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Ecological Assessment Report

Residential Subdivision and Associated Infrastructure
898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd,
Lochinvar, NSW

Prepared for: Lochinvar Developments Pty Ltd

C/- Mathew London

ADW Johnson Pty Ltd

May 2023

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Document Control

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AEP Project Team	Natalie Black Frances O'Brien Angela Metcalfe Darcy Kilvert Chris Wark Sam Rayfield Rachael Smethurst Kathleen Bushell

Revision

Revision	Date	Author	Reviewed	Approved
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Distribution

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03	16/05/2023	Jessica Bailey	Lochinvar Developments Pty Ltd C/- ADW Johnson Pty Ltd

EXECUTIVE SUMMARY

Anderson Environment & Planning (AEP) was commissioned by ADW Johnson Pty Ltd on behalf of Lochinvar Developments Pty Ltd (the proponent) to undertake an Ecological Assessment Report (EAR) for proposed development works over land identified within 898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd, Lochinvar, NSW (Lots 2-6 and 9 DP747391, Lots 12 and 13 DP1219648) within the Maitland Local Government Area (LGA) in the Hunter region of New South Wales.

Lochinvar Developments Pty Ltd is proposing a 262 Lot residential subdivision with internal roads, services, storm water facilities, recreational park lands, vegetated riparian creek line and asset protection zones (APZs). The residential development will be situated within approx. 21.33ha of currently semi-rural land, with 1.22ha dedicated to revegetated riparian zone. The land is zoned for General Residential (R1) land use and forms part of the broader Lochinvar Urban Release.

The report is specifically intended to indicate the likelihood of the proposed development having a significant impact on potentially occurring threatened species or ecological communities. In this regard, the report aims to recognise the relevant requirements of the *Environmental Planning & Assessment Act 1979*, the *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Study Area consists of the Subject Site and a 15m Buffer and totals approx. 26.30ha, consisting of small patches of native vegetation (0.636ha) in poor condition; the majority of the Study Area is exotic pasture improved grasslands, existing infrastructure and dams.

Native vegetation includes scattered native canopy trees; *Eucalyptus tereticornis* in the north with introduced Pinus sp. scattered *Hakea sericea* and Melaleuca spp in the center of the site and planted *Corymbia maculata*, remanant *Casuarina glauca* (Swamp Oak) with *Juncus usitatus* in the ground stratum within the low-lying areas in the south.

Despite having a highly managed understorey of predominantly agricultural pasture grasses and very limited shrub layer in the midstratum across the entire site, the vegetation present constitutes a disturbed variant of three EEC's:

- PCT 1592 - Spotted Gum - Red Ironbark - Grey Gym shrub - grass open forest of the Lower Hunter associated with the *Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion* Endangered Ecological Community (EEC) under the BC Act
- PCT 1594 - Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter associated with River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (CEEC) under the BC Act
- PCT 1728 - Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast associated with Swamp oak floodplain forest of the NSW North Coast Sydney Basin and South East Corner bioregions (EEC) under the BC Act

Flora and fauna species recorded were typical of those expected in this locality in a disturbed and modified vegetation remnant.

Assessment under the Five-part Test of Significance of Impacts determined that no significant impacts upon threatened entities listed under the BC Act are likely to occur if mitigation measures are implemented, and consideration of the EPBC Act revealed that impacts on Matters of National Environmental Significance are unlikely to occur, as is a referral to the Commonwealth.

The proposed development has works within 40m of a watercourse including a creek crossing, triggering the *Section 91* of the *Water Management Act, 2000*, *Section 201 and 219* of the *Fisheries Management Act, 1994*.

Review of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* reveals this SEPP applies to the site in relation to *Chapter 3 Koala Habitat Protection 2020* and *Chapter 4 Koala Habitat Protection 2021*. The Subject Site provides marginal foraging habitat for Koala. Vegetation exists in a highly degraded and fragmented state unlikely to support the presence of this species. Targeted surveys including SATs and nocturnal call playback carried out within the site revealed no utilisation by Koala.

Furthermore, consultation of *Chapter 2 Coastal Management* of *State Environmental Planning Policy (Resilience and Hazards) 2021* reveals that the Subject Site is not mapped as containing lands subject to coastal management and the SEPP does not apply.

General recommendations and mitigation measures have been included in the report to minimise environmental impacts of the proposal.

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1.0 Introduction

The proposed development will result in the removal of 0.24ha of native vegetation in association with a 262 Lot residential subdivision and associated infrastructure at 898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd, Lochinvar, NSW

Anderson Environment & Planning was commissioned by ADW Johnson Pty Ltd (the client) to undertake an Ecological Assessment Report (EAR) for the proposed development. The site is currently zoned R1 – General Residential. The proposed development is a large residential subdivision planned under the Lochinvar Urban Release program with retained creekline proposed to be managed under a vegetation management plan.

Anderson Environment & Planning (AEP) have undertaken necessary investigations for the production of an EAR. This assessment has been undertaken with reference to the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), the *NSW Biodiversity Conservation Act 2016* (BC Act), the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Water Management Act, 2000 (WM Act) and *Fisheries Management Act, 1944* (FM Act).

This report is specifically intended to indicate the likelihood of the proposal having a significant impact on threatened species or ecological communities. In this regard, the report aims to recognise the relevant requirements of the EP&A Act, the BC Act, the EPBC Act, WM Act, FM Act and consideration of other relevant policies is given including *State Environmental Planning Policy* (SEPP) (*Biodiversity and Conservation) 2021* and *SEPP (Resilience and Hazards) 2021*. The purpose of this report is to:

- Describe the ecological values of the Subject Site;
- Explore the potential for threatened species to utilise the area; and
- Assess ecological impacts associated with the proposal against relevant legislation.

Potential ecological impacts on native species in general are also considered, as are recommendations for minimising any impacts within the scope of the development.

For the purposes of referencing, this document should be referred to as:

> *Anderson Environment & Planning (2023). Ecological Assessment Report for Residential Subdivision and Associated Infrastructure at 898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd, Lochinvar, NSW*

2.0 Site Particulars

Table 1 – Site Particulars

Detail	Comments
Client	Lochinvar Developments Pty Ltd
Address	898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd, Lochinvar, NSW
Title(s)	Lot 2 to 6 DP 747391, Lot 12 and 13 DP 1219648, and Lot 9 DP 747391
Study Area	Land located at 898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd, Lochinvar, NSW (Lots 2-6 and 9 DP747391, Lots 12 and 13 DP1219648) and a roads and infrastructure buffer (**Figure 1**). A first order stream bisects the south of the site from west to east. The streamline was included in all surveys. The vegetated riparian zone (VRZ), 10m either side of the top of bank will be retained and managed under a vegetation management plan (VMP).
Subject Site	The Subject Site consists of lands 898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd, Lochinvar, NSW (Lots 2-6 and 9 DP747391, Lots 12 and 13 DP1219648), consisting of the land proposed for development excluding the VRZ, consists of semi-rural land currently being grazed. The vegetation is dominated by pasture grasses, exotics and weeds with remnant native vegetation comprised of predominantly scattered paddock trees. Three farm dams are present in the northern portion of the Site. There are agricultural structures consisting of an open shed and scattered rubble piles throughout the paddock (**Figure 1 & 2**).
Development Footprint	The lands being impacted by the proposed development (**Figure 2**)
LGA	Maitland City Council
Zoning	Under the Maitland Local Environmental Plan 2011 (the LEP) (pub. 16-12-2011), the Subject Site is zoned R1 – General Residential.
Current Land Use	The Study Area consists of rural land currently being grazed. The vegetation is dominated by pasture grasses, exotics and weeds with remnant native vegetation dominated by scattered paddock trees concentrated around the creekline in the south of the site. There are agricultural structures consisting of an open shed and scattered rubble piles throughout the paddock. The vegetation within the Study Area was determined to be patches of: • Non-remnant *PCT 1592 - Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter* which is associated with Endangered Ecological Community (EEC) *Lower Hunter Spotted Gum – Ironbark Forest* (BC Act). However, given its planted nature, absence of midstratum and managed understorey, this is a highly disturbed variant of the EEC. • Remnant *PCT 1594 - Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter.* This PCT is *associated with* Critically Endangered Ecological Community *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* • Remnant PCT 1728 - *Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast.* This PCT is associated with the Endangered Ecological Community *Swamp oak floodplain forest of the NSW North Coast Sydney Basin and South East Corner bioregions.*
Surrounding Land Use	The site has limited to no vegetative connectivity to the broader locality due to the surrounding land uses, being a school, grazing lands and the New England Highway (SP2 – Special Infrastructure).
Additional Legislation	Maitland DCP - Part F - Urban Release Areas - Lochinvar Urban Release Area - 2011

Figure 1 depicts the extent of the site overlain on an aerial photograph of the locality.

3.0 Proposed Development

Lochinvar Developments Pty Ltd is proposing a 262 Lot residential subdivision with internal roads, services, storm water facilities, recreational park lands, vegetated riparian creek line and asset protection zones (APZs). The development footprint totals 22.54ha with a further 1.22ha of the Subject Site retained as a riparian zone. The land is currently zoned for General Residential (R1) land use and forms part of the Lochinvar Urban Release.

Figure 2 depicts the proposed development plan within the Subject Site.

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Figure 1 - Site Location

Date: May 2023

Location: New England Hwy and Wyndella Rd, Lochinvar

Client: ADW Johnson

AEP ref: 2699.01

240332-MP-005 [M]

1
DP65706

2
DP818314

227
DP246447

226
DP246447

225
DP246447

224
DP246447

223
DP246447

11
DP1219648

1
DP743130

ROAD WIDENING

ROAD WIDENING

ROAD WIDENING

WYNDELLA ROAD

NEW ENGLAND HIGHWAY

620
FUTURE PARK 2
SUBJECT TO FUTURE DA

439
BASIN 1

1013
RIPARIAN CORRIDOR

1012
RIPARIAN CORRIDOR

1010
DRAINAGE CORRIDOR

1011
FUTURE PARK 1
SUBJECT TO FUTURE DA

LEGEND

SITE BOUNDARY

PROPOSED BOUNDARY

GDA2020

SHEET 1 OF 5

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
M	15/03/2023	LAYOUT AMENDMENTS	AM	MLO	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:1250 · 0 · 25.0 · 50.0 · 62.5m · A3 1:2500	

working beyond expectations

drawing title:

PROPOSED MASTER PLAN OVERALL

location: NEW ENGLAND HWY & WYNDELLA ROAD, LOCHINVAR

council: MAITLAND CITY COUNCIL

dwg ref: 240332-MP-005 [M]

client: CPG ESTATES

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• urban design • visualisation • development feasibility • surveying • town planning • social impact • economic analysis • civil engineering • infrastructure • superintendency • project management

4.0 Scope and Purpose

Investigations were carried out within the Study Area and via literature and database searches to gather information required to adequately address Section 7.3 of the BC Act (known as the "5-part test"). The Commonwealth EPBC Act, and relevant State Environmental Planning Policies (SEPPs) were also considered in the assessment.

The assessment approach was tailored to undertake sufficient works to ensure that legislative requirements were met relating to threatened species and native species in general for the proposed specific development. This was achieved by background research and literature review, database searches, consultation, targeted ecological fieldwork and mapping, detailed habitat assessment, and ultimately impact assessment consideration against the type and form of development proposed.

Impact assessment was undertaken with due reference to the "*Threatened Species Test of Significance Guidelines"* (OEH, 2018).

Specifically, the scope of this study is to:

- Identify vascular plant species occurring within the site, including any threatened species listed under the BC Act or EPBC Act;
- Identify and map the extent of vegetation communities within the site, including any EECs listed under the BC Act or EPBC Act;
- Identify any fauna species, including threatened and migratory species, and populations or their habitats, which occur within the site and are known to occur in the wider locality;
- Assess the potential of the proposed development to have a significant impact on any threatened species, populations or ecological communities (or their habitats) identified from the site; and
- Describe measures to be implemented to avoid, minimise, manage or monitor potential impacts of the proposal.

In addition to the survey work conducted within the site boundary and its immediate surrounds, consideration has been afforded to the wider locality, via database searches within 10km of the site and via consideration of habitat areas that may be linked ecologically to the site.

5.0 Study Certification and Licencing

This report was written by Angela Metcalfe, reviewed and certified by Natalie Black (BAAS 19076) of Anderson Environment & Planning.

Staff	Title/Qualification	Tasks
Natalie Black	Senior Environmental Manager / Works Coordinator BSc (Hons), Master Planning, Cert IV (TA) BAAS: 19076	Scientific advice, report certification and review.
Frances O'Brien	Senior Ecologist/Lead Botanist BEnv LLB GDLP MEL	Due diligence assessment, RDPs, riparian assessment
Angela Metcalfe	Ecologist BEnvSc (Hons)	Report Author, PCT determination, diurnal bird survey, BAM plots, nocturnal fauna surveys
Darcy Kilvert	Ecologist/Botanist B.Sc. (Bio)	BAM plots, incidental flora and fauna.
Kathleen Bushell	Ecologist B.Sc	Riparian assessment, RDPs, incidental flora and fauna.
Sam Rayfield	Ecologist B.Sc	Habitat survey, Koala SATs, Nocturnal fauna survey, BAM plots, incidental flora and fauna.

