Subject Land (**Table 14**). These surveys were implemented in accordance with Section 5.3 of the BAM and all relevant DPE threatened species survey guidelines.

5.3.1 Fauna Species Credit Survey

A total of 17 threatened fauna species were identified within the BAM-C (DPE, 2022e) as having the potential to occur within the Subject Land. Targeted fauna surveys were conducted for four of those species within the DPE endorsed survey period (**Table 15**). Four species, Eastern Pygmy-Possum, Green and Golden Bell Frog, Green-thighed Frog and Southern Greater Glider, were excluded from the assessment due to the following:

- After carrying out a field assessment of the habitat constraints and microhabitats on the Subject Land, the assessor determined that the habitat is substantially degraded such that the species are unlikely to utilise the Subject Land (or specific vegetation zones) (as per Section 6.4.1.17 of the BAM; DPE, 2020a).

One species, *Dromaius novaehollandiae* (endangered population), was excluded as the site is located outside the listed geographic limitation (Port Stephens LGA).

Table 15. Species credit fauna species requiring targeted surveys.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
White-bellied Sea-Eagle									✓			
Little Eagle									✓			
Square-tailed Kite									✓			
Eastern Osprey									✓			
Key	✓ = Surveyed						= DPE endorsed survey period					

5.3.1.1 Targeted Fauna Survey Effort

Targeted surveys for five (5) species (**Table 15**) were required to determine their presence or absence. Targeted surveys were undertaken in accordance with the Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft) (DEC 2004).

Table 16. Candidate Species credits predicted to occur within the Subject Land.

Target Species	Survey Technique	Survey Effort and Timing	Target Species Identified?
White-bellied Sea-Eagle	Stick nest search	Thorough searches of potential habitat over the course of two (2) days. All trees were inspected for any evidence of stick nests.	No.
Little Eagle	Stick nest search		No.
Square-tailed Kite	Stick nest search		No.
Eastern Osprey	Stick nest search		No.

5.3.2 Flora Species Credit Survey

Three threatened flora species were identified within the BAM-C (DPE, 2023d) as having the potential to occur within the Subject Land. One species, *Diuris tricolor* (endangered population), was excluded as the site is located outside the listed geographic limitation (Muswellbrook LGA).

A targeted survey was undertaken for two species, *Persoonia pauciflora* and *Pterostylis chaetophora* using parallel field traverses in accordance with the 'Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method' (DPE 2020b; **Table 17**). These species were not detected within the Subject Land during the DPE endorsed survey period.

Table 17. Species credit flora species requiring targeted surveys. Targeted surveys were conducted within endorsed survey periods.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Persoonia pauciflora									✓			
Pterostylis chaetophora									✓			
Key	✓ = Surveyed						= DPE endorsed survey period					

Pre-survey weather conditions (**Table 2**) were generally conducive for identifying threatened species should they occur within the Subject Land. Significant rainfall occurred in the months prior to the initial targeted flora survey that provided ideal conditions for the emergence and/ or flowering of threatened species should they occur within the Subject Land. Such rainfall also allowed for optimal conditions for the emergence of shrubs and groundcovers within the Subject Land, which ensured maximum species diversity was observed during the site visit. These surveys were implemented in accordance with Section 5.3 of the BAM and all relevant DPE threatened species survey guidelines.

5.4 Species Polygons

No species credit species were present within the Subject Land. Therefore, no species polygons were assigned.

6. PRESCRIBED IMPACTS

Certain projects may have impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/ or loss of habitat. For many of these impacts, the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Prescribed biodiversity impacts require an assessment of the impacts of the project on the habitat of threatened species or ecological communities. This is discussed in **Table 18**.

Table 18. Prescribed and uncertain impacts associated with the proposed development.

Will there be impacts on any of the following?	Yes/No	If Yes, Address all of the assessment questions from section 6 of the BAM
Habitat of threatened entities including: ▪ karst, caves, crevices, cliffs, rocks and other geological features of significance, or ▪ human-made structures, or ▪ non-native vegetation	No	There are no karsts, caves, crevices, cliffs and other features of geological significance on or near the Subject Land. A human-made structure in the form of a single pipe-culvert (30cm diameter) was identified in the Subject Land. This culvert was fully inundated (filled with sediment) and on inspection displayed no suitable roosting habitat for threatened species. All other human-made structures (e.g. dwelling) are in use (i.e. not derelict), and are unlikely to provide suitable habitat for threatened microbats. Non-native vegetation was present within the Subject Land in the form of common environmental weeds. No threatened species predicted to occur within the Subject Land are believed to be reliant on this non-native vegetation.
On areas connecting threatened species habitat, such as movement corridors	No	The Subject Land is located within a highly disturbed landscape where the majority of habitats have been cleared. The habitats that do remain are fragmented and highly isolated. Any impacts to this habitat are unlikely to impact the movement of species throughout the broader landscape.

Will there be impacts on any of the following?	Yes/No	If Yes, Address all of the assessment questions from section 6 of the BAM
That affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	No	It is unlikely that changes to water bodies or hydrological processes within the Subject Land will impact threatened species reliant on these processes. No threatened freshwater fish populations are modelled within the Subject Land, nor are any considered likely to occur. The water quality within the farm dams is severely degraded, to the point that they could not sustain threatened amphibians. Emergent vegetation is absent, that might afford habitats to threatened water birds (e.g. Bittern). No mapped Groundwater Dependent Ecosystems occur within the Subject Land (BOM, 2023a).
On threatened and protected animals from turbine strikes from a wind farm	No	No wind farms are associated with the proposed development.
On threatened species or fauna that are part of a TEC from vehicle strikes.	No	The Subject Land has the very low potential to support threatened species. Given the existing land use and the lack of available habitats, it is highly unlikely that risk of vehicle strikes will be increased as a result of the proposed development.

7. AVOID AND MINIMISE IMPACTS

This section demonstrates the efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposed development in accordance with the BAM, including:

- Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology
- Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route
- Alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location
- Alternative sites within a property on which the proposed development is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site
- Efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through Concept design, and
- Other site constraints that the proponent has considered in determining the location and design of the proposed development.

The principal means to reduce impacts on biodiversity values within the development site is to avoid and/ or minimise the removal of native vegetation and fauna habitat. The development has been strategically positioned to minimise impacts on native vegetation and habitat as much as possible. The proponent has selected a property that has been historically cleared of shrub and canopy for the proposed development. This area has been historically, and continues to be, exposed to varying disturbances, including weed invasion and grazing.

