Flora and Fauna Assessment Report

61 Foord Road Run-o-Waters NSW 2583

Lot 336/-/DP750015

Prepared for Tina Dodson | General Manager

Premise | 3/31 Clinton Street Goulburn NSW 2580

18 March 2025

Ecology CONSULTING

About this document

This document has been approved for release to client by Principal Ecologist, Lesley Peden, Accredited Biodiversity Assessor NSW licence BAAS19005.

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Document Tracking

Version	Document Author	Reviewer	Date of review
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Abbreviations and common terms

AOBV	Area of Biodiversity Value declared under the NSW BC Act
APZ	Asset Protection Zone
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BOSET	Biodiversity Offset Scheme Entry Threshold
CE	denotes a species, population or ecological community listed as Critically Endangered under Commonwealth and/or State legislation
Cwlth	Commonwealth
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPIE	Department of Planning, Industry and Environment
E	denotes a species, population or ecological community listed as Endangered under Commonwealth and/or State legislation
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
FFA	Flora and Fauna Assessment
FM Act	Fisheries Management Act 1994
ha	Hectare
HTE	High Threat Exotic – a type of declared weed in NSW
IBRA	Interim Biogeographic Region of Australia
km	Kilometres
KTP	Key Threatening Process listed under Commonwealth and/or State legislation
LEP	Local Environmental Plan—a type of planning instrument made under the EP&A Act
LGA	Local Government Area
LLS	Local Land Service
m	Metres
MNES	Matters of National Environmental Significance
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
NVR	NSW Native Vegetation Regulatory
PCT	Plant Community Type
SEPP	State Environmental Planning Policy—a type of planning instrument made under the EP&A Act
sp./spp.	species (singular) / species (plural)
study area	the area described in Study area of this report
subsp.	subspecies
SVTM	NSW State Vegetation Type Map
TEC	Threatened Ecological Community or equivalent (terms may vary across jurisdictions)
V	denotes a species, population or ecological community listed as Vulnerable under Commonwealth and/or State legislation
var.	Variety
VIS	Vegetation Integrity Score
WoNS	Weeds of National Significance

1 Introduction

Ecology Consulting has been commissioned by Premise, on behalf of the landholder, to prepare a Flora and Fauna Assessment (FFA) report to be submitted with a development application. The development application seeks consent for a proposed subdivision at 61 Foord Road, Run-o-Waters 2580 (Lot 336 DP 750015).

1.1 Purpose and scope of this report

The purpose of this report is to provide an expert assessment of the:

- biodiversity present or likely to be present in the study area,
- likely ecological impacts of the proposed work, both before and after mitigation, and
- requirements of key biodiversity legislation, including whether the proposed work meets certain thresholds for significant impacts on biodiversity and requires entry to the Biodiversity Offset Scheme (BOS).

1.2 Study area

The study area is located within a rural locality in Goulburn, approximately 705 – 730 m above sea level, to the west of Goulburn's major urban area (34.7566550° S, 149.6849346° E) as presented in **Figure 1**. It is within:

- Goulburn Mulwaree Council Local Government Area (LGA),
- South East Local Land Services (LLS) Management Area, and
- Bungonia Subregions within the NSW South Eastern Highlands region according to the Interim Biogeographic Regionalisation of Australia (IBRA).

The study area is bounded by Foord Road to the west, and a side road joining Foord Road to the north. The southern and eastern boundaries of the study area are existing fence lines sharing with the neighbouring Lots. An aerial view of the study area and surrounds is provided in **Figure 2**.

The study area itself comprises approximately 9.75 hectares (ha) and according to the current Goulburn Mulwaree Local Environmental Plan (LEP) 2009, it:

- is zoned RU6 – Transition,
- has a minimum lot size of 2 ha, and
- is zoned Terrestrial Biodiversity.

The study area consists of:

- native woodland and forest,
- a small dam,
- areas of historical clearing and modification, and
- dwellings and associated structures in proposed lot 2, and
- boundary fences.

FIGURE 1: STUDY AREA IN ITS REGIONAL CONTEXT

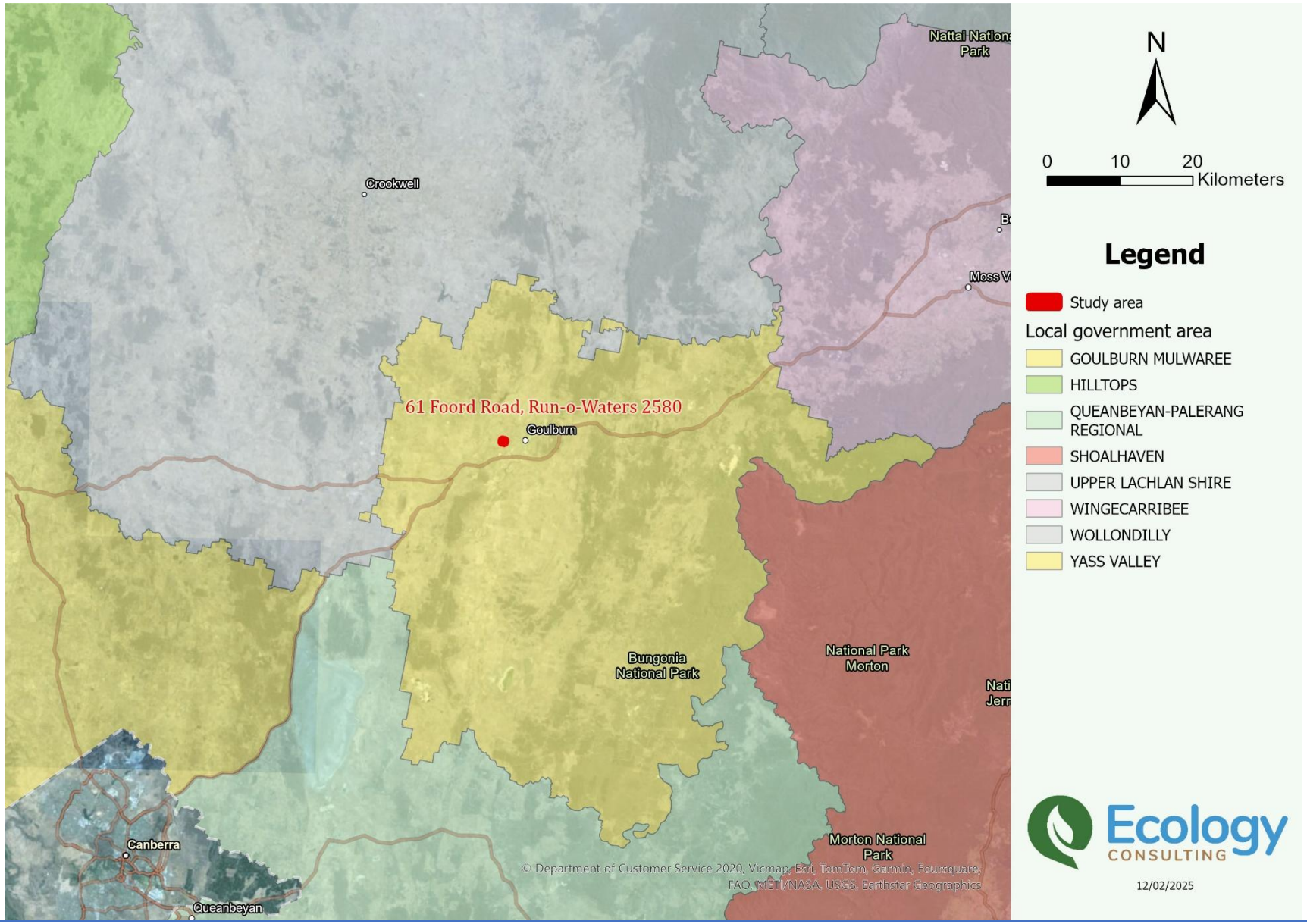


FIGURE 2: AERIAL VIEW OF THE STUDY AREA

1.3 Work area

The client has advised that the proposed work will involve the subdivision of the study area into two lots (identified as proposed Lots 1 and 2).

A nominated dwelling site (building envelope) and associated structures has been identified in proposed Lot 1. The existing dwelling and associated structures in Lot 2 will be retained and will require establishment of an asset protection zone (APZ) (**Figure 3**, **Figure 4**, **Figure 5** and **Figure 6**).

The subdivision will align with the existing fence lines and land use within the lot is considered likely to remain the same, that being agricultural. It is recommended as a precaution to preserve native vegetation that occurs close to the lot boundaries that a covenant be placed on the title of the land restricting the application of the Rural Boundary Clearing Code (see **Section 5.6**). As fence lines are already established and do not require further works, no boundary fence clearing has been considered by this report.

Overall, the total development footprint is approximately 0.54 ha consisting of the following internal works:

- construction of a new building envelope in proposed Lot 1,
- establishment of a bushfire Asset Protection Zone (APZ) for the proposed building envelope in Lot 1,
- establishment of an APZ for the existing building envelope in Lot 2,
- construction of a waste water management system including an effluent disposal area, pipeline, and AWTS for the proposed dwelling in proposed Lot 1, and
- construction of a driveway and bushfire-compliant turning bay providing access from Foord Road to proposed Lot 1.

FIGURE 3: SITE PLAN (CLIENT SUPPLIED)

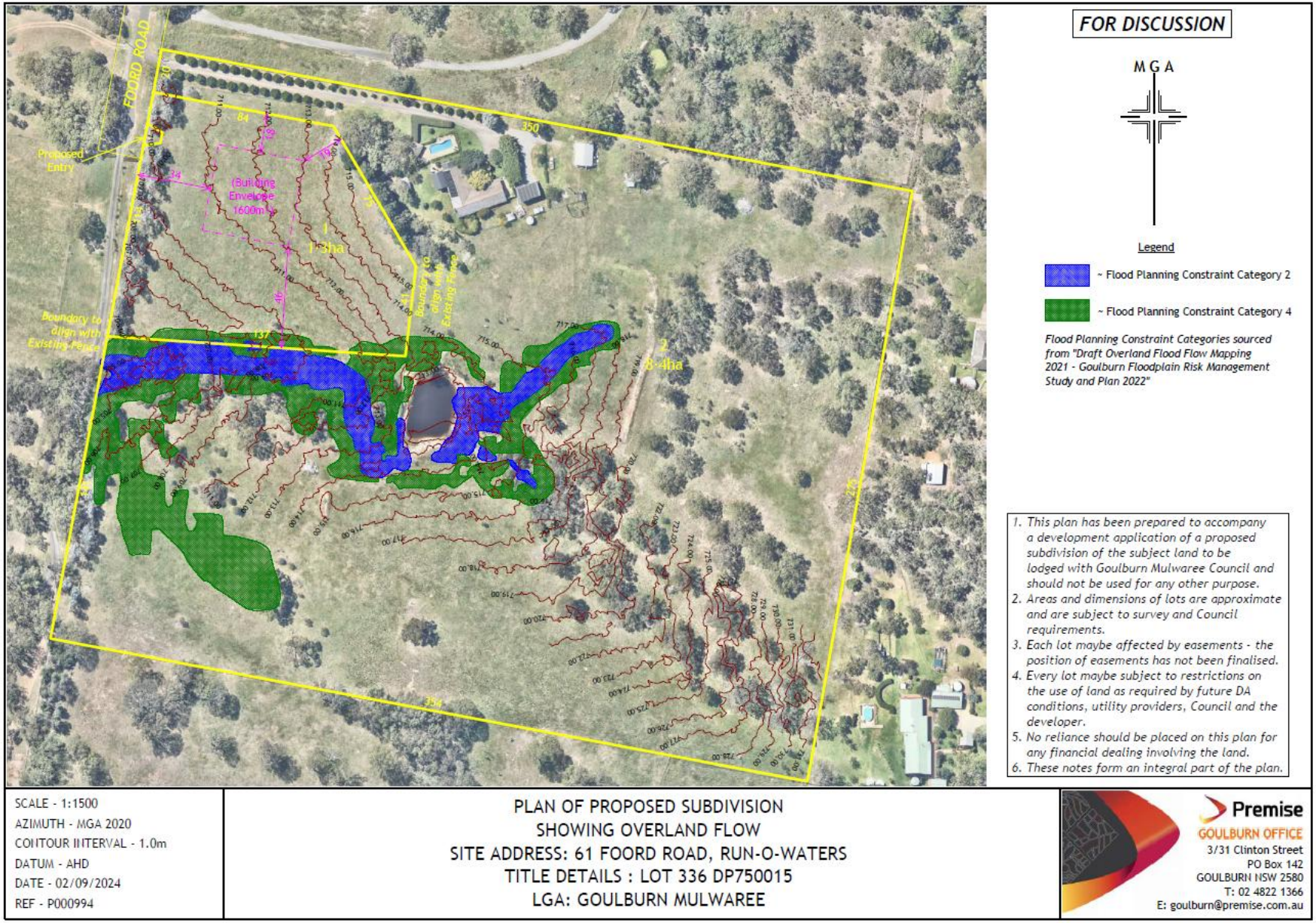


FIGURE 4: SITE PLAN (CLIENT SUPPLIED)

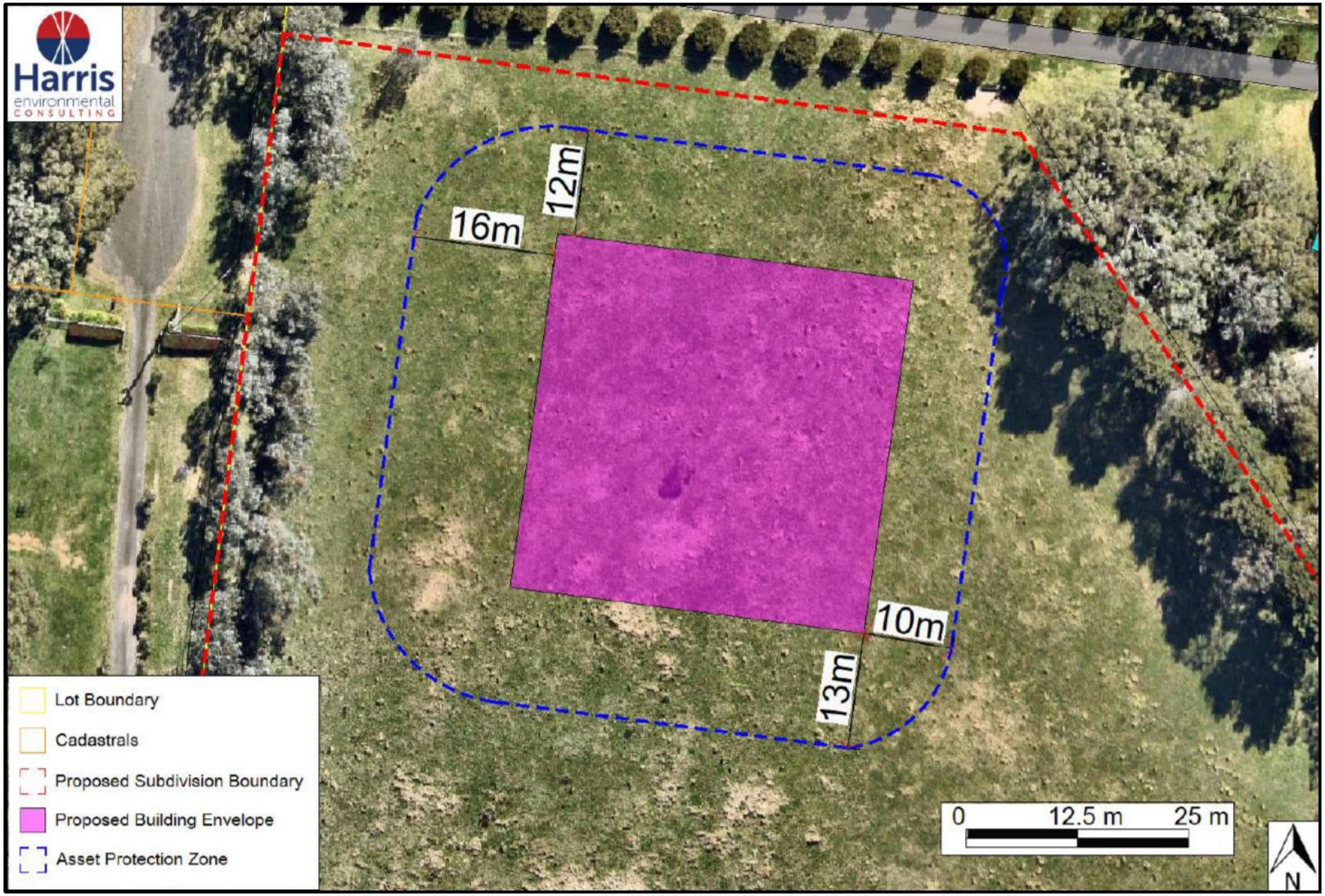


FIGURE 5: SITE PLAN (CLIENT SUPPLIED)

FIGURE 6: SITE PLAN (CLIENT SUPPLIED)

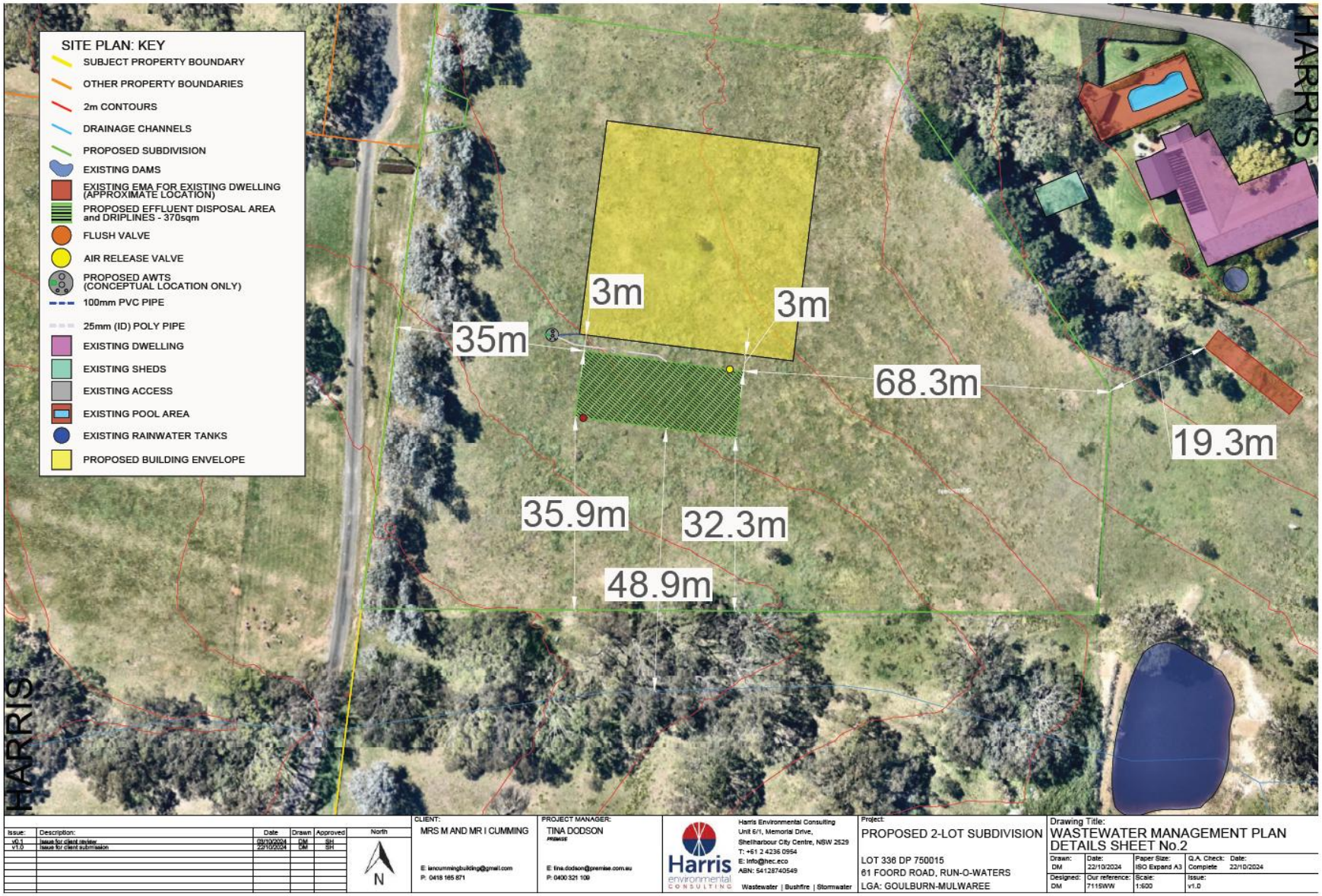


FIGURE 7: SITE PLAN

FIGURE 8: SITE PLAN (ZOOM IN TO WORK AREA)

2 Methodology

This report was prepared, based on:

- desktop data published by relevant publications and data bases,
- field data collected on site by professional ecologists, and
- development proposal plans supplied by the landholder.

2.1 Desktop assessment

Desktop research was undertaken to identify site characteristics, landscape context and threatened species and ecological communities known or likely to occur within 10 km of the study area. Databases and search tools included the:

- Commonwealth EPBC Act Protected Matters Search Tool;
- National Species Profiles and Threats (SPRAT) database;
- National Atlas of Living Australia;
- BioNet Atlas of NSW Wildlife;
- NSW Threatened Biodiversity Profile tool;
- NSW Biodiversity Values Map;
- NSW eSpade soil and land information database;
- NSW Bush Fire Prone Land data portal;
- NSW Draft Native Vegetation Regulatory Map;
- NSW Koala Habitat Suitability Model;
- SEED environmental data portal; and
- eBird data for Goulburn Wetlands hotspot.

2.2 Field inspections (ground truthing)

Field inspection was conducted by Principal Ecologist Lesley Peden on 5 November, 11 November, 21 November, and 22 November 2024. Survey work was undertaken to assess any biodiversity values that may be present and to determine the type and condition of vegetation and habitat in the study area. Field inspections involved wandering transects throughout the study area, targeted surveys for threatened flora and fauna and formal floristic plots, with a particular focus was on the work area.

2.2.1 Comprehensive flora and vegetation surveys

Flora and vegetation survey work involved a wandering meander across the study area with data collected, and observations made about:

- plant species present onsite,
- plant community types (PCTs) and distribution. These would be identified with reference to species composition and structure, landscape position and the known geographical distribution of plant communities, and
- habitat and presence of threatened flora species known or likely to occur within the study area.

The NSW Biodiversity Assessment Method (BAM) forms part of the Biodiversity Offsets Scheme (BOS) under the NSW *Biodiversity Conservation Act 2016* (BC Act) and provides a consistent method of vegetation assessment to assess impacts on biodiversity values from a proposed work. Three full-floristic and vegetation integrity survey plots (BAM plots) were completed to quantifiably identify the value of biodiversity within proposed impact areas as well as areas of greater biodiversity value that are present within the study area, and to present the standardised condition of vegetation. As part of this process:

- the attributes of the plot were surveyed in accordance with the NSW Government's BAM method; and
- plot data was entered into the NSW Government's Biodiversity Offsets Calculator to enable calculation of vegetation integrity.

2.2.2 Hoary Sunray targeted surveys

Threatened species surveys were undertaken for Hoary Sunray (*Leucochrysum albicans* var. *tricolor*), following the NSW guidelines for Surveying threatened plants and their habitats.[1]

The parallel field traverse survey approach was employed for Hoary Sunray, involving systematic searches along a grid of parallel traverses set at defined distances apart. In addition, incidental searches were conducted concurrently with all other field surveys on the 5, 11, 21, 22 November 2024. The parallel traverse was set up with a 5-10 m separation distance across the work area on 5 November 2024. The survey was carried out by one ecologist over a 1.5 hour timeframe. Traverses were recorded on a GPS device and the extent of targeted surveys is shown in **Figure 10.**

2.2.3 Fauna and habitat surveys

Fauna surveys were undertaken concurrently with vegetation surveys. A variety of survey work was carried out to assess what fauna were present or likely to be present in the study area. This involved traversing the study area with surveys focusing on an active search for and data collected on key habitat types such as:

- hollow-bearing trees and associated attributes such as size of hollows (diameter) and distance from the ground for each hollow,
- nests,
- fallen timber and leaf litter,
- aquatic habitat (soaks, dams etc.), and
- other potential foraging/breeding habitats for native/threatened species.

Fauna field surveys undertaken comprised several approaches to detect threatened/non-threatened fauna species likely to occur within the study area and the vicinity. This involved the following surveys:

- active searches for tracks, scat, and other evidence of animals,
- opportunistic fauna surveys (walking and stationary), and
- identification of frogs and birds through calls.

[1] Department of Planning, Industry and Environment. Surveying Threatened Plants and their Habitats Survey Guide Biodiversity Assessment Method 2020.

2.2.4 Key's Matchstick Grasshopper targeted surveys

Targeted transect surveys for Key's Matchstick Grasshopper (*Keyacris scurra*) were conducted within the optimal survey period as listed on BioNet Threatened Biodiversity Profiles (TBDC). Surveys were in accordance with methodology developed by NSW DCCEEW Senior Threatened Species Officer Rob Armstrong and Insect Ecologist Dr Roger Farrow.