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL101313;
- Animal Research Authority (Trim File No: 14/600(2)) issued by NSW Agriculture; and
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: 14/600(2)) issued by NSW Agriculture.

Certification:

As the principal author, I, Natalie Black, make the following certification:

The results presented in the report are, in the opinion of the principal author and certifier, a true and accurate account of the species recorded, or considered likely to occur within the Survey Area;

Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, unless specified departures from industry standard guidelines are justified for scientific and/or animal ethics reasons.

All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the Animal Research Act 1995, National Parks and Wildlife Act 1974 and the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes.

Principal Author and Certifier:

Natalie Black

Senior Environmental Manager / Works Coordinator

Anderson Environment & Planning

BAAS: 19076

6.0 Methodology

The field surveys for the site have been prepared and performed with due recognition of the State survey guidelines and Maitland City Council Guidelines (DEC 2004; DECC 2009; DPIE 2020; OEH 2018, DPE 2022).

The size of the site, the type of native vegetation and habitats remaining, the status of existing and proposed surrounding land use, and the level and type of habitat linkages to proximate bushland areas were considered in formulating the methodology employed and described below.

The assessment approach was tailored to undertake sufficient works to ensure that legislative requirements were met relating to threatened species and native species in general for the proposed specific development.

6.1 Information Sources

Information and spatial data provided within this EAR has been compiled from various sources including:

- Aerial Photograph Interpretation (API) of the site and surrounding locality;
- *NSW Biodiversity Values Map* (accessed February 2023);
- Vegetation of the Cessnock-Kurri Region (Bell and Driscoll 2007);
- State survey guidelines (DEC 2004; DECC 2009; DPIE 2020; DPE 2022a);
- DPE Threatened Species, Populations and Ecological Communities website (*https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx?a=1*) (accessed August 2022); and
- Collective knowledge gained from previous ecological survey and assessment in the Maitland region over the past 25 years.

In addition, database searches were carried out, namely:

- Review of flora and fauna records held by the BioNet Atlas of NSW Wildlife within a 10km radius of the site (December 2022); and
- Review of flora and fauna records held by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search within a 5km radius of the Study Area (December 2022).

6.2 Considerations of Biodiversity Offsets Scheme

There are three criteria that require assessment under the Biodiversity Offsets Scheme (BOS) to determine whether or not entry into the BOS is required. The three criteria include;

- Whether or not the site contains Biodiversity Values Mapped land;
- Whether or not it exceeds the Area Clearing Threshold applicable to the minimum lot size; and / or
- Whether or not a 5-part Test of Significance determines that a significant impact on threatened biodiversity is likely to occur.

The criteria are addressed below.

6.2.1 Biodiversity Values Map

The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the Biodiversity Conservation Regulation 2017. The Biodiversity Offsets Scheme (BOS) applies to all local developments, major projects or the clearing of native vegetation where the SEPP (Vegetation in Non-Rural Areas) 2017 applies. Any of these will require entry into the BOS if they occur on land mapped on the BV Map. Exempt and complying development or private native forestry are not subject to the Biodiversity Offsets Scheme.

The BV Map does not intersect with the Study Area; therefore, the proposal does not trigger the BOS or the requirement for a Biodiversity Development Assessment Report (BDAR) under this criterion (refer **Appendix D**).

6.2.2 Area Clearing Threshold

"The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP). The area threshold applies to all proposed native vegetation clearing associated with a development proposal" (DPE, 2022c).

Table 2 - Area Clearing Thresholds (BC Act)

Minimum lot size	Threshold for clearing, above which the BOS applies
< 1ha	**>0.25ha**
1ha to <40ha	>0.5ha
40ha to <1000ha	>1.0ha
>1000ha	>2ha

In this case, as per the Biodiversity Values Map and Threshold Report included in **Appendix C**, the minimum lot size is approx. 450m^2. Therefore, the applicable area clearing threshold is **0.25ha**. As the area of vegetation to be removed totals approx. **0.24ha** the BOS is not triggered, and as such the preparation of a BDAR is not required based on the clearing threshold.

6.2.3 Test of Significance

Following the above assessments, it is a requirement to determine whether or not the development is likely to significantly affect threatened species, ecological communities or their habitats using a Test of Significance. The Test of Significance is used to undertake qualitative analysis of the likely impacts and determine whether further assessment is required in association with the development. As part of this Ecological Assessment Report, a Five-part Test of Significance has been undertaken in **Section 9.0**.

6.3 Field Survey

All fieldwork was conducted within the Study Area as shown in **Figure 5.**

6.3.1 Vegetation Communities

Vegetation was surveyed utilising a variety of methods, as outlined below.

- Consideration of regional mapping for the site sourced from State Vegetation Type Mapping (SVTM, 2022) and Lower Hunter Regional Vegetation Mapping (Parsons Brinkerhoff, 2013);
- Aerial Photo interpretation (API) to identify any notable variations within the site;
- Consultation of 1:25,000 topographic map series for the area;

- Inspection of the site to ground-truth the unit(s) identified by SVTM (2022); and
- Identification of the vegetation map unit occurred via identification of required dominant species in community structural layers.

The final derived vegetation map was based on the limited key diagnostic remnant native species present within the site. Historical vegetation mapping, soils, dominant species composition, structural and physical attributes were all considered when assigning the best fit ecological communities.

Consideration was given to the potential for the derived vegetation communities to constitute EECs as listed under the BC Act and/or EPBC Act. The floristic composition, geomorphological characteristics and geographical extent were important considerations in this process. The type and location of the relevant vegetation communities can be seen in **Figure 4.**

6.3.2 Flora

Extensive flora surveys were undertaken to produce a flora species list for the Study Area, to search specifically for threatened flora species known from the wider locality, and to gather data necessary to both derive vegetation community type(s) and to meet relevant survey guidelines. Such works included:

- Identification of all vascular plant species encountered during fieldwork;
- Survey involved systematic coverage of the Study Area. A combination of Random Meander Technique (Cropper, 1993), BAM plots and RDPs were utilised to maximise species encountered. All vascular plant species encountered during fieldwork were recorded;
- Ten (10) BAM plots and five (5) rapid data points were carried out to assess vegetation composition and determine the plant community types within the Site; and
- A systematic approach to target threatened plant species at the site as per DPIE guidelines (DPIE, 2020).

6.3.3 Habitat

An assessment of the relative habitat values present within the Study Area was carried out. This assessment focused primarily on the identification of specific habitat types and resources within the site favoured by known threatened species from the region. The assessment also considered the potential value of the Study Area (and surrounding areas) for all major guilds of native flora and fauna.

The assessment was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages.

In particular, focus was put on documenting the presence of key habitat features such as tree hollows. Hollows are an important resource utilised by a variety of fauna, and are particularly relevant for several of the likely key threatened species in this locality. Vertebrate and invertebrate species use hollows as diurnal or nocturnal shelter sites, for rearing young, feeding, thermoregulation, and to facilitate ranging behaviour and dispersal.

A search was carried out utilising the methodology of tree hollow identification set by OEH in the BioBanking field plot methodology (2009), namely:

> *"A hollow is only recorded if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm across; (c) the hollow appears to have depth (i.e., you cannot see solid wood beyond the entrance); and (d) the hollow is at least 1 m above the ground (this omits hollows in cut stumps or at the base of trees)".*

No hollows were found to be present on site at the time of surveys.

6.3.4 Fauna

Fauna survey was carried out utilising techniques as outlined below**.** Fauna survey work was undertaken with reference to relevant guidelines and to add additional information to the generated Expected Fauna Species List (**Appendix B**).

Spotlighting

Two consecutive nights of spotlighting were carried out on 19th and 20th December 2022. Attention was paid to the farm shed, remnant vegetation and the dams.

Bat Mist Netting

Mist netting was carried out at the entrance to the farm shed at dusk on 23rd January 2023. Bat echolocation calls were recorded using one handheld Anabat Detector while mist netting was carried out.

Avifauna Surveys

Targeted avian diurnal surveys were carried out in December 2022. Emphasis was placed on peak activity periods, i.e., early mornings and late afternoon, to maximise chances of species encountered. Birds were identified by direct observation or by recognition of calls or distinctive features such as nest, feathers etc.

To date, diurnal incidental observations were recorded during all phases of fieldwork.

Herpetofauna Surveys

Incidental herpetofauna (frog and reptile) searches were carried out in each of the habitat units present. Such habitat included areas of thicker vegetation, in ground litter, near and under fallen timber, around piles of refuse, wet / damp areas, and areas of poor infiltration capacity and / or periodic inundation. Opportunistic encounters during all phases of field work were also noted.

Mammals

The occurrence of mammals within the Study Area was assessed by utilising habitat assessment as an analogue for presence in combination with diurnal and nocturnal survey including spotlighting. Habitat assessment included survey for foraging resources (blossom, herbaceous, prey etc), hollows and roosting opportunity, connectivity and water.

Incidental Observations & Secondary Indications

Incidental records of any fauna species observed during fieldwork were noted. This included opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of any resident or migratory species. Searches were also conducted for whitewash, regurgitation pellets and prey remains from Owls, chewed *(Allo) Casuarina* cones from Black-Cockatoos, chewed fruit remains from frugivorous birds etc.

6.3.5 Details of Field Surveys

A summary of the survey effort is below in **Table 3** and **Figure 5**.

Table 3 – Field Survey Periods

Date	Time	Field Activity	No. of Persons on Site
23/08/22	08:15 – 12:45	General site reconnaissance, rapid data points flora survey, general habitat assessment	2
30/08/22	08:30 – 13:30	Riparian assessment	2
19/12/22	11:30 – 21:30	General vegetation assessment	2

Date	Time	Field Activity	No. of Persons on Site
		BAM plots 10m transects Nocturnal spotlighting Call playback	
20/12/22	10:30 – 21:00	BAM plots SATs 10m transects Nocturnal spotlighting Call playback Incidentals	3
23/01/2023	19:00 – 21:30	Mist netting targeting microbats Incidentals	3

The above survey methodology is considered to provide sufficient understanding of the biodiversity of the Study Area.

In addition, by applying rigorous habitat assessment to more mobile species identified in BioNet Atlas records within the locality, it was ensured that all possible use of the Study Area by notable species was considered, and accommodated within subsequent ecological assessment and management recommendations.

7.0 Results

7.1 Vegetation Communities

Regional vegetation mapping undertaken by Parsons Brinckerhoff (2013) does not contain any native vegetation mapping. The newly released State Vegetation Type Mapping (SVTM, 2022) indicates that the site is mapped as containing 0.084ha of *PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest* which is associated with Endangered Ecological Community (EEC) *Lower Hunter Spotted Gum – Ironbark Forest* (BC Act 2016). *This plant community type is equivalent to the now redundant PCT 1592 - Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter and thus Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions.*

The area indicated on the SVTM as PCT 3433 has been ground-truthed and consists of exotic canopy. However, there is PCT 3433 (previously PCT 1592) on site in the south western corner; this has been planted for a period of no longer than 20 years ago judging by the age of the trees.

Given the absence of midstory, sparse native understorey and fragmented condition of the site, the *Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest* present in planted form is a highly disturbed variant of the EEC.

Figure 3 shows the extent regionally-mapped vegetation within the Study Area.

Fieldwork was conducted to ground-truth regional vegetation maps. Fieldwork confirmed vegetation within the Study Area to be commensurate with:

- *PCT 1592 - Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter* and thus *Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions* (0.15ha)
- *PCT 1594 - Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter* (0.24ha)
- *PCT 1728 - Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast* (0.25ha)

Figure 4 shows the extent of ground-truthed vegetation identified within the Study Area.

7.1.1 PCT 1592 - Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter

The *Lower Hunter Spotted Gum – Ironbark Forest* present on site is dominated by a canopy of Spotted Gum (*Corymbia maculata*) and Grey Gum (*Eucalyptus punctata*). This patch of vegetation is not remnant, having been planted in what appears to be parallel lines no longer than 20 years ago, this is evident by the age of the trees. The assignment to this PCT was due to the characteristic species present including Spotted Gum (*Corymbia maculata*), Grey Gum (*Eucalyptus punctata*) and *Lobelia purpurascens,* and the PCT being present within the locality.

There is a mixture of Dry Sclerophyll Forests species and Forested Wetland species such as *Casuarina glauca*, *Carex appressa* and *Juncus usitatus* resulting from plantings being placed adjacent to the hydroline. Additional native species present include, *Centella asiatica, Rumex brownii, Lachnagrostis aemula* and *Parsonsia straminea.*

PCT 1592 - Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter is associated with the Endangered Ecological Community Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion. Given the absence of midstory, sparse native understorey and fragmented condition of the site, the Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest present in planted form is a highly disturbed variant of the EEC. This small patch of vegetation suffers from edge effects and disturbance form the grazing cattle. The entire Site is currently grazed by cattle and therefore suppressing

the shrub layer. The lower stratum, although highly disturbed and containing large number of exotics, also comprises a regenerating native understorey.