8. IMPACT ASSESSMENT

8.1 Direct Impacts

8.1.1 Native Vegetation Clearing

The proposed development will require the removal of approximately 9.75ha of degraded PCT 3328 to accommodate the proposed development. This vegetation is in poor condition, fragmented, and located within a disturbed landscape that makes potential use by threatened species highly unlikely.

8.2 Prescribed Impacts

There will be no prescribed impacts on threatened entities associated with the proposed development. Consideration of prescribed impacts resulting from the proposed development are discussed in **Section 6.1**.

8.3 Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the Subject Land. Indirect impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat. The indirect impacts relevant to the proposed development are outlined in **Table 19.**

Table 19. Indirect impacts associated with the proposed development.

Potential Indirect Impact	Nature, extent and duration
Inadvertent impacts on adjacent habitat or vegetation	Impacts to adjacent vegetation can be prevented or minimised through appropriate exclusion fencing, implementation of a site-specific Construction Environmental Management Plan detailing best practice environmental protection measures, strict water quality practices and stormwater controls, and by ensuring any lighting is directed towards the developed area, rather than towards the adjacent vegetation.
Reduced viability of adjacent habitat due to edge effects	Adjacent habitats are currently subject to a high degree of edge effects due to prior clearing and surrounding existing rural land use. Woody weeds, particularly *Olea europaea* and *Pyracantha angustifolia* are already prolific within the Subject Land, and the surrounding properties. The existing land use (grazing) has resulted in a severely degraded and compacted groundcover that is not likely to recover without significant intervention. Although neighbouring properties were not accessed, they appeared to be in the same or similar degraded condition. Subject to appropriate controls, downstream impacts (sedimentation, or spread of weeds can be prevented during flooding events. It is noted that the watercourse was discontinuous (i.e. dammed) at the time of survey. Edge effects to adjacent habitats are unlikely to be exacerbated by the proposed development.

Potential Indirect Impact	Nature, extent and duration
Reduced viability of adjacent habitat due to noise, dust or light spill	It is predicted that adjacent habitat outside the Subject Land is likely to experience a negligible increase to indirect impacts created by noise, dust and light spill, during construction and operation of the future development of the Subject Land. Site lighting will be designed to minimise glare and light spillage into adjoining properties and vegetation and be consistent with the requirements of Australian Standards and Guidelines 4282-2019 Control of the obtrusive effects of outdoor lighting. Additional control measures can be installed to minimise glare and light spillage into adjoining vegetation to minimise potential impacts to fauna species and lighting can be installed in a direction oriented away from sensitive habitats, such as the road reserve. These indirect impacts will be managed via best practices outlined in an approved Construction Environmental Management Plan. These impacts are not likely to substantially increase due to the proposed future development. Any potential impacts are not considered significant as it is highly unlikely that species abundance would be diminished.
Transport of weeds and pathogens from the site to adjacent vegetation	Weeds occurring within the Subject Land are common with those occurring within adjacent vegetation to be retained. Increased transport of pathogens and weeds is unlikely to occur, however this would be managed by biosecurity measures outlined in the Construction Environmental Management Plan.
Increased risk of starvation, exposure and loss of shade or shelter	It is highly unlikely that any threatened fauna would be exposed to increased risks from starvation, exposure, and loss of shade and shelter beyond the Subject Land as a result of the proposed development. No habitat is to be removed beyond the Subject Land, although disturbances from noise during construction and utilisation may deem such habitats unsuitable for certain species. However, due to the relatively urbanised nature of the vegetation adjacent to the Subject Land, it is unlikely that this impact will be significant.
Loss of breeding habitats	No breeding habitat features (e.g., hollows, nests, caves) were identified immediately adjacent to the Subject Land. It is therefore considered unlikely that the proposed development would result in a loss of breeding habitats. Aquatic habitats are unlikely to offer suitable breeding habitat for amphibians given their ongoing use for livestock, which has degraded the habitat to poor quality, particularly for sensitive species.
Trampling of threatened flora species	No impacts to threatened flora as a result of trampling are expected as a result of the proposed development. No threatened flora have been identified within the Subject Land, nor is suitable habitat considered to exist.
Increase in predatory species populations	It is likely that predatory species, such as foxes and cats, already inhabit areas surrounding the Subject Land. The vegetation clearance proposed by the development, and proposed land use, is unlikely to increase predatory species populations.

Potential Indirect Impact	Nature, extent and duration
Increase in pest animal populations	The Subject Land occurs in a peri-urban landscape with impacts including introduced domestic pets such as cats *Felis catus* currently occurring within the locality. Pest animals such as Black Rats *Rattus rattus* are also widely spread within the region and are likely to occur across the locality. The proposed development would not result in an increase in available habitat for these species and is unlikely to lead to an increase in pest animal populations. Suitable waste disposal implemented during and post construction would further reduce the resources available for pest species.
Disturbance to specialist breeding and foraging habitat, e.g., beach nesting for shorebirds.	No specialist breeding and foraging habitat was identified adjacent to the Subject Land. It is therefore not expected that the proposed development will disturb any specialist breeding and foraging habitat.

8.4 Key Threatening Processes

There are currently 39 Key Threatening Processes (KTPs) listed under the BC Act, 21 KTPs under the EPBC Act, and eight listed under the FM Act. Several KTPS are listed under more than one Act. KTPs relevant to the proposed development are discussed in **Table 20**. Mitigation measures to limit the impacts of these KTPs are detailed in **Section 8.7**.

Table 20. Key Threatening Processes relevant to the proposed development.

Key Threatening Process	Status	Potential Impacts from the Proposed Development
Native Vegetation and Terrestrial Habitat Impacts		
Land clearance/ Clearing of native vegetation	EPBC Act BC Act	Clearing of native vegetation would occur as a result of the proposed development. A total of 9.75ha of native vegetation is proposed to be cleared across one PCT (PCT 3328).
Biosecurity Impacts		
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	EPBC Act BC Act	Construction work has the potential to introduce amphibian chytrid to the Subject Land, which could lead to death of non-threatened frogs and tadpoles. Habitat for threatened frogs is considered to be absent within the Subject Land.
Aquatic Impacts		
Degradation of native riparian vegetation along New South Wales water courses	FM Act	The native riparian vegetation within and adjacent to the Subject Land is already severely degraded but the proposed development may lead to an increase in this KTP.

8.6 Impacts to Groundwater Dependent Ecosystems (GDE)

Assessment of the potential for the Subject Land to support groundwater dependent ecosystems was carried out using the Commonwealth's Bureau of Meteorology Groundwater Dependent Ecosystems Atlas (BOM, 2023a). No vegetation within or directly adjoining the Subject Land has been mapped as a Groundwater Dependent Ecosystem.