Active transect searches were undertaken across the work area on 5, 11, 21 November 2024 to identify mature grasshoppers. The surveys were conducted between 10 am to 4 pm on warm sunny days when the species are likely to be active **(Section 2.4**). A total of 9 survey transects, spaced 10 m apart, were conducted across suitable habitat by one ecologist, amounting to a total effort of 4.5 person-hours (**Figure 11**). The Ecologist employed a slow meander shuffle through the grass to flush out insects and to capture them carefully without injury. Surveying was concentrated on areas with greater native ground layer coverage.

FIGURE 9: BAM PLOT LOCATIONS

FIGURE 10: HOARY SUNRAY TARGETED SURVEY TRACKS

FIGURE 11: KEY'S MATCHSTICK GRASSHOPPER TARGETED SURVEY TRACKS

2.3 Survey limitations

Conditions at the time of fieldwork were suitable to enable most plant species in the study area to be identified with confidence. However, the results of fieldwork may not be complete because some plants and animals are only detectable at certain times of the year, or after particular weather events, and some species can only be identified to species level when in flower.

For fauna, it should also be noted that fieldwork was not intended to provide a comprehensive survey of all animal species that may utilise the site over time. However, habitat surveys were undertaken for the quantity and quality of habitat that may be suitable for different species.

The level of investigation was considered appropriate given the condition of the study area, scope of works and biodiversity values present or likely present.

2.4 Weather conditions

Prevailing weather conditions during the surveys (highlighted) and during the lead-up to the survey is presented in **Table 1**. The data was collated for the nearest Bureau of Meteorology weather station at Goulburn Airport AWS (station 070330).

TABLE 1: WEATHER CONDITIONS PRIOR AND DURING FIELD SURVEYS

Survey undertaken	Date	Min Temp (°C)	Max Temp(°C)	Rainfall (mm)	Max Wind Gust (km/h)
N/A	2 November 2024	8.7	21.0	0	41
N/A	3 November 2024	6.7	29.6	0	65
N/A	4 November 2024	11.6	24.7	0	61
Hoary Sunray targeted surveys **Key's Matchstick Grasshopper targeted surveys**	**5 November 2024**	**11.7**	**23.7**	**0.4**	**39**
N/A	8 November 2024	6.1	22.4	0	61
N/A	9 November 2024	3.1	24.8	0	35
N/A	10 November 2024	8.8	25.3	0	46
Key's Matchstick Grasshopper targeted surveys	**11 November 2024**	**11.1**	**22.7**	**0**	**30**
N/A	18 November 2024	8.7	22.4	14.4	52
N/A	19 November 2024	11.1	23.3	0	37
N/A	20 November 2024	8.7	25.6	0	37
Key's Matchstick Grasshopper targeted surveys	**21 November 2024**	**9.7**	**25.6**	**0**	**31**
Comprehensive flora and vegetation surveys **Fauna and habitat surveys**	**22 November 2024**	**6.5**	**31.0**	**–**	**–**

3 Existing environment

3.1 Landscape context

3.1.1 IBRA Bioregions and subregions

Under the Interim Biogeographic Regionalisation for Australia (IBRA v7), the study area is located in the Bungonia Subregions of the South Eastern Highlands region.

3.1.2 NSW Mitchell Landscape Ecosystem[2]

NSW (Mitchell) Landscapes were developed for conservation planning and reserve establishment purposes, to provide consistent state-wide ecological units finer than the existing bioregions and sub-regions[3]. They group ecosystems into larger meso-ecosystems representing natural entities based on topography and geology, and each landscape's name includes both location and descriptive information.

The study area primarily occurs in the South-eastern Highlands Monaro Landscape Ecosystem, Gundary Plains as detailed below.

> *" Wide open valleys with abandoned terraces and Quaternary lakebeds on lower Devonian siltstone, sandstone, andesite and quartz felspar porphyry. General elevation 75m, local relief <30m. Yellow, hard setting texture-contrast soils with distinct bleached A2 horizons. Grasslands of spear grass (Austrostipa sp.) and kangaroo grass (Themeda triandra) with small clumps of sparse snow gum (Eucalyptus pauciflora) on rounded rocky hills and sandy lunettes of former lakes."*

3.1.3 Topography, geology, and soils

The study area slopes downward from the east towards the west. Elevation ranges from approximately 710 m at the western part of the study area to around 730 m at its highest point at the eastern boundary of the study area.

Desktop research from NSW eSpade soil and land information database shows that the study area is primarily situated within the Monastery Hill Soil Landscape, which has formed on teschenite (dolerite) intrusions. Monastery Hill Soil Landscape is characterised by undulating rises with a relief of 10 – 30 m and slope gradients < 10 %, with permanent erosional stream channels, occurring on soils from alluvial-colluvial material derived from the parent rock.[4]

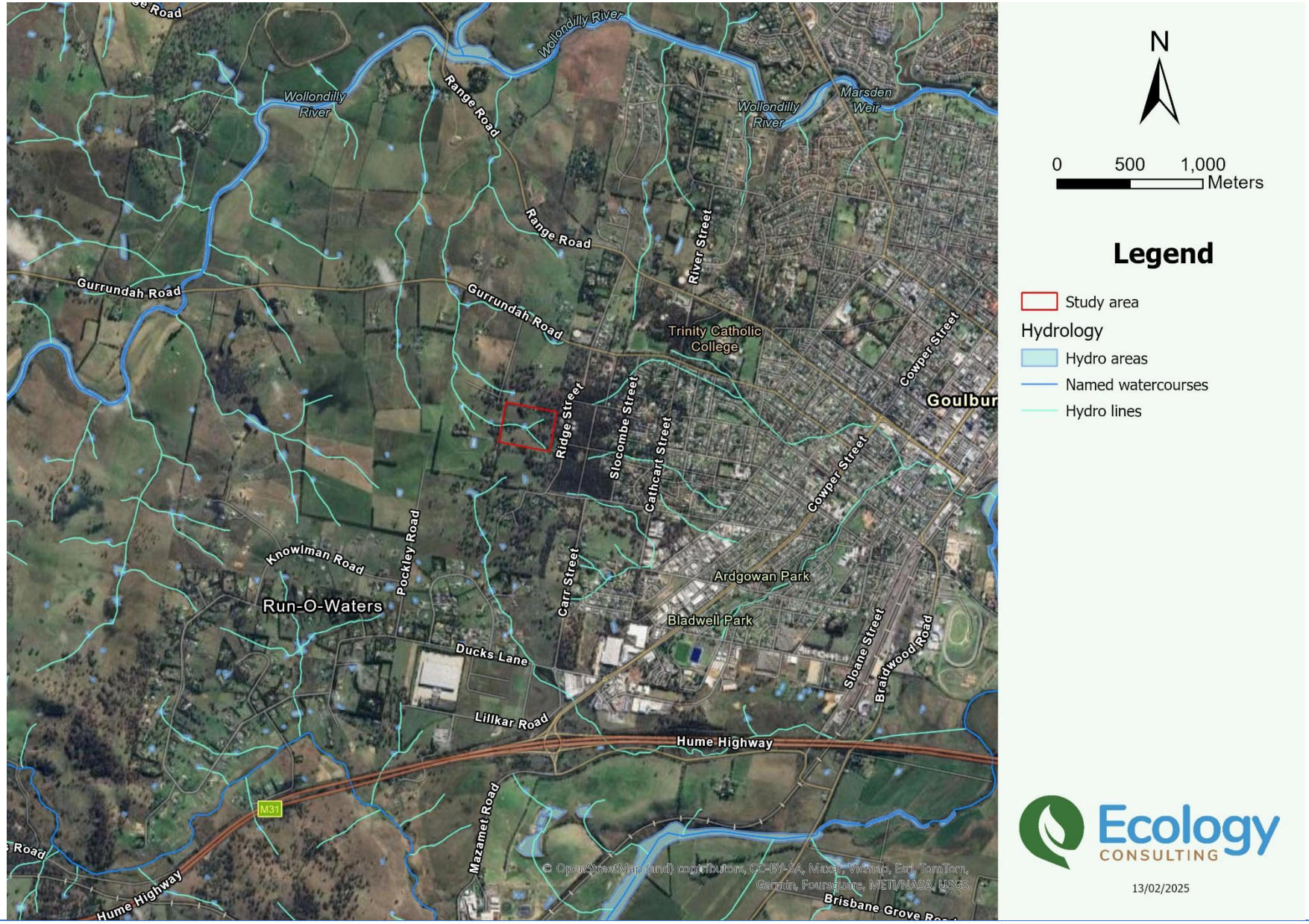
3.1.4 Hydrology

The study area features a farm dam fed by two unnamed drainage lines–one from the northeastern corner and the other from the southeastern corner (**Figure 2**). These drainage lines merge at the dam and continue as a single flow toward the west. The drainage line then flows approximately 2.4 km north beyond the study area and eventually feeds into the Wollondilly River.

Fieldwork indicates that sections of the drainage line within the study area hold limited water. The condition of the present dam within the study area is poor due to direct stock access which has reduced fringing riparian vegetation heavily and lead to a diminished water quality through increased turbidity (**Photo 5**).

[2] Information in this section sourced from Descriptions for NSW (Mitchell) Landscapes (2002).
[3] NSW Government Seed dataset, see https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1
[4] https://www.environment.nsw.gov.au/eSpade2WebApp

FIGURE 12: HYDROLOGY



3.2 Biodiversity context

The study area is located within a rural locality in Goulburn NSW, approximately 2.5 km west of the Goulburn town centre, and forms part of a historically modified agricultural land system with patches of remnant woodland and forest.

Remnant forest patches within the study area, along with scattered woodland patches in the surrounding landscape—particularly within Category 2 regulated land as identified on the draft native vegetation regulatory map (**Figure 13**)— serves as a crucial wildlife corridor. To the west of Ridge Street, a continuous woodland patch provides essential connectivity for native birds, mammals, and reptiles.

Several moderate to high-quality biodiversity areas are also present in the broader landscape. Notably, Goulburn Wetland, located within 5 km of the study area, provides valuable wetland habitat. Additionally, sizable patches of uncleared woodland and forests lie to the east of the study area, including Rocky Hill War Memorial and Governor Hills.

The broader landscape also features protected areas managed by the NSW National Parks and Wildlife Service (NPWS), as well as several key river systems, **(Figure 14**):

- Wollondilly River and ~ 2.5 km north,
- Rossi Reservoir ~ 2.6 km north,
- Green Gully Creek, ~ 3.6 km northwest,
- Run O' water Creek ~ 2.6 km south,
- Mulwaree River ~ 3 km southwest,
- Ryans Creek ~4.6 km west,
- Gundary Creek ~4.5 km southeast,
- Pomaderris Nature Reserve ~ 12.4, southwest and
- Narrangarril Nature Reserve ~15 km northeast.

These are examples of potentially biodiverse areas in the broader landscape, and although these areas mostly do not share common ecological communities of the study area, they might share many similar individual species that may have utilised the study area prior to clearing. The study area also sits within a network of hydro lines and streams which provide riparian connectivity.

FIGURE 13: DRAFT NATIVE VEGETATION REGULATORY MAP

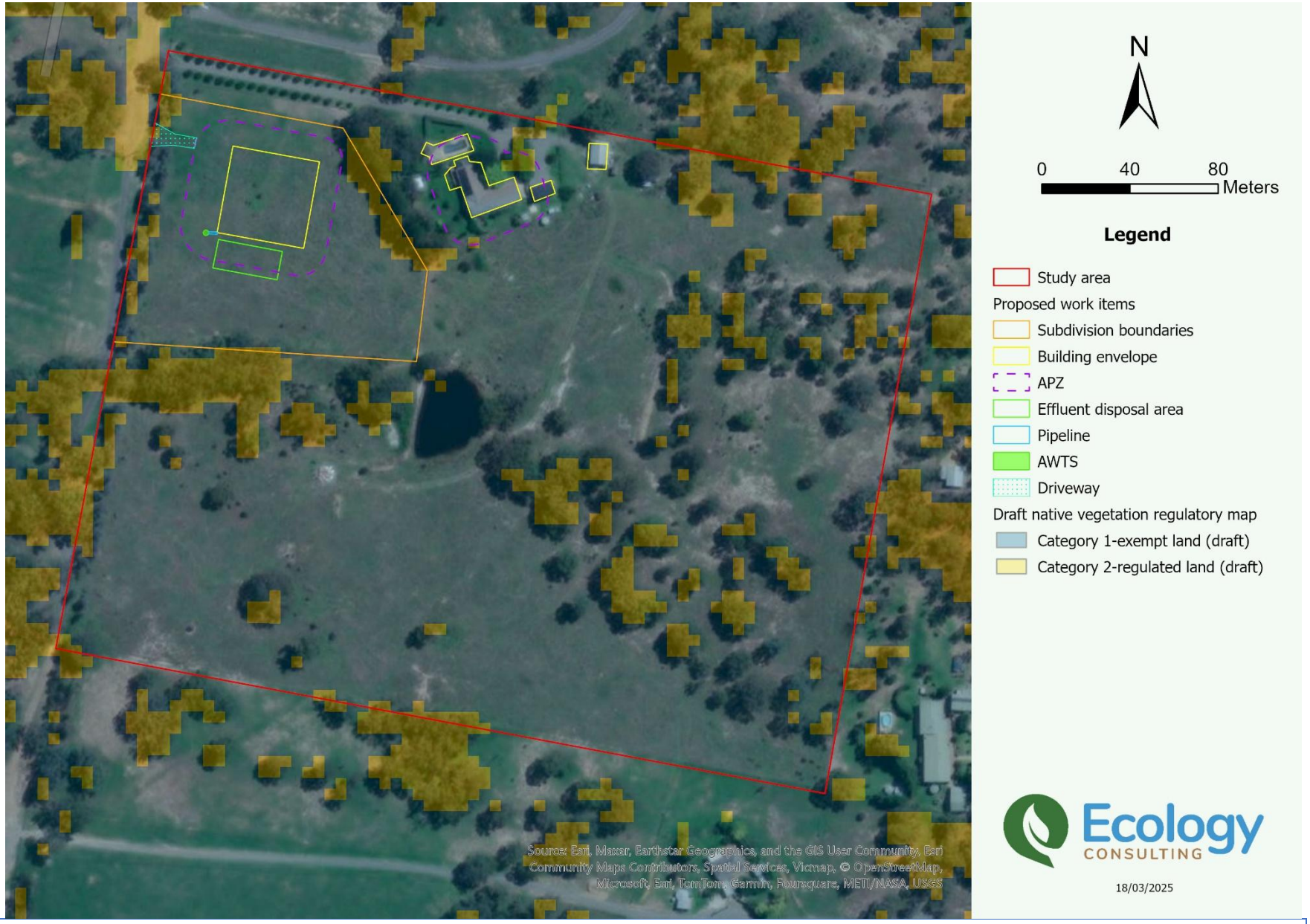
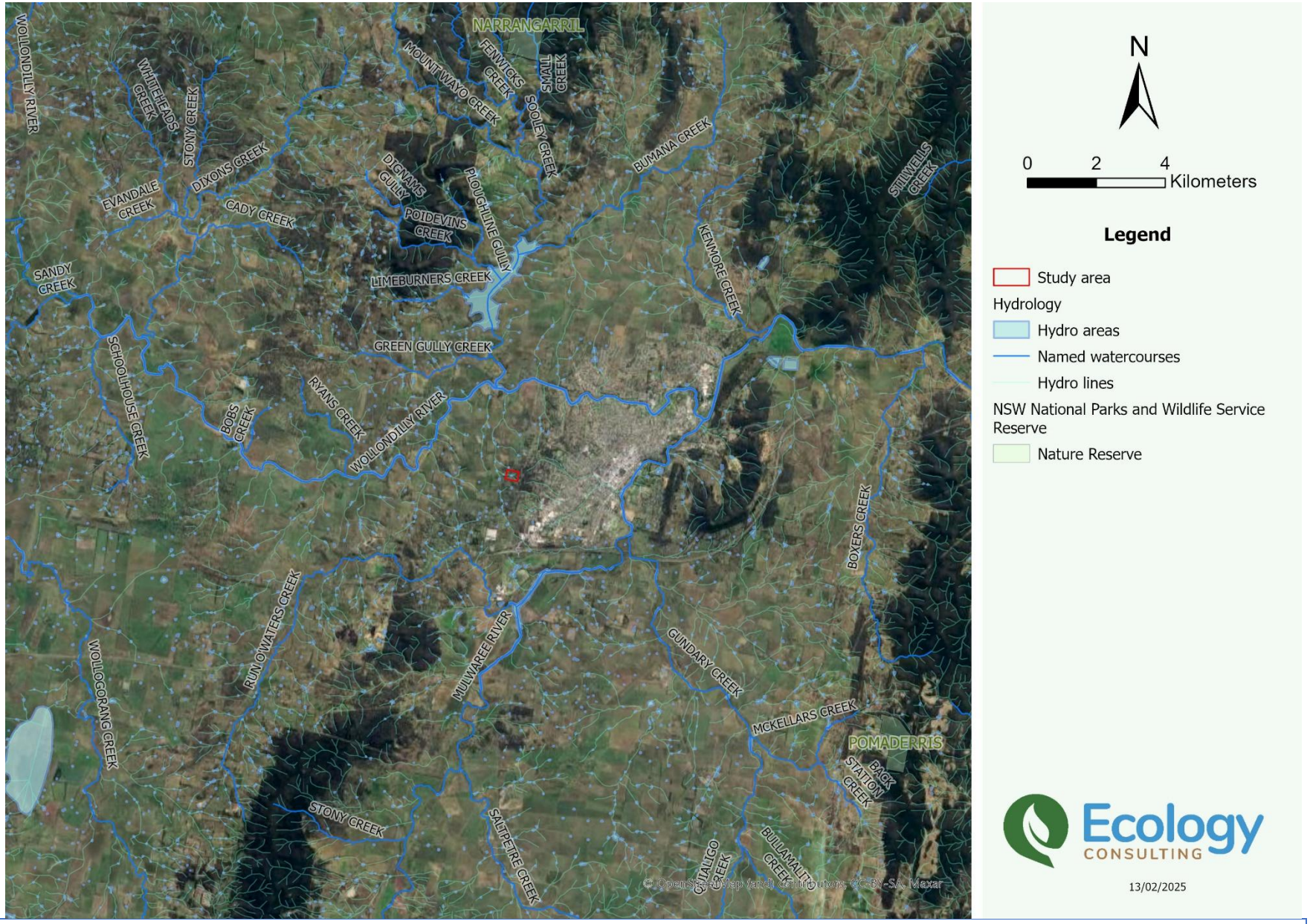


FIGURE 14: BIODIVERSITY CONTEXT MAP



3.2.1 Vegetation

Native vegetation within the study area has been largely modified through historic agricultural practices such as clearing, cropping and grazing. Despite this, the area retains a mosaic of remnant woodland, mixed native and exotic grassland and some areas containing derived native grassland. A complete list of all plant species observed during on-site survey is provided in **Appendix A** and summarised below.

Overstory

Remnant woodland patches are scattered throughout the study area, primarily along a hydrological corridor that runs through the centre of the property and is more concentrated in the east. The woodland comprises mature native canopy species, including Blakely's Red Gum (*Eucalyptus blakelyi*), Yellow Box (*E. melliodora*), and planted Argyle Apple (*Eucalyptus cinerea*). While these trees are generally in good health, regeneration in Lot 1 was limited. In contrast, Lot 2 exhibited a moderate level of upper canopy eucalypt regeneration. (**Photo 1**).

Midstory

Native midstory layer within the study area has been largely removed, and only eucalyptus regeneration and exotic shrubs persist (**Photo 2**). Exotic shrubs include African Boxthorn (*Lycium ferocissimum*), and Briar Rose (*Rosa rubiginosa*).

Understory

The understory vegetation in Lot 1 has been significantly modified and consists mainly of exotic pasture grasses, disturbance-tolerant native grasses and forbs, exotic broadleaf species, and invasive exotic grasses and herbaceous species, including but not limited to:

- Serrated Tussock (*Nassella trichotoma*),
- Chilean Needlegrass (*N. neesiana*),
- St John's Wort (*Hypericum perforatum*),
- Pattersons Curse (*Echium plantagineum*),
- African Lovegrass (*Eragrostis curvula*),
- Cocksfoot (*Dactylis glomerata*),
- Phalaris (*Phalaris aquatica*), and
- Wimmera Ryegrass (*Lolium rigidum*).

These changes are largely due to its history of cropping, pasture modification, and grazing (**Photo 3**). Remnant woodland in Lot 2 has a relatively higher proportion of native grasses and forbs, including but not limited to:

- Weeping Grass (*Microlaena stipoides*),
- Wallaby Grass (*Rytidosperma* spp.),
- Tall Stipa (*Austrostipa bigeniculata*),
- Corkscrew Speargrass (*A. scabra*),
- Red Grass (*Bothriochloa macra*),
- Juncus (*Juncus filicaulis*),
- Variable Plantain (*Plantago varia*),

- New Holland Daisy (*Vittadinia muelleri*),
- Climbing Saltbush (*Einadia nutans*), and
- Star Cudweed (*Euchiton involucratus*).

However, native forbs remain limited in both abundance and diversity.

PHOTO 1: REMNANT WOODLAND PATCHES WITHIN LOT 2

PHOTO 2: OVERSTORY AND MIDSTORY VEGETATION WITHIN LOT 2

PHOTO 3: MODIFIED GRASSLAND WITHIN LOT 1

3.2.1.1 Plant community types (PCTs)

The study area has been heavily disturbed and modified from original condition through extensive agricultural activities, primarily cropping and grazing. Despite the study area's extent of modification, remnant vegetation both in the under and overstory has been assessed as aligning with Plant Community Type (PCT) 3373: Goulburn Tableland Box-Gum Grassy Forest (**Figure 15**). This is supported by the State Vegetation Type Map (SVTM), a regional-scale map that maps the distribution of PCTs, vegetation class and vegetation formation across all tenures in NSW.

The determination of presence for PCT 3373 is displayed in **Table 2** respectively. The BioNet Vegetation Classification identifies this PCT as being associated with the NSW listed threatened Critically Endangered Ecological Community (CEEC) *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions* (Box Gum Woodland), discussed further in **Section 3.2.3**.

PCT Justification

TABLE 2: PCT (3373) DETERMINATION AND DESCRIPTION

PCT filter input and determination		
Observed vegetation formation	Grassy Woodlands	
Vegetation class	Southern Tableland Grassy Woodlands	
IBRA Region	South Eastern Highlands (SEH)	
IBRA Sub-region	Bungonia	
Species used for PCT justification	**Species name**	**Estimated percentage cover (%)**
	Blakely's Red Gum (*Eucalyptus blakelyi*)	<40

	Yellow Box (*Eucalyptus melliodora*) (Outside plot)	<5
	Weeping Grass (*Microlaena stipoides*)	<20
	Wallaby Grass (*Rytidosperma* spp.)	<10
	Tall Stipa (*Austrostipa bigeniculata*)	<5
	Red Grass (*Bothriochloa macra*)	<5
	Scrambled Eggs (*Goodenia hederacea*)	<1
	Common Wheatgrass (*Anthosachne scabra*)	<5
	Fine Matrush (*Lomandra filiformis*)	<1
	Star Cudweed (*Euchiton sphaericus*)	<1

PCT filter outputs

The study area's associated bioregion and the remnant understory and overstory species that are listed above were entered into the BioNet vegetation classification database and the top five results are listed below:

- PCT 3375 – Monaro-Queanbeyan Rolling Hills Grassy Forest
- PCT 3376 – Southern Tableland Grassy Box Woodland
- PCT 3372– Dalton Hills Grassy Stringybark Forest
- PCT 3366 – Central Tableland Clay Apple Box Grassy Forest
- PCT 3370 – Central Tableland Red Stringybark Grassy Forest
- PCT 3373 – Goulburn Tableland Box-Gum Grassy Forest

Of these, PCT 3373 – Goulburn Tableland Box-Gum Grassy Forest was assessed to most closely align with the observed vegetation community of the study area. The landscape position and local geology also closely align with this PCT. Moreover, SVTM also identifies this community as widely occurring within the study area and the broader surrounding area.

State Vegetation Type Mapping

STVM identifies the following PCT as present within 1 km or occurring within the study area:

- PCT 3373 – Goulburn Tableland Box-Gum Grassy Forest

Justification

It has been determined that PCT 3373 – Goulburn Tableland Box-Gum Grassy Forest meets the observed characteristics of the community recorded within the study area. This was determined by:

- matching vegetation formation,
- occurrence within IBRA region and IBRA sub-region,
- matching overstory composition,
- understory species similar in composition when input into PCT filter tool, and
- landscape position.