7.1.2 PCT 1594 - Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter

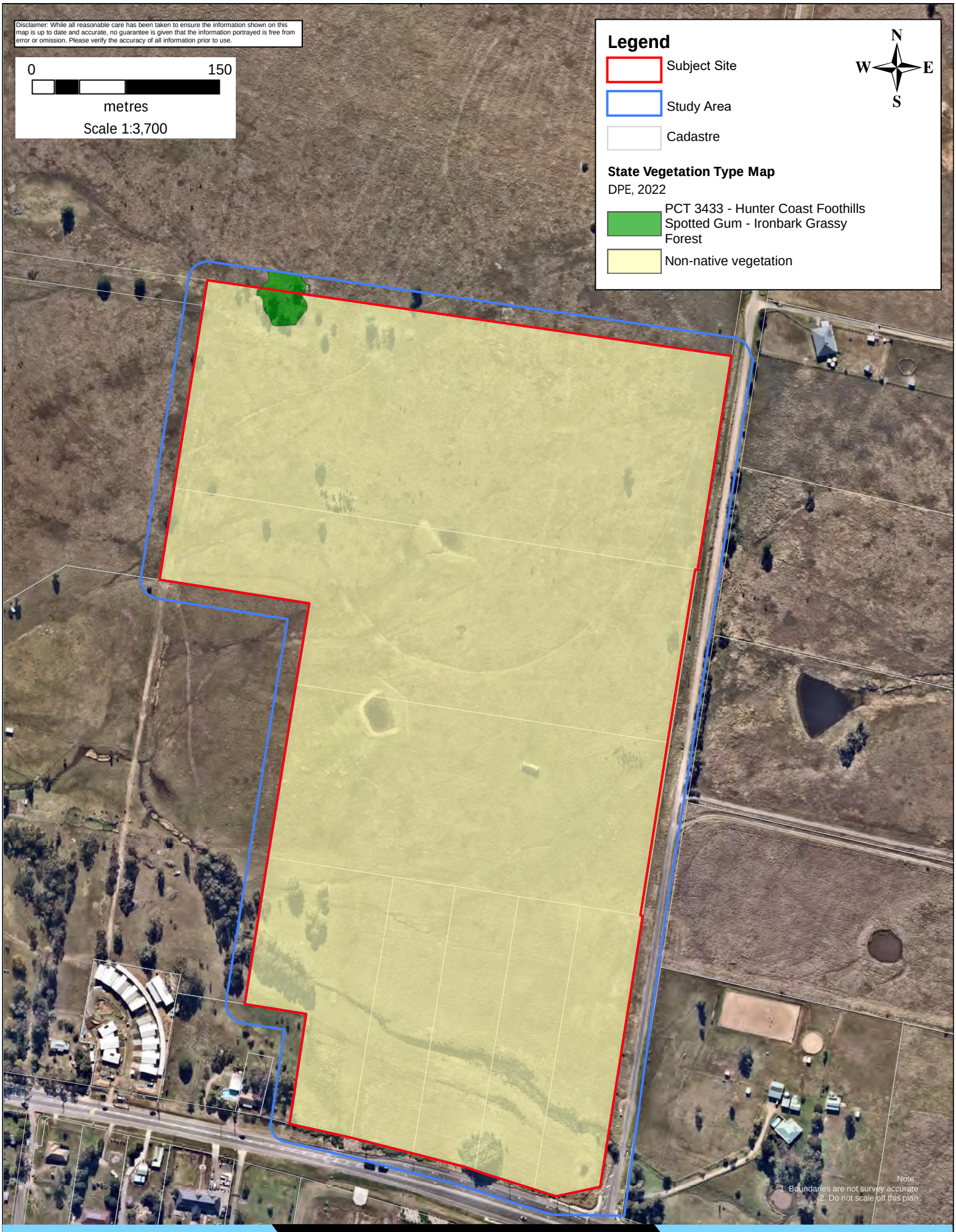
Vegetation present on site determined to be associated with PCT 1594 - *Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter* is in a highly disturbed and fragmented condition. The determination to associate this vegetation to PCT 1594 was made due to the presence of the remnant canopy species *Eucalyptus tereticornis,* and the midstratum species, *Hakea sericea,* in conjunction with the Study Area's position within the Hunter Sub-IBRA and Newcastle Coastal Ramp Mitchell Landscapes. Both species were scattered across the northern portion of the site. No other species associated with this PCT was found to be present on site following a long history of agricultural land use. The ground stratum was dominated by a wide range of pasture grasses.

PCT 1594 - Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter is associated with Critically Endangered Ecological Community *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.* Associated vegetation within the Subject Site is limited to one (1) canopy tree species, *Eucalyptus tereticornis*, and one (1) midstratum species, *Hakea sericea.* Therefore, the vegetation present is insufficient in associating it with this EPBC Act listed threatened ecological community.

7.1.3 PCT 1728 - Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast

Vegetation in the southern low-lying areas of the Site were determined to be commensurate with PCT 1728 - *Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast*. *Casuarina glauca* dominated the canopy with a ground stratum of *Carex appressa, Juncus usitatus* and *Cynodon dactylon.* Introduced species *Cyperus eragrostis* and *Juncus acutus* also dominated the low-lying areas of the site.

PCT 1728 - Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast is associated with the Endangered Ecological Community *Swamp oak floodplain forest of the NSW North Coast| Sydney Basin and South East Corner bioregions*. Associated vegetation within the Subject site is limited to one (1) canopy tree species, *Casuarina glauca*, and two (2) ground stratum species, *Carex appressa* and *Juncus usitatus.* Given the limited diversity of native species, highly disturbed and fragmented condition of the site, the Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast present is a highly disturbed variant of the EEC.



AEP

Figure 3 - Regional Vegetation Map

Date: Mar 2023

Location: New England Hwy and Wyndella Rd, NSW

Client: Lochinvar Developments Pty Ltd

AEP Ref: 2699.01

AEP

Figure 4 - Groundtruthed Vegetation

Date: May 2023

Location: New England Hwy and Wyndella Rd, Lochinvar

Client: ADW Johnson

AEP ref: 2699.01

7.2 Flora

Flora surveys to date have resulted in the identification of 73 species with the Study Area. Approximately 55% of these species are exotics, principally pasture weed species associated with areas of previous disturbance and cleared grassland.

Within the Study Area there are a mixture of native species including seven (7) canopy tree species, eleven (11) mid-stratum species and fourteen (14) ground stratum species. Limited regrowth of eucalypts was only evident within the roadside areas where cattle are not present.

Plant Community Types identified on site constitute highly disturbed variants of three (3) EECs (**Section 7.1**); however no threatened flora species were detected during comprehensive survey efforts.

A full list of flora species identified within the site during surveys to date is included in **Appendix A**.

7.3 Habitat Assessment

The Subject Site offers limited habitat for fauna. Native canopy species are present within the Subject Site (*Corymbia maculata, Eucalyptus fibrosa, Lophostemon confertus*) which may constitute suitable feed trees for some bird species and arboreal mammals. There were no habitat trees observed to be containing hollows at the time of survey.

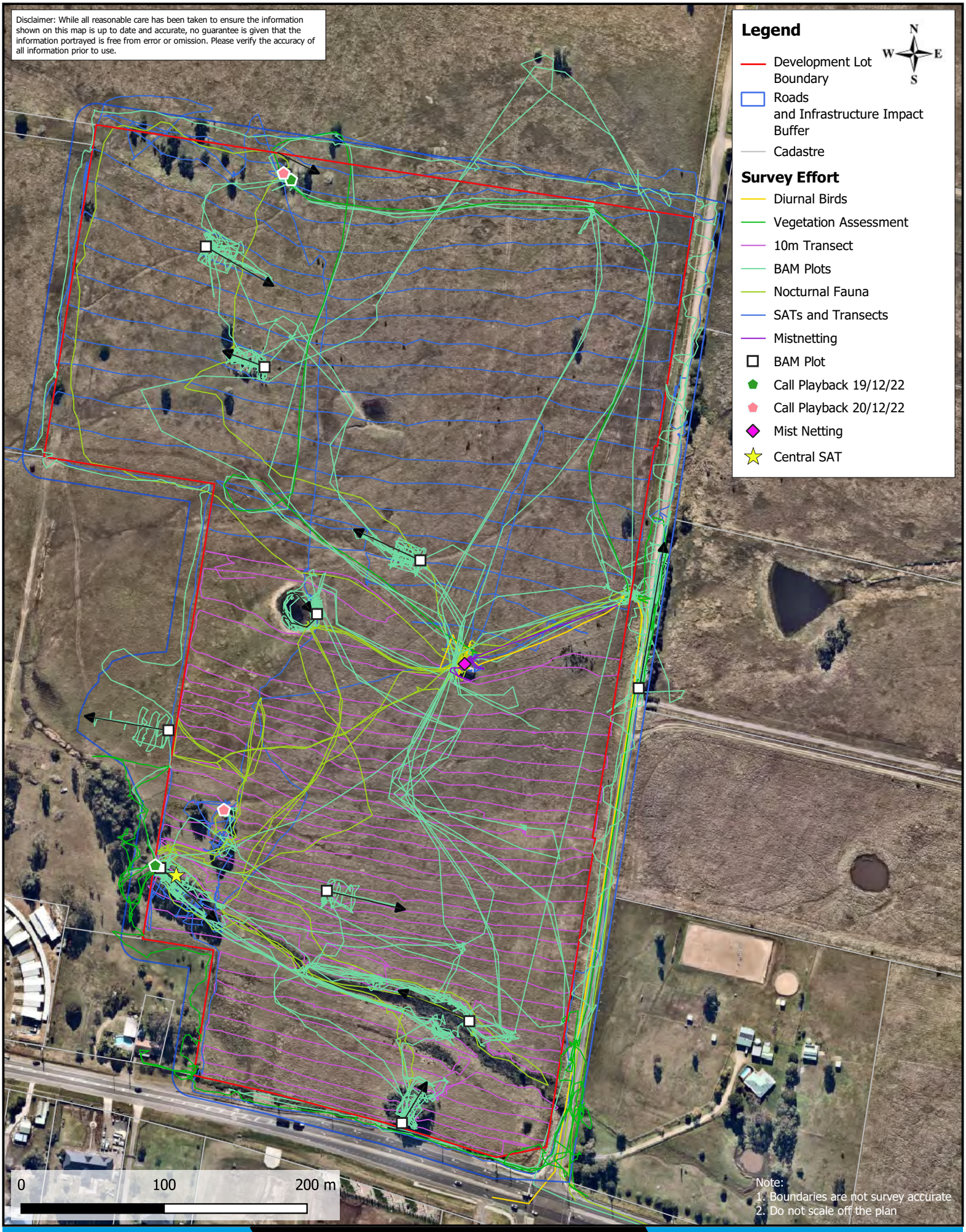
Fauna activity within the Study Area's native vegetation during survey period was limited to highly mobile generalist species such as Pacific Black Ducks, Ibis, Magpie, Rainbow Lorikeet and Corellas. Brushtail Possum, Sugar Glider and Ringtail Possum were recorded via songmeter, though evidence of these species was not found during spotlighting or habitat assessment.

7.4 Fauna

Fauna surveys to date have identified 67 species within the Study Area and surrounds, three (3) of these are introduced species. Native species comprise of predominantly highly mobile species. Two (2) reptile, four (4) amphibian, 52 bird and nine (9) mammal species were recorded via visual and audio surveys. No threatened species were detected to be utilising the Subject Site.

Microbats were detected in the roof of the farm shed and confirmed to be the non-threatened species *Nyctophilus geoffroyi* via mistnetting. Advice regarding this species is provided in **Section 12.0**. Other notable species, including some more mobile (flying) threatened species, are also considered to possibly utilise the site on an intermittent basis as part of a larger home range. Such species are considered further in following sections.

An Expected Fauna Species List for the entire Study Area has been generated for the site from BioNet Atlas and is included in **Appendix B**. All fauna species recorded during fieldwork are listed.



AEP

Figure 5 - Survey Effort

Date: May 2023

Location: New England Hwy and Wyndella Rd, Lochinvar

Client: ADW Johnson

AEP ref: 2699.01

7.5 Database Searches

Searches were undertaken of databases within a 10km radius of the Subject Site for BC Act listings and EPBC Act listings. Note that any records considered erroneous, historic only, or obviously of no relevance to the site in regards to habitat (e.g., seabirds, marine species etc.) were omitted.