8.7 Mitigating Residual Impacts – Management Measures and Implementation

This section details the measures to be implemented before, during and post construction to avoid and minimise the impacts of the proposed development(**Table 21**).

Table 21. Recommended measures to be implemented before, during and after construction to avoid and minimise the impacts of the proposed development.

Measure	Action	Outcome	Timing	Responsibility
FF1	**Preparation of a Construction Environmental Management Plan (CEMP)**	A CEMP will be required for the construction phase of the project, and will be prepared prior to issue of the Construction Certificate. The CEMP would include, as a minimum, industry-standard measures for the management of soil, surface water, weeds, pathogens and pollutants, as well as site-specific measures, including the procedures outlined below. The proposed mitigation measures would include environmental safeguards for protection of neighbouring properties in accordance with relevant policy documentation and Government guidelines. In order to address the potential impacts of the proposal on biodiversity, the mitigation and management measures outlined within this table would be implemented as part of the CEMP. The CEMP would contain an adaptive management component. Adaptive management strategies would be receptive to any new and relevant data that may arise through ongoing assessment and monitoring and are key to the successful implementation of crucial objectives yet also allow flexibility to changing dynamics and ongoing feedback and results.	Pre-construction phase	Proponent
FF2	**Fauna management**	Prior to works, the applicant should commission the services of a qualified and experienced Ecologist (minimum 5 years' experience). The Ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act. The Ecologist will be commissioned to: ▪ Undertake an extensive pre-clearing survey, delineating habitat trees and trees to be retained/ removed ▪ Supervise the clearance of trees and shrubs (native and exotic) in order to capture, treat and/ or relocate any displaced fauna.	Pre-construction phase	Proponent

Measure	Action	Outcome	Timing	Responsibility
FF3	**Vegetation clearing**	Tree protection fencing should consist of temporary chain wire panels 1.8m in height, supported by steel stakes fastened together and supported to prevent sideways movement using corner braces. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together, a single fence encompassing the area is deemed to be adequate. Existing site boundary fences may form part of the enclosure.	Pre-construction phase, construction phase	Proponent
FF4	**Erosion and Sedimentation**	Appropriate erosion and sediment control must be erected and maintained at all times prior to, and during construction in order to avoid the potential of incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom, 2004).	Pre-construction phase, construction phase	Proponent
FF6	**Storage and Stockpiling (Soil and Materials)**	Allocate all storage, stockpile and laydown sites away from any native vegetation that is planned to be retained. Avoid importing any soil from outside the site as this can introduce weeds and pathogens to the site in order to avoid the potential of incurring indirect impacts on biodiversity values.	Construction phase	Proponent
FF7	**Stormwater management**	Potential impacts relating to stormwater and runoff will be managed during construction and operation phases. The CEMP will guide stormwater management during the construction phase of development.	Construction, Post-construction phase	Proponent

9. SERIOUS AND IRREVERSIBLE IMPACTS

9.1 Assessment for Serious and Irreversible Impacts (SAII's) of Biodiversity Values

No entities at risk of SAII were identified within the Subject Land and none are likely to be impacted by the proposed development.

10. IMPACT SUMMARY

10.1 Determine an Offset Requirement for Impacts

The preferred approach to offset the residual impacts of the proposal is to purchase and retire the appropriate species credits from registered Biodiversity Stewardship Sites that comply with the trading rules of the NSW BOS in accordance with the 'like for like' report generated by the BAM-C. If such credits are unavailable, credits would be sourced in accordance with the 'variation report' generated by the BAM-C.

A payment to the Biodiversity Conservation Trust (BCT) would be considered as a contingency option if a suitable number and type of biodiversity credits cannot be secured.

10.1.1 Offset Requirement for Ecosystem Credits

The assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

a) ≥15, where the PCT is representative of an EEC or a CEEC
b) ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community
c) ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

As the vegetation integrity (VI) score for Vegetation Zone 1: Canopy is below 15 (VI = 14.7) and Vegetation Zone 2: Grassland is below 15 (VI = 1.2) no Ecosystem Credits are required to offset the biodiversity impacts associated with either zone (**Figure 9**). The purchase and retirement of Biodiversity Offset Credits will not be required for Exotic Vegetation.

The offset requirement for impacts to native vegetation from the proposed development was calculated using the BAM Calculator and is summarised below in **Table 22** (and refer to credit report in **Appendix B**).

Table 22. Ecosystem credits required to offset the proposed development.

PCT	Vegetation Zone	Vegetation Integrity Score Loss	Area (ha)	Credit Requirement
PCT 3328: Lower Hunter Red Gum-Paperbark Riverflat Forest	Zone 1: Canopy	14.7	0.21	0
	Zone 2: Grassland	1.2	9.54	0

10.1.2 Offset Requirement for Species Credits

No candidate species credit species will require offsetting through the retiring of biodiversity offset species credits under the BOS as a result of the proposed development. This is due to all other candidate species credit species being excluded from occurring on the Subject Land based on available habitat constraints or the habitat being substantially degraded such that the species is unlikely to utilise the Subject Land in accordance with section 6.4.1.17 of the BAM.