Determined PCT		
Vegetation type	**PCT ID**	3373
	Common community name	Goulburn Tableland Box-Gum Grassy Forest
	Vegetation formation	Grassy Woodlands
	Vegetation class	Southern Tableland Grassy Woodlands
Percentage cleared (in NSW)	92.1%	
Extent within study area	~ 8.95 ha	
BioNet PCT Description	This community is characterised as a mid-high to tall dry sclerophyll grassy open forest to woodland of northern parts of the Southern Tablelands, occurring from Canberra and Queanbeyan north to Pejar and east to Durran Durra and Canyonleigh, with a northern outlier at Golspie. It is found in landscape positions with moderately deep soil profiles, particularly footslopes of gently undulating low hills, on a wide range of substrates including sedimentary (sandstone, arenite, greywacke, shale), acid volcanic (ignimbrite, rhyolite) and granitic rocks. This PCT is found at elevations of 600-850 metres asl with mean annual rainfall of 650-800 mm. Remnants of this community often have a long history of disturbance and the tree canopy may be sparse to very sparse, commonly including Yellow Box (*Eucalyptus melliodora*) and occasionally with Red Stringybark (*E. macrorhyncha*), Blakely's Red Gum (*E. blakelyi*) or Broad-leaved Peppermint (*E. dives*). A very sparse shrub stratum commonly includes scattered Peach Heath (*Lissanthe strigosa*), Curved Rice-flower (*Pimelea curviflora*), Urn Heath (*Melichrus urceolatus*) or Hoary Guinea-flower (*Hibbertia obtusifolia*), while the ground layer is predominantly grassy and commonly includes Kangaroo Grass (*Themeda triandra*), Weeping Grass (*Microlaena stipoides*), Snow Grass (*Poa sieberiana*), Native Wheatgrass (*Anthosachne sabra*) and Purple Wiregrass (*Aristida ramosa*), with occasional high cover of Wallaby Grass (*Rytidosperma laeve*). Common forbs include Wattle Mat-rush (*Lomandra filiformis*), Many-flowered Mat-rush (*Lomandra multiflora* subsp. *multiflora*), Ivy Goodenia (*Goodenia hederacea*),	

	Stinking Pennywort (*Hydrocotyle laxiflora*), Yellow Wood-sorrel (*Oxalis perennans*), Common Everlasting (*Chrysocephalum apiculatum*), Yellow Autumn Lily (*Tricoryne elatior*), Poverty Raspwort (*Gonocarpus tetragynus*) and Small St John's Wort (*Hypericum gramineum*).
Condition (zones)	This community covers most of the study area, except for the exotic landscape garden around the existing dwelling, conifers along the northern driveway and planted Argyle Apple (*Eucalyptus cinerea*) trees on the western boundary. There has been considerable historic agricultural modification of the understory vegetation with a sparse mid to mature overstory canopy remaining within the landscape. PCT 3373 occurs in two condition classes within the study area: remnant woodland with a sparse canopy of predominantly Blakely's Red Gum and Yellow Box and mixed exotic and native understory, and modified grasslands. Relative to benchmark, PCT 3373 within the study area was assigned the conditions of moderate (Zone 1) and low (Zone 2) due to the broad conditions of the presence or absence of canopy, abundance and diversity of native species understory species and functional characteristics compared to the benchmark of PCT 3373. Zones are described as follows. • Zone 1 – Remnant woodland patch largely intact with regeneration and inclusive of areas of native plantings along the western boundary, with a ground layer that has a mix of native and exotic grasses, and a low native forb cover and diversity, • Zone 2 – Modified grassland that has undergone historic clearing, and as such, contains no native canopy or midstory species and limited native composition, and • Zone 3 – Exotic garden planting, which is not recognised as a PCT.
TEC status (BC Act)	Associated with the Critically Endangered Ecological Community: • White Box - Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions,
TEC status (EPBC Act)	Associated with the Critically Endangered Ecological Community: • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

FIGURE 15: FIELD VALIDATED PCT MAPPING

3.2.1.2 Standardised condition (BAM plots)

Data collected from three BAM plots supports field survey findings, indicating that vegetation across the property is in low to moderate condition. The survey revealed two distinct vegetation zones:

- **Zone 1 (Lot 2)**: Remnant woodland with a mixed native and exotic understory, containing areas of moderate conservation value.
- **Zone 2 (Lot 1)**: Cleared canopy with understory dominated by exotic species, accompanied by minor native grasses and forbs, indicating a lower conservation value (**Figure 9**).

An additional zone (Zone 3) was allocated to the landscaped areas of Lot 2. However, no BAM plots were conducted in this zone.

The work area in Lot 1 is characterised by modified native grassland with a mix of native and exotic grasses, particularly noting a low diversity of native forbs (BAM 1 and BAM 2). The absence of midstory and canopy species in BAM 1 and BAM 2 resulted in a lower structure and function score for Zone 2.

In contrast, BAM 3 exhibited a higher function condition score due to the presence of canopy species, indicating greater complexity in landscape features and a more diverse range of habitats. This is further supported by the occurrence of regeneration and large trees within Zone 1.

Notably, High Threat Exotics were present in all BAM plots, highlighting the need for consideration in the development planning process to mitigate potential environmental impacts.

For BAM plot data and photographs, see **Appendix A2**.

TABLE 3: BAM CALCULATOR SCORES

Plot	PCT and Zone	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score (VIS)
BAM 1	PCT 3373 - Zone 2	32.5	39.2	4.4	17.8
BAM 2	PCT 3373 - Zone 2	24	42.8	16.7	25.8
BAM 3	PCT 3373 - Zone 1	43.9	81.9	74.5	64.5

3.2.1.3 Category 1 – exempt land

The Draft Native Vegetation Regulatory (NVR) Map has been prepared under Part 5A of the Local Land Services (LLS) Act[5]. The development site contains areas on the Draft NVR Map as presented in **Figure 13**:

- Category 1 – exempt land (blue), and
- Category 2 – regulated land (yellow).

Definitions of Category 1 – exempt land relative to the development site include:

- Land cleared of native vegetation as of 1 January 1990 or lawfully cleared after 1 January 1990 and before 25 August 2017; and
- Land containing low conservation value grasslands or groundcover.

Many parts of the study area that have been historically cleared and pasture improved are mapped as Category 1 – exempt land on the Draft NVR Map (**Figure 13**). During the transitional period Section 60F [3] of the Local Land Services Act (2013) requires the conservation value of grasslands and groundcover to be determined through systematic, scientific data collection.

In order to determine whether cleared areas on the property meet the definition of Category 1 – exempt land, formal floristic surveys were undertaken at three locations across the study area in accordance with the NSW Biodiversity Assessment Method (BAM) (**Figure 6**).

Two BAM plots were undertaken in Lot 1 (one in the direct impact area and one adjacent to the impact area) and one plot was conducted in the retained/ avoided area of Lot 2. BAM plot data indicates that cleared areas of Lot 1 are in low to moderate native condition. The combined plot data for Lot 1 resulted in a Vegetation Integrity Score (VIS) of 24.2, which exceeds the threshold of 15 for classification as "low conservation value grasslands or groundcover". As a result, Category 1 – exempt land does not apply. Moderate condition areas within remnant woodland canopy generated a VIS of 64.5 which is consistent with mapping of Category 2 – regulated land.

3.2.1.4 Vegetation zones

Vegetation within the study area has been categorised into four zones, as follows:

- Zone 1 – PCT 3373: Remnant woodland with mixed native and exotic understory (4.25 ha):
  - Remnant woodland patch largely intact with regeneration of canopy species and inclusive of areas with native plantings along the western boundary, with a ground layer that has a mix of native and exotic grasses and a low native forb diversity.
- Zone 2 – PCT 3373: Modified grassland with mixed native and exotic understory (4.71 ha):
  - Area has undergone historic clearing, with only minor canopy or midstory species present, and minimal regeneration. The ground layer comprises low to moderate condition native grassland with mixed native and exotic grasses and low native forb diversity.
- Zone 3 – PCT 0: Exotic landscaped areas (approximately 0.45 ha):
  - Area comprised of landscape plantings of multiple exotic species.

[5] Native Vegetation Regulatory Map - https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=DraftNVRmap

FIGURE 16: VEGETATION MAPPING

3.2.2 Native fauna and habitat

The study area has been modified from its original condition which has led to the reduction of available native fauna habitat and reduced connectivity to surrounding habitat. Despite its modification, it still provides several ecologically valuable habitats that may be utilised by a range of native fauna. These include:

- scattered paddock trees and open remnant woodland patches with mature eucalypts containing hollows and nests (**Photo 4**),
- Open grassland with a mixed exotic and native composition, and
- riparian habitat in the form of drainage lines and a farm dam (**Photo 5**).

The study area and proposed development footprint predominantly comprise modified and grazed grasslands, which offer limited ecologically valuable habitat. However, scattered patches of remnant native overstory vegetation, particularly in Lot 2, provide important habitat features, including:

- Hollows and foraging resources, supporting a range of fauna, such as birds, mammals, and reptiles,
- Foraging habitat and shelter for various species, and
- Perching and feeding opportunities for birds of prey in the open paddocks with scattered trees.

Notably, even degraded habitats like blackberry thickets provide protective cover and nesting opportunities for small woodland birds.

These findings highlight the importance of preserving and managing remnant vegetation and habitat features to maintain ecological values and support local biodiversity.

Riparian habitat observed within the study area has been degraded by stock grazing. The hydro lines and dam contain very limited fringing aquatic vegetation which limits their usability for fauna species (**Photo 5**). Despite this, disturbance tolerant frog species such as Common Eastern Froglet (*Crinia signifera*) and Spotted grass frog (*Limnodynastes tasmaniensis*) were recorded utilising these dams. It is likely that if stock access was reduced more riparian vegetation could establish around the dam. This would likely increase the diversity and number of individuals of fauna species that may utilise these habitats.

A total of 10 native birds, two native mammals, and two native frog species were observed during field inspection. The study area also recorded feral species such as European Fox. A complete list of species observed in the study area is provided in **Appendix A.**

PHOTO 4: HABITAT TREE (NEST) WITHIN THE STUDY AREA

PHOTO 5: DAM WITHIN THE STUDY AREA

3.2.3 Threatened Ecological Communities (TECs)

Desktop research found that three Commonwealth and/or NSW-listed TECs are known or may occur within 10 km of the study area. These include:

- Natural Temperate Grassland of the South Eastern Highlands,
- Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion,
- Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions,
- Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions, and
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

For an assessment into each TEC individually, see Appendix B1. Based on their geographic characteristics and the distinct plant communities associated with them, the study area supports the NSW BC Act-listed Critically Endangered Ecological Community (CEEC), commonly known as Box Gum Woodland (**Table 4**).

TABLE 4: TECS WITHIN THE STUDY AREA

TEC name	Profile ID (from TBDC)	BC Act status	EPBC Act status	Associated Vegetation Zones	Area within subject land
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	10837	Critically Endangered Ecological Community	Not listed	Zone 1 and Zone 2	8.96 ha

3.2.3.1 White Box - Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (BC Act)

The study area is situated within the known geographic distribution area for the Box Gum Woodland CEEC in the NSW South Western Slopes South Bioregion, and site characteristics meet the definition of the BC Act-listed CEEC. NSW DCEEW, Threatened Species Profile and Threatened Species Scientific Committee (NSW TSSC) determination (2020) describes Box Gum Woodland as:

> *"An open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: White Box Eucalyptus albens, Yellow Box E. melliodora and Blakely's Red Gum E. blakelyi. Intact sites contain a high diversity of plant species, including the main tree species, additional tree species, some shrub species, several climbing plant species, many grasses and a very high diversity of herbs. The community also includes a range of mammal, bird, reptile, frog and invertebrate fauna species. Intact stands that contain diverse upper and mid-storeys and ground layers are rare. Modified sites include the following:*
>
> - *Areas where the main tree species are present ranging from an open woodland formation to a forest structure, and the groundlayer is predominantly composed of exotic species; and*
> - *Sites where the trees have been removed and only the grassy groundlayer and some herbs remain."*[6].

Based on the NSW DCCEEW description of the CEEC, and comparison to our observations and plot data, it is determined that Zone 1 meets the definition of BC Act-listed Box Gum Woodland TEC.

3.2.3.2 White Box - Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act)

The assessment of PCTs across all zones within the study area reveals that none meet the listing requirements outlined in the Commonwealth Conservation Advice for the EPBC Act-listed Threatened Ecological Community (TEC) (Table 5).[7]

TABLE 5: CONDITION CLASSES AND THRESHOLDS OF COMMONWEALTH EPBC ACT-LISTED BOX GUM WOODLAND

Condition class	Patch size*	Required features present	Application
Class A Good quality understorey and mature overstorey both present.	0.1 ha (1,000 m^2) or larger	• The ground layer is predominantly (50%) native, and • the understorey contains at least 12 native, non-grass species (such as forbs, shrubs, ferns and sedges), and • at least one of the understorey species should be a species recognised as 'important' *, and • the patch contains 10 or more mature trees (>= 125 cm DBH) per hectare consistent with the key diagnostics for the ecological community.	None of the vegetation zones present a predominately native ground layer. Zone 1 almost has the required percentage of native ground layer (48%), which is largely contributed by the abundant presence of Weeping Grass (*Microlaena stipoides*). However, Zone 1 still does not meet the full criteria due to the following reasons: • Limited diversity in the understory layer, with only

[6] White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions - Notice of and reason for the Final Determination as a Critically Endangered Ecological Community in Part 1 of Schedule 2 of the Act (NSW Scientific Committee, 2020).

[7] Approved Conservation Advice for the White Box – Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Commonwealth DCCEEW, 2023).

Condition class	Patch size*	Required features present	Application
Class B Good quality understorey present. Characteristic trees may be absent.	0.1 ha (1,000 m^2) or larger	• The ground layer is predominantly (50%) native, and • the understorey contains at least 12 native, non-grass species (such as forbs, shrubs, ferns and sedges), and • at least one of the understorey species should be a species recognised as 'important'*, and • the patch contains 10 or more mature trees (> 125 cm DBH) per hectare consistent with the key diagnostics for the ecological community.	seven native, non-grass species recorded. • None of the understory species were recognized as 'important'*, and The patch is, however, likely to contain ten or more mature trees per hectare and does contain natural regeneration of dominant overstorey eucalyptus.
Class C Allows for a lower diversity in the understorey in areas where there is regeneration and/or tree density may be relatively dense.	2 ha (20,000 m^2) or larger	• The ground layer is predominantly (50%) native, and • the understorey contains at least 12 native, non-grass species (such as forbs, shrubs, ferns and sedges), and/or • the patch contains natural regeneration (>=5 cm DBH) of dominant overstorey eucalyptus	

* Notes:

- *Approved Conservation Advice for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* defines "Patch" as

  "a continuous area containing the ecological community. The patch is the larger of:

  - an area that contains five or more trees in which the gap between the outer canopy of any tree and the outer canopy of the nearest tree is no greater than 75 m, or
  - the area over which the ground layer is predominantly native (at least 50% of the perennial vegetation cover in the ground layer is made up of native species)."[8]
- *See 'Important' column in plant species list at Appendix A - Species lists in the Approved Conservation Advice for the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland*[9].

3.2.4 Threatened flora

Desktop research found that the following threatened flora are known or may occur within 10 km of the study area:

- Hoary Sunray (*Leucochrysum albicans* subsp*. tricolor*)

Hoary Sunray has potential to occur within both the work area and study area. A targeted survey for Hoary Sunray was conducted in November, aligning with the optimal survey period recommended by BioNet Threatened Biodiversity Profiles (**Section 2.2.2**). At the time of survey, a number of Hoary Sunray were in flower in the local area along roadsides. Surveys did not detect evidence of Hoary Sunray in the study area.

[8] Commonwealth DCCEEW, 2023
[9] Commonwealth DCCEEW, 2023

3.2.5 Threatened fauna

Desktop research found that 54 threatened fauna species are known, likely, or may occur within 10 km of the study area. No threatened fauna species were observed during field inspection. Despite this, habitat in the study area may be utilised by threatened fauna opportunistically or in transit.

The proposed work area consists of heavily modified agricultural land which contains primarily exotic understory vegetation and limited ecological valuable habitats. Despite this, the study area retains patches of remnant overstory and understory vegetation, particularly within Lot 2. Given the higher quality refugia and habitat offered in these wooded areas it is likely that threatened species may utilise these areas.

For a complete list of all the threatened fauna species considered in preparing this report, refer to **Appendix B3.**

Threatened birds

There is potential that the following smaller woodland and grassland birds may utilise habitat (e.g., remnant woodland patches and grasslands) within the study area:

- Southern Whiteface (*Aphelocephala leucopsis*),
- Dusky Woodswallow (*Artamus cyanopterus*),
- Speckled Warbler (*Chthonicola sagittata*),
- Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*),
- Varied Sittella (*Daphoenositta chrysoptera*),
- White-throated Needletail (*Hirundapus caudacutus*),
- White-fronted Chat (*Epthianura albifrons*),
- Scarlet Robin (*Petroica boodang*),
- Flame Robin (*Petroica phoenicea*), and
- Diamond Firetail (*Stagonopleura guttata*).

Most larger birds require mature and hollow-bearing trees for roosting and nesting, as well as large areas of woodland and forest to hunt/forage. The study area contains patches of remnant mature overstory vegetation with hollow bearing trees. These areas have been assessed as providing potential habitat for the following larger birds to utilise either for nesting or foraging, or on a transient basis:

- Gang-gang Cockatoo (*Callocephalon fimbriatum*),
- Little Lorikeet (*Glossopsitta pusilla*),
- Turquoise Parrot (*Neophema pulchella*), and
- Superb Parrot (*Polytelis swainsonii*).

The study area offers utilisable habitat for threatened raptors, primarily in the form of canopy species and open areas for perching and hunting. Raptors that are likely to utilise these habitats include:

- Spotted Harrier (*Circus assimilis*),
- Black Falcon (*Falco subniger*),
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*), and
- Little Eagle (*Hieraaetus morphnoides*).

The study area provides utilisable habitat for the following threatened waterbird species, which have been assessed as having the potential to occur within the area. These include:

- Magpie Goose (*Anseranas semipalmata*),
- Latham's Snipe (*Gallinago hardwickii*),
- Blue-billed Duck (*Oxyura australis*), and
- Freckled Duck (*Stictonetta naevosa*).

For details into the impact assessment of each species respectively, see **Appendix C1.2.**

Threatened fish

No threatened fish species considered likely to be present in the study area. The study area's dam and drainage lines do not offer the required habitat features required to support the threatened fish species known or with potential to occur within 10 km of the study area. For details on species inclusion, refer to **Appendix B3**.

Threatened frogs

Based on the assessment, no threatened frog species are known or considered likely to be present within the study area. Furthermore, the study area lacks habitat features suitable to support the presence of threatened frog species known to occur within a 10 km radius of the study area.

Threatened invertebrates

- Key's Matchstick Grasshopper (*Keyacris scurra*)

Key's Matchstick Grasshopper is considered to have potential to occur within the study area. Suitable habitat is present for the species, primarily in grassland areas with a higher native species composition. It contains a small amount of Asteraceae species, which serve as food plants for Key's Matchstick Grasshopper. The targeted survey did not detect any evidence of the species' presence. For details into the impact assessment, see **Appendix C1.8.**

Threatened bats

The following threatened bat species are considered as likely or to have potential to occur within the study area:

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*),
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*),
- Little Bent-winged Bat (*Miniopterus australis*), and
- Grey-headed Flying-fox (*Pteropus poliocephalus*).

The study area contains potential habitat for these threatened bat species in the form of remnant woodland with hollow-bearing trees and an existing dwelling and ancillary structures as foraging habitat and shelter.

For details into the impact assessment of each fauna species respectively, see **Appendix C1.5.**

Threatened mammals other than bats

Koala (*Phascolarctos cinereus*) has potential to occur within the study area. The study area contains foraging habitat for Koala in remnant woodland patches. Suitable Koala feed trees are abundant in Lot 2 (Zone 1).

For details into the impact assessment of the species, see **Appendix C1.6.**

Threatened reptiles

Striped Legless Lizard (*Delma impar*) has potential to occur within the study area within modified grasslands of Lot 1 (Zone 2) and in remnant Box Gum Woodland in Lot 2 (Zone 1).

For details into the impact assessment of the species, see **Appendix C1.7.**

Threatened populations

No threatened populations listed under the NSW BC Act are known or considered likely to be present in the study area.

3.2.6 Listed migratory species

Results of field survey indicate the following listed migratory species have potential to occur within the study area:

- White-throated Needletail (*Hirundapus caudacutus*), and
- Latham's Snipe (*Gallinago hardwickii*).

Field assessment determined that these species are likely to forage above the study area but not within. For details into the impact assessment of each species respectively, see **Appendix C1.2.**

3.2.7 Pest animal species

Several pest animal species are associated with KTPs or otherwise listed under Commonwealth and/or NSW laws. Many of these species are highly mobile and as such, it is rarely possible to categorically rule out their presence in a certain area. Several pest species are likely to be present in the study area and/or immediate surrounds. They include the following birds:

- Common Myna (*Acridotheres tristis*),
- Eurasian Skylark (*Alauda arvensis*),
- European Goldfinch (*Carduelis carduelis*),
- House Sparrow (*Passer domesticus*),
- Eurasian Tree Sparrow (*Passer montanus*),
- Common Starling (*Sturnus vulgaris*), and
- Common Blackbird (*Turdus merula*).

As well as the following mammals:

- Wild Dog (*Canis lupus*),
- Goat (*Capra hircus*),
- Cat (*Felis catus*),
- Hare (*Lepus capensis*),
- House Mouse (*Mus musculus*),
- Rabbit (*Oryctolagus cuniculus*),
- Black Rat (*Rattus rattus*),
- Pig (*Sus scrofa*),

- European Fox (*Vulpes vulpes*), and
- Deer (various species).

Among the above species European Fox was observed during the field survey. Many others are also considered likely to occur given the study area's geography. For a complete list of all the feral animal species considered, their legislative status, and distribution or abundance in the local area, refer to **Appendix**

B.

3.2.8 Weed species

The study area contains areas of predominately exotic plant cover, including exotic broadleaf species, and invasive exotic grasses and herbaceous species, particularly in Lot 1. Several weeds classified as Goulburn Mulwaree Council priority weeds (GMCPW)[10], High Threat Exotic (HTE) species, and Commonwealth recognised Weeds of National Significance (WoNS) [11], were recorded. These species include:

- Sheep Sorrel (*Acetosella vulgaris*) HTE,
- Tree of Heaven (*Ailanthus altissima*) HTE,
- Hawthorn (*Crataegus monogyna*) HTE,
- Umbrella Sedge (*Cyperus eragrostis*) HTE,
- African Lovegrass (*Eragrostis curvula*) GMCPW and HTE,
- St John's Wort (*Hypericum perforatum*) GMCPW and HTE,
- African Boxthorn (*Lycium ferocissimum*) WoNS and HTE,
- Chilean Needle Grass (*Nassella neesiana*) WoNS and GMCPW,
- Serrated Tussock (*N. trichotoma*) WoNS,
- Paspalum (*Paspalum dilatatum*) HTE,
- Pattersons Curse (*Echium plantagenium*) WoNS and HTE,
- Blackberry (*Rubus fruticosus* sp. agg.) WoNS and GMCPW.
- Sweet Briar (*Rosa rubiginosa*) HTE.

African Lovegrass and Serrated Tussock were the most abundant weed species across the study area and work area. Other exotic species, such as Chilean Needlegrass, Pattersons Curse and St John's Wort, were present but had smaller coverage. For a complete list of all the weed species considered and their legislative status, refer to **Appendix A1** and **B7**.

WoNS, HTE and GMCPW species are recognised as a current and future priority weed threat, causing significant economic, environmental, and social impacts. It is highly recommended that these species be managed through physical removal or careful application of a suitable herbicide. Refer to **Section 6.2.1.** for detailed recommendations on weed management.

[10] Local Weed Management Plan. Goulburn Mulwaree Council. (2019).
[11] For more information about WoNS, refer to NSW WeedWise at:

4 Impacts to biodiversity

The proposed work area is primarily sited in a previously cleared and disturbed area. The development requires clearing of approximately 0.43 ha. of native vegetation and associated habitats for the establishment of a building envelope encompassing:

- a proposed dwelling in Lot 1 ~ 0.16 ha,
- wastewater management system including effluent disposal area, AWTS, and pipelines ~ 0.04 ha,
- driveway access to the proposed dwelling 0.01 ha,
- an Asset Protection Zone (APZ) in Lot 1~ 0.22 ha (area surrounding the proposed dwelling and wastewater management system), and
- an APZ in Lot 2 ~ 0.10 ha (area surrounding the existing dwelling and associated structures).

No new fence installation is required, as the subdivision will align with the existing fence lines.

Note that the APZ in Lot 2 for the existing dwelling will require the removal of approximately 0.10 ha of exotic vegetation only, with no native vegetation requiring removal (**Figure 13** and **Figure 16**).

While the entire APZ may not need to be completely cleared in order to maintain bushfire protection requirements, it is assumed as completely cleared in the absence of guaranteed future management practices and ongoing monitoring.

Note: The required clearing is under the 0.5 ha clearing threshold associated with the minimum lot size.

The following section aims to identify the direct and potential indirect, and long-term impacts on the biodiversity values of the study area as a result of the proposed development.

4.1 Avoidance

The proposed work area is sited in an area heavily dominated by exotic pasture grass species which has been historically modified. Only a minor number of native understory species are present in the proposed work area, and these occur at a very low cover. Higher biodiversity parts of the study area containing remnant native trees have been avoided with the siting of the development area.

While it is assumed that a 6 m wide strip is to be cleared for the maintenance of boundary fences, the design has utilised existing fence lines as new boundaries in an attempt to avoid additional impacts. It is recommended that the Consent Authority consider a protective covenant on the title of the land (e.g., Section 88b covenant) to restrict application of Rural Boundary Clearing Code which would typically allow for a 50 m wide strip (25 m either side) along new boundaries (refer to **Section 5.6**).