The potential for listed threatened species to occur within the site is considered in **Table 4** and selection for subject species in **Table 5** below. Detailed ecological profiles of threatened species can be found at:

https://www.environment.nsw.gov.au/threatenedspeciesapp/

Table 4 – Threatened Species Appraisal

Scientific Name	Common Name	NSW status	Comm. status	BioNet Records	Likelihood of Occurrence
Flora					
Eucalyptus glaucina	Slaty Red Gum	V	V	5	Species or habitat likely to occur in area. Species was not detected in surveys to date. With the few trees present on site, it is unlikely that the species would be undetected. It is considered unlikely to occur.
Eucalyptus camaldulensis	Eucalyptus camaldulensis population in the Hunter catchment	E		1	Species or habitat likely to occur in area. Species was not detected in surveys to date. With the few trees present on site, it is unlikely that the species would be undetected. It is considered unlikely to occur.
Eucalyptus glaucina	Slaty Red Gum	V	V	5	Species or habitat likely to occur in area. Species was not detected in surveys to date. With the few trees present on site, it is unlikely that the species would be undetected. It is considered unlikely to occur.
Persoonia pauciflora	North Rothbury Persoonia	E	CE	1	The species is only found in North Rothbury, NSW. The species would not be found to occur within the Study Area.
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	1	Species or habitat known to occur in area. The absence of understorey species in the Study Area makes it unlikely the species would remain undetected by survey. The study area would offer a small amount of suitable habitat.
Syzygium paniculatum	Magenta Lilly Pilly	E	V	2	Species or habitat known to occur in area. Grows in open woodlands on exposed sandstone ridges. No habitat in Study Area. Unlikely to remain undetected by survey within the open and disturbed site. Considered unlikely to occur.
Acacia bynoeana	Bynoe's Wattle	E	V	1	Species or habitat known to occur in area. Occurs in heath or dry sclerophyll forest on sandy soils. No habitat in Study Area. Unlikely to remain undetected by survey within the open and disturbed site. Considered unlikely to occur.
Callistemon linearifolius	Netted Bottle Brush	V		1	Species or habitat known to occur in area. Grows in dry sclerophyll forest on the coast and adjacent ranges. No habitat in Study Area. Unlikely to remain undetected by survey within the open and disturbed site. Considered unlikely to occur.
Cymbidium canaliculatum		E		1	Species or habitat known to occur in area. An epiphytic orchid which grows in the hollows and forks of eucalypts and wattles. Very limited to

Scientific Name	Common Name	NSW status	Comm. status	BioNet Records	Likelihood of Occurrence
					no habitat in Study Area. Unlikely to remain undetected by survey within the open and disturbed site. Considered unlikely to occur.
Pterostylis gibbosa	Illawarra Greenhood	E	E	1	BioNet contains only one (1) record. All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark (*E. crebra*), Forest Red Gum (*Eucalyptus tereticornis*) and Black Cypress Pine (*Callitris endlicheri*). Suitable habitat is not present within the proposed Subject Site. The species is considered unlikely to occur.
Rutidosis heterogama	Heath Wrinklewort	V	V	1	BioNet contains only one (1) record. Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides. Soils within the Study Area are not highly suitable. Not recorded during surveys to date. The species is considered unlikely to occur.
Amphibians					
Litoria aurea	Green and Golden Bell Frog	E	V	1	Habitat for the species includes semipermanent/ephemeral wet areas, within 1km of swamps, waterbodies or wet areas. Habitat is present however two nights of nocturnal searches within the recommended survey period did not detect this species within the proposed impacted dams. Retained lands can also support this species. it is considered unlikely to be impacted by the proposal.
Aves					
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		1	No sign of species during fieldwork and only one (1) Atlas record exists within 10km of the site. The species could utilise the canopy vegetation on site for foraging, but it is unlikely that the species will be impacted by proposal considering the small amount of vegetation removal and lack of sightings.
Chthonicola sagittata	Speckled Warbler	V		11	Requires large, relatively undisturbed remnants with habitat that would include scattered native tussock grasses, a sparse shrub layer. Some eucalypt regrowth and an open canopy. No suitable habitat, considered unlikely to occur.
Daphoenositta chrysoptera	Varied Sittella	V		8	No sign of species during fieldwork. Requires rough-barked species and mature smooth-barked gums with dead branches, a small amount of potential foraging habitat exists within site. Considering the lack of

Scientific Name	Common Name	NSW status	Comm. status	BioNet Records	Likelihood of Occurrence
					suitable habitat on site, it is considered unlikely to be impacted by the proposal.
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		3	No sign of species during fieldwork and limited species records within 10km from the Study Area. Site might constitute small part of a larger home range; however, preferred habitat is characterised by presence of large bodies of open water. As the Study Area holds no suitable or significant habitat value, this species is considered unlikely to occur.
Hieraaetus morphnoides	Little Eagle	V		2	No sign of species during fieldwork and only two (2) Atlas records exist within 10km of site. Could utilise the vegetation on site for foraging.
Ephippiorhynchus asiaticus	Black-necked Stork	E		1	No sign of species during fieldwork and limited species records within 10km from the Study Area. Known to spend non-breeding season in Australia and observed to roost in trees or cliff crevices. Due to lack of local records and limited habitat, the species is considered unlikely to be impacted by the proposal.
Glossopsitta pusilla	Little Lorikeet	V		8	Limited records. No sign of species during fieldwork. No nesting habitat is present on site. Species could possibly utilise the eucalypts on site for seasonal foraging.
Anthochaera phrygia	Regent Honeyeater	E	CE	3	Study Area is not mapped as Important Habitat. Limited records within 10km indicates this species is not likely to be impacted by the proposed development.
Calyptorhynchus lathami	Glossy Black Cockatoo	V	V	-	No BioNet records present within 10km however the species was recorded on songmeter. Likely to be a flyover. No allocasuarina species present on site and no suitable large or x-large hollows. The species may intermittently utilise the Pinus tress on site however, no signs of chewed pine cones or white was on the site.
Lophoictinia isura	Square-tailed Kite	V		1	No sign of species during fieldwork and only one (1) Atlas record from within 10km of Study Area. Site might constitute a small part of a larger home range; however, preferred habitat is characterised by timbered habitat. As the Study Area holds no suitable or significant habitat value, this species is considered unlikely to occur.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		30	Several individuals of species were observed foraging within vegetation on site during fieldwork. No evidence of roosting or nesting. **SUBJECT SPECIES.**

Scientific Name	Common Name	NSW status	Comm. status	BioNet Records	Likelihood of Occurrence
Mammals					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	14	Species or habitat known to occur within area. Limited Atlas records within 10km of Study Area. Small amount of potential foraging habitat within Study Area, but no caves or overhangs for roosting and nesting. **SUBJECT SPECIES.**
Dasyurus maculatus	Spotted-tailed Quoll	V	E	3	Given that the three (3) Atlas record exists within 10km of the site are . No sign of species during fieldwork and Suitable ground habitat is not present on site. Overall unlikely that the species will be impacted by proposal considering the small amount of vegetation removal and lack of evidence of occurrence.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		3	Limited Atlas record within 10km of Study Area. Small amount of potential foraging. No roosting habitat within Study Area in the form of small hollows and loose bark. **SUBJECT SPECIES.**
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V		8	No roosting habitat present, however, suitable foraging habitat present on site. **SUBJECT SPECIES.**
Miniopterus australis	Little Bent-winged Bat	V		7	No roosting habitat present, however, suitable foraging habitat present on site. **SUBJECT SPECIES.**
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		14	No indication of this species during surveys. Suitable roosting habitat is absent but species may use the Site for foraging. **SUBJECT SPECIES.**
Myotis macropus	Southern Myotis	V		4	No sign of species during fieldwork. Four (4) records exist within 10km of the site. Suitable foraging and limited roosting habitat present on site. **SUBJECT SPECIES.**
Petaurus norfolcensis	Squirrel Glider	V		17	No sign of species during fieldwork. Subject Site is highly fragmented with no connecting vegetation suitable to support this species. Following revegetation, the retained riparian zone may increase landscape connectivity for this species.

Scientific Name	Common Name	NSW status	Comm. status	BioNet Records	Likelihood of Occurrence
Phascolarctos cinereus	Koala	E	E	-	No records within 10km and no evidence of this species following two (2) nights of nocturnal searches with call playback and SAT assessment within the Study Area. A precautionary approach was taken to confirm absence of this species in the Study Area. Due to the lack of suitable habitat, and evidence of occupation this species is considered unlikely to be impacted by the proposed development.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	122	Roosting known to occur within the locality. No sign of this species was found during fieldwork, although 122 records exist from within 10km of site. Suitable foraging habitat is present on site and may constitute part of a larger home range. **SUBJECT SPECIES.**
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		2	No sign of species during fieldwork. The Study Area could represent a small amount of foraging and roosting habitat. **SUBJECT SPECIES.**
Scoteanax rueppellii	Greater Broad-nosed Bat	V		7	No sign of species during fieldwork. No suitable roosting habitat occurs on site though the site may constitute foraging habitat of a larger home range. **SUBJECT SPECIES.**
Vespadelus troughtoni	Eastern Cave Bat	V		2	Species or habitat known to occur in the area. No sign of species during fieldwork, however two (2) Atlas records exist within 10km of the site. Suitable roosting habitat is absent from the site; however, site may constitute foraging habitat of a larger home range. **SUBJECT SPECIES.**
Phascogale tapoatafa	Brush-tailed Phascogale	V		7	The species preferred habitat includes hollow logs, under bark, rocks, cracks in soil, grass tussocks or building debris. The species prefer dry sclerophyll open forest. Agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater. They nest and shelter in tree hollows. There is are no hollow bearing trees present within the Study Area and very limited number of rough barkled trees. It is highly unlikely this species would traverse the disconnected landscape to utilise this site for foraging only.

Table Key - Status (BC Act & EPBC Act): CE: Critically Endangered, E: Endangered, V: Vulnerable (#) – Indicates number of Atlas Records within 10km of the Subject Site**.**

From **Table 4** above, the species listed in **Table 5** are considered key subject or indicator species for the Subject Site due to the likelihood that these species may forage, roost or nest on site. The Subject Site potentially forms an important part of a local home range for resident specimens and suitable habitat will be removed by the proposal.

Table 5 – Subject Species

Scientific Name	Common Name	BC Act	EPBC Act
Aves			
Pomatostomus temporalis temporalis (30)	Grey-crowned Babbler (eastern subspecies)	V	
Glossopsitta pusilla (8)	Little Lorikeet	V	
Mammals			
Falsistrellus tasmaniensis (5)	Eastern False Pipistrelle	V	
Micronomus norfolkensis (20)	Eastern coastal Free-tailed Bat	V	
Miniopterus australis (15)	Little Bent-winged Bat	V	
Miniopterus orianae oceanensis (15)	Large Bent-winged Bat	V	
Myotis macropus (13)	Southern Myotis	V	
Pteropus poliocephalus (75)	Grey-headed Flying-fox	V	V
Saccolaimus flaviventris (3)	Yellow-bellied Sheathtail-bat	V	
Scoteanax rueppellii (10)	Greater Broad-nosed Bat	V	

Table Key - Status (BC Act & EPBC Act):
CE: Critically Endangered, E: Endangered, V: Vulnerable
(#) – Indicates number of Atlas Records within 10km of the Subject Site

8.0 Key Species Considerations

The species identified for further consideration have been categorised into guilds in **Table 6**. By considering these species and their lifecycle needs, many other species are also inadvertently considered. The analysis below considers key lifecycle features for each guild of species in more detail, and assists in informing the subsequent 5-part test assessment.

Table 6 – Key Species Analysis

Guild / Species	Reason for Inclusion	Comment
Birds (Insectivorous) Grey-crowned Babbler	Foraging Resources	The species may forage for invertebrates on the trunks and branches of Eucalypt species and on the ground throughout the site.
	Roosting & Nesting	Nests are usually located in shrubs or sapling eucalypts which are absent from the site, however they may be built in the outermost leaves of low branches of large eucalypts.
	Connectivity & Patch Size	Given the mobility of the Grey-crowned Babbler, the site is considered viably connected to other potential habitat areas within the wider landscape matrix.
Birds (Nectivorous) Little Lorikeet	Foraging Resources	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in *Angophora, Melaleuca* and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards.
	Roosting & Nesting	Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like *Allocasuarina*. Nesting season extends from May to September. In years when flowering is prolific, Little Lorikeet pairs can breed twice, producing 3-4 young per attempt. However, the survival rate of fledglings is unknown.
	Connectivity & Patch Size	Given the mobility of the Little Lorikeet, the site is considered viably connected to other potential habitat areas within the wider landscape matrix.
Bats (Micro & Mega) Large-eared Pied Bat, Eastern False Pipistrelle, Eastern coastal Free-tailed Bat, Little Bent-winged Bat, Large Bent-winged Bat, Southern Myotis, Grey-headed Flying-fox, Yellow-bellied Sheathtail-bat,	Foraging Resources	Whilst microbat species have differing micro-habitat preferences for foraging habitat, they all seek insects in and around forested areas, and may also at times forage in proximity of developed areas. Three farm dams present on site are suitable foraging habitat for microbat species. The dams are proposed for removal, however a retention basin is proposed in the south west of the site which may be suitable for foraging, and remaining farm dams in the surrounding locality will continue to provide foraging habitat.
	Roosting & Nesting	No hollows were detected within the Study Area. Undetected small hollows and area of decorticating bark within the Subject Site may provide intermittent roosting habitat however this would be limited. No caves or other suitable structures were identified for species requiring such habitat for roosting or nesting.