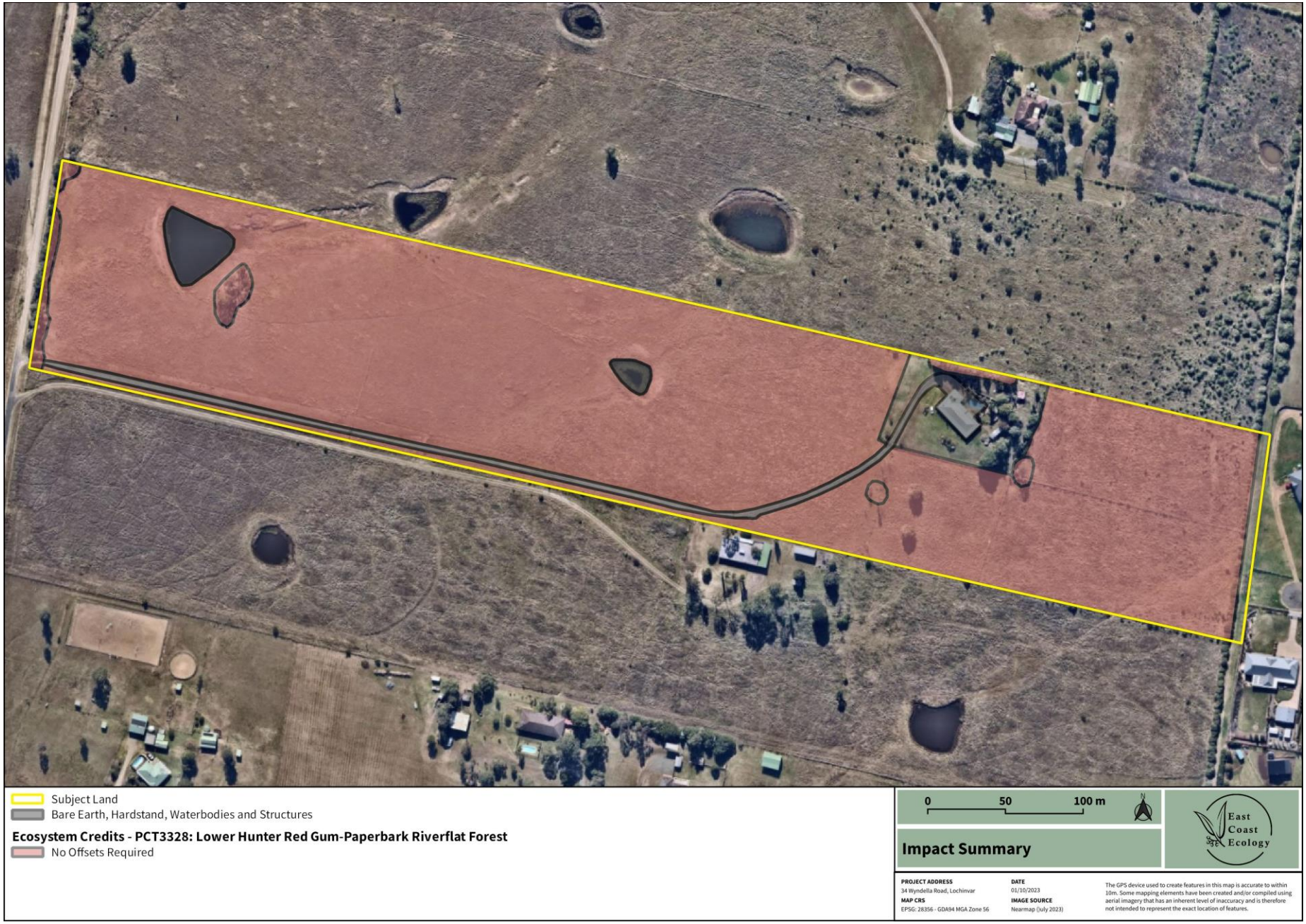

Figure 9. Impacts on native vegetation.

11. LEGISLATION AND POLICY

11.1 *Biodiversity Conservation Act 2016*

The purpose of the *Biodiversity Conservation Act 2016* (NSW) (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development.

The BC Act seeks to establish a framework for assessment and offsetting of development impacts as well as investment in biodiversity conservation, specifically:

- The NSW Biodiversity Offsets Scheme, established under Part 6 of the BC Act
- The BAM, established under Section 6.7 of the BC Act. The purpose of the BAM is to assess certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values, where required under the BC Act.

This report has been prepared to address all requirements set out under the BAM (DPE, 2020a).

11.2 *Environment Protection and Biodiversity Conservation Act 1999*

Under the EPBC Act, a proponent must not take an action if that action will have, or is likely to have, a significant impact on matters protected under the EPBC Act, referred to as Matters of National Environmental Significance (MNES). The EPBC Act identifies eight MNES:

1. World Heritage properties
2. National Heritage places
3. Wetlands of international importance (those listed under the Ramsar Convention)
4. Listed threatened species and communities
5. Migratory species listed under international agreements
6. Great Barrier Reef Marine Park
7. Commonwealth marine areas
8. Nuclear actions

The Protected Matters Search Tool (**Appendix C**) identified the following as potentially occurring within the Subject Land (or within the area):

- 9 Threatened Ecological Communities
- 47 threatened species
- 16 Migratory species

No MNES were identified within the Subject Land. MNES relevant to the proposed development are summarised in **Table 23**.

Table 23. EPBC Act Assessment of Significant Impact.

MNES	Proposed Development Specifics	Impact
Threatened species	No EPBC Act listed threatened species have the potential to be	No significant impact likely.

MNES	Proposed Development Specifics	Impact
	impacted by the proposed development.	
Threatened ecological communities	The PCT within the Subject Land does not meet the eligibility criteria for the EPBC Act listed TEC (**Section 4.1.6**).	No significant impact likely.
Migratory species	Based on the results of the Protected Matters Search Tool (**Appendix D**), 16 listed migratory species may occur in the broader locality. Migratory species are unlikely to occur within the Subject Land given the location in the landscape and historical land use.	Some EPBC Act listed threatened and migratory wader birds including the Curlew Sandpiper, Great Knot, Red Knot, Eastern Curlew, Greater Sand Plover, Lesser Sand Plover, Bar-tailed Godwit and Black-tailed Godwit may occur in the proximal riparian habitats associated with the Lochinvar Creek. The habitats in the Subject Land are not important habitats for migratory birds. The proposed development would not substantially modify, destroy or isolate an area of important habitat for the migratory species, and it would not seriously disrupt the lifecycle of an ecologically significant proportion of a population of migratory birds.
National Heritage Places	The Subject Land does not contain any National Heritage Places.	No significant impact likely.
Wetlands of international importance (Ramsar sites)	The Subject Land does not contain any wetlands of international or national importance.	No significant impact likely.

11.3 Fisheries Management Act 1994

11.3.1 Key Fish Habitat

Key Fish Habitat (KFH) was defined to include all marine and estuarine habitats up to highest astronomical tide level (that are reached by 'king' tides) and most permanent and semi-permanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank. Small headwater creeks and gullies (known as first and second order streams), that only flow for a short period after rain are generally excluded, as are farm dams constructed on such systems. Wholly artificial waterbodies such as irrigation channels, urban drains and ponds, salt and evaporation ponds are also excluded except where they are known to support populations of threatened fish or invertebrates (Policy Definition, Department of Primary Industries). Key fish habitat mapping has been prepared by Fisheries Ecosystems Branch of NSW DPI for local government areas (LGAs) across NSW. Two unnamed waterbodies in the west and centre of the Subject Land are mapped as KFH under the NSW DPI Key Fish Habitat mapping for the Central Rivers (DPI, 2023b) (**Figure 12**).

11.3.2 Key Fish Habitat Classification Scheme

The functionality of a watercourse as fish habitat is defined by DPI (2013) to assess impacts of activities on fish habitat, in conjunction with habitat sensitivity (**Table 25**), and to make management recommendations to minimise the impact of developments. Waterways classified under NSW DPI (DPI, 2013) are designated a Class (1 – 4), per the characteristics detailed in **Table 24**.