4.2 Direct impacts

4.2.1 Vegetation Clearing for proposed work within Lot 1

The proposed development within Lot 1 includes the construction of a dwelling, driveway, wastewater management system, establishment of an APZ and other ancillary structures. The proposed work within Lot 1 will likely require the unavoidable removal of up to 0.43 ha of mixed exotic and native grassland. These areas have been previously cleared of overstory and midstory.

4.2.2 Vegetation Clearing for proposed work within Lot 2

The proposed development within Lot 2 includes establishment of an APZ around the existing dwelling. The APZ within Lot 2 is primarily located within an area that includes landscaped gardens, existing infrastructure, and exotic planted lawns. No native trees were identified within the development footprint of the above structures. As these areas do not contain native vegetation, they will not contribute to the native clearing threshold.

4.2.3 Overall

The development footprint is estimated at approximate 0.54 ha. As a result, the proposal has the potential to impact up to 0.43 ha of low condition PCT 3373 (Zone 2: modified grassland with mixed native and exotic understory) and 0.10 ha of exotic landscape planting (Zone 3).

4.3 Impacts to threatened entities

While the above avoidance measures have been undertaken, the proposed development will likely involve the unavoidable clearing of exotic grassland vegetation containing limited native understory vegetation and associated habitats.

Overall, impacts to threatened species were assessed against the NSW Threatened Species Tests of Significance mandated by State and National legislation. Assessment concluded that the proposed development is unlikely to result in a viable local population of any NSW-listed threatened species or community to be placed at risk of extinction (**Appendix C**)[12]. Assessments of impacts on biodiversity values against Commonwealth legislation indicates that the proposed development is not likely to have a significant impact on Commonwealth-listed threatened species and communities (**Table 6**)[13].

4.4 Indirect impacts

Indirect impacts are development related activities not associated with clearing for the development footprint and often occur beyond the development footprint or even the development site. They have a lower or variable intensity of impact compared to direct impacts and may be harder to predict spatially and temporally.

Indirect impacts may occur across the entire study area and surrounding landscape where areas of native vegetation and habitats remain following development. Indirect impacts likely or with potential to occur as a result of the proposed development include but are not limited to:

- transport of weeds and pathogens from the development site to adjacent and retained vegetation,
- erosion, sedimentation, and pollution of the dam,
- reduced viability of adjacent habitat due to edge effects,
- increase in pest animal populations, and
- reduced viability of adjacent habitat due to noise, dust, or light spill.

Section 6 presents recommended mitigation measures (e.g., implementation of standard construction environmental controls), which will likely reduce the effect of indirect impacts on biodiversity within and surrounding the study area.

[12] Process followed Threatened Species Test of Significance Guidelines (State of NSW and Office of Environment and Heritage 2018)
[13] Process followed Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (Commonwealth of Australia 2013)

5 Assessment against biodiversity legislation

This section identifies key legislation and policy documents relevant to biodiversity and assesses the extent to which recent and proposed works may require consent under Commonwealth or NSW law.

Commonwealth biodiversity laws and policies relevant to the proposed development include:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

NSW laws and policies relevant to recent and proposed works include:

- *Environment Planning & Assessment Act 1979* (EP&A Act) and instruments made under that Act, including State Environment Planning Policies (SEPPs),
- *Biodiversity Conservation Act 2016* (BC Act) and regulations made under that Act,
- *Fisheries Management Act 1994* (FM Act),
- *Biosecurity Act 2015*,
- *Local Land Services Act 2013*, and
- Goulburn Mulwaree Development Control Plan.

5.1 Environment Protection Biodiversity Conservation Act 1999

The Commonwealth's EPBC Act is the key framework legislation for managing nationally and internationally important plants, animals, ecological communities, and related matters. The Act identifies nine Matters of National Environmental Significance (MNES) and requires that proposed developments likely to impact on MNES be referred to the Commonwealth Minister for the Environment for consent.

The potential impacts of proposed works were assessed against the MNES, and significant impacts are not considered likely as a result of the proposed development (**Table 6**).

TABLE 6: MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE (MNES)

MNES	Impacts	More information
World Heritage Properties	None	The study area does not contain and is not within 5 km of a World Heritage Property.
National Heritage Places	None	The study area does not contain and is not within 5 km of a National Heritage Place.
Wetlands of international importance (RAMSAR wetlands)	None	The study area does not contain and is not within 5 km of a wetland of international importance.
Nationally threatened ecological communities and species	Potential, not likely significant	An EPBC Protected Matters search report flags that two TECs and 50 threatened species listed by the Commonwealth are known or may occur within 10 km of the study area. A likelihood of occurrence assessment was undertaken with the following results for Commonwealth listed species (**Appendix B**): **Threatened Ecological Communities** The study area is unlikely to contain any Commonwealth-listed TEC due to its historical land use and present vegetation composition (**Appendix B1**). **Threatened Flora** The following Commonwealth listed threatened flora species are known or likely to occur within the locality, and have potential to utilise habitats within the study area: • Hoary Sunray (*Leucochrysum albicans* subsp. *tricolor*) The targeted survey within work area did not detect any evidence of the species' presence (**Section 2.2.2**). Therefore, the proposed development is unlikely to have an adverse or significant impact on long-term habitat for the survival of this species. Hoary Sunray is also listed as threatened under the NSW BC Act, and further descriptions of habitat and impacts to these species can be found in **Appendix C1.1**. **Threatened Fauna** The following Commonwealth listed threatened fauna species are known or likely to occur within the locality, and have potential to utilise habitats within the study area: • Southern Whiteface (*Aphelocephala leucopsis*), • Gang-gang Cockatoo (*Callocephalon fimbriatum*), • Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*), • Latham's Snipe (*Gallinago hardwickii*), • White-throated Needletail (*Hirundapus caudacutus*), • Superb Parrot (*Polytelis swainsonii*), • Diamond Firetail (*Stagonopleura guttata*), • Grey-headed Flying-fox (*Pteropus poliocephalus*), • Koala (*Phascolarctos cinereus*), and • Stripped Legless Lizard (*Delma impar*). The proposed development is not likely to have a significant impact on these species as it will only remove a relatively small area of previously cleared/disturbed habitat that is lower in quality than habitat retained in the rest of the study area and surrounding landscape.

		The above threatened species are also listed as threatened under the NSW BC Act, and further descriptions of habitat and impacts to these species can be found in **Appendix C**.
Migratory species	Potential, not likely significant	Among the eight EPBC PMST listed migratory species are known or likely to occur within 10 km of the study area, White-throated Needletail (*Hirundapus caudacutus*) and Latham's Snipe (*Gallinago hardwickii*) are considered likely to occur in the study area given the quality of habitat available within the study area. The proposed development is not likely to have a significant impact on any listed migratory species as it is not likely to: • substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles, or altering hydrological cycles), destroying, or isolating an area of important habitat, • result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or • seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviors) of an ecologically significant proportion of the population of a migratory species.
Commonwealth marine areas	None	The study area does not contain or adjoin any such area.
Great Barrier Reef Marine Park	None	None, the study area does not contain or adjoin any such area.
Nuclear actions including uranium mining	None	None, the study area does not contain or adjoin any such area.
A water resource, in relation to coal seam gas development/ large coal mining development	None	None, the proposed development does not involve uranium mining or other nuclear actions.

5.2 NSW Environmental Planning & Assessment Act 1979

The NSW Government's EP&A Act is the key framework legislation for planning in NSW. It aims to encourage the proper consideration and management of the impacts of proposed development and land-use changes on the natural and built environment, and on the community.

Several planning instruments have been made under the EP&A Act regarding specific aspects of planning at the State or regional level. State Environmental Planning Policies (SEPPs) are environmental planning instruments made under the EP&A Act that outline policy objectives relevant to planning at the State or regional level.

5.2.1 Koala Habitat Protection SEPP

A key SEPP, from a biodiversity perspective, is the SEPP on Koala Habitat Protection. The Koala SEPP has undergone significant changes in recent years, and different versions of the SEPP currently apply in different areas[14]. These were formerly known as SEPP 44 and are now located within a much larger SEPP on Biodiversity and Conservation as follows:

- Chapter 3 – Koala Habitat Protection 2020.
- Chapter 4 – Koala Habitat Protection 2021.

As at time of writing, Chapter 4 applies

- in the Sydney Metropolitan Area and Central Coast—in all zones.
- in all other identified LGAs—in all zones except RU1, RU2 and RU3 zoned land.

Chapter 3 continues to apply pending development of new land management codes.

The study area is in the Goulburn Mulwaree Council LGA and is zoned RU6 and fails to meet the criteria for exempt land[15], so Chapter 4 applies as detailed below.

Chapter 4 - Koala Habitat Protection 2021

Chapter 4 specifies that Councils must consider whether a development is consistent with the approved Koala Plan of Management that applies to the land or, if there is no such plan, whether it is likely to impact on Core Koala Habitat.

Core Koala habitat is currently defined as land:

- assessed by a suitably qualified and experienced person as being highly suitable Koala habitat
- where Koalas are present at the time of assessment or have been recorded as being present in the previous 18 years.

As Goulburn Mulwaree Council has not published an approved Koala Plan of Management, works in this LGA would normally require an assessment of potential impacts on Core Koala Habitat.

[14] https://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Koala-Habitat-Protection-SEPP
[15] The property has not been damaged by bushfire: https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0722#sec.3.4

While Koala tree use varies considerably by region[16], NSW Department of Planning, Industry and Environment (DPIE) modelling has rated overstorey vegetation within the study area has a modelled habitat value score ranging from 0.21 to 0.96; while the entire work area has no score (**Figure 17**).

Field inspection of the study area also noted the presence of the two Koala use tree species listed in Schedule 3 of the Biodiversity and Conservation SEPP[17]:

- Blakely's Red Gum (*Eucalyptus blakelyi*),
- Yellow Box (*E. melliodora*)

The study area potentially contains suitable habitat for Koalas, due to the presence of regionally relevant feed and use tree species. However, it is unlikely that Koalas rely on the cleared areas within the study area, particularly within the proposed development footprint in Lot 1.

While there is potential for Koalas to utilise parts of Lot 2, more extensive habitat is present in the surrounding landscape. Consequently, the proposed development is not considered likely to impact Core Koala Habitat, if present.

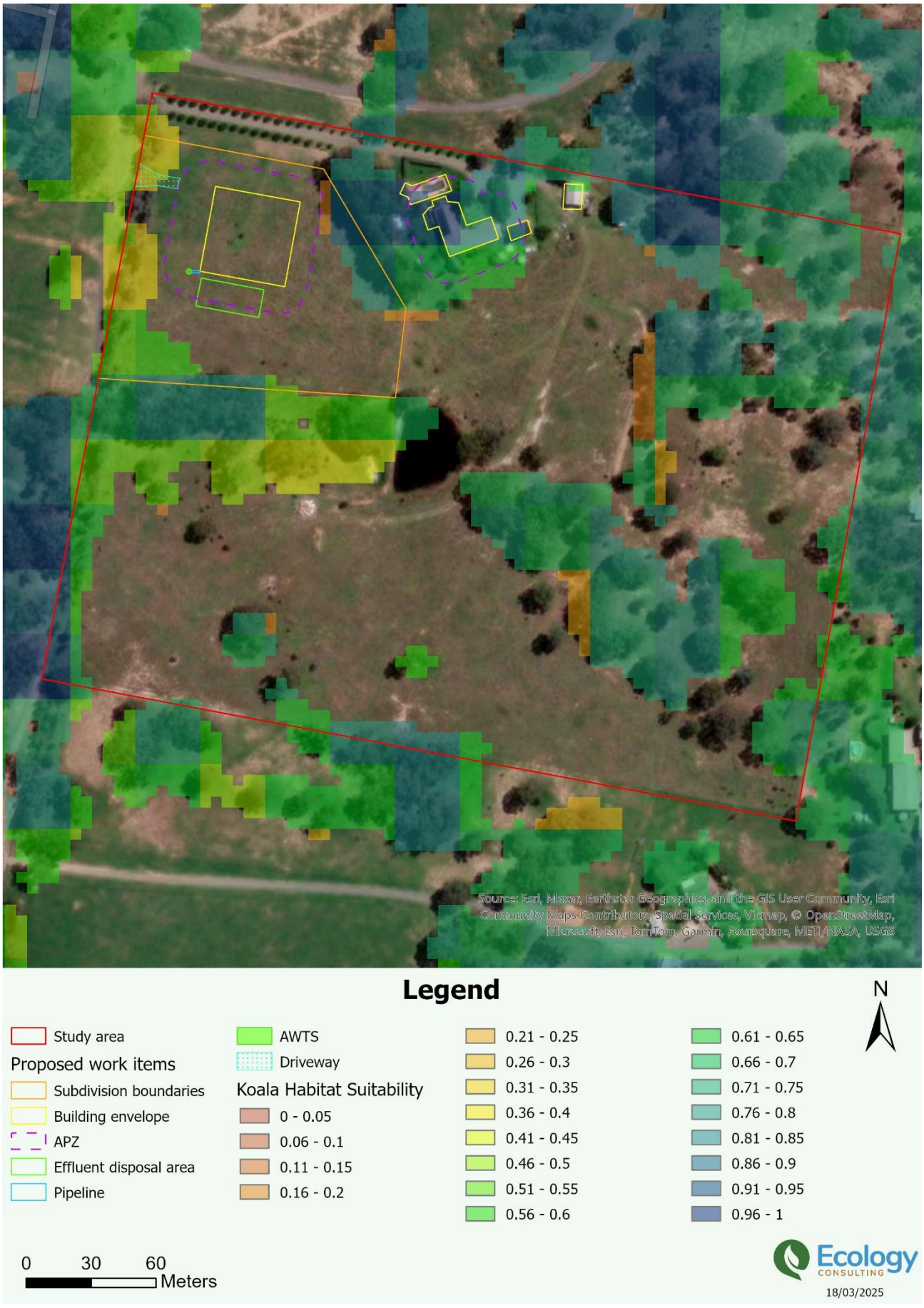
As Koalas are listed as a threatened species, a detailed assessment of the site's impact on Koalas is provided in **Appendix C**.

5.2.2 Other SEPPs that may apply

A desktop review of other SEPPs did not identify any other SEPP that may be relevant to this report or biodiversity matters.

[16] A review of koala tree use across NSW - NSW Office of Environment and Heritage (2018) https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Native-animals/review-of-koala-tree-use-across-nsw-180385.pdf
[17] SEPP (*Biodiversity and Conservation 2021*) Schedule 3 Koala use tree species – Chapter 4: https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021-0722#sch.3

FIGURE 17: KOALA HABITAT SUITABILITY



5.3 NSW Biodiversity Conservation Act 2016

The BC Act aims to maintain a healthy, productive, and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. Among other things, it identifies all the terrestrial species and ecological communities that are listed as threatened or otherwise protected under NSW law.

An assessment was undertaken to determine the likelihood of threatened species, populations and ecological communities occurring within the study area, and the potential impacts of the proposed development on these species and communities. **Appendix B** presents threatened species and ecological communities that are likely to occur within the study area.

To determine if the development is likely to significantly affect threatened species or ecological communities, an assessment was carried out against the Threatened Species Test of Significance mandated by the NSW BC Act. That assessment concluded that the development is unlikely to significantly affect threatened species or ecological communities listed under the BC Act. For more information on the Test of Significance and related matters, see **Appendix C**.

5.3.1 NSW Biodiversity Offsets Scheme Entry Thresholds

The NSW Biodiversity Offsets Scheme was established in 2017 under the BC Act and Regulations to ensure that developments that have a significant impact on biodiversity are assessed to a consistently high standard and are offset by other conservation measures. If the scheme is triggered:

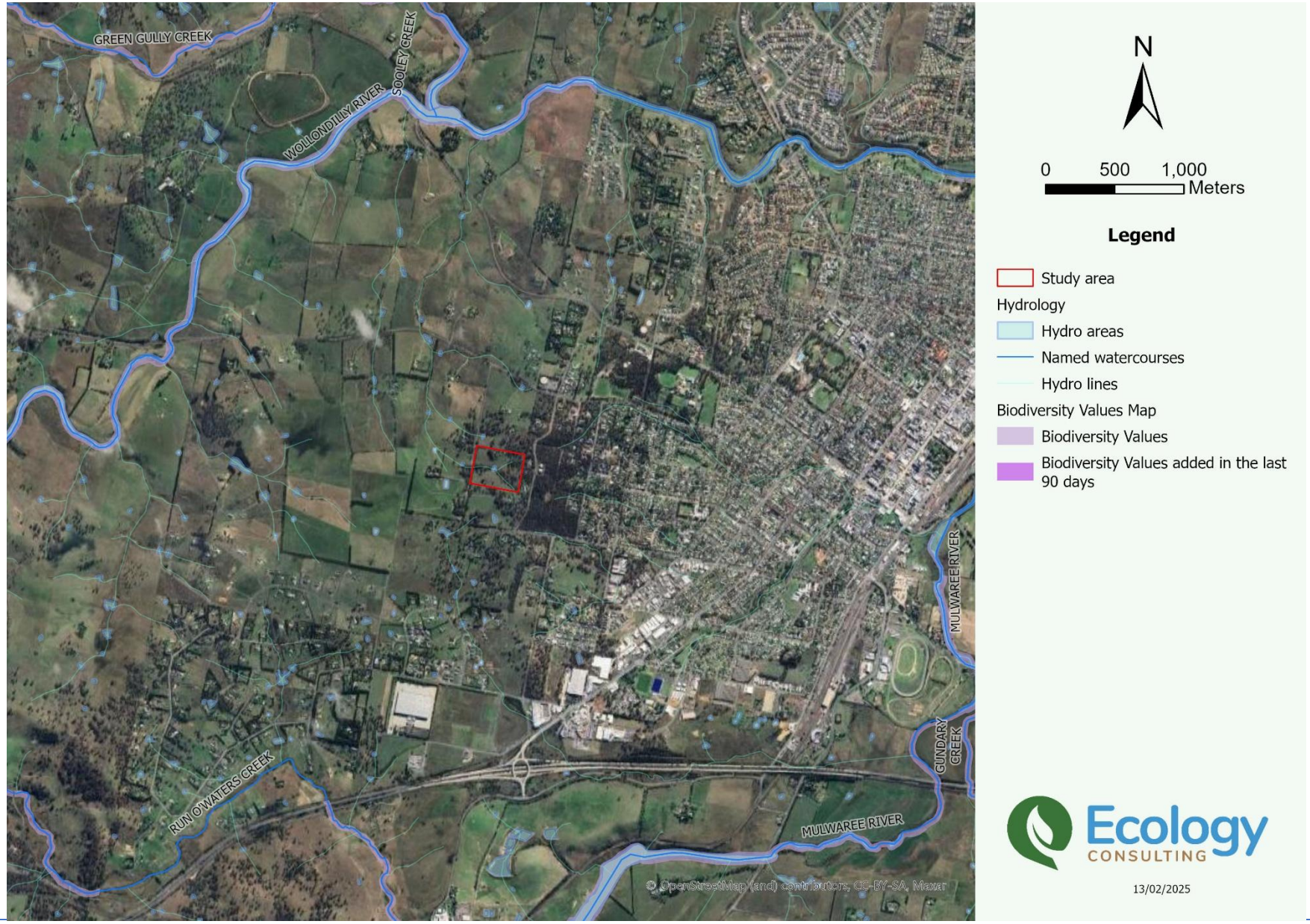
- an accredited assessor must be engaged to assess the impacts of a development proposal using the Biodiversity Assessment Method (BAM),
- the findings must be documented and submitted to the relevant consent authority in the form of a detailed BDAR, and
- if the development is approved, the developer must comply with any offset requirements including payment of offset credits to the Biodiversity Conservation Trust.

The Biodiversity Offsets Scheme applies to a development if any one of three 'trigger' criteria is met (**Table 7**).

TABLE 7: BIODIVERSITY OFFSET SCHEME ENTRY THRESHOLD (BOSET) TRIGGERS

BOSET triggers	Triggered	Key findings
Development involves native vegetation clearing more than the relevant area clearing threshold.	No.	The area threshold varies depending on the minimum lot size shown in the LEP and applies to all proposed native vegetation clearing associated with a development. The minimum lot size set for the study area is 2 ha, meaning the allowable clearing threshold of native vegetation is set at 0.5 ha. The proposed development requires clearing up to 0.43 ha of native vegetation (**Section 4.2**). Therefore, the proposed development is not likely to exceed the area clearing threshold.
Development impacts on an area mapped on the NSW Biodiversity Values Map.	No.	No areas of Biodiversity Values are mapped as occurring within the study area, broader study area or directly surrounding either (**Figure 18**). As such, the development will not impact on an area mapped on the NSW Biodiversity Values Map.
Development is likely to have a significant adverse impact on a threatened species or ecological community listed under the BC Act, regardless of biodiversity mapping (assessed through the Test of Significance).	No.	Development is not likely to have a significant adverse impact on a threatened species or ecological community listed under the BC Act as discussed in **Appendix C**.

FIGURE 18: BIODIVERSITY VALUES MAPPING



5.4 NSW Fisheries Management Act 1994

The FM Act aims to conserve, develop, and share the fisheries resources of the State. It identifies the aquatic species and ecological communities that are listed as threatened or otherwise protected in NSW, and related Key Threatening Processes including:

- degradation of native riparian vegetation, and
- installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.

The proposed development does not involve contribution to any Key Threatening Processes listed under the FM act. No threatened species listed under the FM occur or are likely to occur within the study area (see **Appendix B**). All closest waterways to the study area are mapped as having a "Very Poor" or "Poor" fish status[18] (**Figure 19**).

One of the objectives of the Fisheries Management Act 1994 is to 'conserve key fish habitats'. All major waterways, along with some of their tributaries and associated hydrological areas, are mapped as Key Fish Habitat within the Hawkesbury-Nepean Basin. These include, but are not limited to:

- Wollondilly River,
- Rossi Reservoir,
- Green Gully Creek,
- Run O' waters Creek,
- Mulwaree River,
- Ryans Creek,
- Gundary Creek, and
- Two unnamed creeks.

Given the distance of the work area from these waterways (**Figure 20**) and the fact that the development footprint does not cover any waterbodies (**Figure 2**), it is considered unlikely that the proposed work will have any significant impact on these mapped Key Fish Habitats.

However, the construction of building envelopes and driveways may increase erosion. Consequently, it is recommended to implement standard construction environmental controls, as outlined in **Section 6**, during any clearing, earthworks, or other construction activities to prevent potential indirect impacts to the local aquatic environment.

[18] Access data of Fish Communities and Threatened Species Distributions of NSW (2016) at: https://spatial.industry.nsw.gov.au/arcgis/rest/services/PUBLIC/NSW_Fish_Status/MapServer.