Guild / Species	Reason for Inclusion	Comment
Greater Broad-nosed Bat, Eastern Cave Bat	Connectivity & Patch Size	n/a

9.0 Five-part Test Assessment

Section 7.3 of the BC Act lists five factors that must be taken into account in determining the significance of potential impacts of proposed activities on threatened species, populations, ecological communities and/or their habitats as listed within the BC Act.

The 5-part test is used to determine whether there is likely to be a significant impact, and thus whether the Biodiversity Offsets Scheme (BOS) is triggered.

a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

The proposed development involves the removal of approx. 0.021ha of non-remnant *PCT 1592,* 0.094ha of *PCT 1594* and 0.126ha of *PCT 1728.* This totals 0.241ha for removal. The proposal will retain and revegetate a total of 0.35ha of native vegetation.

Table 5 – Threatened Plant Community Types proposed for removal and retention

Plant Community Type	Area proposed for removal	Retained and maintained under VMP
PCT 1592 (non-remnant)	0.021ha	0.24ha
PCT 1594	0.094ha	-
PCT 1728	0.126ha	0.11ha
Total	**0.241ha**	**0.35ha**

The remainder of the site comprised a combination of native and exotic grassland, with native grass comprising less than 15% cover, and some scattered plants and cultivated gardens.

Birds (Insectivorous):

Impacts to the Grey-crowned Babbler as a result of the proposal may include the removal of foraging and potential nesting habitat. No evidence of nesting was found within the Subject Site and preferred nesting habitat of a shrub layer is absent. Given that the areas of onsite retained vegetation, that will continue to improve through revegetation efforts, would provide foraging and nesting resources for the species, it is unlikely that the Grey-crowned Babbler would be significantly impacted by the proposal or be placed at risk of extinction as a result.

Birds (Nectivorous):

Impacts upon the Little Lorikeet as a result of the proposal may include the removal of intermittent foraging resources during canopy flowering periods. Given the absence of any specific evidence of continued utilisation or residence within the Study Area for the species, and the relatively small amount of foraging habitat to be removed in conjunction with the retained vegetation, it is not considered likely that the Little Lorikeet will be significantly impacted upon by the proposal or be placed at risk of extinction as a result.

Bats (Micro and Mega):

Given the absence of roosting habitat for these threatened species it can be assumed that, if present, these species are likely to utilise the site as a movement corridor and potentially as foraging habitat only. It is considered unlikely that the removal of scattered trees within the Subject Site will significantly impact connectivity any further, or notably reduce suitable habitat availability for the species. Dams

within the Study Area will be impacted, however the creekline will be retained and managed, a retention basin installed on site, and many farm dams remain in the locality for these species to utilise.

Large areas of contiguous foraging habitat will remain within off site areas to the north and south. These species will not be significantly impacted by the proposed development. The retained vegetation will provide habitat in the future as trees mature. Additionally, supplementary habitat may be installed in the retained lands as a proxy.

Given the lack of hollow bearing trees in the Study Area and abundance of creeks and dams in the surrounding locality, it is considered unlikely that any local population of these species is solely dependent on the resources within the Study Area. As such, it is considered unlikely that the development as proposed, will significantly impact any local population of these species.

It is an important safeguard measure that pre-clearance surveys of the farm shed are carried out by an appropriately experienced Ecologist. The shed must be deconstructed by hand with a supervising to capture the inhabitants and re-release them safely.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Vegetation within the Subject Site has been identified as *PCT 1592 Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter.* This plant community type is associated with *Lower Hunter Spotted Gum – Ironbark Forest*, an Endangered Ecological Community (EEC) under the Biodiversity Conservation Act 2016.

Although the site does contain Lower Hunter Spotted Gum Ironbark Forest, 92.5% of this vegetation type will be retained on site. The portion of vegetation proposed for removal is small, degraded and largely isolated patches (194m2) and will not negatively impact the long-term survival of the ecological community in the locality.

ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Although the site does contain Lower Hunter Spotted Gum Ironbark Forest, 92.5% of this vegetation type will be retained on site. The portion of vegetation proposed for removal is small, degraded and largely isolated patches (194m2) and will not negatively impact the long-term survival of the ecological community in the locality. The management of the retained area of the this PCT should improve the composition and structure of the community. Hence, it has been determined that the propose development will not place PCT 1592 at the risk of local extinction.

c) in relation to the habitat of a threatened species or ecological community:

i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

As discussed above, the proposed areas of impact offer limited habitat value for highly mobile species only. Impacts to native vegetation will be minimal, and in association with the proposed development

the riparian corridor will undergo revegetation resulting in a net improvement in habitat features and connectivity. Significantly improving biodiversity values within the Subject Site.

ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The proposed development will not contribute to a net habitat loss as a result of native vegetation clearing. Proposed vegetation to be removed is presently fragmented patches of low habitat value due to previously severed vegetation connectivity. In association with the proposed development the riparian corridor (1.22ha) will undergo revegetation resulting in a net improvement in habitat features and connectivity.

iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality

Habitat identified within the site is not considered important to the survival of any threatened species, given that the vegetation is highly degraded, and is predominately pasture improved paddock. Although the site does contain *Lower Hunter Spotted Gum Ironbark Forest*, the 92.5% of this vegetation type will be retained. The portion of vegetation proposed for removal is small, degraded and largely isolated patches (194m^2) and will not negatively impact the long-term survival of the ecological community in the locality.

d) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)

No area of outstanding biodiversity value is present on site. Biodiversity Values mapped land, Lochinvar Creek, is 1.4km downstream of the Study Area. Through appropriate stormwater design and revegetation works to the 1st order creek on site the biodiversity mapped creek line will not experience any adverse effects, and may see an overall positive impact through increasing connectivity and reducing weed loads travelling via the watercourse.

e) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process (KTP)

The development has potential to contribute to the following KTPs:

- ***Anthropogenic climate change***

The development as proposed may contribute in a small way to the processes causing anthropogenic climate change via the removal of vegetation which act as a carbon sink. The impact is considered minimal due to the small amount of vegetation removed. The revegetation of the riparian corridor and planting of street trees and parkland is likely to result in a net increase to vegetation within the Study Area.

- ***Clearing of native vegetation***

The proposal will remove a small amount of native vegetation (0.24ha). Removal of this vegetation is not considered a significant contribution to this KTP.

- ***Invasion and establishment of aggressive weed species and exotic perennial grasses***

The site has historically been pasture improved paddocks and already supports a wide range of agricultural weed species. These areas will be developed, reducing the extent of these weeds on the site, appropriate controls will be put in place to reduce the potential for weed spread into the adjacent riparian area. A vegetation management plan will be implemented for the retained lands and will include weed management strategies.

- ***Loss of hollow bearing trees***

No habitat trees are present within the Study Area.

10.0 EPBC Act Assessment

A search was conducted in December 2022 for Matters of National Environmental Significance (MNES) as relevant to the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act). The following MNES are considered in this assessment.

World Heritage Properties:

The site is not a World Heritage area and is not in close proximity to any such area.

National Heritage Places:

The site is not a National Heritage Place and does not contain any matters of national heritage.

Wetlands of International Significance (declared Ramsar wetlands):

The site is 20 - 30km upstream from the Ramsar listed Hunter estuary wetlands.

Great Barrier Reef Marine Park:

The site is not part of, or within close proximity to, the Great Barrier Reef Marine Park.

Commonwealth Marine Areas:

The site is not part of, or within close proximity to, any Commonwealth Marine Area.

Threatened Ecological Communities (TECs):

There are eight (8) listed TECs within a 5km radius of the Subject Site:

- *Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland;*
- *Lowland Rainforest of Subtropical Australia;*
- *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions;*
- *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community;*
- *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria;*
- *Hunter Valley Weeping Myall (Acacia pendula) Woodland;*
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland;* and
- *Central Hunter Valley eucalypt forest and woodland.*

Native vegetation within the Subject Site is associated with the following PCTs:

PCT 1594 - Cabbage Gum-Rough-barked Apple grassy woodland on alluvial floodplains of the lower Hunter is associated with Critically Endangered Ecological Community *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.* Associated vegetation within the Subject site is limited to one (1) canopy tree species, *Eucalyptus tereticornis*, and one (1) midstratum species, *Hakea sericea.* Therefore, the vegetation present is insufficient in associating it with this EPBC Act listed threatened ecological community.

PCT 1592 - Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter is associated with the Endangered Ecological Community *Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion.* Associated vegetation within the Subject Site has been planted, and is limited to two (2) canopy tree species, *Corymbia maculata* and *Eucalyptus punctata,* and one (1) ground stratum species, *Themeda australis.* 92.5% of this vegetation type will be retained on site. The portion

of vegetation proposed for removal is small, degraded and largely isolated patches (194m2) and will not negatively impact the long-term survival of the ecological community in the locality.

PCT 1728 - Swamp Oak - Prickly Paperbark - Tall Sedge swamp forest on coastal lowlands of the Central Coast and Lower North Coast is associated with the Endangered Ecological Community *Swamp oak floodplain forest of the NSW North Coast| Sydney Basin and South East Corner bioregions.* Associated vegetation within the Subject site is limited to one (1) canopy tree species, *Casuarina glauca*, and two (2) ground stratum species, *Carex appressa* and *Juncus usitatus.*

Threatened Species:

Forty-two (42) threatened species may occur in, or may relate to areas within 5km of the Study Area. Of these species, Grey Falcon have the potential to utilise the site for foraging. The site does not provide Removal of vegetation within the Subject Site is not considered likely to result in significant impact to any threatened species due to the size and quality of the habitat.

Migratory Species:

A total of 16 migratory species may occur in, or may relate to areas within 5km of the Subject Site. None of which are considered likely to be impacted by the proposed development given the size and quality of the habitat proposed for removal.

EPBC Act Assessment Conclusion:

Consideration of the EPBC Act revealed that the proposal is not likely to have a significant impact on MNES, therefore a referral is considered unnecessary in this instance.

11.0 Water Management Act 2000

The objects of the *Water Management Act, 2000 (*WM Act), are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. Ecological Considerations within the objectives focus on applying the principles of ecologically sustainable development, to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality. There is also a focusing on having an integrated management of water sources with the management of other aspects of the environment, including the land, its soil, its native vegetation and its native fauna,

The assessment of the Subject Site showed the unnamed creek is a first order stream within the Site. An assessment of the Creek and proposed development have been undertaken to ensure the objectives of WM Act have been implemented within the design of the proposed development.

In accordance with *Section 91* of the Wm Act, if there are wors proposed within 40m a watercourse a Controlled Activity Application.

To ensure protection of the upstream and downstream riparian area measure such as erosion and sedimentation controls are to be installed prior to construction commencing, and regularly inspected and maintained (weekly or after rain events) during construction works.

The Water Sensitive Urban Design (WSUD) measures will be incorporated within the detailed design of each stage to ensure Narrabeen Lagoon Catchment is maintained and enhanced for both quality and quantity.

In accordance with *Section 9*1of the WM Act a Controlled Activities Approval is required.

12.0 Fisheries Management Act 1994

The objects of the *Fisheries Management Act, 1994 (*FM Act), are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. Ecological considerations within the objectives focus on the:

- Conservation of fish stocks and key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation, and
- Promote ecologically sustainable development, including the conservation of biological diversity,

The assessment of the Subject Site showed unnamed Creek is a first order stream. An assessment of the Creek and proposed development have been undertaken to ensure the objectives of FM Act have been implemented within the design of the proposed development.

In accordance with *Section 201* Dredge and Reclamation and 219 Blockage to Fish Passage of the *Fisheries Management Act 1994* (FM ACT), a Permit is required to undertake the proposed works to construct a road crossing.

13.0 State Environmental Planning Policy (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BC SEPP) commenced on 1 March 2022. This SEPP consolidated 11 other SEPPs within this SEPP on the 1 March 2022. The *State Environment Planning Policy (Koala Habitat Protection) 2021* was one SEPP that was consolidated within the Biodiversity and Conservation SEPP under *Chapter 4 – Koala Habitat Protection 2021*. No policy changes were made as part of the consolidation nor did the legal effect of the existing SEPPs, with section 30A of the *Interpretation Act 1987* applying to the transferred provisions. The consolidation was undertaken in accordance with section 3.22 of the *Environmental Planning and Assessment Act 1979*.

The BC SEPP 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.

The land which comprises the Study Area has no approved koala plan of management. According to Chapter 4 of the BC SEPP, the policy applies if:

4.9 Development assessment process—no approved Koala plan of management for land

(1) This clause applies to land to which this Policy applies 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.