Table 24. Key Fish Habitat Classification Characteristics

Classification	Characteristics of waterway class
CLASS 1 Major key fish habitat	Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (e.g. river or major creek), habitat of a threatened or protected fish species or 'critical habitat'.
CLASS 2 Moderate key fish habitat	Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats (see **Table 25**) present.
CLASS 3 Minimal key fish habitat	Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (e.g. fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other CLASS 1-3 fish habitats.
CLASS 4 Unlikely key fish habitat	Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free-standing water or pools post rain events (e.g. dry gullies or shallow floodplain depressions with no aquatic flora present).

11.3.3 Key Fish Habitat Sensitivity

For the purposes of the application of the FM Act, NSW DPI has developed a classification scheme for the sensitivity of KFH, to define the importance of habitat for the survival of fish and the ability of the habitat to withstand disturbance (**Table 25**).

Table 25. Key fish habitat and associated sensitivity classification scheme (for assessing potential impacts of certain activities and developments on key fish habitat types).

TYPE 1 – Highly sensitive key fish habitat	TYPE 2 – Moderately sensitive key fish habitat
▪ *Posidonia australis* (Strapweed) ▪ *Zostera, Heterozostera, Halophila* and *Ruppia* species of seagrass beds >5m^2 in area ▪ Coastal saltmarsh >5m^2 in area ▪ Coral communities ▪ Coastal lakes and lagoons that have a natural opening and closing regime (i.e. are not permanently open or artificially opened or are subject to one off unauthorised openings) ▪ Marine park, an aquatic reserve or intertidal protected area ▪ SEPP 14 coastal wetlands, wetlands recognised under international agreements (e.g. Ramsar, JAMBA, CAMBA, ROKAMBA wetlands), wetlands listed in the Directory of Important Wetlands of Australia2 ▪ Freshwater habitats that contain in-stream gravel beds, rocks greater than 500mm in two dimensions, snags greater than 300mm in diameter or 3m in length, or native aquatic plants ▪ Any known or expected protected or threatened species habitat or area of declared 'critical habitat' under the FM Act, and ▪ Mound springs.	▪ *Zostera, Heterozostera, Halophila* and *Ruppia* species of seagrass beds <5m^2 in area ▪ Mangroves ▪ Coastal saltmarsh <5m^2 in area ▪ Marine macroalgae such as *Ecklonia* and *Sargassum* species ▪ Estuarine and marine rocky reefs ▪ Coastal lakes and lagoons that are permanently open or subject to artificial opening via agreed management arrangements (e.g. managed in line with an entrance management plan) ▪ Aquatic habitat within 100m of a marine park, an aquatic reserve or intertidal protected area ▪ Stable intertidal sand/mud flats, coastal and estuarine sandy beaches with large populations of in-fauna ▪ Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in TYPE 1, and ▪ Weir pools and dams up to full supply.
	TYPE 3 – Minimally sensitive key fish habitat
	▪ Unstable or unvegetated sand or mud substrate, coastal and estuarine sandy beaches with minimal or no in-fauna ▪ Coastal and freshwater habitats not included in TYPES 1 or 2, and ▪ Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation.

11.3.4 Unnamed Waterbodies Classification

The contours of the unnamed waterbodies in that bifurcate the Subject Land no have a clearly defined channel (due to human intervention) (**Figure 12**). The existing waterbodies (farm dams) have been constructed as a water source for livestock.

As each waterbody is a first-order 'stream', and contains minimal instream habitat (**Figure 10** and **Figure 11**), it is not considered Key Fish Habitat in accordance with the *Policy and guidelines for fish habitat conservation and management – Updated 2013* (DPI, 2013) and is classified as Class 3 (minimal key fish habitat). No threatened species listed under the *Fisheries Management Act 1994* have potential habitat within the either of the two unnamed dams, or within the mapped ephemeral watercourses.

Figure 10. Western dam within the Subject Land (looking southeast).

Figure 11. Central dam within the Subject Land (looking southeast).