FIGURE 19: FRESHWATER FISH COMMUNITY STATUS (DPI FISHERIES) MAP

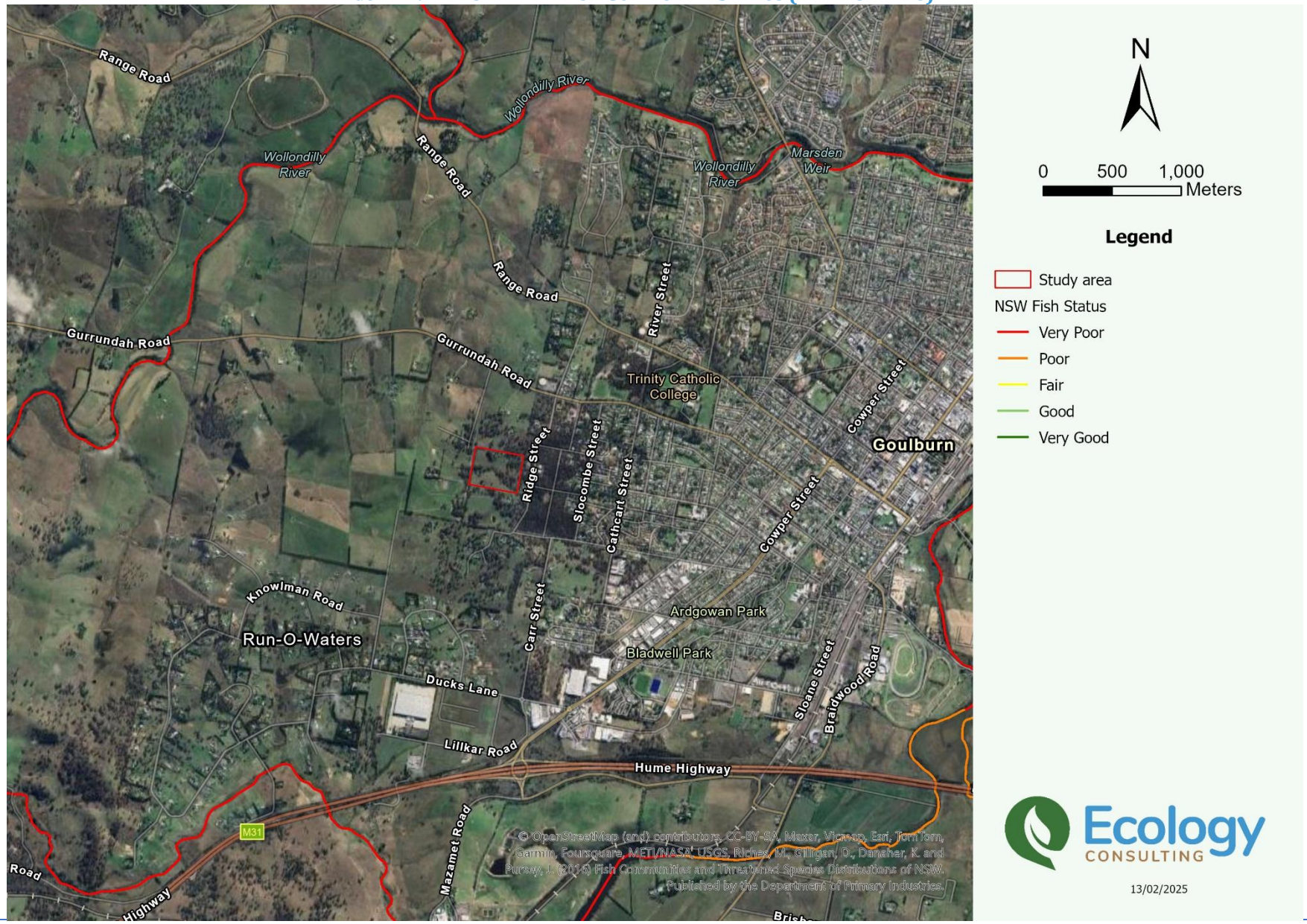
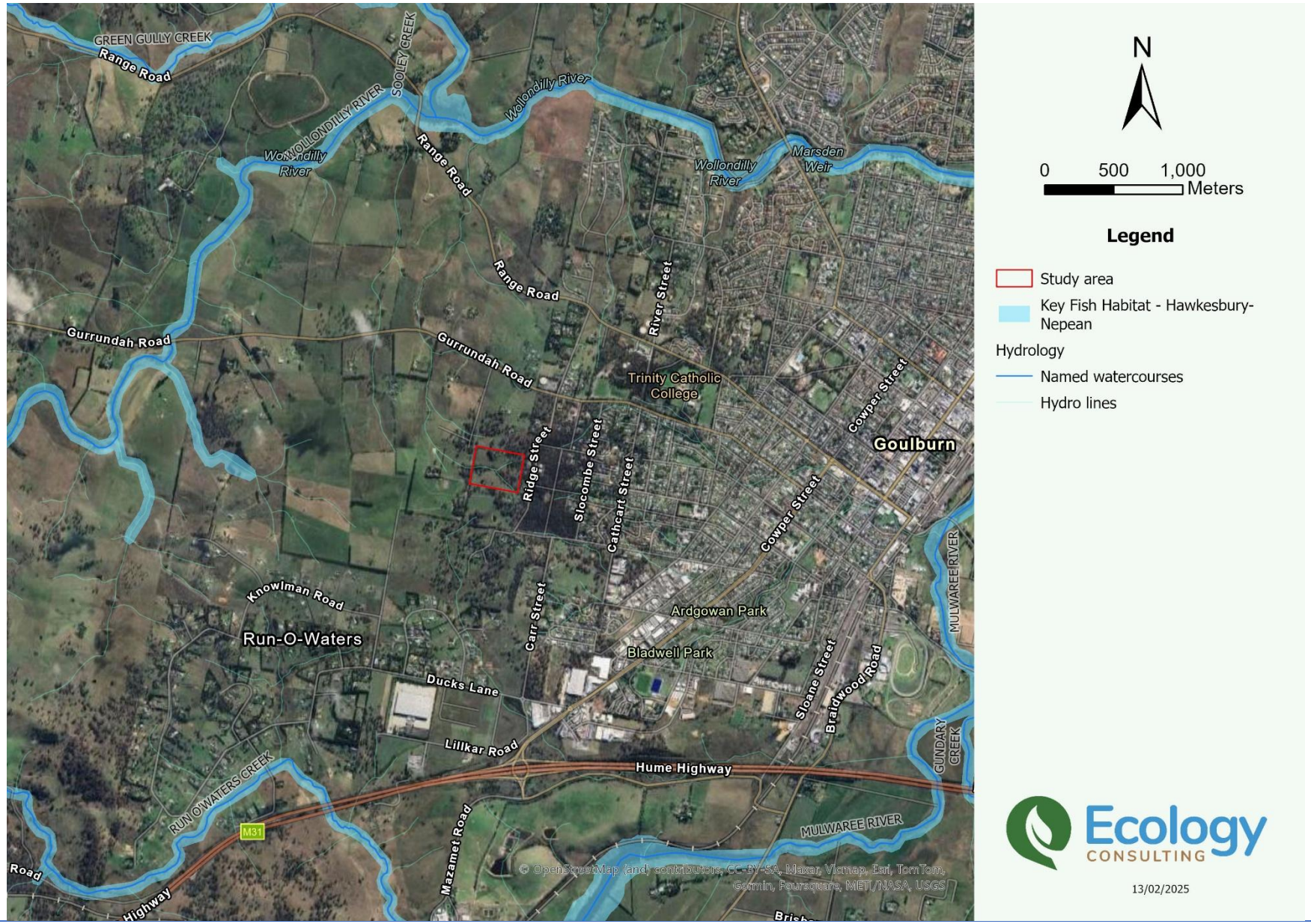


FIGURE 20: KEY FISH HABITAT



5.5 NSW Biosecurity Act 2015

The *Biosecurity Act 2015* requires landholders to manage weed and pest species. Significant weeds are prominent within the study area, likely due to its historical use for agriculture. Safeguards and sustained action are required to prevent their spread into the study area through the proposed works.

Section 3.2.8 and **Appendix A1** provide lists of weeds observed within the study and work areas. Notably, African Lovegrass, Serrated Tussock, St Johns Wort, Blackberry and African Boxthorn require targeted attention and management prior and post development. They have the potential to quickly spread within the study area and surrounding landscape. As environmental weeds these species invade native grasslands, open forests and woodland, surrounding dams and disturbed areas. They grow quickly, outcompete native plants, reduce habitat for native animals and are difficult to control, posing a significant threat to native plant species.

All invasive plant species are subject to regulation under a general biosecurity obligation, requiring individuals to take measures to prevent, eliminate, or minimize any potential biosecurity risks they may present. Anyone involved in handling such plants, who is aware or should be aware of associated biosecurity risks, is obligated to take reasonable and practical steps to prevent, eliminate, or minimise those risks[19]. Weed management actions are required to prevent these weeds from spreading through the immediate surrounds and the connecting areas of high biodiversity that are present within the surrounding and broader landscape.

5.6 Rural Fires Act 1997

5.6.1 Rural Boundary Clearing Code and 10/50 Rule for New South Wales

The Rural Boundary Clearing Code For New South Wales[20] was introduced following the 2019/2020 NSW bush fires and allows landowners to clear certain vegetation along the boundary of their landholding to reduce the potential for the spread of bush fires. The Code applies to any holding within a rural zone within the Boundary Clearing Code Vegetation Map (**Figure 21**) and within 25 m of the holding's boundary with adjoining land.

Section 7.1 of the NSW *Biodiversity Conservation Regulation 2017* states that for subdivision developments, the subdivision is taken to involve the clearing of native vegetation that, in the opinion of the relevant consent authority or other planning approval body, is required or likely to be required for the purposes for which the land is to be subdivided. This includes assuming application of the Rural Boundary Clearing Code and consequently assuming a 50 m wide clearing strip along new boundaries.

Additionally, an NSW bushfire protection measure that allows landowners in designated areas to clear certain vegetation within designated entitlement areas without needing council approval. It was introduced in response to the devastating 2013 NSW bushfires to help reduce bushfire risk.

This report has taken into consideration that a restriction be placed on the title of the land to prevent application of the Rural Boundary Clearing Code and the 10/50 Rule, and only a 6 m wide strip is assumed to be cleared for construction and maintenance of boundary fences (**Section 4.1**).

[19] Read Biosecurity Act 2015
[20] Rural Boundary Clearing Code For New South Wales

FIGURE 21: RURAL BOUNDARY CLEARING TOOL[21]

Boundary Clearing Zone

Boundary clearing may be permissible/allowed under the Rural Boundary Clearing Code in these areas. You may only clear vegetation along your boundary in these areas in accordance with the Rural Boundary Clearing Code.

Non Boundary Clearing Zone

Clearing is not permissible/allowed under the Rural Boundary Clearing Code, as these areas are excluded from the Code.

Council Not Opted In

Clearing is not permissible/allowed under the Rural Boundary Clearing Code in these areas, as the council has not opted in to the Rural Boundary Clearing Code.

5.7 Other planning controls

The NSW Planning Report for the study area notes that it "may be affected by additional planning controls not outlined in this report" and advises landholders to contact their council for more information. No other planning controls have been notified by Goulburn Mulwaree Council or considered as part of this report.

[21] Rural Boundary Clearing Tool

6 Recommended mitigation measures

The proposed site plan notably conserves the habitat features within the study area (see **Section 4.1**). At a minimum, the measures described below have been identified as best practice measures to further manage impacts of the proposal on biodiversity. This report has taken these mitigation measures into account when assessing both the long and short-term impacts of the proposal to biodiversity.

6.1 Protection of ecologically significant features

6.1.1 Unexpected threatened species find

Since the proposed development does not involve the removal of trees, bush rock, or other significant habitat features, an ecologist is not required to guide the clearing procedures.

However, if a threatened species is unexpectedly discovered or if threatened fauna enter the work area or its immediate vicinity during development, a suitably qualified ecologist should be engaged to determine appropriate adaptive management actions to ensure the species' protection.

6.1.2 Subsequent development

Following the subdivision, it is recommended that any subsequent development utilise best practice methods before, during and after construction to mitigate any unavoidable impacts with, at a minimum the following measures implemented.

6.1.2.1 Delineation of Clearing Areas and Protection Zones

To avoid removal or damage to native vegetation and ecologically valuable habitats beyond the defined footprint, as well as to ensure clearing remains within exotic dominant grassland, it is recommended to clearly demarcate the works area with temporary fencing and signage before commencing any clearing and other activities. Fencing should remain in place until construction has ceased, the site is stabilised, and any rehabilitation efforts have commenced.

Furthermore, ancillary facilities such as stockpile sites, site compounds etc. should be located within the limits of clearing. Restrictions on clearing, access, movement, and construction activity within areas outside the footprint are recommended with contractors, workers, and visitors to the proposal site made aware of clearing limits and no-go zones as part of their site induction.

Clearing and disturbance of vegetation beyond the designated clearing footprint should not be undertaken unless part of environmental conservation activities and/or otherwise approved by Council.

6.1.2.2 Erosion, sedimentation, and pollution control

The proposed work may result in erosion and transport of sediments into drainage lines, onsite dam/aquatic habitat and further offsite as a result of soil disturbance and spills during construction. To reduce sedimentation and pollution during construction, erosion and chemical contaminant control measures should be implemented in accordance with "The Blue Book" (Landcom 2004). This includes the following:

- minimising the amount of exposed soils,
- installation of sediment control fences,
- covering soil stockpiles,

- ensuring stockpiles are located well away (at least 40 m) from the ephemeral drainage lines, other drainage lines, or riparian areas,
- avoiding soil disturbance prior to heavy rainfall,
- taking precautions for fast and effective containment of pollution, such as:
    - pollution traps,
    - spill kits, and
    - removal of pollution to an off-site location.

To avoid potential indirect impacts during construction, an appropriate Erosion and Sedimentation Control Plan should be in place following best practice (e.g., Landcom, 2004) prior to any construction works taking place.

6.1.2.3 General recommendations on construction and landscaping

Development can impact on the diversity and abundance of the plants and animals in and around a site in many other ways, for example, by changing water flows and quality, and by introducing or facilitating the spread of new pests and diseases. In this context, it would also be highly desirable for the landholder to:

- control weeds present on site prior to construction, with follow-up after establishment of Lot 1,
- ensure construction vehicles and earthmoving equipment are clean (and if necessary, are cleaned to remove soil and weed seed) before entering or leaving the study area,
- put in place sediment control traps or take other action to ensure run-off from the work area does not degrade nearby dams/areas of high biodiversity value,
- monitor soil disturbance in the work area and control any weeds as soon as they emerge,
- Prioritise planting native species that are indigenous to the local area in landscaping, and
- ensure garden plantings do not include potentially invasive plant species.

More information about potentially invasive plant species and alternatives to them can be obtained from websites including Grow Me Instead.

6.1.3 Section 88 instrument/s

The study area contains a range of ecologically important vegetation, habitats and biodiversity values mapped areas and the development has potential to trigger the biodiversity offset scheme where these areas are impacted or otherwise disturbed.

It is therefore recommended that Council consider restricting what can be done on the property by means of a covenant on the property title under s88B of the NSW Conveyancing Act 1919. As part of this:

- the following activities should be explicitly prohibited:
    - planting/sowing species in the study area unless the species planted are endemic native species,
    - removal and/or significant disturbance to the remaining native trees, and
    - boundary clearing without consent under Rural Boundary Clearing Code and the 10/50 Rule.

A s88B covenant is strongly recommended to ensure that future property owners are aware of the study area's special ecological values and can be held accountable for activities that degrade or destroy these values.

6.2 Rehabilitation and conservation management

6.2.1 Management of significant weeds

Several Goulburn Mulwaree Council priority weeds (GMCPW)[22], High Threat Exotic (HTE) species, and Commonwealth recognised Weeds of National Significance (WoNS) [23] were observed to be present (see **Appendix A1** and **Section 3.2.8**). It is strongly recommended that the landholder manages these species. Any of these listed species that occur within the proposed work areas should be appropriately treated prior to the commencement of any works to limit the potential spread of these species in the area.

Among all weed species observed within the study area, Serrated Tussock (*Nassella trichotoma*) and African Lovegrass (*Eragrostis curvula*) has the highest coverage and is common throughout the majority of the site. It is highly recommended that they are managed through careful application of a suitable herbicide.

6.2.2 Re-establishment of native composition

It is recommended that revegetation of remnant native vegetation areas, particularly surrounding the development area are undertaken to assist the regeneration of native vegetation within the study area. This should be undertaken through the planting of endemic mid and overstory species which already occur within the study area as well as species which would have likely been present prior to the clearing associated with the study area's agricultural utilisation. It is recommended that a management plan and planting guide be prepared to assist rehabilitation efforts and provide for ecologically sustainable development. Ecology Consulting Pty Ltd is happy to provide this service on request.

It is recommended that plantings as part of restoration and landscaping works to increase the connectivity to the woodland patch to the immediate south of the study area include the following shrub and understory species:

- Blakely's Red Gum *(Eucalyptus blakelyi),*
- Yellow Box *(E. melliodora),*
- Argyle Apple *(Eucalyptus cinerea),*
- Kurrajong (*Brachychiton populneus*),
- Black Wattle (*Acacia mearnsii*),
- Native Blackthorn (*Bursaria spinosa*),
- Shiny Cassinia (*Cassinia longifolia*),
- Hickory Wattle (*Acacia implexa*), and
- Kangaroo Grass (*Themeda triandra*).

[22] Local Weed Management Plan. Goulburn Mulwaree Council. (2019).
[23] For more information about WoNS, refer to NSW WeedWise at:

7 Conclusion

This report presents findings of a biodiversity assessment of Lot 336 DP 750015 at 61 Foord Road, Run-o-Waters, conducted on behalf of the landholder in support of a DA for a two-lot subdivision. Future land use within proposed Lots 1 and 2 will remain as currently presented (rural residential and agricultural). Overall, the development footprint is estimated at approximately 0.54 ha consisting of the construction of a building envelope and associated structures (e.g., dwelling, tanks, sheds, driveway, APZ, and effluent disposal area) in proposed Lot 1, as well as the establishment of an APZ for the existing dwelling in proposed Lot 2.

The study area is located within a rural setting in the locality of Run-o-Waters. The study area and surrounding landscape contain native vegetation which has been largely modified for rural agricultural use. Despite this clearing, remnant vegetation that exists within the study area and surrounding landscape, particularly overstory vegetation has been assessed as important to landscape function and as habitat and habitat connectivity for local fauna. These ecologically valuable habitats further include exotic and native trees, modified grasslands and riparian areas. These habitats offer habitat for a range of native and threatened fauna known or likely to occur within the area.

Parts of the study area have been heavily disturbed and modified from their original condition. As a result, these areas have been classified as low-condition modified grasslands (Zone 2). However, the study area still retains remnant native vegetation in the form of scattered trees and patches (Zone 1), which provide important biodiversity value. Both Zone 1 and Zone 2 align with PCT 3373 Goulburn Tableland Box-Gum Grassy Forest, meeting the criteria for the TEC Box Gum Woodland (BC Act listed). The garden planting around the existing dwelling in Lot 2 is mapped as Zone 3. Weed infestations, primarily Serrated Tussock and African Lovegrass, are widespread throughout the study area.

The proposed works avoid better condition areas in Zone 1 and are entirely within Zone 2 and Zone 3, with construction occurring within modified grassland and landscaped gardens. The development footprint contains minimal native vegetation, with only 0.43 ha of modified grassland to be removed.

Overall, provided mitigation measures and recommendations outlined in **Section 6** are undertaken, the proposed work will not trigger entry into the Biodiversity Offset Scheme (refer to **Table 7**) or further assessment under relevant biodiversity legislation (**Section 5**).

Standard construction environmental control measures and rehabilitation efforts have been recommended to minimise the likelihood of direct, indirect or long-term cumulative impacts to biodiversity (**Sections 6.1** and **6.2**). These include but are not limited to:

- demarcation of the development footprint and set up of no-go zones,
- sediment and erosion control measures,
- immediate 'stop work', in the event of an unexpected threatened species find,
- management of significant weeds,
- rehabilitation planting of endemic species, and
- restrictions on allowable future clearing (i.e., Section 88b instrument/s).

Appendix A: Species observed within study area

A1 Flora species observed within the study area during field inspection.

The following codes denote the status of a species:

H	High Threat Exotic (NSW)
K	Species that is associated with a Key Threatening Process
N	Native species
P	Protected species (not listed as a threatened species but subject to special protections)
T	Threatened species (may be Vulnerable, Endangered or Critically Endangered)
W	Weed of National Significance (Commonwealth)
X	Other exotic species

Plant species information is presented in order of growth form then scientific name. It does not consider the relative abundance or significance of particular species.

TABLE A 1: NATIVE FLORA SPECIES OBSERVED WITHIN THE STUDY AREA DURING FIELD INSPECTION

Scientific name	Common name	Family	Status
Trees (native)			
Eucalyptus blakelyi	Blakely's Red Gum	Myrtaceae	**N**
Eucalyptus cinerea	Argyle Apple	Myrtaceae	**N**
Eucalyptus melliodora	Yellow Box	Myrtaceae	**N**
Grasses and Grasslike (native)			
Austrostipa bigeniculata	Tall Stipa	Poaceae	**N**
Austrostipa scabra	Speargrass	Poaceae	**N**
Bothriochloa macra	Red Grass	Poaceae	**N**
Chloris truncata	Windmill Grass	Poaceae	**N**
Cynodon dactylon	Common Couch	Poaceae	**N**
Anthosacne scaber	Common Wheatgrass	Poaceae	**N**
Eragrostis brownii	Brown's Lovegrass	Poaceae	**N**
Juncus filicaulis	Pinrush	Juncaceae	**N**
Lomandra bracteata	Mat-rush	Lomandraceae	**N**
Lomandra filiformis subsp. *coriacea*	Wattle Matt-rush	Lomandraceae	**N**
Microlaena stipoides	Weeping Grass	Poaceae	**N**
Rytidosperma spp.	Wallaby Grass	Poaceae	**N**
Forbs (native)			
Acaena ovina	Acaena	Rosaceae	**N**
Chamaesyce drummondii	Caustic Weed	Euphorbiaceae	**N**
Cynoglossum suaveolens	Sweet Hound's-tongue	Boraginaceae	**N**
Einadia nutans	Climbing Saltbush	Chenopodiaceae	**N**
Euchiton involucratus	Star Cudweed	Asteraceae	**N**

Scientific name	Common name	Family	Status
Euchiton sphaericus	Star Cudweed	Asteraceae	N
Goodenia pinnatifida	Scrambles Eggs	Goodeniaceae	N
Lythrum hyssopifolia	Hyssop Loosestrife	Lythraceae	N
Oxalis perennans	Wood Sorrell	Oxalidaceae	N
Plantago varia	Variable Plantain	Plantaginaceae	N
Pseudognaphalium luteoalbum	Jersey Cudweed	Asteraceae	N
Rumex brownii	Swamp Dock	Polygonaceae	N
Tricoryne elatior	Yellow Autumn-lily	Anthericaceae	N
Vittadinia muelleri	New Holland Daisy	Asteraceae	N
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	N

TABLE A 2: EXOTIC FLORA SPECIES OBSERVED WITHIN THE STUDY AREA DURING FIELD INSPECTION

Scientific name	Common name	Family	Status
Trees (exotic)			
Ailanthus altissima	Tree of Heaven	Simaroubaceae	H
Shrubs (exotic)			
Crataegus monogyna	Hawthorn	Malaceae	H
Lycium ferocissimum	African Boxthorn	Solanaceae	W
Rosa rubiginosa	Sweet Briar	Rosaceae	H
Solanum nigrum	Black-berry Nightshade	Solanaceae	X
Grasses and Grasslike (exotic)			
Aira spp.	A Hairgrass	Poaceae	X
Avena spp.	Oats	Poaceae	X
Bromus catharticus	Prairie Grass	Poaceae	X
Bromus hordeaceus	Soft Brome	Poaceae	X
Cyperus eragrostis	Umbrella Sedge	Cyperaceae	H
Dactylis glomerata	Cocksfoot	Poaceae	X
Eleusine tristachya	Goose Grass	Poaceae	X
Eragrostis curvula	African Lovegrass	Poaceae	H
Lolium rigidum	Wimmera Ryegrass	Poaceae	X
Nassella neesiana	Chilean Needle Grass	Poaceae	W
Nassella trichotoma	Serrated Tussock	Poaceae	W
Paspalum dilatatum	Paspalum	Poaceae	H
Phalaris aquatica	Phalaris	Poaceae	X
Vulpia spp.	Rat's-tail Fescue	Poaceae	X
Forbs (exotic)			
Acetosella vulgaris	Sheep Sorrel	Polygonaceae	H
Arctotheca calendula	Capeweed	Asteraceae	X
Cirsium vulgare	Spear Thistle	Asteraceae	X
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	X
Echium plantagineum	Patterson's Curse	Boraginaceae	X

Scientific name	Common name	Family	Status
Erodium cicutarium	Common Crowfoot	Geraniaceae	X
Gamochaeta purpurea	Purple Cudweed	Asteraceae	X
Gamochaeta sp.	A Cudweed	Asteraceae	X
Hypericum perforatum	St. John's Wort	Clusiaceae	H
Hypochaeris radicata	Catsear	Asteraceae	X
Juncus bufonius	Toad Rush	Juncaceae	X
Lactuca serriola	Prickly Lettuce	Asteraceae	X
Lepidium africanum	Common Peppercress	Brassicaceae	X
Modiola caroliniana	Red-flowered Mallow	Malvaceae	X
Onopordum acanthium subsp. *acanthium*	Scotch Thistle	Asteraceae	X
Paronychia brasiliana	Chilean Whitlow Wort	Caryophyllaceae	X
Plantago lanceolata	Lamb's Tongues	Plantaginaceae	X
Romulea rosea var. *australis*	Onion Grass	Iridaceae	X
Sonchus asper	Prickly Sowthistle	Asteraceae	X
Sonchus oleraceus	Common Sowthistle	Asteraceae	X
Trifolium dubium	Yellow Suckling Clover	Fabaceae (Faboideae)	X
Trifolium glomeratum	Clustered Clover	Fabaceae (Faboideae)	X
Trifolium subterraneum	Subterranean Clover	Fabaceae (Faboideae)	X
Others			
Rubus fruticosus sp. agg.	Blackberry complex	Rosaceae	W

A2 Fauna species observed within the study area during field inspection

The following codes denote the status of a species:

K	Species that is associated with a Key Threatening Process
P	Protected species (not listed as a threatened species but subject to special protections)
T	Threatened species (may be Vulnerable, Endangered or Critically Endangered)
X	Other exotic species

TABLE A 3: FAUNA SPECIES OBSERVED WITHIN THE STUDY AREA DURING FIELD INSPECTION

Scientific name	Common name	Family	Status	Observation Type
Birds				
Anthochaera carunculata	Red Wattlebird	Meliphagidae	P	Visual
Cacatua galerita	Sulphur-crested Cockatoo	Cacatuidae	P	Visual
Cacatua sanguinea	Little Corella	Cacatuidae	P	Visual
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Campephagidae	P	Visual
Grallina cyanoleuca	Magpie-lark	Monarchidae	P	Visual
Gymnorhina tibicen	Australian Magpie	Artamidae	P	Visual
Platycercus elegans	Crimson Rosella	Psittaculidae	P	Visual
Platycercus eximius	Eastern Rosella	Psittaculidae	P	Visual
Psephotus haematonotus	Red-rumped parrot	Psittaculidae	P	Visual
Turdus merula	Common Black Bird	Turdidae	P	Visual
Mammals				
Macropus giganteus	Eastern Grey Kangaroo	Macropodidae	P	Scat
Osphranter robustus	Common Wallaroo	Macropodidae	P	Visual
Vulpes vulpes	Fox	Canidae	K	Scat
Amphibians				
Crinia signifera	Common Eastern Froglet	Myobatrachidae	P	Call
Limnodynastes tasmaniensis	Spotted grass frog	Limnodynastidae	P	Call

A3 Systematic survey data

This appendix section summarises the results of systematic flora survey work across the study area.