Review of the information identified that the entirety of the Subject Site Lots 2-6 and 9 DP747391, Lots 12 and 13 DP1219648, located at 898 New England Hwy, 25 Wyndella Rd and 39 Wyndella Rd, Lochinvar, NSW is greater than 1ha and does not have an approved Koala plan of management. Therefore, the SEPP applies. As a result, additional assessments were required to satisfy the Development Assessment Process.

However, despite subclauses (3) and (4), the council may grant development consent if the applicant provides to the council –

a. information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application –

i. does not include any trees belonging to the Koala use tree species listed in Schedule 2 for the relevant Koala management area, or

ii. is not core Koala habitat,

Site inspections identified that trees belonging to the Koala use trees listed in Schedule 2 for the relevant Koala Management Area were located within the Study Area, five (5) of which are within the Subject Site.

In regards to identifying the site as core Koala habitat, core Koala habitat is defined as;

a. an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable Koala habitat and where Koalas are recorded as being present at the time of assessment of the land as highly suitable Koala habitat, or

b. *an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable Koala habitat and where Koalas have been recorded as being present in the previous 18 years.*

Highly Suitable Koala Habitat is defined as – Where trees within any PCT are the regionally relevant species of those listed in Schedule 2 for the relevant Koala management area.

Koala Investigation Results

As a Koala feed tree was identified within the Study Area, additional assessments were undertaken to determine if Koalas were present on site and to determine if the site was core Koala habitat as per the definitions above.

Survey effort for Koalas included:

- Habitat Assessment (23/08/2022; 30/08/2022; 19/12/2022); and
- Incidental surveys (23/08/2022; 30/08/2022; 19/12/2022; 20/12/2022; 23/01/2023).
- Targeted searches including nocturnal searches on two consecutive nights with call playback (19/12/2022; 20/12/2022);
- Spot Assessment Technique (SAT) surveys including searches around the base of trees within the Subject Site for scats or scratches in the bark of eucalypts (20/12/202);

Surveys failed to identify any sign of Koala utilisation of the site. Desktop assessment of local records in BioNet Atlas showed no Koala records, within approximately 10km of the Study Area in the last 18 years. The Subject Site is bounded by roads, areas of clearing, and rural residential development.

Given that there are no records of Koala within 10km of the Subject Site and no evidence of Koala was found to be present following extensive habitat assessments and SAT surveys, it is considered that the survey above is more than sufficient to determine that there will be low or no impact to Koala as a result of this development and the development should be assessed under a Tier 1 Assessment.

It is considered that the implementation of specific Koala measures is not required given the location of the proposed development, current condition and likely utilisation of the Subject Site by Koala into the future.

14.0 SEPP (Resilience and Hazards) 2021

The State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) commenced on 1 March 2022. The State Environment Planning Policy (Coastal Management) 2018 (Coastal Management SEPP) was one SEPP that was consolidated within the Resilience and Hazards SEPP 2021 under Chapter 2 Coastal Management. No policy changes were made as part of the consolidation nor did the legal effect of the existing SEPPs, with section 30A of the *Interpretation Act 1987* applying to the transferred provisions. The consolidation was undertaken in accordance with section 3.22 of the *Environmental Planning and Assessment Act 1979*.

Investigations in accordance with the *State Environmental Planning Policy (Resilience and Hazards) 2021* (R&H SEPP) found that the Subject Site is not within Coastal Wetlands Area or Littoral Rainforest Area.

Therefore, the R&H SEPP does not apply and no further assessment is required.

15.0 Recommendations

The following general recommendations are made for consideration to minimise localised impacts on biodiversity in general as a result of the rezoning and development of the site:

15.1 Protection of Native Fauna

- Deconstruction of the farm shed must be carried out carefully by hand at the direction of a suitably experienced Ecologist to ensure the safe removal and relocation of several microbats (*Nyctophilus geoffroyi*) currently roosting in the eaves.
- The Ecologist will manage any displaced native fauna, notably several microbats (*Nyctophilus geoffroyi),* either by relocating in suitable retained vegetation adjacent to the site or within the locality, or, if the fauna is injured or immature, by handing over to local Native Fauna Carers or veterinary clinic if required.
- Prior to construction commencing, exclusion flagging tape and signage will be installed to delineate construction zone from retained vegetation.

15.2 Water quality and hydrology

- An Erosion and Sedimentation Control Plan (ESCP) should be prepared for the proposal following guidelines from the “Blue Book” (Landcom, 2004);
- Best practice erosion and sedimentation controls should be put in place to limit offsite movement of materials into the adjacent vegetation; and
- Erosion and sedimentation controls should be checked daily and maintained in working order especially after rain events.

15.3 Preparation of a Biodiversity Management Plan

Preparation of the Biodiversity Management Plan (BMP). The overall BMP objectives are to provide:

- Education of the Plant Community Type (PCT) within the Subject Site;
- Regeneration of unnamed Creek;
- Planting of canopy and shrub layers;
- Improving water quality and aquatic habitat;
- To assess and adjust weeding and planting regimes across the BMP;
- Areas of habitat for native flora and fauna, including locally occurring threatened species; and
- A long-term environmental conservation area, in a state of Natural Regeneration requiring nominal ongoing maintenance.

15.4 General Recommendations

General recommendations are made below for consideration to mitigate potential impacts on local biodiversity as a result of the development of the site.

- Temporary construction fencing around the Subject Site is to be erected during the construction phase to limit incursions of fauna and delineate the boundary of clearing works;
- Tree protection zones are to be established around retained trees/vegetation as per the arborist’s report;

- Implement hygiene protocols for machinery to prevent the spread of weeds outside the development site;
- Where possible landscaping is to occur in conjunction with the proposed development and provide some future resources for native fauna in the area.
- Development of a Construction Environmental Management Plan (CEMP) that incorporates pre, during and post construction mitigation measure to reduce both direct and indirect impacts, such as lighting, vehicle strike, runoff etc.

15.5 Clearing Protocols

- Vegetation clearing is to be timed to avoid cold weather periods where overnight temperatures are forecast to be less than 12°C. Cold weather is likely to make it difficult for resident hollow dependent fauna to successfully relocate. This is particularly relevant for low body-weight species;
- A staged approach to clearing is to be undertaken to provide fauna the opportunity to disperse outside the area of impact. Staging to include;
    - Phase 1 Clearing: Underscrubbing;
    - Phase 2 Clearing: Removal of non-habitat trees; and
    - Phase 3 Clearing: Removal of habitat and connecting trees;
    - All clearing works (Phase 1, 2 and 3) to be undertaken under the supervision of the Project Ecologist;
- Clearing should occur in a direction from previously disturbed lands towards retained lands;
- Implementation of clearing protocols, including pre-clearance surveys to identify habitat and vegetation to be retained;
- All clearing works to be attended by a suitable equipped and experienced ecologist to deal appropriately with any displaced fauna species;
- All hollow bearing features (if located on site following pre-clearance surveys) will be sectionally lowered by tree climbers (where safe to do so);
- Any fauna rescued during vegetation clearing is to be assessed for injuries, and subsequently released to a suitable nearby location; this may require holding fauna until dusk for release in accordance with relevant animal ethics licencing and standards;
- If any fauna is injured during vegetation clearing, they are to be taken promptly to a nearby veterinarian or suitable wildlife carer contact;
- In addition, prior to clearing of any vegetation, an ecologist is to inspect the area for any signs of resident fauna requiring attention, and in particular nesting birds. Where such is identified, appropriate strategies are to be developed and instigated to minimise impacts. Pre-clearance surveys to include diurnal surveys, stag watching and nocturnal surveys; and
- Civil Construction staff to be inducted into pre-clearing and clearing protocols, and to identify environmental features for protection.

16.0 References

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Appendix A – Flora Species List

FLORA SPECIES LIST

The following list includes all species of vascular plants observed on site during fieldwork to date. It should be noted that such a list cannot be considered comprehensive, but rather indicative of the flora present on the site. It can take many years of flora surveys to record all of the plant species occurring within any area, especially plant species that are only apparent in some seasons such as Orchids.

A number of species cannot always be accurately identified during a brief survey, generally due to a lack of suitable flowering and/or fruiting material. Any such species are identified as accurately as possible, and are indicated in the list as thus:

- specimens that could only be identified to genus level are indicated by the generic name followed by the abbreviation “sp.”, indicating an unidentified species of that genus;
- specimens for which identification of the genus was uncertain are indicated by a question mark (“?”) placed in front of the generic, which is followed by the abbreviation “sp.” and;
- specimens that could be accurately identified to genus level, but could be identified to species level with only a degree of certainty are indicated by a (“?”) placed in front of the epithet.

Authorities for the scientific names are not provided in the list. These follow the references outlined below.

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Names of families and higher taxa follow a modified Cronquist System (1981).

Introduced species are indicated by an asterisk “*”.

Threatened species listed under the BC Act or the EPBC Act are indicated in **bold font.**

Family Name	Scientific Name	Common Name
Aizoaceae	*Galenia pubescens**	Galenia
Apiaceae	*Foeniculum vulgare**	Fennel
Apiaceae	*Centella asiatica*	Swamp Pennywort
Apiaceae	*Cyclospermum leptophyllum**	Slender Celery
Apocynaceae	*Parsonsia straminea*	Common Silkpod
Apocynaceae	*Araujia sericifera**	Mothvine
Apocynaceae	*Gomphocarpus fruiticosus**	Narrow Leaf Cotton Bush
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Asteraceae	*Conyza bonariensis**	Flax-leaf Fleabane
Asteraceae	*Oncosiphon piluliferum**	
Asteraceae	*Onopordum acanthium subsp. Acanthium**	Scotch Thistle
Asteraceae	*Silybum marianum**	Variegated Thistle
Asteraceae	*Hypochaeris radicata**	Flatweed
Asteraceae	*Senecio madagascariensis**	Fireweed
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cyperaceae	*Baumea juncea*	
Cyperaceae	*Cyperus sesquiflorus**	
Cyperaceae	*Cyperus spp.*	
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-rush
Cyperaceae	*Carex appressa*	Tall Sedge
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge
Fabaceae	*Trifolium repens**	White Clover
Gentianaceae	*Centaurium erythraea**	Common Centaury
Juncaceae	*Juncus acutus**	
Juncaceae	*Juncus cognatus**	
Juncaceae	*Juncus usitatus*	Common Rush
Lobeliaceae	*Lobelia purpurascens*	Whiteroot
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Myrtaceae	*Eucalyptus punctata*	Grey Gum
Myrtaceae	*Eucalyptus spp.*	
Myrtaceae	*Corymbia maculata*	Spotted Gum
Myrtaceae	*Eucalyptus microcorys*	Tallowwood

Family Name	Scientific Name	Common Name
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
Myrtaceae	*Melaleuca bracteata*	Black Tea-tree
Myrtaceae	*Melaleuca ericifolia*	Swamp Paperbark
Oleaceae	*Olea europaea subsp. cuspidata**	African Olive
Onagraceae	*Ludwigia peploides subsp. montevidensis*	Water Primrose
Phormiaceae	*Dianella caerulea*	Blue Flax-lily
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Plantaginaceae	*Plantago lanceolata**	Ribwort
Poaceae	*Cynodon spp.**	
Poaceae	*Setaria pumila**	Pale Pigeon Grass
Poaceae	*Paspalum dilatatum**	Paspalum
Poaceae	*Stenotaphrum secundatum**	Buffalo Grass
Poaceae	*Andropogon virginicus**	Whisky Grass
Poaceae	*Austrostipa ramosissima*	Stout Bamboo Grass
Poaceae	*Bothriochloa macra*	Red Grass
Poaceae	*Briza maxima**	Quaking Grass
Poaceae	*Briza minor**	Shivery Grass
Poaceae	*Briza subaristata**	
Poaceae	*Chloris gayana**	Rhodes Grass
Poaceae	*Eragrostis brownii*	Brown's Lovegrass
Poaceae	*Rytidosperma pallidum*	Silvertop Wallaby Grass
Poaceae	*Megathyrsus maximus**	Guinea Grass
Poaceae	*Bromus spp.**	A Brome
Poaceae	*Poa spp.**	
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Poaceae	*Sporobolus elongatus*	Slender Rat's Tail Grass
Poaceae	*Lachnagrostis aemula*	Blown Grass
Poaceae	*Themeda triandra*	Kangaroo Grass
Poaceae	*Lolium rigidum**	Wimmera Ryegrass
Polygonaceae	*Rumex brownii*	Swamp Dock
Polygonaceae	*Persicaria spp.**	Knotweed

Family Name	Scientific Name	Common Name
Primulaceae	*Lysimachia arvensis var. caerulea**	Blue Pimpernel
Proteaceae	*Hakea bakeriana*	
Pteridaceae	*Cheilanthes sieberi*	Rock Fern
Ranunculaceae	*Ranunculus inundatus*	River Buttercup
Restionaceae	*Empodisma minus*	Spreading Rope-rush
Solanaceae	*Solanum nigrum**	Black Nightshade, Black-berry Nightshade
Solanaceae	*Solanum seaforthianum**	Climbing Nightshade
Verbenaceae	*Verbena bonariensis**	Purpletop

Appendix B – Expected Fauna Species List

EXPECTED FAUNA SPECIES LIST

The following list includes fauna species that could be reasonably expected to occur on the Subject Site at some point, given site attributes and location.