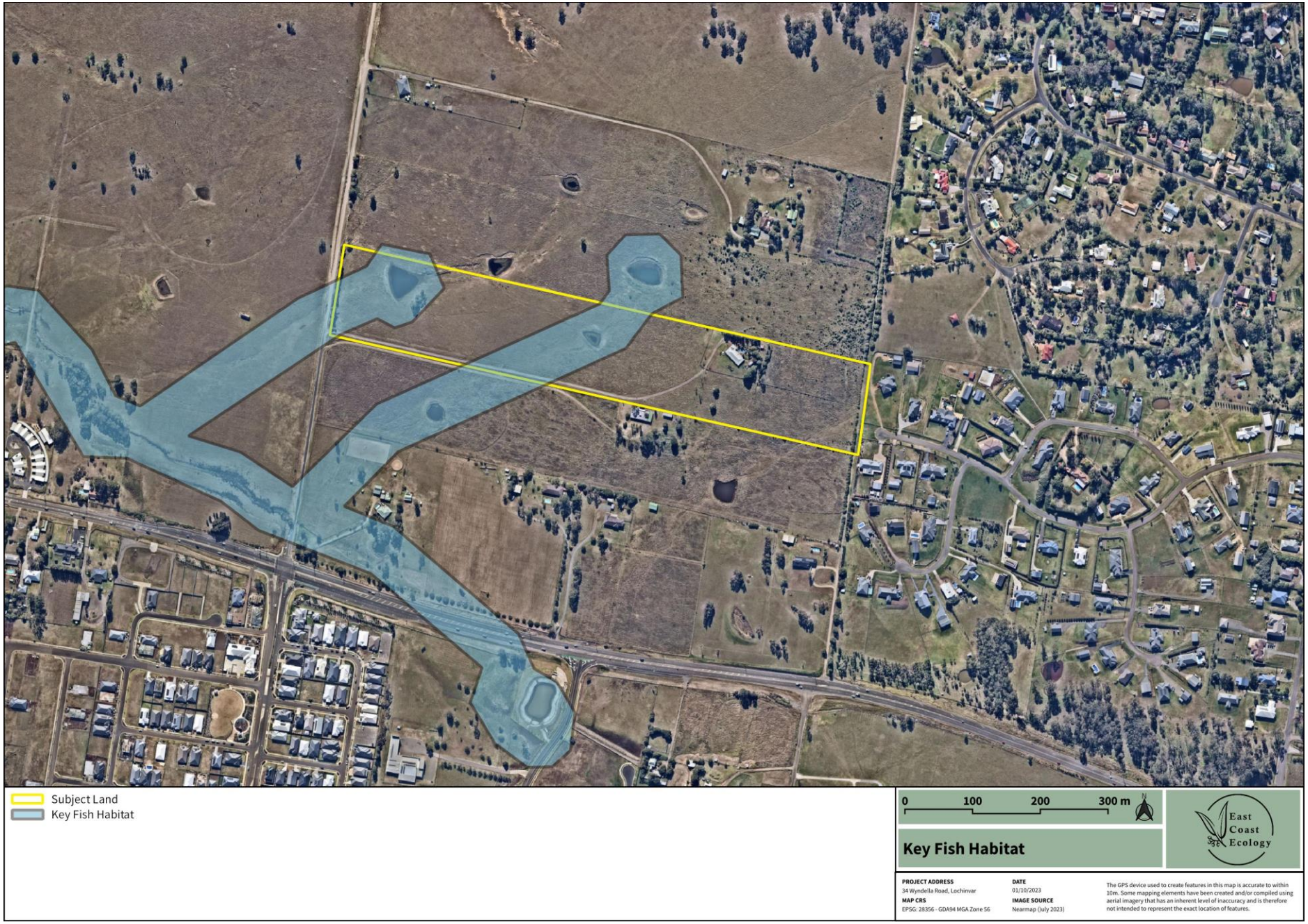

Figure 12. Key Fish Habitat Map.

11.4 Biosecurity Act 2015

The *Biosecurity Act 2015* (NSW) provides a framework for the prevention, elimination and minimisation of biosecurity risks posed by an activity as a matter of biosecurity. As defined in Part 3, section 23 of the Act, any non-conformance by an individual is defined as guilty of an offence.

Four priority weeds for the Hunter region (DPI, 2023c) were identified within the Subject Land:

- *Lycium ferocissimum* (African Boxthorn)
- *Olea europaea subsp. cuspidata* (African Olive)
- *Eragrostis curvula* (African Lovegrass), and
- *Senecio madagascariensis* (Fireweed)

Priority weeds must be managed in accordance with the *Biosecurity Act 2015* (NSW).

11.5 State Environmental Planning Policy (Biodiversity and Conservation) 2020 – Chapter 3 Koala Habitat Protection 2020

This Chapter aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. This chapter of the SEPP applies to LGAs that are listed in Schedule 1 of State Environmental Planning Policy (Koala Habitat Protection) 2021, but not if the local government area is marked with an * in that Schedule—

(a) Zone RU1 Primary Production

(b) Zone RU2 Rural Landscape, and

(c) Zone RU3 Forestry.

As the Maitland LGA is included in Schedule 1, this SEPP applies to the proposed development. The City of Maitland LGA forms part of the Central Cost Koala Management Area. As such, the development control provisions of the SEPP apply if the land:

(a) has an area of at least 1 hectare (including adjoining land within the same ownership), and

(b) does not have an approved koala plan of management applying to the land.

The Subject Land does not include *core koala habitat* on the basis that:

- No Koalas, or evidence of past Koala use was identified during targeted surveys, or recorded during previous applications/surveys
- No records within the past 18-years of Koalas occur within 5km of the Subject Land, and
- The Subject Land contains no koala use trees (per Schedule 1 of the SEPP).

It was therefore determined that the land does not contain potential or core koala habitat, and no further assessment under the SEPP (i.e. Koala Assessment Report) is required.

11.6 State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021: Chapter 2 – Coastal Management applies to land within the coastal zone. The coastal zone means the area of land comprised of the following coastal management areas:

- The coastal wetlands and littoral rainforests area;
- The coastal vulnerability area;
- The coastal environment area; or
- The coastal use area.

As the Subject Land does not occur within any of these listed areas, this SEPP does not apply.

12. REFERENCES

Australian Standard 4970 (2009) Protection of Trees on Development Sites

Biodiversity Conservation Act (2016) https://legislation.nsw.gov.au/#/view/act/2016/63/full

Biodiversity Conservation Regulation (2017)
https://www.legislation.nsw.gov.au/#/view/regulation/2017/432

Bureau of Meteorology (BOM) (2023a). Groundwater Dependent Ecosystem GDE Atlas Home: Water Information: Bureau of Meteorology. Bureau of Meteorology: Climate Data Online.
http://www.bom.gov.au/water/groundwater/gde/

Bureau of Meteorology (BOM) (2023b) Maitland Airport, New South Wales. August/September 2023 Daily Weather Observations http://www.bom.gov.au/

Department of Agriculture, Water and the Environment (DAWE) (2020) Conservation advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

Department of Climate Change Energy the Environment and Water (DCCEEW) (2013). Matters of National Environmental Significance, Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999. Australian Government Department of the Environment, Commonwealth of Australia, Canberra. Australian Government Department of the Environment. Canberra, Australian Capital Territory

Department of Climate Change Energy the Environment and Water (DCCEEW) (2023) Protected Matters Search Tool

Department of Environmental Conservation (DEC) (2004a) Australian River Assessment System (AUSRIVAS) Sampling and Processing Manual

Department of Environmental Conservation (DEC) (2004b) Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft)

Department of the Environment and Energy (2018) Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions)

Department of Planning and Environment (DPE) (2020a) Biodiversity Assessment Method

Department of Planning and Environment (DPE) (2020b) Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method

Department of Planning and Environment (DPE) (2023a) BioNet. The website of the Atlas of NSW Wildlife http://www.bionet.nsw.gov.au/

Department of Planning and Environment (DPE) (2023b) BioNet. Threatened Biodiversity Data Collection

Department of Planning and Environment (DPE) (2023c) BioNet. Vegetation Classification System

Department of Planning and Environment (DPE) (2023d) Biodiversity Assessment Method Calculator Version 1.4.0.00

Department of Planning and Environment (DPE) (2023e) Soil Landscapes http://espade.environment.nsw.gov.au

Department of Planning and Environment (DPE) (2023f) The NSW State Vegetation Type Map

Department of Planning and Environment (DPE) (2023g) Biodiversity Values Mapping

Department of Primary Industries (DPI) (2012) Risk assessment guidelines for groundwater dependent ecosystems. New South Wales Government Department of Primary Industries.

Department of Primary Industries (DPI) (2013) Policy and guidelines for fish habitat conservation and management.