A3.1 BAM plots

TABLE A 4: BAM PLOT DATA

	BAM 1	BAM 2	BAM3
Date of survey	24/11/2024	24/11/2024	24/11/2024
Location			
Easting (UTM 55H)	745715	745669	745850
Northing (UTM 55H)	6150686	6150735	6150706
BAM ATTRIBUTE - 20x20m plot **Species richness (count)**			
Native tree	0	1	1
Native shrub	0	0	0
Native forb	5	3	7
Native grass and grasslike species	8	6	11
Native fern	0	0	0
Other native vascular plant	0	0	0
Total native vascular plants	13	10	19
Cover abundance %			
Native tree	0	1	40
Native shrub	0	0	0
Native forb	0.5	0.3	1.4
Native grass and grass-like species	23.2	26.1	46.7
Native fern	0	0	0
Other native vascular plant	0	0	0
Total native vascular plants	23.7	27.4	88.1
High Threat Exotic species	1.2	1.2	2.7
BAM ATTRIBUTES - 1x1m quadrats **Litter cover %**			
5m	10	60	40
15m	10	25	60
25m	15	5	65
35m	15	20	55
45m	10	80	70
Average	11.3	38.0	58.0
Bare ground cover (%)			
5m	10	1	0
15m	5	1	0
25m	0	20	0

35m	1	15	0
45m	1	2	1
Average	3.4	7.8	0.2
Cryptogam cover %			
5m	0	0	0
15m	0	0	0
25m	0	0	0
35m	0	0	0
45m	0	0	0
Average	0	0	0
Rock cover %			
5m	0	0	0
15m	0	0	0
25m	0	0	0
35m	0	0	0
45m	0	0	0
Average	0	0	0

FIGURE A 1: BAM PHOTOS

BAM 1

0-50m transect line

Plot BAM1 (5m)

Plot BAM1 (15m)

Plot BAM1 (25m)

Plot BAM1 (35m)

Plot BAM1 (45m)

BAM 2
0-50m transect line

Plot BAM2 (5m)

Plot BAM2 (15m)

Plot BAM2 (25m)

Plot BAM2 (35m)

Plot BAM2 (45m)

BAM 3

0-50m transect line

Plot BAM3 (5m)

Plot BAM3 (15m)

Plot BAM3 (25m)

Plot BAM3 (35m)

Plot BAM3 (45m)

Appendix B: Likelihood of Occurrence assessment

The study area is situated within a modified agricultural landscape which has been cleared and modified with an exotic dominant ground cover. However, valuable refugia and habitat is available for a range of native fauna species, particularly in Lot 2 where remnant native woodland vegetation is present. Other habitat features such as hollows, are present in scattered remnant canopy vegetation.

Threatened species that have specialised habitat requirements, may be less likely to find permanent suitable habitat within the site. Rather, they may utilise habitat in the study area opportunistically, or in transit.

The following analysis works through each threatened species listed as under the Commonwealth EPBC Act, NSW BC Act and/or the FM Act. For ease of reference, the following acronyms are used to indicate the status of a community or species according to each jurisdiction:

CE	Critically Endangered
E	Endangered
V	Vulnerable
M	Listed Migratory (EPBC Act only)
–	Not listed

The following analysis also incorporates data from a variety of sources including:

- threatened community/species profiles published by the NSW Department of Climate Change, Energy, the Environment and Water,
- Atlas of Living Australia (ALA) records for the area within a 10 km buffer of the study area
- BioNet Atlas of NSW Wildlife records for the area within a 10 km buffer of the study area, and
- Reference sites:
    - eBird data for Goulburn Wetlands hotspot.

The terms for likelihood of occurrence are defined below:

- Present = the species was or has been observed on the site.
- Likely = a medium to high probability that a species uses the site.
- Potential = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur.
- Unlikely = a very low to low probability that a species uses the site.
- No = only applicable to Threatened Ecological Communities.

B1 Threatened Ecological Communities

TABLE B 1: LIKELIHOOD OF OCCURRENCE OF THREATENED ECOLOGICAL COMMUNITIES

Scientific name	Common name	EPBC Act Status	BC Act Status	Distribution and habitat	Likelihood of occurrence
Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion	Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion	—	CE	This TEC occurs between Captains Flat in the north and Bombala in the south, as far east as the crest of the Great Dividing Range and west towards Adaminaby. The TEC is characterised by a sparse to very sparse tree layer dominated by Snow Gum, either as a single species or in a mix with any of these species as co-dominants: • Blackwood, • Candlebark, • Black Sallee (*E. stellulata*), and • Ribbon Gum. The TEC is also characterised by a certain grass and forb species that tend to persist on sites even if the tree canopy is removed. Such derived native grassland may still be protected under relevant laws and can regenerate to woodland under the right conditions.	**No** – This community was not identified within the study area. The dominant overstory species, Snow Gum, was not recorded in or directly surrounding the study area.
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	Montane Peatlands and Swamps	—	E	Currently known from conservation reserves including Werrikimbee, Barrington, Kanangra-Boyd, Monga, Wadbilliga, South East Forests and Kosciusko National Parks. It consists of accumulated peaty or organic-mineral sediments on poorly drained flats in the headwaters of stream. It occurs on undulating tablelands and plateaus, above 400 – 500 m elevation, generally in catchments with basic volcanic or fine-grained sedimentary substrates or, occasionally, granite	**No –** This community was not identified within the study area. The study area does not contain peat or swamps.
Natural Temperate Grassland of the South Eastern Highlands	Natural Temperate Grassland	CE	—	Confined to the Southern Tablelands, a region bounded by the ACT, Yass, Boorowa, the Abercrombie River, Goulburn, the Great Eastern Escarpment, the Victorian border, and the eastern boundary of Kosciusko National Park. It is a naturally treeless grassland community dominated by a range of perennial grass species and, in highly intact sites, containing a large range of herbaceous species in many plant families. Particular condition criteria must be met for an area of grassland to be considered natural temperate grassland.	**No** – This community was not identified within the study area. The study area is not naturally treeless.

Scientific name	Common name	EPBC Act Status	BC Act Status	Distribution and habitat	Likelihood of occurrence
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions	—	E	This TEC is currently found in the Eastern Highlands and Southern and Central Tablelands. It occurs on loam or clay soils associated with basalt, but sometimes on other substrates that produce relatively fertile soils. It occurs at elevations of 600 – 900 m above sea level and is characterised by an open forest dominated by pure stands or varying combinations of the following eucalypt species: • Ribbon Gum, • Narrow-leaved Peppermint (*E. radiata*), Mountain Gum or Broad-leaved Ribbon Gum (*E. dalrympleana* subsp. *dalrymplea*na), and/or Snow Gum.	**No** – This community was not identified within the study area. The study area does not contain basalt derived soils, and the tree layer is not dominated by the characteristic tree species.
Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions	Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions	—	CE	This TEC occurs on the eastern slopes of the Great Dividing Range, between Golspie in the north and Majors Creek in the south and between Carwoola in the west and Marulan in the east. It is characterised by a sparse to very sparse tree layer dominated by Snow Gum, sometimes with Candlebark as a co-dominant. The TEC is also characterised by a certain grass and forb species that tend to persist on sites even if the tree canopy is removed. Such derived native grassland may still be protected under relevant legislation and can regenerate to woodland under the right conditions.	**No –** This community was not identified within the study area. The dominant overstory species, Snow Gum and Candlebark, were not recorded in or directly surrounding the study area.
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	Box Gum Woodland	—	CE	Has an extensive distribution, being found in a large portion of NSW, extending north to the Queensland border Queensland, down to the Victorian border in the south. It occurs in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. Found in a wide variety of soils, as well as a variety of habitat from flat undulating plains to gradual and steep slopes. Dominant overstory species of this community are White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E blakelyi*).	**Present** – This community was identified within the site during field survey. It contains the characteristic species associated with this community and meets condition standards for listing (**Section 3.2.3.1**).

Scientific name	Common name	EPBC Act Status	BC Act Status	Distribution and habitat	Likelihood of occurrence
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Box Gum Woodland	CE	—	In NSW this TEC can occur along most of Eastern NSW up to the Queensland border in the north and to the Victorian border in the south. Its distribution covers the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. Box Gum Woodland is found in a wide variety of soils, as well as a variety of habitat from flat undulating plains to gradual and steep slopes. Dominant overstory species of this community are White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E blakelyi*).	**No –** This community was not identified within the study area. Vegetation condition within the study are does not meet the Commonwealth EPBC Act listed criteria (**Section 3.2.3.2**).
	TEC count	**2**	**5**	**7 TECs across all jurisdictions**	

B2 Threatened flora species

TABLE B 2: LIKELIHOOD OF OCCURRENCE OF THREATENED FLORA

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Acacia bynoeana	Bynoe's Wattle	V	E	No	No	Found in central eastern NSW, from the Hunter District south to the Southern Highlands and west to the Blue Mountains. Currently known from about 30 locations. Shrub to a metre high occurring in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites.	**Unlikely.** Habitat within the study area is degraded and sub-optimal. Study area is outside predicted/known distribution and there are no known records on BioNet.
Bossiaea oligosperma	Few-seeded Bossiaea	V	V	No	**Yes (1)**	Known from two disjunct areas - the lower Blue Mountains in the Warragamba area (Wollondilly, Allum, Tonalli River catchments) and the Windellama area in Goulburn Mulwaree Shire, where it is locally abundant. Occurs on stony slopes or ridges on sandstone in the Yerranderie area and in low woodland on loamy soil in the Windellama area.	**Unlikely**. Habitat within study area is sub-optimal and landscape does not consist of stony slopes or ridges. A single record within 10 km was collected in 1964.
Calotis glandulosa	Mauve Burr-daisy	V	V	No	No	Found on Monaro and Kosciuszko regions. There are three known sites in the upper Shoalhaven catchment, Kybeyan-Gourock, Monaro and Oberon. Occurs in subalpine grassland and montane or natural temperate grassland and Snow Gum Woodlands on the Monaro and Shoalhaven area. Appears common on roadside in colonises though it does not persist for long.	**Unlikely**. Habitat within study area is sub-optimal. No records within 10 km.
Commersonia prostrata	Dwarf Kerrawang	E	E	No	No	Known in the Southern Highlands and Southern Tablelands. Population was found near the Corang, at Rowes Lagoon, at Thirlmere Lakes, on the North Coast, and in Victoria. Occurs on sandy, sometimes peaty soils in a wide variety of habitat. Appears to respond positively to some forms of disturbance, however, there are conflicting reports about the species response to fire.	**Unlikely**. Habitat within study area is degraded and sub-optimal. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Diuris aequalis	Buttercup Doubletail	E	E	**Yes (15)**	**Yes (13)**	Known in Kanangra-Boyd National Park, Gurnang State Forest, towards Wombeyan Caves, the Taralga - Goulburn area, and the ranges between Braidwood, Tarago, and Bungendore. Populations tend to contain few, scattered individuals. Only about 200 plants in total, from 20 populations are known. Not always detectable in unfavourable years. Best months to survey are October and November. Occurs in forest, low open woodland with grassy understory and secondary grassland on the higher parts of the Southern and Central Tablelands.	**Unlikely**. Study area is too modified and degraded for this species to persist despite multiple records within 10 km. Property was surveyed during the known flowering time and species was not observed.
Dodonaea procumbens	Creeping Hop-bush	V	V	No	No	Found in the dry areas of the Monaro, between Michelago and Dalgety. One population was found at Lake Bathurst. Grows on sandy-clay soils, on or near vertically-tilted shale outcrops. Occurs in Natural Temperate Grassland or fringing eucalypt woodland of Snow Gum. Often occurs in disturbed or exposed locations such as roadsides or outcrops of rocks.	**Unlikely**. Habitat within study area is degraded and sub-optimal. during field surveys. No records within 10 km.
Eucalyptus aggregata	Black Gum	V	V	No	No	Known to occur in the NSW Central and Southern Tablelands, with small, isolated populations occurring in ACT and VIC. Grows in the lowest parts of the landscape, on alluvial soils in poorly drained flats and hollows near creeks and small rivers.	**No.** Landscape of the study area located does not provide suitable habitat for the species.
Eucalyptus macarthurii	Paddys River Box	E	E	**Yes (2)**	**Yes (11)**	Has a moderately restricted distribution, currently recorded from the Moss Vale District to Kanangra-Boyd National Park. Occurs on grassy woodland on relatively fertile soils on broad cold flats.	**No**. Although known records present within 10km, landscape of the study area located does not provide suitable habitat for the species. No evidence of this canopy species was observed during field surveys.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Hibbertia acaulothrix	A Guinea Flower	E	—	No	No	Known from Wadbilliga National Park in the Southern Tablelands, through the Nattai-Wollondilly area in the southern Central Tablelands, to the Mt Baker and Mt Coricudgy (Wollemi) area in northern part of the Central Coast and Tablelands. Grows on sedimentary rocks in Silvertop Ash (*E. sieberi*) woodland or associated with Black She-oak (*Allocasuarina littoralis*), Red Bloodwood (*Corymbia gummifera*), Flaky-barked Tea-tree (*Leptospermum trinervium*).	**Unlikely**. Study area does not contain associated overstory species. Habitat within is degraded and sub-optimal. No records within 10 km.
Lepidium aschersonii	Spiny Peppercress	V	V	No	No	Occurs in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). Found on ridges of gilgai clays dominated by Brigalow, Belah, Buloke and Grey Box. In the south has been recorded growing in Bull Mallee. Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmannii*) and Grey Box (*E. microcarpa*). The species grows in where vegetation structure varies open to dense with sparse grassy understory dominated by introduced plants and occasional heavy litter.	**Unlikely**. Study area does not contain associated overstory species. Habitat within is sub-optimal. No records within 10 km.
Lepidium hyssopifolium	Basalt Pepper-cress	E	E	No	No	Only known from three areas (Bathurst, Bungendore, and Crookwell) in NSW. Medium perennial forb recorded in a variety of native habitats as well as heavily modified, weed-infested areas such as roadsides, suggesting it may require disturbance to establish. Similar in appearance to other species of related exotic peppercress, easiest to identify when in flower (optimal survey months: October- December).	**Unlikely**. Habitat within study area is sub-optimal and degraded. No records within 10 km.
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	E	E	**Yes (83)**	**Yes (69)**	Endemic to south-eastern Australia, where it is currently known from three geographically separate areas in Tasmania, Victoria and south-eastern NSW and ACT. In NSW it currently occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega, and Goulburn, with a few scattered localities know from beyond this region. Small clump-forming forb that grows well in disturbed roadside verges. Occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils. Can occur in modified habitats such as semi-urban areas and roadsides. It does not tolerate heavy competition.	**Potential.** Suitable habitat within the study area. Several records within 10 km. The species is easily identifiable, even when not in flower. The targeted survey within work area did not detect any evidence of the species' presence.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Pomaderris delicata	Delicate Pomaderris	CE	CE	No	No	Only known from two sites between Goulburn and Bungonia and south of Windellama (Cullula). Grows in dry open forest dominated by Silvertop Ash with a dense she-oak understory. Soils are shallow and derived from sandstone and siltstone.	**Unlikely.** Study area does not contain associated overstory species. Habitat within the study area is sub-optimal and degraded. No record within 10 km.
Pomaderris pallida	Pale Pomaderris	V	V	No	No	Has been recorded from near Kydra Trig, Tinderry Nature Reserve, the Queanbeyan River, the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. Usually growing in shrub communities surrounded by Brittle Gum and Red Stringybark or *Callitris* spp. woodland.	**Unlikely.** Study area does not contain associated shrub species. Habitat within the study area is sub-optimal and degraded. No record within 10 km.
Prasophyllum petilum	Tarengo Leek Orchid	E	E	No	No	Natural populations are known from a total of five sites in NSW: near Boorowa, Queanbeyan area, Ilford, Delegate, and a newly recognised population 10 km west of Muswellbrook. Grows in grassy woodland, highly susceptible to grazing and only known on little grazed sites. Not visible outside flowering period (October–December).	**No.** Study area is outside the known natural population sites. Habitat within the study area is unsuitable. No records within 10 km.
Rhizanthella slateri	Eastern Underground Orchid	E	V	No	No	In NSW, currently known from near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Flowers from September to November. Little known about its habitat requirements as it almost grows below the soil surface and only found when the soil is disturbed.	**Unlikely**. Habitat within study area is degraded and sub-optimal. No records within 10 km.
Rutidosis leptorrhynchoides	Button Wrinklewort	E	E	**Yes (30)**	**Yes (25)**	In the Canberra - Queanbeyan region Button Wrinklewort primarily occurs in the ecotone between the treeless Kangaroo Grass, Poa tussocks (*Poa* spp.), and Spear Grass (*Austrostipa* spp.) dominated grasslands and the open grassy Yellow Box - Blakely's Red Gum woodlands. Flowers between December and April. Grows on soils that are usually shallow, stony red-brown clay loams; tends to occupy areas where there is relatively less competition from herbaceous species.	**Unlikely**. Study area is too modified and degraded for this species to persist despite multiple records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	Distribution and habitat	Likelihood of Occurrence
Senecio macrocarpus	Large-fruit Groundsel	V	—	No	No	In NSW, one population has been discovered near Gundaroo. Occurs in partly cleared dry forests and Box Gum woodlands which transition to Brittle Gum Forest with a relatively undisturbed understory of native grasses, forbs, and subshrubs.	**Unlikely**. Habitat within study area is degraded. No records within 10 km.
Thesium australe	Austral Toadflax	V	V	No	No	Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Grows in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass.	**Unlikely.** Habitat within study area is degraded. No record within 10 km.
	Species Count	19	17			**Total species: 19**	

B3 Threatened fauna species

TABLE B 3: LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Birds								
Anseranas semipalmata	Magpie Goose	—	V	**Yes (1)**	No	No	Common in the Australian northern. Increasing number of records in central and northern NSW since 1980s. Mainly found in wetlands less than 1 m deep with dense growth rushes or sedges. Often seen in trios or flocks on shallow wetlands, dry ephemeral swamps, wet grasslands, and floodplains. Nests in trees over deep water. Breeding is strongly influenced by water level and unlikely in south-eastern NSW.	**Potential.** Suitable foraging habitat present within study area; however, the species is unlikely to breed within the area.
Anthochaera phrygia	Regent Honeyeater	CE	CE	**Yes (1)**	**Yes (1)**	No	Found in inland slopes of south-east Australia and drier coastal area. In NSW, the distribution is very patchy and mainly confined to the Capertee Valley and the Bundarra-Barraba region. Very distinctive woodlands specialist that inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-oak (*Casuarina cunninghamiana*). Displays preference for old growth sites with abundant mistletoe.	**Unlikely.** Study area does not provide important feeding species (such as Mistletoe). Suggests that study area does not provide ideal conditions for the species.
Aphelocephala leucopsis	Southern Whiteface	V	V	**Yes (18)**	No	No	Occurs across most of mainland Australia south of the tropics, from the northeastern edge of the Western Australian wheatbelt, east to the Great Dividing Range. Occurs in a wide range of open woodlands and shrublands where there is an understory of grasses or shrubs, or both. Almost exclusively forage and feeds on the ground.	**Likely**. Suitable foraging habitat present within study area. It has been recorded multiple times within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Artamus cyanopterus cyanopterus	Dusky Woodswallow	—	V	**Yes (58)**	**Yes (8)**	**Yes (4)**	Widespread in eastern, southern, and south western Australia. The species occurs throughout most of New South Wales. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understory of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	**Likely**. Suitable foraging habitat present within study area. Many known recorded within 10 km.
Botaurus poiciloptilus	Australasian Bittern	E	E	No	No	No	Widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Wetland specialist that favours permanent freshwater wetlands with tall, dense vegetation especially Bullrushes (*Typha* spp.) and Spike-rushes (*Eleocharis* spp.).	**Unlikely.** Habitat present within the study area is degraded and sub-optimal. No known records within 10 km.
Calidris acuminata	Sharp-tailed Sandpiper	V (M)	—	**Yes (4)**	No	No	Spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh, or other low vegetation.	**Unlikely.** The habitat within the study area is degraded and considered sub-optimal. Known records exist at Wet Lagoon and Goulburn Maturation Ponds, which offer more suitable habitat conditions.
Calidris ferruginea	Curlew Sandpiper	CE (M)	E	No	No	No	Annual migratory shorebird to and from Siberia. Recorded in all states in Australia during non-breeding seasons as well as breeding season when many one-year-old birds remain in Australia. Most often found around the coasts and widespread inland with small numbers. Mainly occur in littoral and estuarine habitats. Sometimes found in inland swamps and lakes during annual migration.	**Unlikely.** Study area provides foraging and transitory habitat, though it is considered degraded. No known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	**Yes (33)**	**Yes (1)**	**Yes (2)**	Distinctive parrot found from southern Victoria through south- and central-eastern New South Wales. In Spring and summer, generally found in tall mountain forests and woodlands especially wet sclerophyll forests. In autumn and winter often moves to lower altitudes in drier and more open forests and woodlands. Prefers to roost in old growth forests and to nest in hollows with a 10+ cm diameter at least 9 m above ground level.	**Likely.** Utilisable transitory and foraging habitat within study area and possibly breeding habitat in broader landscape. Many known records within 10 km.
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	No	No	No	Uncommon, although widespread throughout suitable forest and woodland habitats from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of She-oak occur. Black She-oak (*Allocasuarina littoralis*) and Forest She-oak (*A. torulosa*) are important foods.	**Unlikely.** Study area does not provide important plant species, Black She-oak or Forest She-oak do. No known record within 10 km.
Chthonicola sagittata	Speckled Warbler	—	V	**Yes (44)**	**Yes (2)**	No	The species has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. Ground-dwelling bird living in a wide range of Eucalyptus dominated communities with a grassy understory, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth, and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees.	**Likely.** Utilisable foraging habitat within study area and records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Circus assimilis	Spotted Harrier	—	V	**Yes (10)**	No	No	Occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment, and ranges. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland. Most commonly found in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree. Preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.	**Potential.** Study area provide utilisable foraging habitat. Known records within 10 km.
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	V	V	**Yes (2)**	No	No	Endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. Mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understory. Hollows in standing dead or live trees and tree stumps are essential for nesting.	**Potential**. Utilisable habitat within study area and known records within 10 km.
Daphoenositta chrysoptera	Varied Sittella	—	V	**Yes (81)**	**Yes (5)**	No	Sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Acrobatic woodland specialist that lives in eucalypt forests and woodland, mallee, and Acacia woodland. Feeds on slaters and other arthropods extracted from crevices in bark and dead wood.	**Potential.** Study area presents utilisable habitat for the species, and known records within 10 km.
Ephippiorhynchus asiaticus	Black-necked Stork	—	E	**Yes (1)**	**Yes (1)**	No	In Australia, widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW (although vagrants may occur further south or inland, well away from breeding areas). In NSW, the species becomes increasingly uncommon south of the Clarence Valley, and rarely occurs south of Sydney. Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries.	**Unlikely.** Habitat within the study area is sub-optimal. Known record within 10 km was documented in 1998.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Epthianura albifrons	White-fronted Chat	—	V	**Yes (9)**	**Yes (1)**	No	Found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. Usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	**Potential.** Study area has utilisable habitat for the species, and known records within 10 km.
Falco hypoleucos	Grey Falcon	V	V	No	No	No	Medium-sized raptor sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions. Sometimes found in open woodlands near the coast and near wetlands where surface water attracts prey.	**Unlikely.** Habitat within study area sub-optimal for the species. No known records.
Falco subniger	Black Falcon	—	V	**Yes (5)**	**Yes (1)**	No	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland region. Habitat is usually in the arid and semi-arid zones. Inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses, and agricultural land with scattered remnant trees. It hunts over open wooded grasslands, saltbush plains, bluebush plains and other low vegetation.	**Potential.** Study area has utilisable foraging habitat for the species, and known records within 10 km
Gallinago hardwickii	Latham's Snipe	V (M)	—	**Yes (255)**	**Yes (2)**	**Yes (2)**	Non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level, usually inhabiting open, freshwater wetlands with low, dense vegetation. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Potential.** Study area provides transitory habitat. Known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Glossopsitta pusilla	Little Lorikeet	—	V	No	**Yes (1)**	No	In NSW, distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They have been recorded from both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes.	**Potential.** Utilisable foraging habitat and study area within known and predicted geographic distribution. Not observed during field surveys.
Grantiella picta	Painted Honeyeater	V	V	**Yes (2)**	No	No	Occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria, and southern Queensland. Distinctive nomadic species that is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias especially *Amyema* sp.	**Unlikely**. Habitat within study area does not contain important feeding species (such as Mistletoe). Known records within 10 km were documented in 2007.
Haliaeetus leucogaster	White-bellied Sea-Eagle	—	V	**Yes (56)**	**Yes (1)**	**Yes (2)**	Large eagle distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest).	**Likely.** Study area provides utilisable foraging habitat. Many known records within 10 km.
Hieraaetus morphnoides	Little Eagle	—	V	**Yes (132)**	**Yes (10)**	**Yes (1)**	Found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland, or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	**Potential.** Utilisable foraging habitat within study area. Known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Hirundapus caudacutus	White-throated Needletail	V (M)	V	**Yes (9)**	No	**Yes (12)**	Widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Almost exclusively aerial species that forages for insects up to 1 km above ground, usually in large flocks. Only occurs in Australia between late spring and early autumn, breeds in north Asia.	**Likely.** Species may forage above study area with multiple known records within 10 km.
Lathamus discolor	Swift Parrot	CE	E	**Yes (2)**	No	No	Distinctive parrot that breeds in Tasmania during spring and summer and migrates to the mainland for autumn and winter, where they are found in areas with eucalypts that flower profusely in winter or that have abundant lerp (sap-sucking bugs) infestations. Some favourite flowering trees include but not limited to Swamp Mahogany (*E. robusta*,), and Spotted Gum (*Corymbia maculata)*, Red Bloodwood (*C. gummifera*).	**Unlikely.** Habitat within study area does not provide favourite flowering trees, may only provide transitory habitat. Known records within 10 km were in nearby nature reserves.
Lophoictinia isura	Square-tailed Kite	—	V	**Yes (1)**	No	No	In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	**Unlikely.** Habitat within study area is sub-optimal. The known record within 10 km was in 2016.
Melanodryas cucullata cucullata	South-eastern Hooded Robin	E	E	**Yes (6)**	No	No	Widespread, found across Australia, except for the driest deserts and the wetter coastal areas. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs, and a ground layer of moderately tall native grasses.	**Unlikely.** Habitat within study area is sub-optimal as it does not provide structurally diverse habitat.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Neophema chrysostoma	Blue-winged Parrot	V	V	No	No	No	Inhabits a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. Tends to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. Species breeds south of the Great Dividing Range, through southern Victoria and South Australia, and in parts of Tasmania. Partially migratory as variable numbers of individuals migrate across the Bass Strait during winter.	**Unlikely.** Habitat within study area provides sub-optimal habitat for species. No known records within 10 km.
Neophema pulchella	Turquoise Parrot	—	V	**Yes (6)**	No	**Yes (1)**	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges, and creeks in farmland. Nests in tree hollows, logs, or posts, from August to December.	**Potential.** Study area provides utilisable habitat. Known records within 10 km.
Oxyura australis	Blue-billed Duck	—	V	**Yes (469)**	No	**Yes (1)**	Endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover.	**Potential.** Study area provide transitory habitat. Known records within 10 km were documented in Wollondilly River and Goulburn Wetlands.
Petroica boodang	Scarlet Robin	—	V	**Yes (57)**	**Yes (2)**	**Yes (1)**	Found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. A season altitudinal migrant, breeding in high altitude forests in the spring and summer and migrating to lower open woodlands for autumn and winter. Prefers sites with abundant logs and fallen timber, though sometimes found in grazed paddocks with scattered trees.	**Likely.** Study area provides utilisable foraging habitat. Many known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Petroica phoenicea	Flame Robin	—	V	**Yes (29)**	No	No	Endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. Species is generally seasonally migratory between their more alpine and subalpine ranges. Breeds in upland tall moist eucalypt forests during spring and summer and moving to open grasslands and open woodlands in the autumn and winter. The species forages for insects from perched positions from course woody debris, logs or other favoured perches.	**Likely.** Utilisable habitat within study area and multiple known records within 10 km.
Polytelis swainsonii	Superb Parrot	V	V	**Yes (2)**	**Yes (1)**	No	Found throughout eastern inland NSW. Inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. They nest in the hollows of large trees (dead or alive). May forage up to 10 km from nesting sites, primarily in grassy box woodland.	**Potential.** Study area provides utilisable transitory habitat. Species may fly above study area.
Pycnoptilus floccosus	Pilotbird	V	V	No	No	No	Widely distributed throughout the south-eastern region of Australia. Ground foraging species that occupies a variety of different habitats. Strictly terrestrial species, living on the ground in dense forests with heavy undergrowth. Habitat critical to their survival includes wet sclerophyll forests in temperate zones in moist gullies with dense undergrowth, and dry sclerophyll forests and woodlands occupying dry slopes and ridges.	**Unlikely.** Habitat within study area is degraded and sub-optimal. No records within 10 km.
Rostratula australis	Australian Painted Snipe	E	E	No	No	No	In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. A small freshwater wader. Prefers fringes of swamps, dams, and nearby marshy areas where there is a cover of grasses, lignum, low scrub, or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks, or reeds.	**Unlikely.** Habitat within study area is degraded and sub-optimal. No records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Stagonopleura guttata	Diamond Firetail	V	V	**Yes (56)**	**Yes (2)**	No	Endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Distinctive ground-feeding bird found in grasslands and grassy eucalyptus woodlands, riparian areas, and sometimes lightly wooded farmland. Has been recorded in some towns and near farmhouses.	**Likely.** Utilisable habitat within study area and many known records within 10 km.
Stictonetta naevosa	Freckled Duck	—	V	**Yes (110)**	No	No	Primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. Prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move to lakes, reservoirs, farm dams and sewage ponds. Generally, rest in dense cover during the day, usually in deep water. Nests are usually located in dense vegetation at or near water level.	**Potential.** Utilisable transitory and foraging habitat within works area. Known records within 10 km.
Fish								
Macquaria australasica	Macquarie Perch	E	E (FM Act)	No	No	n/a	Found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments. Occurs in waters with lots of cover such as aquatic vegetation, snags, boulders, and overhanging banks.	**Unlikely.** Not a watercourse that is part of the known indicative distribution of the species in NSW, furthermore no known records within 10 km.
Frogs								