“Threatened species listed under the BC Act or the EPBC Act are indicated in bold font.

Surveyed Observations used within Site:

- Observed (O);
- Heard (W);
- Scat (P);
- Miscellaneous (M);
- Track/scratchings (F); and
- Nest (E), Burrow (FB).

Bat Records used within Site:

- Observed (O);
- Definitely (D);
- Possible or within Species Group (P); and
- Likely (L).

Survey Equipment used to observe fauna within the Subject Site:

- Anabat (A);
- Songmeter (SM);
- Camera Trap (CT); and
- Harp Trap (HT).

Scientific Name	Common Name	NSW status	Comm. status	Records	Observations	Survey Equipment
Amphibia						
Crinia signifera	Common Eastern Froglet			154	W	SM
Paracrinia haswelli	Haswell's Froglet			8	W	SM
Pseudophryne coriacea	Red-backed Toadlet			2		
Uperoleia fusca	Dusky Toadlet			22		
Uperoleia laevigata	Smooth Toadlet			13	W	
Litoria dentata	Bleating Tree Frog			12		
Litoria fallax	Eastern Dwarf Tree Frog			127		
Litoria peronii	Peron's Tree Frog			78		
Litoria phyllochroa	Leaf-green Tree Frog			5		
Litoria revelata	Revealed Frog			5		
Litoria tyleri	Tyler's Tree Frog			49		
Litoria verreauxii	Verreaux's Frog			16	W	SM
Limnodynastes peronii	Brown-striped Frog			131		
Limnodynastes tasmaniensis	Spotted Grass Frog			23		
Reptilia						
Chelodina longicollis	Eastern Snake-necked Turtle			35		
Lampropholis delicata	Dark-flecked Garden Sunskink			49	O	
Lampropholis guichenoti	Pale-flecked Garden Sunskink			23		
Tiliqua scincoides	Eastern Blue-tongue			101		
Morelia spilota	Carpet & Diamond Pythons			1	O	
Pseudechis porphyriacus	Red-bellied Black Snake			128		
Pseudonaja textilis	Eastern Brown Snake			6		
Aves						
Anas superciliosa	Pacific Black Duck			90	OW	SM
Aythya australis	Hardhead			4		
Chenonetta jubata	Australian Wood Duck			161	OW	SM
Cygnus atratus	Black Swan			18		

Scientific Name	Common Name	NSW status	Comm. status	Records	Observations	Survey Equipment
Tachybaptus novaehollandiae	Australasian Grebe			11	O	
Geopelia humeralis	Bar-shouldered Dove			26	O	
Ocyphaps lophotes	Crested Pigeon			120	O	
Spilopelia chinensis	Spotted Turtle-Dove			92		
Podargus strigoides	Tawny Frogmouth			79		
Pelecanus conspicillatus	Australian Pelican			38	O	
Ardea pacifica	White-necked Heron			29		
Bubulcus ibis	Cattle Egret			39	O	
Casmerodius modesta	Eastern Great Egret			24		
Egretta novaehollandiae	White-faced Heron			89	O	
Threskiornis moluccus	Australian White Ibis			40	O	
Threskiornis spinicollis	Straw-necked Ibis			64		
Aquila audax	Wedge-tailed Eagle			10	O	
Lophoictinia isura	Square-tailed Kite	V		10	O (Potential – flying overhead)	
Falco cenchroides cenchroides	Nankeen Kestrel			22	O	
Lewinia pectoralis	Lewin's Rail			2	W	SM
Porphyrio porphyrio	Purple Swamphen			52		
Vanellus miles	Masked Lapwing			178	W	SM
Cacatua galerita	Sulphur-crested Cockatoo			159	OW	SM
Cacatua sanguinea	Little Corella			62	W	SM
Cacatua tenuirostris	Long-billed Corella			45		
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		31	OW	SM
Eolophus roseicapilla	Galah			196	O	
Zanda funereus	Yellow-tailed Black-Cockatoo			43	OW	SM

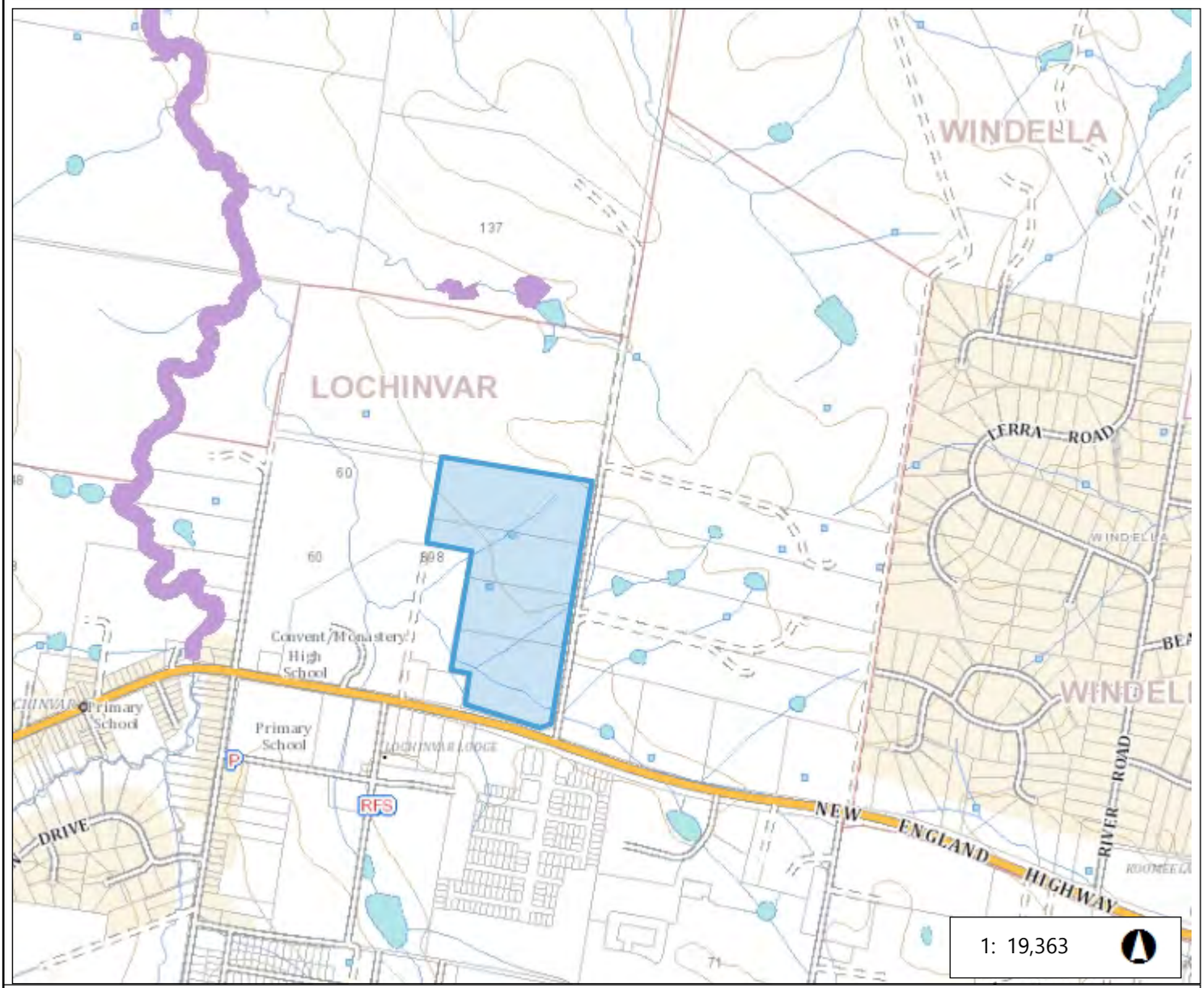
Scientific Name	Common Name	NSW status	Comm. status	Records	Observations	Survey Equipment
Alisterus scapularis	Australian King-Parrot			51	W	SM
Glossopsitta concinna	Musk Lorikeet			27		
Glossopsitta pusilla	Little Lorikeet	V		38	W	SM
Platycercus elegans	Crimson Rosella			15		
Platycercus eximius	Eastern Rosella			196		
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet			13		
Trichoglossus haematodus	Rainbow Lorikeet			484	OW	SM
Cacomantis flabelliformis	Fan-tailed Cuckoo			51		
Centropus phasianinus	Pheasant Coucal			20		
Tyto javanica	Eastern Barn Owl			14	O	
Tyto tenebricosa	Sooty Owl	V		18		
Ceyx azureus	Azure Kingfisher			13		
Dacelo novaeguineae	Laughing Kookaburra			299	W	SM
Todiramphus sanctus	Sacred Kingfisher			82		
Eurystomus orientalis	Dollarbird			46		
Cormobates leucophaea	White-throated Treecreeper			109	W	SM
Malurus cyaneus	Superb Fairy-wren			207	OW	SM
Malurus lamberti	Variegated Fairy-wren			79		
Acanthiza pusilla	Brown Thornbill			119	O	
Gerygone mouki	Brown Gerygone			28	O	
Neosericornis citreogularis	Yellow-throated Scrubwren			10	O	
Sericornis frontalis	White-browed Scrubwren			77	O	
Pardalotus punctatus	Spotted Pardalote			113		
Pardalotus striatus	Striated Pardalote			34		
Acanthorhynchus tenuirostris	Eastern Spinebill			157	OW	SM

Scientific Name	Common Name	NSW status	Comm. status	Records	Observations	Survey Equipment
Anthochaera carunculata	Red Wattlebird			106		
Anthochaera chrysoptera	Little Wattlebird			72	W	SM
Caligavis chrysops	Yellow-faced Honeyeater			265		
Manorina melanocephala	Noisy Miner			341	W	SM
Manorina melanophrys	Bell Miner			74	W	
Meliphaga lewinii	Lewin's Honeyeater			78		
Melithreptus brevirostris	Brown-headed Honeyeater			43		
Melithreptus lunatus	White-naped Honeyeater			18		
Myzomela sanguinolenta	Scarlet Honeyeater			66	W	SM
Philemon corniculatus	Noisy Friarbird			103		
Phylidonyris niger	White-cheeked Honeyeater			43	W	SM
Daphoenositta chrysoptera	Varied Sittella	V		23		
Pomatostomus temporalis	Grey-crowned Babbler				OW	
Coracina novaehollandiae	Black-faced Cuckoo-shrike			133		
Colluricincla harmonica	Grey Shrike-thrush			121	OW	SM
Pachycephala pectoralis	Golden Whistler			111	OW	SM
Pachycephala rufiventris	Rufous Whistler			79		
Oriolus sagittatus	Olive-backed Oriole			52		
Cracticus nigrogularis	Pied Butcherbird			130	OW	SM
Cracticus torquatus	Grey Butcherbird			182		
Gymnorhina tibicen	Australian Magpie			401	OW	SM
Strepera graculina	Pied Currawong			132	OW	
Rhipidura albiscapa	Grey Fantail			231	OW	SM

Scientific Name	Common Name	NSW status	Comm. status	Records	Observations	Survey Equipment
Rhipidura leucophrys	Willie Wagtail			117	O	
Corvus coronoides	Australian Raven			278	OW	
Corvus orru	Torresian Crow			4	W	SM
Grallina cyanoleuca	Magpie-lark			189	W	SM
Eopsaltria australis	Eastern Yellow Robin			121	OW	SM
Microeca fascinans	Jacky Winter			27		
Hirundo neoxena	Welcome Swallow			141	O	
Acridotheres tristis	Common Myna			125	W	SM
Sturnus vulgaris	Common Starling			18		
Zosterops lateralis	Silvereye			78	W	SM
Dicaeum hirundinaceum	Mistletoebird			32		
Neochmia temporalis	Red-browed Finch			91	OW	
Mammalia						
Antechinus stuartii	Brown Antechinus			137		
Petaurus breviceps	Sugar Glider			64	W	SM
Petaurus norfolcensis	Squirrel Glider	V		60		
Pseudocheirus peregrinus	Common Ringtail Possum			141	O	
Trichosurus vulpecula	Common Brushtail Possum			111	OW	SM
Macropus giganteus	Eastern Grey Kangaroo			50	O, P, F, W	SM
Wallabia bicolor	Swamp Wallaby			46	OW	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	67	W	SM
Nyctophilus geoffroyi	Lesser Long-eared Bat			40	O	
Vulpes vulpes	Fox			65	OWF	SM
Oryctolagus cuniculus	Rabbit			68		
Equus caballus	Horse			15	O	
Bos taurus	European cattle			12	O	