Department of Primary Industries (DPI) (2016) Fish Communities and Threatened Species Distributions of NSW

Department of Primary Industries (DPI) (2023a) Freshwater Threatened Species Distributions Maps

Department of Primary Industries (DPI) (2023b) Key Fish Habitat Maps – Central Rivers

Department of Primary Industries (DPI) (2023c) Priority weeds for the Hunter Region https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=87

Department of Planning, Industry and Environment (DPIE) (2019) Guidance to assist a decision-maker to determine a serious and irreversible impact https://www.environment.nsw.gov.au/-media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/guidance-decision-makers-determine-serious-irreversible-impact-190511.pdf

Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage

Landcom (2004) Managing Urban Stormwater: Soils and Construction 'The Blue Book', Volume 1, Fourth Edition, New South Wales Government, ISBN 0-9752030-3-7

Mitchell (2002) NSW Ecosystems Study: Background and Methodology (Unpublished)

NSW Spatial Services (2023) Six Maps Clip & Ship https://maps.six.nsw.gov.au/clipnship.html

PlantNET (2023) The NSW Plant Information Network System, Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au

Robinson (2003) Field Guide to the Native Plants of Sydney, Third Edition, Kangaroo Press

Scientific Committee (2011) Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions - Determination to make a minor amendment to Part 3 of Schedule 1 of the Threatened Species Conservation Act

13. APPENDICES

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

Appendix B. BAMC Generated Biodiversity Credit Report.

Appendix C. BAM Candidate Species Report.

Appendix D. Protected Matters Search Tool results (September 2023).

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

BAM Site – Field Survey Form					
Date:	7/09/2023	**Plot ID:**	Plot 1	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20x50m	**Easting:**	356225.24 m E
Datum:	GDA 94	**Middle bearing from 0m:**	233°	**Northing:**	6381251.45 m S
PCT:	PCT3328: Lower Hunter Red Gum-Paperbark Riverflat Forest				

Growth Form	Scientific Name	Cover	Abundance
Tree (TG)	*Eucalyptus botryoides*	35	10
Shrub (SG)	*Melaleuca spp.*	0.1	3
Grass & grasslike (GG)	*Sporobolus creber*	35	2000
Grass & grasslike (GG)	*Cynodon dactylon*	10	600
HTE	*Senecio madagascariensis*	0.1	4
HTE	*Olea europaea*	0.1	1
HTE	*Eragrostis curvula*	40	6000
HTE	*Chloris gayana*	0.2	60
Exotic	*Hypochaeris radicata*	0.1	20
Exotic	*Sida rhombifolia*	0.1	10
Exotic	*Verbena bonariensis*	0.3	30
Exotic	*Erigeron bonariensis*	0.1	10
Exotic	*Anagallis arvensis*	0.1	30
Exotic	*Plantago lanceolata*	0.1	15
Exotic	*Rumex crispus*	0.1	2

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	0
30-49cm	Present	0
20-29cm	Present	0
10-19cm	Present	0
5-9cm	Absent	0
<5cm	Absent	0

Length of Logs (m)	0

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	15
2 (15m)	10
3 (25m)	15

4 (35m)	1
5 (45m)	1
Average	8.4

Growth Form	Composition Data (Count of Native Cover)	Structure Data (Sum of Cover)
Tree	1	35
Shrub	1	0.1
Grass	2	45
Forb	0	0
Fern	0	0
Other	0	0
High Threat Exotics	4	40.4

BAM Site – Field Survey Form					
Date:	7/09/2023	**Plot ID:**	Plot 2	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20x50m	**Easting:**	356274.66 m E
Datum:	GDA 94	**Middle bearing from 0m:**	29°	**Northing:**	6381183.59 m S
PCT:	PCT3328: Lower Hunter Red Gum-Paperbark Riverflat Forest				

Growth Form	Scientific Name	Cover	Abundance
Grass & grasslike (GG)	*Sporobolus creber*	15	N/A
Grass & grasslike (GG)	*Juncus usitatus*	0.1	4
HTE	*Senecio madagascariensis*	0.2	10
HTE	*Eragrostis curvula*	80	N/A
HTE	*Cenchrus clandestinus*	5	100
HTE	*Axonopus fissifolius*	5	500
Exotic	*Romulea rosea*	0.1	10
Exotic	*Hypochaeris radicata*	2	40
Exotic	*Verbena bonariensis*	0.1	15
Exotic	*Erigeron bonariensis*	0.1	6
Exotic	*Briza minor*	0.1	10
Exotic	*Lolium perenne*	0.1	20

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	0
30-49cm	Absent	0
20-29cm	Absent	0
10-19cm	Absent	0
5-9cm	Absent	0
<5cm	Absent	0

Length of Logs (m)	0

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	2
2 (15m)	1
3 (25m)	1
4 (35m)	1
5 (45m)	2
Average	1.4

Growth Form	Composition Data (Count of Native Cover)	Structure Data (Sum of Cover)

Tree	0	0
Shrub	0	0
Grass	2	15.1
Forb	0	0
Fern	0	0
Other	0	0
High Threat Exotics	4	90.2

BAM Site – Field Survey Form					
Date:	7/09/2023	**Plot ID:**	Plot 3	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20x50m	**Easting:**	356840.42 m E
Datum:	GDA 94	**Middle bearing from 0m:**	281°	**Northing:**	6381136.19 m S
PCT:	PCT3328: Lower Hunter Red Gum-Paperbark Riverflat Forest				

Growth Form	Scientific Name	Cover	Abundance
Grass & grasslike (GG)	*Sporobolus creber*	3	200
Grass & grasslike (GG)	*Austrostipa spp.*	25	N/A
Forb (FG)	*Asperula conferta*	0.1	2
Forb (FG)	*Dichondra repens*	0.1	30
HTE	*Olea europaea*	2	20
HTE	*Eragrostis curvula*	20	N/A
HTE	*Cenchrus clandestinus*	2	50
HTE	*Pyracantha angustifolia*	0.2	6
HTE	*Paspalum dilatatum*	0.5	30
HTE	*Senecio madagascariensis*	0.1	5
Exotic	*Verbena bonariensis*	10	N/A
Exotic	*Lolium perenne*	2	100
Exotic	*Hypochaeris radicata*	5	100
Exotic	*Romulea rosea*	0.1	20
Exotic	*Plantago lanceolata*	1	40
Exotic	*Anagallis arvensis*	0.1	5
Exotic	*Cirsium vulgare*	0.1	1

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	0
30-49cm	Absent	0
20-29cm	Absent	0
10-19cm	Absent	0
5-9cm	Absent	0
<5cm	Absent	0

Length of Logs (m)	0

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	3
2 (15m)	5
3 (25m)	2
4 (35m)	1
5 (45m)	1