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Litoria aurea	Green and Golden Bell Frog	V	E	**Yes (1)**	**Yes (1)**	n/a	Since 1990 the species has only been recorded at an approximate 50 locations in NSW, most of which are small, coastal, or near coastal populations. Only a single population is known to exist in the NSW Southern Tablelands. Found in marshes, dams, and stream-sides, particularly those containing bullrushes or spike-rushes. A relatively large species that can reach 100 mm in length and usually vividly pea coloured, splotched with a near metallic brown or golden. However, colouration is variable in the species.	**Unlikely.** Habitat within study area is degraded. Known records were documented in 1975.
Mammals—bats								
Chalinolobus dwyeri	Large-eared Pied Bat	E	E	**Yes (1)**	No	n/a	Small-medium bat mainly found in well-timbered areas with extensive cliffs and caves from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. Breeds in breeds in sandstone caves/overhangs and will return to same nursery sites over many years.	**No**. Habitat within study area and its vicinity is unsuitable.
Falsistrellus tasmaniensis	Eastern False Pipistrelle	—	V	**Yes (4)**	**Yes (4)**	n/a	Found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils, and other flying insects above or just below the tree canopy.	**Potential.** Utilisable foraging habitat within study area and known records within 10 km.
Miniopterus orianae oceanensis	Large Bent-winged Bat	—	V	No	**Yes (9)**	n/a	Occurs along the east and north-west coasts of Australia. Prefers to roost in caves but may also use derelict mines, storm-water tunnels, and similar man-made structures. Breeding or roosting colonies can number from 100 to 150,000 individuals.	**Potential.** Utilisable foraging habitat within study area and many known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Miniopterus australis	Little Bent-winged Bat	—	V	**Yes (1)**	**Yes (1)**	n/a	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	**Potential.** Study area provides sub-optimal forage and limited foraging habitat. Known record within 10 km.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	**Yes (45)**	**Yes (42)**	n/a	Largest bat in Australia, generally found within 200 km of the east coast. Roosts communally in large camps often located in a gully close to water under dense canopy cover. May travel 20–50 km when foraging for foods, with a home range is ~785,000 ha. Favourite food plants include flowering native trees (Eucalyptus, Melaleuca and Banksia), fruiting rainforest trees and vines, urban gardens, and cultivated fruit crops.	**Likely.** Utilisable habitat presents within study area. Existing camp within 3 km.
Mammals—other								
Dasyurus maculatus	Spotted-tail Quoll	E	V	No	No	n/a	Found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. Mostly nocturnal predator that forages across a range of habitat types, including rainforest, open forest, woodland, coastal heath, and inland riparian forest, from the sub-alpine zone to the coastline. Lives in hollow-bearing trees, fallen logs, other animal burrows, caves, and rocky outcrops. Often hunts densely vegetated creek lines but may also consume carrion.	**Unlikely.** Habitat within the study area is sub-optimal. No known record within 10 km.
Petauroides volans	Greater Glider	E	E	No	No	n/a	Largest glider in Australia. Prefers old growth forests with many hollows and may den in up to 18 hollows across their home range, which averages just 1–3 ha. Favourite foods including leaves from the Ribbon Gum, Mountain Gum and Narrow-leaved Peppermint as well as mistletoe, *Acacia* foliage and young pinecones (*Pinus radiata*).	**No.** Habitat within study area unsuited for the species. No known records within 10 km.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Petaurus australis	Yellow-bellied Glider	V	V	No	No	n/a	Found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	**No.** Habitat within study area unsuited for the species. No known records within 10 km.
Petaurus norfolcensis	Squirrel Glider	—	V	No	No	n/a	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum Forest west of the Great Dividing Range and Blackbutt-Bloodwood Forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstory. Requires abundant tree hollows for refuge and nest sites.	**No.** Habitat within study area unsuited for the species. No known records within 10 km.
Petrogale penicillata	Brush-tailed Rock-wallaby	V	E	No	No	n/a	Ranges from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupies rocky escarpments, outcrops, and cliffs with a preference for complex structures with fissures, caves, and ledges, often facing north.	**No.** Habitat within study area unsuited for the species. No known records within 10 km.
Phascolarctos cinereus	Koala	E	E	No	No	n/a	Fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. Iconic tree-dweller that inhabits eucalypt woodlands and forests, feeding on the foliage of 70+ Eucalyptus species and 30+ other species.	**Potential.** This species may utilise the study area in transit between areas of suitable habitat in the surrounding landscape. However, habitat within the impact area is sub-optimal and no known record within 10 km.
Reptiles								

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	No	No	n/a	Primarily known from the Central and Southern Tablelands and the South Western Slopes, with a confirmed outlier record on the Hay Plains north of Hay. Species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks.	**Unlikely.** Habitat within study area is sub-optimal and degraded. No known records within 10 km. No suitable rocky habitat provides within study area.
Delma impar	Striped Legless Lizard	V	V	**Yes (1)**	**Yes (1)**	n/a	Occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Mainly found in and around Natural Temperate Grassland but has also been captured in grasslands with a high exotic component and in open Box-Gum Woodland.	**Potential.** Utilisable habitat presents within the study area. Known record within 10 km was documented in Gundary Travelling Stock Reserve, which provide better habitat condition.
Suta flagellum	Little Whip Snake	—	V	**Yes (1)**	**Yes (1)**	n/a	Found within an area bounded by Crookwell in the north, Bombala in the south, Tumbarumba to the west and Braidwood to the east. Occurs in Natural Temperate Grasslands and grassy woodlands, including those dominated by Snow Gum (*Eucalyptus pauciflora*) or Yellow Box (*E. melliodora*). Also occurs in secondary grasslands derived from clearing of woodlands. Found on well drained hillsides, mostly associated with scattered loose rocks.	**Unlikely.** Habitat within study area is sub-optimal or degraded. No suitable rocky habitat provides within study area.
Invertebrates								
Keyacris scurra	Key's Matchstick Grasshopper	E	E	**Yes (37)**	**Yes (25)**	n/a	Usually found in native grasslands but it has also been recorded in other vegetation associations containing a native grass understory. Associated with Kangaroo Grass and known to feed on Asteraceae species. Disturbance appears to be an important determinant of site occupancy, and it appears to be absent from sites that are disturbed during inappropriate times of the year (and interrupt the short non-overlapping lifecycle) or have been subjected to erratic management (e.g. periods of over and under grazing).	**Potential.** The study area offers some utilisable habitat. Targeted surveys conducted within work area during the optimal survey period did not detect any evidence of the species' presence.

Scientific name	Common name	Cwlth listing (EPBC Act)	NSW listing (BC Act)	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Synemon plana	Golden Sun Moth	V	V	No	No	n/a	NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. Medium-sized day-flying moth that requires native grassland dominated by Kangaroo Grass, Wallaby Grass and (exotic) Chilean Needle Grass. Spends much of its lifecycle underground and adult females are flightless.	**Unlikely.** The study area offers a small amount of utilisable habitat, however, sub-optimal. No known records within 10 km.
	Species count	33	52				54 species across all jurisdictions	

* Local bird sighting data from eBird hotspots: Goulburn Wetlands hotspot.

B4 Threatened populations

Threatened populations are geographically defined groups of native plants and animals likely to become extinct in NSW in the near future. A population is a group of organisms of the same species occupying a particular area. A search of the BioNet Atlas of NSW Wildlife found no threatened populations exist or may exist within 10 km of the study area.

B5 Listed migratory species

This list incorporates EPBC Act listed Migratory species as presented by the PMST report.

TABLE B 4: LIKELIHOOD OF OCCURRENCE OF LISTED MIGRATORY SPECIES

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Marine birds								
Apus pacificus	Fork-tailed Swift	(M)	—	No	No	No	Non-breeding visitor to all states and territories of Australia. Recorded in all regions of NSW, with many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. Almost exclusively aerial and feeds on insects in mid-air, only landing occasionally where it nests on mountain cliffs and cliff faces.	**No**. Habitat within study area and vicinity is unsuitable. No known records within 10 km.
Terrestrial birds								
Hirundapus caudacutus	White-throated Needletail	V (M)	V	**Yes (9)**	No	**Yes (12)**	Widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. Almost exclusively aerial species that forages for insects up to 1 km above ground, usually in large flocks. Only occurs in Australia between late spring and early autumn, breeds in north Asia.	**Likely.** Species may forage above study area with multiple known records within 10 km.
Motacilla flava	Yellow Wagtail	(M)	—	No	No	No	Has an extremely large range, extending from Europe, east through Siberia to west Asia and northwestern China; and south through the Arabian Peninsula to Egypt. Important habitat is mostly well watered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation.	**No**. Habitat within study area and vicinity is unsuitable. No known records within 10 km.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Myiagra cyanoleuca	Satin Flycatcher	(M)	—	**Yes (2)**	No	No	Widespread in eastern Australia and vagrant to New Zealand. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes. Inhabits heavily vegetated gullies in eucalypt forests near water and may forage through a diverse range of ecosystems nearby.	**Unlikely.** Habitat within study area is sub-optimal and degraded.
Rhipidura rufifrons	Rufous Fantail	(M)	—	**Yes (8)**	No	No	Occurs in coastal and near coastal districts of northern and eastern Australia. Mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*E. microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint, Mountain Ash (*E. regnans*), Alpine Ash, Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understory often including ferns.	**Unlikely.** Habitat within study area is sub-optimal and degraded.
Wetlands birds								
Actitis hypoleucos	Common Sandpiper	(M)	—	No	No	No	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. Utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	**Unlikely.** No record within 10 km and the study area contains sub-optimal habitat.
Calidris acuminata	Sharp-tailed Sandpiper	V (M)	—	**Yes (4)**	No	No	Spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh, or other low vegetation.	**Unlikely.** Few records within 10 km and sub-optimal habitat present within the study area.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Distribution and habitat	Likelihood of Occurrence
Calidris ferruginea	Curlew Sandpiper	CE (M)	E	No	No	No	Annual migratory shorebird to and from Siberia. Recorded in all states in Australia during non-breeding seasons as well as breeding season when many one-year-old birds remain in Australia. Most often found around the coasts and widespread inland with small numbers. Mainly occur in littoral and estuarine habitats. Sometimes found in inland swamps and lakes during annual migration.	**Unlikely.** No record within 10 km and the study area contains sub-optimal habitat.
Calidris melanotos	Pectoral Sandpiper	(M)	—	No	No	No	Widespread, but scattered in NSW with records existing east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. Prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, and artificial wetlands.	**Unlikely.** No record within 10 km and the study area contains sub-optimal habitat.
Gallinago hardwickii	Latham's Snipe	V (M)	V	**Yes (255)**	**Yes (2)**	**Yes (2)**	Non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia. Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level, usually inhabiting open, freshwater wetlands with low, dense vegetation. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	**Potential.** Some suitable foraging and transitory habitat present within study area. Most of records within 10 km were documented at Goulburn Wetland.
	Species count:	**10**	**2**					

* Local bird sighting data from eBird hotspots: Goulburn Wetlands hotspot.

B6 Pest species associated with Key Threatening Processes (KTPs)

TABLE B 5: LIKELIHOOD OF OCCURRENCE OF KEY PEST SPECIES

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Comment about species preferences and habitat in the study area	Likelihood of Occurrence
Birds								
Acridotheres tristis	Common Myna	Yes	—	**Yes**	**Yes**	**Yes**	Typically found in open woodland, cultivation, and around human habitation.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Alauda arvensis	Skylark	Yes	—	**Yes**	**Yes**	No	Found in cultivated grasslands and crops, wastelands, and coastal dunes.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Anas platyrhynchos	Mallard	Yes	—	No	No	No	Prefers still, shallow water with abundant plant life and is most often found on artificial lakes, ponds, and wetlands in urban and farm areas.	**Unlikely.** Study area contains habitat for the species; however, species has not been recorded within 10 km.
Carduelis carduelis	European Goldfinch	Yes	—	**Yes**	**Yes**	**Yes**	Fairly common to common in open woodland, parks, gardens, and farmland and open country with hedges and weedy patches; often feeds on seeding thistles.	**Potential.** Species has been recorded within 10 km and habitat is present throughout the study area.
Columba livia	Rock Dove	Yes	—	**Yes**	**Yes**	No	Common in most built-up areas.	**Unlikely.** Species has been recorded within 10 km; however, study area is unlikely to support this species.
Passer domesticus	House Sparrow	Yes	—	**Yes**	**Yes**	**Yes**	Occurs in and around human habitation, as well as cultivated areas and some wooded country.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Passer montanus	Eurasian Tree Sparrow	Yes	—	No	No	No	Relative to the House Sparrow, although typically found in small flocks, often in more natural areas than House Sparrow.	**Potential.** Potential habitat within the study area, however species has not been recorded within 10 km.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Comment about species preferences and habitat in the study area	Likelihood of Occurrence
Pycnonotus jocosus	Red-whiskered Bulbul	Yes	—	No	No	No	Occurs mainly in built-up areas, inhabiting parks, gardens, and streetscapes, though they are occasionally recorded in orchards. They especially favour areas infested with weeds, especially lantana, privet, and blackberry.	**Unlikely.** Study area contains an abundance of blackberry as food source for the species. However, species has not been recorded within 10 km.
Streptopelia chinensis	Spotted Turtledove	Yes	—	No	No	No	Common around human habitation and can easily be seen in parks, gardens, and agricultural areas.	**Unlikely.** Study area contains habitat for the species; however, species has not been recorded within 10 km.
Sturnus vulgaris	Common Starling	Yes	—	**Yes**	**Yes**	No	Short-grassed habitats are favoured foraging habitats, and they may feed in association with livestock.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Turdus merula	Common Blackbird	Yes	—	**Yes**	**Yes**	**Yes**	Most often found in urban areas and surrounding localities but has successfully moved into bushland habitats.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Mammals								
Canis lupus	Wild dog	—	Yes	**Yes**	**Yes**	n/a	Found across NSW but most common in the eastern ranges, the coastal hinterland, and tablelands. Prefers areas where human disturbance is limited and where shelter, food and water are abundant.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Capra hircus	Goat	Yes	Yes	**Yes**	**Yes**	n/a	Found in many areas of NSW. They have benefited from sheep grazing practices and the provision of artificial water points throughout the dryer regions of NSW.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Felis catus	Cat	Yes	Yes	**Yes**	**Yes**	n/a	Found all over Australia in all habitats, including forests, woodlands, grasslands, wetlands, and arid areas.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Lepus capensis	Hare	Yes	—	**Yes**	**Yes**	n/a	Preferred habitat is open country with the presence of tussock or rocks to hide amongst.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.

Scientific name	Common name	Cwlth EPBC Act	NSW Law	ALA records within 10 km	BioNet records within 10km	eBird*	Comment about species preferences and habitat in the study area	Likelihood of Occurrence
Mus musculus	House mouse	Yes	—	**Yes**	**Yes**	n/a	Associated with human habituation, nest behind rafters, in woodpiles, storage areas, or any hidden spot near a source of food.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Oryctolagus cuniculus	Rabbit	Yes	Yes	**Yes**	**Yes**	n/a	Densities are greatest around non-arable rough country. This includes creeks, riverbanks, erosion gullies and rocky outcrops.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Rattus rattus	Black Rat	Yes	—	**Yes**	**Yes**	n/a	Very closely associated with humans and common in urban areas.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Sus scrofa	Feral Pig	Yes	Yes	**Yes**	**Yes**	n/a	Need moist areas providing adequate food and water and enough shelter to protect against extremes of temperature.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
Vulpes vulpes	Fox	Yes	Yes	**Yes**	**Yes**	n/a	Common in fragmented landscapes and areas with shelter, food, and den sites. Highest densities include temperate grazing lands and peri-urban/urban areas where food is abundant.	**Present.** This species was recorded on site during field inspection.
various species	Deer	Yes	Yes	**Yes**	**Yes**	n/a	Live predominantly in grassy forests. They occupy rainforests, eucalypt forests and farmlands. Preferred food is grass, though they also eat the leaves of shrubs, trees and herbs, bark, and some fruit.	**Likely.** Species has been recorded within 10 km and habitat is present throughout the study area.
	Species count	**21**	**7**				**21 species total**	

* Local bird sighting data from eBird hotspots: Goulburn Wetlands hotspot.

B7 Weed species

This list incorporates Commonwealth recognised Weeds of National Significance (WoNS) [24] and South East Regional Priority Weeds (RPW)[25].

TABLE B 6: LIKELIHOOD OF OCCURRENCE OF KEY WEED SPECIES

Scientific name	Common name	Cwlth EPBC Act	RPW	ALA records within 10 km	BioNet records within 10km	Comment about species preferences and habitat in the study area	Likelihood of Occurrence
Asparagus asparagoides	Bridal Creeper	WONS	No	No	**Yes**	As well as a wide range of natural habitats, bridal creeper grows well in citrus orchards and pine plantations. It can grow in most soils but is most common close to the coast where it invades woodlands and other open coastal vegetation.	**Unlikely.** Species has been recorded within 10 km; however, habitat within the study area is unlikely to support this species.
Chrysanthemoides monilifera	Bitou Bush	WONS	No	No	No	Found mostly in coastal areas but does not tolerate waterlogged soils. Grows best on sandy or medium textured soils.	**Unlikely.** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Cytisus scoparius, and *various Genista* spp.	Broom spp.	WONS	No	**Yes**	**Yes**	Evergreen shrub 1–4 m tall with bright yellow pea-like flowers, tends to form dense thickets. All species prefer cool temperate areas especially the tablelands.	**Potential.** Species has been recorded within 10 km and habitat is present in the study area. However, species was not recorded during field survey.
Lycium ferocissimum	African Boxthorn	WONS	No	**Yes**	**Yes**	Drought tolerant species growing in temperate, subtropical, and semi-arid regions. It can grow on all soil types, though it grows best on well-drained, sandier soils along dry creek beds.	**Present.** This species was recorded on site during field inspection.
Nassella neesiana	Chilean Needle Grass	WONS	No	**Yes**	**Yes**	Resembles native spear grasses (*Austrostipa* spp.) but has a distinctive corona of 'little teeth' where the awn joins the seed. Has a major impact on grassland productivity and animal health.	**Present.** This species was recorded on site during field inspection.
Nassella trichotoma	Serrated Tussock	WONS	No	**Yes**	**Yes**	Drought tolerant grass with exceptionally low feed value that can completely take over a new area within 4 years. Prefers cool temperate conditions and does not grow well in wet areas, heavy shade, or heavily vegetated areas.	**Present.** This species was recorded on site during field inspection.

[24] For more information about WoNS, refer to NSW WeedWise at:
[25] South East Regional Strategic Weed Management Plan 2023 – 2027. State of New South Wales through Local Land Services (2022).