Appendix C – BOSET report

Biodiversity Values Map



983.7 0 491.83 983.7 Metres

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes

Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	22/08/2022 3:33 PM	**BDAR Required***
Total Digitised Area	211,964.8 sqm	
Minimum Lot Size Method	LEP	
Minimum Lot Size 10,000sqm = 1ha	450 sqm	
Area Clearing Threshold 10,000sqm = 1ha	2,500 sqm	
Area clearing trigger Area of native vegetation cleared	Unknown #	Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is '"likely to significantly affect threatened species' as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BMAT user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Department of Planning and Environment and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies will all aspects of the *Biodiversity Conservation Act 2016.*

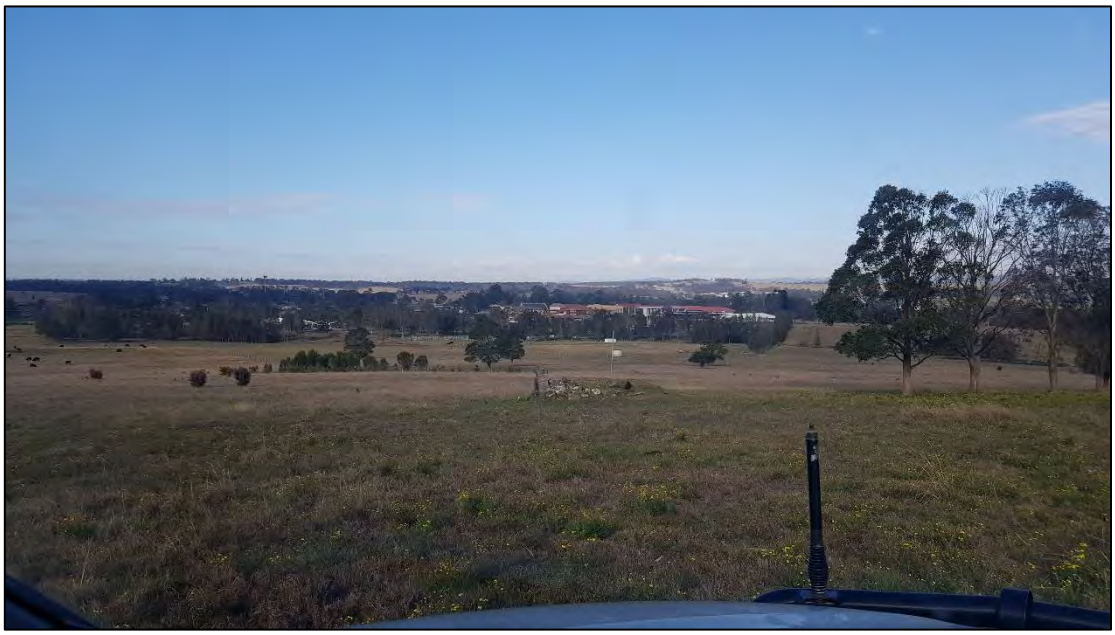
The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature_____ Date:22/08/2022 03:33 PM

Appendix D – Site Photographs



Above: Mid-north boundary – Looking south

Below: Mid-east boundary – Looking north

Above: Mid east boundary – Looking south west

Below: Mid east boundary – Looking south toward east boundary

Above: Largest dam in south west of site

Below: Melaleuca spp. in center of site

Above: Centre west of site looking south

Below: Farm shed containing several Nyctophilus geoffroyi individuals

Above: Planted PCT 1592 along riparian zone in the south west of site

Below: Predominantly exotic riparian area

Above: Stand of retained PCT 1728 at the southern boundary

Below: Predominantly exotic riparian zone in the south east corner with scattered Casuarina glauca

Appendix E – Author CVs

Natalie Black
Curriculum Vitae

Natalie works with AEP in the role of Senior Environmental Manager. She has extensive knowledge in environmental management, environmental planning, and report writing and assessment. With a detail understanding of planning, catchment management, coastal management and rehabilitation. Natalie has had a successful career with both state and local government in conservation, planning and field investigation roles. Natalie has also gained extensive communication skills and project management through her previous career in lecturing. Her background and experience in the ecological and planning fields is utilised in a diverse array of application in her current role.

Qualifications

- B.Sc (Hons), University of Newcastle, 2002 Sustainable Resource Management and Marine Science.
- Master Planning, University of Technology Sydney 2007.
- Certificate IV Training and Assessment at NSW TAFE 2012.
- BAM Assessor; accreditation number: BAAS19076.

Certification

- Evidence Gathering and Legal Process (Australian Institute of Environmental Health).
- Conflict Resolution Course (LGSA).
- Report Writing Course (LGSA).
- Powerful Presentation (LGSA).
- NSW Rural Fire Services Bush Fire Assessment
- Relocation of Threatened Species (Botanical Gardens Sydney).
- Sustainable Home Assessment Reduction Revolution.
- Flora and Fauna Survey Assessments Niche Environment and Heritage.
- First Aid TAFE.

Fields of Special Competence

- Environmental Planning
- Environmental Management and rehabilitation of catchments coastal waterways. Statement of Environmental Effects (preparation and assessing).
- Fish Passage
- Marine ecosystems including; mangroves, seagrasses, algae, Fauna and habitat assessment.
- vegetation.
- Communicating with a wide range of stakeholders.
- Development Application.
- Education in both Environmental and Planning industries.
- Koala Plans of Management.
- Policy Development.

Employment History
2019 to present AEP Senior Environmental Manager

2010 to 2019
Natalie Black is the Principal Environmental Planner for Black EARTH Environmental. Working a a range of projects, Bush Fire Assessments, Landscaping, Development Applications, Statements of Environmental Effect's, Environmental Management Plans, Sustainability Assessment of both private and businesses, sustainable gardens, environmental assessments for proposed projects and environmental advice and volunteering for local Sustainable Community Group and Landcare. During this time Natalie also lectured at Hunter TAFE teaching a range of environmental units both face to face and on-line to a varying range of qualification and levels.

2003 to 2010
Natalie was the Natural Resource Manager and Development Assessment Officer at Lismore City Council working with diverse range of professions such as engineers, town planners, environmental health officer, accountants, building surveyors, arborists, councillors. During this time the main projects were grants application, restoration projects, flora and fauna assessments, environmental legal adviser, bush fire assessments, strategic work, development application assessment (ranging from sheds to Designated Developments) and council development application team for internal projects, Council's for climate change, water wise programs and others. During 2006 -2007 Natalie was the lead Environmental Officer and Development Planner for the development of Council Plans of Management (POM). The POMs were for each parcel of land owned and managed lands, by Council. The parcels of land ranged from easements, parks and recreation areas to urban bushland, each POM provided clear guidelines and procedures for all works including civil, maintence and regeneration etc.

2002 to 2003 was a step into the Policy unit within DPI where Natalie was part of the team working on the Jervis Bay Indigenous Fishing Strategy, and the closure of Port Botany. Dealing with many stakeholders and running workshops with Ministers and community. During 2003 with Natalie was the North Coast Fish Passage Officer. Managing an Environmental Trust Grant of $1 million to remove 50 structures that block fish passage within the catchments of the North Coast. This project had all 50 sites contracted by the end of the 12 months with 70% of these projects commenced. This role allowed for the development of field assessments, independent work and communication with a range of stakeholders.

2000 saw the commencement of Natalie's career with NSW Department of Primary Industries (Fisheries Unit) in the Office of Conservation in Sydney. Natalie was part of the Conservation team that reviewed integrated development applications in the Sydney Region, with a focus on the seagrasses present within the estuaries. The assessments ranged from jetties to the Lane Cove Tunnel, North West T-Way and the expansion of the M7 and fish ladders.

BSc Honours Project was research paper into the variations of *Zostera capricorni* wrack located within the Tuggerah Lakes system in comparison to Brisbane Waters and Lake Macquarie.

ANGELA METCALFE

Curriculum Vitae

Angela works with AEP in the role of Ecologist. She graduated with a Bachelor of Environmental Science and Management (Honours), majoring in Ecosystems and Biodiversity. Angela has previously worked in bush regeneration before coming to AEP. Angela has experience in a variety of environmental work, both paid and unpaid in, flora and fauna terrestrial and aquatic field surveys, reporting, GIS and mapping and habitat restoration. Her background in ecological surveying projects and growing flora knowledge and experience is utilised in a diverse array of applications in her current role.

Qualifications

- Bachelor of Environmental Science and Management (Honours) (Ecosystems and Biodiversity) – University of Newcastle (2020)

Further Education & Training

- Class C NSW Driver's Licence
- NSW Construction White Card
- First Aid (Provide first aid HLTAID003)
- Chemcert and EPA ground applicator licence

Fields of Competence

- GIS and remote sensing
- Ecological field survey, covering terrestrial fauna and flora
- Experience in reptile handling and fauna trapping
- Growing proficiency in botanical surveys
- Adept experience in operating 4x4 vehicles

Relevant Employment History

2021 – Present **Ecologist**
Anderson Environment & Planning, Newcastle

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation. Expanding knowledge of field survey methodology, report writing, mapping and data manipulation.

2020 **Conservation Field Officer**
SkyLand Management, Bolwarra Heights

2019 **Research Assistant**
University of Newcastle, Callaghan

Darcy Kilvert

Curriculum Vitae

Darcy works with AEP in the role of Ecologist. He graduated with a Bachelor of Science majoring in Biology. Darcy has worked as a Bush Regenerator for over 5 years and undertaken numerous volunteering projects in the environmental sector. These experiences have given him experience in flora & fauna identification, surveying, reporting, mapping, and ecological restoration

Qualifications

- Bachelor of Science (Biology), The University of Newcastle, completed in September 2021

Further Education & Training

- Class C NSW Driver's Licence
- NSW Construction White Card
- Working at Heights
- Chemcert and EPA ground applicator licence
- Apply First Aid

Fields of Competence

- Flora & fauna surveying both terrestrial and aquatic
- Growing proficiency in botanical surveys
- Adept experience in operating 4x4 vehicles

Relevant Employment History

2021 – Present — **Ecologist**
Anderson Environment & Planning, Newcastle

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation. Expanding knowledge of field survey methodology, report writing, mapping and data manipulation.

2018 - 2021 — **Senior Field Supervisor**
Traditional Aussie Gardens, Newcastle

2015 - 2017 — **Field Worker**
Newcastle City Council, Newcastle

Samuel V. Rayfield

Curriculum Vitae

Samuel works with AEP in the role of Ecologist. He graduated with a Bachelor of Communication and is working towards completion of a Diploma in Conservation and Ecosystems Management. Samuel has previously worked in ecological restoration and land management before coming to AEP. Samuel has experience in a variety of environmental work, both paid and unpaid, including flora and fauna terrestrial and aquatic field surveys, weed management, reporting, GIS and mapping and habitat restoration. His background in ecological surveying projects and growing flora knowledge and experience is utilised in a diverse array of applications in his current role.

Qualifications

- Working at Heights Certificate
- First Aid & CPR Cert – HLTAID003
- Driver Licence – Class C, unrestricted
- National Police Check
- Working with Children Check

Further Education & Training

2020	**Introduction to Anatomy & Physiology; Individual Determinants of Health** Latrobe University
2017	**Diploma in Conservation and Land Management** Hunter TAFE – partial completion
2012 –2016	**Bachelor of Communication** University of Newcastle

Relevant Employment History

2022 – Present	**Ecologist** Anderson Environment and Planning, Newcastle
2020	**Bush Regenerator** Litoria Ecological Restoration Services
2018 – 2020	**Bush Regenerator** Toolijooa Environmental Restoration
2016 – 2017	**Bush Regenerator** Newcastle City Council

RACHAEL SMETHURST

Curriculum Vitae

Qualifications

- Construction Industry White Card
- Open Manual Drivers Licence
- Wildlife Identification & Handling
- Venomous Snake Handling
- Apply First Aid & CPR
- Working Safely at Heights
- Rabies and Tetanus Vaccinations

Further Education & Training

June 2013- 2017

- BACHELOR OF SCIENCE
- Zoology and Ecology
- University of Queensland
- June 2013 – June 2017

Fields of Competence

- Community education
- Human-wildlife conflict resolution
- Fauna & flora identification
- Data analysis & reporting
- Problem-solving
- Attention to detail
- Accountability

- Monitor fauna, flora and waterways to measure and analyse ecological health, biodiversity and the outcomes of environmental programs and projects.

- Plan & implement environmental restoration projects, including project design, engagement & management of contractors and the completion of quality assurance audits.

Relevant Employment History

2022 – Present	**Ecologist** Anderson Environment & Planning, Newcastle
Dec 2018 - March 2020	**Research Assistant** Griffith University
July 2017 – Dec 2018	Fauna Spotter/Catcher/Suburban Wildlife Management QLD Fauna Consultancy

Volunteering

June 2015 – Ongoing	**Bat Conservation and Rescue QLD**
2017 – 2020	**Tolga Bat Hospital**