Average	2.4

Growth Form	Composition Data (Count of Native Cover)	Structure Data (Sum of Cover)
Tree	0	0
Shrub	0	0
Grass	2	28
Forb	2	0.2
Fern	0	0
Other	0	0
High Threat Exotics	6	24.8

BAM Site – Field Survey Form					
Date:	7/09/2023	**Plot ID:**	Plot 4	**Photo #:**	-
Zone:	56	**Plot Dimensions:**	20x50m	**Easting:**	356799.03 m E
Datum:	GDA 94	**Middle bearing from 0m:**	276°	**Northing:**	6381081.80 m S
PCT:	PCT3328: Lower Hunter Red Gum-Paperbark Riverflat Forest				

Growth Form	Scientific Name	Cover	Abundance
Grass & grasslike (GG)	*Austrostipa spp.*	60	N/A
Grass & grasslike (GG)	*Juncus usitatus*	0.2	10
Grass & grasslike (GG)	*Sporobolus creber*	3	50
Forb (FG)	*Asperula conferta*	0.1	10
HTE	*Eragrostis curvula*	30	N/A
HTE	*Olea europaea*	3	20
HTE	*Pyracantha angustifolia*	0.5	5
HTE	*Senecio madagascariensis*	0.1	10
Exotic	*Verbena bonariensis*	5	60
Exotic	*Lolium perenne*	1	50
Exotic	*Plantago lanceolata*	1	20
Exotic	*Anagallis arvensis*	0.1	20
Exotic	*Briza minor*	2	100

DBH	# Tree Stems Count	# Hollow Bearing Trees
80+cm	0	0
50-79cm	0	0
30-49cm	Absent	0
20-29cm	Absent	0
10-19cm	Absent	0
5-9cm	Absent	0
<5cm	Absent	0

Length of Logs (m)	0

BAM Attribute (1x1m)	Litter Cover (%)
1 (5m)	1
2 (15m)	1
3 (25m)	1
4 (35m)	1
5 (45m)	1
Average	1

Growth Form	Composition Data (Count of Native Cover)	Structure Data (Sum of Cover)

Tree	0	0
Shrub	0	0
Grass	3	63.2
Forb	1	0.1
Fern	0	0
Other	0	0
High Threat Exotics	4	33.6

Appendix B. BAMC Generated Biodiversity Credit Report.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00043505/BAAS19040/23/00043506	Proposal Name 34 Wyndella Road Lochinvar	BAM data last updated * 22/06/2023
Assessor Name Alexander Graham	Assessor Number BAAS19040	BAM Data version * 61
Proponent Names Andre Hayek	Report Created 09/02/2024	BAM Case Status Finalised
Assessment Revision 0	Assessment Type Part 4 Developments (General)	Date Finalised 09/02/2024
BOS entry trigger BOS Threshold: Area clearing threshold	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3328-Lower Hunter Red Gum-Paperbark Riverflat Forest	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	10.0	0	0	0

BAM Biodiversity Credit Report (Like for like)

3328-Lower Hunter Red Gum-Paperbark Riverflat Forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3328_Zone_1_Canopy	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3328_Zone_2_Grassland	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

BAM Biodiversity Credit Report (Like for like)

Credit Retirement Options

Like-for-like credit retirement options

Assessment Id	Proposal Name	Page 4 of 4
00043505/BAAS19040/23/00043506	34 Wyndella Road Lochinvar	

Appendix C. BAM Candidate Species Report.

BAM Candidate Species Report

Proposal Details

Assessment Id 00043505/BAAS19040/23/00043506	Proposal Name 34 Wyndella Road Lochinvar	BAM data last updated * 22/06/2023
Assessor Name Alexander Graham	Report Created 09/02/2024	BAM Data version * 61
Assessor Number BAAS19040	Assessment Type Part 4 Developments (General)	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 09/02/2024	BOS entry trigger BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Pandion cristatus Eastern Osprey	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Persoonia pauciflora North Rothbury Persoonia	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pterostylis chaetophora Pterostylis chaetophora	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Barking Owl	Ninox connivens	Habitat constraints
Bush Stone-curlew	Burhinus grallarius	Habitat constraints
Eastern Pygmy-possum	Cercartetus nanus	Habitat degraded
Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	Dromaius novaehollandiae - endangered population	Refer to BAR
Gang-gang Cockatoo	Callocephalon fimbriatum	Habitat constraints
Glossy Black-Cockatoo	Calyptorhynchus lathami	Habitat constraints
Green and Golden Bell Frog	Litoria aurea	Habitat degraded
Green-thighed Frog	Litoria brevipalmata	Habitat degraded

Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Pine Donkey Orchid population in the Muswellbrook local government area	Diuris tricolor - endangered population	Refer to BAR
Powerful Owl	Ninox strenua	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Southern Greater Glider	Petauroides volans	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat constraints

Appendix D. Protected Matters Search Tool results (September 2023).

Australian Government
Department of Climate Change, Energy, the Environment and Water

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. Please see the caveat for interpretation of information provided here.

Report created: 30-Sep-2023

Summary

Matters of National Environment 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 (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	9
Listed Threatened Species:	47
Listed Migratory Species:	16

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	24
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	6
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)	[Resource Information]	
Ramsar Site Name	Proximity	Buffer Status
Hunter estuary wetlands	20 - 30km upstream from Ramsar site	In feature area

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.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community may occur within area	In feature area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community may occur within area	In feature area
Hunter Valley Weeping Myall (Acacia pendula) Woodland	Critically Endangered	Community may occur within area	In feature area
Kurri sand swamp woodland of the Sydney Basin bioregion	Endangered	Community likely to occur within area	In feature area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area	In feature area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area	In feature area
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Endangered	Community likely to occur within area	In buffer area only
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat likely to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area	In feature area
FROG			
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In feature area
MAMMAL			
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area	In feature 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	In feature area
Notamacropus parma Parma Wallaby [89289]	Vulnerable	Species or species habitat may occur within area	In feature area
Petauroides volans Greater Glider (southern and central) [254]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area	In feature 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	In feature area
Potorous tridactylus tridactylus Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
Acacia bynoeana Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In feature area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus glaucina Slaty Red Gum [5670]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Eucalyptus parramattensis subsp. decadens Earp's Gum, Earp's Dirty Gum [56148]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area	In feature area
Grevillea parviflora subsp. parviflora Small-flower Grevillea [64910]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Persoonia pauciflora North Rothbury Persoonia [67214]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area	In feature area
Prostanthera cineolifera [11233]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat known to occur within area	In feature area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In buffer area only
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Rutidosis heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area	In feature area
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area	In buffer area only

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