Scientific name	Common name	Cwlth EPBC Act	RPW	ALA records within 10 km	BioNet records within 10km	Comment about species preferences and habitat in the study area	Likelihood of Occurrence
Opuntia spp.	Prickly Pears	WONS	No	No	**Yes**	Present in all regions of NSW from the coast to the far west. See DPI Weeds for details of individual Opuntia species. Inhabits open woodlands, rangelands, grasslands, pastures, riparian zones (banks of water courses), roadsides, railways lines, coastal environs, gardens, disturbed sites and waste areas.	**Potential.** Species has been recorded within 10 km and habitat is present in the study area. However, species was not recorded during field survey.
Rubus fruticosus aggregata	Blackberry	WONS	No	**Yes**	**Yes**	Prickly scrambler with edible purplish berries. Grows 7 m long canes that touch the ground and take root, forming dense thickets. Prefers cool temperate climate with >700 mm annual rainfall but will grow in drier areas if has access to water e.g., along riverbank.	**Present.** This species was recorded on site during field inspection.
Sagittaria platyphylla	Delta Arrowhead	WONS	No	No	No	An aquatic weed capable of aggressive growth and rapid spread. Establishment is favoured by slow moving or static shallow water. The smaller channels provide ideal conditions for infestation, as the water is generally warmer, shallower, and slower moving.	**Unlikely.** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Salix spp. except *S. babylonica, S.* x *calodendron & S.* x *reichardtii*	Willows except Weeping Willow, Pussy Willow, and Sterile Pussy Willow	WONS	No	**Yes**	**Yes**	Deciduous trees or shrubs that form large, dense root mats on the surface of the soil or in shallow. Historically planted for erosion control, but had had a major impact on the amount, speed and quality of water flows especially when they drop leaves in autumn.	**Potential.** Species has been recorded within 10 km and habitat is present in the study area. However, species was not recorded during field survey.
Salvinia molesta	Salvinia	WONS	**Yes**	No	No	Aquatic weed growing along the NSW coast. It is common in the Tweed, Richmond, Clarence, and Macleay catchments, the central coast and Sydney metropolitan areas. There are heavy infestations in the Hawkesbury–Nepean system.	**Unlikely.** Species has not been recorded within 10 km and habitat within the study area is unlikely to support this species.
Senecio madagascariensis	Fireweed	WONS	No	**Yes**	**Yes**	A widely naturalised forb of pastures, open woodlands, grasslands, suburban bushland, roadsides, disturbed sites, waste areas, parks, and coastal environments in sub-tropical and warmer temperate regions.	**Potential.** Species has been recorded within 10 km and habitat is present in the study area. However, species was not recorded during field survey.
Ulex europaeus	Gorse	WONS	**Yes**	**Yes**	**Yes**	Evergreen shrub 1–2.5 m tall with spiny leaves and bright yellow peak-like flowers with coconut scent. Forms dense thickets. Prefers cool temperate areas.	**Potential.** Species has been recorded within 10 km and habitat is present in the study area. However, species was not recorded during field survey.
	Species count	**13**				**13 species total**	

Appendix C: NSW Test of Significance

The NSW *Biodiversity Conservation Act 2016* (BC Act) sets out a five-part Test of Significance "for the purposes of determining whether a proposed activity or activity is likely to significantly affect threatened species or ecological communities, or their habitats" (s7.3). The five-part test also applies to aquatic species and ecological communities listed as threatened or otherwise protected in NSW under the *Fisheries Management Act 1994* (FM Act).

The NSW five-part Test of Significance focuses on NSW-listed species (BC Act and FM Act). Impacts on species that are only listed under Commonwealth (EPBC Act), no NSW laws are assessed in the MNES table (**Table 6**).

The following assessment considers all of the potential impacts of the proposed works on species and communities listed as threatened under the NSW law, that are known or have been assessed as having a potential of higher likelihood of occurring in the study area. Depending on what is proposed, these impacts may include:

- direct impacts, such as the loss of hollow-bearing trees;
- indirect impacts, such as loss of native seed bank due to soil erosion/deposition.
- cumulative impacts, such as fragmentation of wildlife corridors; and
- key threatening processes, such as the removal of dead wood and dead trees.

C1 Threatened species

In the case of a threatened species, whether the action proposed 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.

C1.1 Threatened plants

The following threatened plant species listed as threatened under NSW law are considered likely to be present in the study area:

- Hoary Sunray (*Leucochrysum albicans* subsp. *tricolor*).

Hoary Sunray occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils. It can occur in modified habitats such as semi-urban areas and roadsides. Highly dependent on the presence of bare ground for germination. It has been recorded within 10 km and there is potential habitat within the study area.

Assessment:

The study area and work area were assessed as containing suitable habitat for Hoary Sunray. However, the targeted survey did not detect any evidence of the species' presence (**Section 2.2.2** and **Section 3.2.4**). Due to Hoary Sunray not being detected during the TBDC recognised survey period, the disturbance of the potential habitat is, it is unlikely that the proposed work will have an adverse impact on the lifecycle of this species such that a viable local population is likely to be placed at risk of extinction.

C1.2 Threatened birds

Small grassland/woodland birds:

- Southern Whiteface (*Aphelocephala leucopsis*),
- Dusky Woodswallow (*Artamus cyanopterus*),
- Speckled Warbler (*Chthonicola sagittata*),
- Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*),
- Varied Sittella (*Daphoenositta chrysoptera*),
- White-fronted Chat (*Epthianura albifrons*),
- Scarlet Robin (*Petroica boodang*),
- Flame Robin (*Petroica phoenicea*), and
- Diamond Firetail (*Stagonopleura guttata*).

Southern Whiteface is a small passerine inhabitant in arid open woodlands with a shrubby or grassy understory, as well as on grass plains. There are records within 10 km of the study area.

Dusky Woodswallow is a medium-sized woodland specialist typically located in grassy eucalypt forests and woodlands. It favours locations abundant with logs and fallen timber but is also observed to utilize farmland on the periphery of forests or woodlands. There are records within 10 km of the study area.

Speckled Warbler is a ground-dwelling bird that inhabits a variety of Eucalyptus-dominated communities with a grassy understory, often preferring rocky ridges or gullies. Typical habitat for the species includes scattered native tussock grasses, a sparse shrub layer, some regrowth of eucalypts, and an open canopy. There are records within 10 km of the study area.

Brown Treecreeper is a species that mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understory. Hollows in standing dead or live trees and tree stumps are essential for nesting. It is known to occur within 10 km of the study area.

Varied Sittella is an acrobatic woodland specialist that lives in lives in eucalypt forests and woodland, mallee, and Acacia woodland. It prefers rough-barked trees such as stringybarks and ironbarks, as well as mature trees containing hollows or dead branches. There are records within 10 km of the study area.

White-fronted Chat found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. There are records within 10 km of the study area.

Scarlet Robin is an iconic robin that prefers sites with abundant logs and fallen timber but is also known to utilise more open woodland, grasslands, pastures with scattered trees and even gardens. It breeds in grassy eucalypt forests and woodlands where it nests in tree forks > 2 m above ground level. There are records within 10 km of the study area.

Flame Robin is a small Australian robin that breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. It prefers clearings or areas with open understory. There are records within 10 km of the study area.

Diamond Firetail is a large finch that is found in grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland and in secondary grassland derived from other communities. It feeds exclusively on

the ground, on ripe and partly ripe grass and herb seeds, green leaves, and insects. There are records within 10 km of the study area.

Assessment:

Habitat for these threatened small grassland/woodland birds was observed in and around the study area in the form of exotic dominant grassland, exotic plantings and areas of remnant Box Gum Woodland, particularly in the proposed Lot 2 (Zone 1). While these species were not observed during field surveys, they can generally be predicted to utilise the study area and vicinity grounded by habitat surrogates.

Aside from one regenerating juvenile eucalypt, the impact area does not contain native canopy or midstory vegetation. It is predominately composed of modified grassland, with limited native species cover and low species diversity. Threatened bird species considered likely to occur in the site are highly mobile and while they may utilise the study area for transit and opportunistic foraging, they are unlikely to rely on habitat present in the work area for breeding or on a permanent basis.

The proposed works will see the removal of up to the 0.43 ha of mixed native and exotic grassland within the study area. The proposed works will impact only a small area of modified grassland and remnant native woodland in the proposed Lot 2 (Zone 1) will be retained. Given the small scale of proposed works and extent of less disturbed habitat in the surrounding landscape, it is considered unlikely that the proposed work will have an adverse impact on the life cycle of the above species to the extent that a viable local population is at risk of extinction.

Remediation or replanting of native midstory species could assist in offsetting some of the potential impacts and increase habitat availability in the area (**Section 6.2.2**).

Wetland birds

- Magpie Goose (*Anseranas semipalmata*),
- Latham's Snipe (*Gallinago hardwickii*),
- Blue-billed Duck (*Oxyura australis*), and
- Freckled Duck (*Stictonetta naevosa*).

Magpie Goose is a large, distinctive black and white water bird. It is often found in shallow wetlands with dense rushes and sedges. It feeds on grasses, bulbs, rhizomes and roosts in tall vegetation. It often breeds in monsoonal areas. There are records within 10 km of the study area.

Latham's Snipe is a wetlands specialist spending its breeding season in Japan and regions of eastern Russia, before migrating to Australia and other areas in the south-pacific for the non-breeding season. There are records within 10 km of the study area.

Blue-billed Duck is a small and compact duck with stiff tails. During summer breeding season, the male's bill turns bright blue. It prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. It is completely aquatic and can fly if disturbed but prefers to dive if approached. There are records within 10 km of the study area.

Freckled Duck is a dark, greyish-brown bird characterized by its dark, greyish-brown plumage and distinctive narrow, slightly upturned bill. It prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. There are records within 10 km of the study area.

Assessment:

Habitat for these species was observed in the form of riparian habitat and aquatic habitat within and near to the study area. Most of the above species are wetlands species that have an increased likelihood of presence due to records from nearby Goulburn Wetlands, Wollondilly River and Mulwaree River. Although none of these threatened species were observed within the study area, they may be generally predicted to utilise the study area in a transitory nature to access these nearby waterbodies. The proposal will not involve direct disturbance to aquatic habitat, ensuring minimal impact on the foraging and transitory habitat of the wetland species mentioned above. Given the lack of direct impacts on potential habitat, it is not considered likely the works have a significant impact on the above-mentioned species such that a viable local population is likely to be placed at risk of extinction.

Furthermore, measures recommended in **Section 6** such as erosion mitigation, remediation work, and replanting of native species will further reduce the extent of impacts and the chance of a significant impact.

Parrots:

- Gang-gang Cockatoo (*Callocephalon fimbriatum*),
- Little Lorikeet (*Glossopsitta pusilla*),
- Turquoise Parrot (*Neophema pulchella*), and
- Superb Parrot (*Polytelis swainsonii*).

Gang-gang Cockatoo is a distinctive parrot found from southern Victoria through south- and central-eastern New South Wales. In Spring and summer, it is generally found in tall mountain forests and woodlands especially wet sclerophyll forests. In autumn and winter, it often moves to lower altitudes in drier and more open forests and woodlands. It prefers to roost in old-growth forests and to nest in hollows with a 10+ cm diameter at least 9 m above ground level. There are records within 10 km of the study area.

Turquoise Parrot lives on the edges of eucalypt woodland adjoining clearings, timbered ridges, and creeks in farmland. It nests in tree hollows, logs, or posts, from August to December. Four or five white, rounded eggs are laid on a nest of decayed wood dust. It has been recorded within 10 km of the study area.

Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia. Nomadic movements are common, influenced by season and food availability. It forages primarily in the canopy of open Eucalyptus forest and woodland, and also Angophora, Melaleuca, and tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. It has been recorded within 10 km of the study area.

Superb Parrot inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. They nest in the hollows of large trees (dead or alive). It may forage up to 10 km from nesting sites, primarily in grassy box woodland. It has not been recorded within 10 km; however suitable habitat is present in the study area.

Assessment:

The study area contains potential foraging habitat for the above mentioned species. This is present in the form of semi-mature eucalypts and exotic fruit plants outside of work area. The proposed works will see the removal of up to the 0.43 ha of mixed native and exotic grassland within the study area. Given the

absence of overstory and midstory vegetation in these areas, they provide minimal foraging habitat for these species. With higher-quality habitat available outside the works area and the impacted habitat likely only used in a transitory capacity, the proposed work is unlikely to adversely affect the life cycle of these species or place a viable local population at risk of extinction.

Raptors:

- Spotted Harrier (*Circus assimilis*),
- Black Falcon (*Falco subniger*),
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*), and
- Little Eagle (*Hieraaetus morphnoides*).

Spotted Harrier is known to occur in grassy open woodland, it is most commonly found in native grassland however also occurs in agricultural land. It forages over open habitats including edges of inland wetlands where it preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion. The species builds a stick nest in a tree. There are records within 10 km of the study area.

Black Falcon usually inhabitants in the arid and semi-arid zones. Inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses, and agricultural land with scattered remnant trees. It hunts over open wooded grasslands, saltbush plains, bluebush plains and other low vegetation. There are records within 10 km of the study area.

White-bellied Sea-eagle habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Terrestrial habitats for this species include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). There are records within 10 km of the study area.

Little Eagle is a medium-sized bird of prey. It occupies open eucalypt forest, woodland, open woodland, or riparian woodlands. It nests in tall living trees within a remnant patch and builds large stick nests. There are records within 10 km of the study area.

Assessment:

A small amount of habitat for the above species was observed in the study area, mostly in the form of riparian areas and remnant Box Gum Woodland patches. The proposed works will only require the removal of up to 0.43 ha of mixed native and exotic grassland. Although these areas would not likely be inhabited by the above species, they are considered to have the potential to provide suitable foraging habitat as they may be occupied by prey species that the above threatened species may hunt within or above the study area.

The proposal does not involve the removal of habitat for the above species. Given the small size of the work area, it is not considered to provide a large area of foraging habitat for these species. The study area exhibits relatively higher-quality habitat outside the work area and in the surrounding landscape, characterized by large areas of native woodland to the east of the study area. Riparian habitat along the Mulwaree River, Wollondilly River and other waterbodies in the surrounding landscape are considered more likely to be utilised, given observations of these species have occurred in these areas.

For the reasons above, the proposed work is not likely to have an adverse effect on the life cycle of the species such that a viable local population of these species is likely to be placed at risk of extinction.

Swifts:

- White-throated Needletail (*Hirundapus caudacutus*).

White-throated Needletail is an almost exclusively aerial species that forages for insects up to 1 km above ground, usually in large flocks. It only occurs in Australia between late spring and early autumn, breeds in north Asia. There are records within 10 km of the study area.

Assessment:

Although the species is almost exclusively an aerial foraging species, White-throated Needletail forages on insects that are often more abundant around certain terrestrial habitats, such as forests, mudflats, coastlines and waterways. The study area is considered an area that is likely to produce abundant foraging opportunities for the White-throated Needletail given the presence of riparian areas with water as well as the presence of native multi-strata vegetation.

The proposed works will only require the removal of up to 0.43 ha of mixed native and exotic grassland. The development will impact what is considered a small area within the surrounding landscape with all surrounding native vegetation being retained and mitigation measures in place to prevent impacts disrupting surrounding native vegetation. As such it is considered unlikely that the proposed work will have an adverse impact on the life cycle of the above species to the extent that a viable local population is at risk of extinction.

C1.3 Threatened fish

No threatened fish species are considered likely to be present on site based on mapped distribution within the Species Profile and Threats Database and Fisheries NSW Spatial Data Portal.

C1.4 Threatened frogs

No threatened frog species are known or considered likely to be present in the study area given their known distribution and habitat requirements.

C1.5 Threatened bats

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*),
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*),
- Little Bent-winged Bat (*Miniopterus australis*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*), and

Eastern False Pipistrelle prefers moist habitats, with trees taller than 20 m. It generally roosts in eucalypt hollows but has also been found under loose bark on trees or in buildings. It hunts beetles, moths, weevils, and other flying insects above or just below the tree canopy. There are records within 10 km of the study area.

Large Bent-winged Bat primarily roots in caves but also use man-made structure such as derelict mines, storm-water tunnels, and buildings. It hunts in forested areas, catching moths and other flying insects above the tree tops. There are records within 10 km of the study area.

Little Bent-winged Bat prefers moist eucalypt forests, rainforests, vine thickets, wet and dry sclerophyll forests, Melaleuca swamps, dense coastal forests, and Banksia scrub. During the day, it roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges, and occasionally buildings. At night, it forages for small insects beneath the canopy of densely vegetated habitats. There are records within 10 km of the study area.

Grey-headed Flying-fox is the largest bat in Australia. It roosts communally in large camps often located in a gully close to water under dense canopy cover. Favourite food plants include flowering native trees (Eucalyptus, Melaleuca and Banksia), fruiting rainforest trees and vines, urban gardens, and cultivated fruit crops. There are records within 10 km of the study area.

Assessment:

The study area provides habitat for the threatened bat species, primarily within remnant Box-Gum Woodland and the existing dwelling. The proposed works will remove up to 0.43 ha of mixed native and exotic grassland but will not impact key habitat for these species. Higher-quality habitat exists beyond the work area, particularly in the extensive native woodland to the east.

For the reasons above, the proposed work is not likely to have an adverse effect on the life cycle of the species such that a viable local population of these species is likely to be placed at risk of extinction.

C1.6 Threatened mammals (other than bats)

- Koala (*Phascolarctos cinereus*)

Koala is an iconic tree-dweller that inhabits eucalypt woodlands and forests, feeding on the foliage of 70+ Eucalyptus species and 30+ other species. Details vary, see DPIE's Review of koala tree use across New South Wales (2018) and note that koala habitat protection is the focus of State Environmental Planning Policy. There are records within 10 km of the study area.

Assessment:

A moderate amount of habitat for this species was observed in the study area. This is primarily present in the form of remnant Box Gum Woodland patches that offer shelter and foraging potential.

The proposed work is considered unlikely to have an adverse effect on this species through the positioning in a previously cleared area. The amount of native vegetation to be cleared is also relatively small in comparison to what is available within the study area and surrounding landscape. As well, supplementary plantings recommended in **Section 6.2.2** have the potential to increase available habitat for these species.

C1.7 Threatened reptiles

- Striped Legless Lizard (*Delma impar*)

Striped Legless Lizard found in areas of native grasslands and nearby grassy woodlands and exotic pasture. The NSW BioNet threatened species profile states that habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass, Spear-grasses and Poa tussocks, and occasionally Wallaby grassy. There are records within 10 km of the study area.

Assessment:

The work area is composed of modified grassland, with limited native species cover which has potential to provide habitat for Striped Legless Lizard.

The proposed works will see the removal of up to the 0.43 ha of mixed native and exotic grassland within the study area. The proposed works will impact a small area dominated by exotic grassland, while remnant native woodland and more extensive grasslands will be retained in the proposed Lot 2 (Zone 1). In consideration of the small scale of proposed works and extent of less disturbed habitat in the surrounding landscape, it is considered unlikely that the proposed work will have an adverse impact on the life cycle of the species to the extent that a viable local population is at risk of extinction.

Pre-construction weed management of invasive grasses and subsequent remediation works to replant with native grass species will assist in offsetting some of the potential impacts and increase habitat availability in the area (**Section 6.2.2**).

C1.8 Threatened invertebrates

- Key's Matchstick Grasshopper (*Keyacris scurra*).

Key's Matchstick Grasshopper is a wingless grasshopper. It is typically associated with native grasslands, secondary native grasslands, or areas containing Kangaroo Grass (*Themeda triandra*) with appropriate disturbance regimes. These regimes are mostly observed through the following land-uses which are characterised by infrequent disturbance: railway easements, travelling stock routes, cemeteries and conservation reserves (mainly within the ACT). There are records within 10 km of the study area.

Assessment:

Patches of habitat for the above species were observed in the study area, mostly in the form of areas containing a native grass cover and adjacent native vegetation. The proposed works will result in the removal of up to 0.43 ha of mixed native and exotic grassland, representing a small portion of the broader landscape. Targeted surveys for Key's Matchstick Grasshopper, conducted during the optimal survey period as recommended by TBDC (**Section 2.2.4** and **Section 3.2.5**), found no evidence of the species within the work area. All surrounding native vegetation will be retained, with mitigation measures in place to prevent indirect impacts.

For the reasons above, the proposed work is not likely to have an adverse effect on the life cycle of the species such that a viable local population of these species is likely to be placed at risk of extinction

C2 Threatened ecological communities

In the case of a critically endangered or endangered ecological community, whether the action proposed:

1. 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
2. Is likely to modify the composition substantially and adversely such that its local occurrence is likely to be placed at risk of extinction.

NSW BC Act listed Box Gum Woodland has been assessed as occurring within the study area, which is associated with the presence of PCT 3373 - Goulburn Tableland Box-Gum Grassy Forest. This TEC occurs in the study area as a remnant overstory of Blakely's Red Gum (*Eucalyptus blakelyi*) and Yellow Box (*E. melliodora*) (Zone 1) and, and areas of remnant understory vegetation with mixed exotic and native vegetation (Zone 2). Landscaped gardens and exotic driveway plantings are allocated to non-native (Zone 3).

Impacts to the Box Gum Woodland TEC include the removal of an area of 0.43 ha of this community. This vegetation is composed of mixed exotic and native understory vegetation. The removal of 0.43 ha of this vegetation is considered have an adverse effect on the extent of the ecological community, however, not to the extent that its local occurrence is likely to be placed at risk of extinction given its presence within the local landscape. Moreover, the proposed works are unlikely to modify the composition substantially and adversely such that its local occurrence is likely to be placed at risk of extinction given the small-scale of the proposed works and areas of connected areas of this TEC within the local landscape.

C3 Habitat for a threatened species, population, or ecological community

In relation to the habitat of a threatened species, population, or ecological community:

1. The extent to which habitat is likely to be removed or modified due to the action proposed, and
2. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat because of the proposed action, and
3. The importance of the habitat to be removed, modified, fragmented, or isolated to the long-term currently interconnecting or proximate areas of habitat for a threatened species, population, or ecological community.

At a minimum, the proposal requires the removal of up to 0.43 ha of exotic dominant understory vegetation, 0.10 ha exotic landscape planting, and associated habitats for threatened species as discussed in **C1** and **C2** above. This mainly involves the removal of/reduction in foraging habitat to small woodland/grassland birds, raptors, reptiles, invertebrates and mammals.

The above assessments in **C2** suggests that the proposal is unlikely to result in a significant adverse impact on the Box Gum Woodland TEC. Habitat to be removed is in low condition and impacts to higher quality habitat will be avoided by situating the proposed development within exotic dominant grassland.

For the reasons above, the proposed development is not likely to have an adverse effect on habitat for the local threatened species and communities. Rehabilitation and conservation efforts have the potential to restore and improve remaining areas of the TECs Box Gum Woodland and threatened species habitat within the study area to minimise the chance for the long-term fragmentation or isolation.

C4 Declared Areas of Outstanding Biodiversity Value

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).

The proposed work is unlikely to impact on any declared Area of Outstanding Biodiversity Value in NSW due its very small scale and distance from any such area. There are currently four declared AOBVs in all of NSW. The closest to the study area is the Wollemi Pine habitat more than 280 km away in the Blue Mountains; the rest all involve marine habitats even further away. For more information about such areas, see the NSW Government's Area of Outstanding Biodiversity Value register.

C5 Key threatening processes

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.

Key threatening processes (KTPs) are listed under both Commonwealth and State legislation. There are more than 14 Commonwealth-listed KTPs, almost 36 NSW-listed KTPs. The lists overlap and include broad threats such as climate change as well as specific threats relating to Lord Howe Island, shark control programs on beaches and longwall mining. The NSW-listed KTPs most relevant to the development are as follows.

C5.1 Feral animals

A number of KTPs are associated with feral animals, which may have impacts including predation, habitat degradation, competition, and disease transmission. Species present or with a moderate to high likelihood of occurrence within the study area include:

- Common Myna (*Acridotheres tristis*),
- Eurasian Skylark (*Alauda arvensis*),
- European Goldfinch (*Carduelis carduelis*),
- House Sparrow (*Passer domesticus*),
- Eurasian Tree Sparrow (*Passer montanus*)
- Common Starling (*Sturnus vulgaris*),
- Common Blackbird (*Turdus merula*),
- Wild Dog (*Canis lupus*),
- Goat (*Capra hircus*),
- Cat (*Felis catus*),
- Hare (*Lepus capensis*),
- House Mouse (*Mus musculus*),
- Rabbit (*Oryctolagus cuniculus*),
- Black Rat (*Rattus rattus*),
- Pig (*Sus scrofa*),
- Fox (*Vulpes vulpes*), and
- Deer (various species).

Most of the pest animals listed above occupy vast areas of NSW and are extremely difficult to control without a concerted effort at the landscape level. The proposed work is considered very unlikely to increase the impact of this KTP.

For details of all the feral animal species considered as part of the field inspection and this test of significance, see **Appendix B6**.

C5.2 Weeds

Invasion and establishment of exotic vines and scramblers

A large patch of Blackberry was observed in the study area during field inspection. Controlling this species will significantly reduce the potential for this species to further establish within the study area. If appropriate measures are implemented as recommended in **Section 6**, it is unlikely that the proposed work will significantly contribute to this KTP.

Invasion of native plant communities by exotic perennial grasses

A range of exotic perennial grasses are present on the site. Chilean Needle Grass (*Nassella neesiana*), Serrated Tussocks (*N. trichotoma*) and African Lovegrass (*Eragrostis curvula*) are listed in the NSW Scientific Committee's final determination for this KTP. Other exotic perennial grasses not specified may, or have the potential to, adversely affect native plant communities and native species.

These three listed species were all observed within the study area. This is very likely due to the agricultural history of the area. Spread of these grasses is often exacerbated by slashing, weed control, forestry and mining operations, movement or addition of fertilisers and nutrients, changes to drainage and fire regimes.

Development activities have the potential to facilitate the establishment of perennial exotic grasses in the proposal site. Impacts are to be mitigated by appropriate weed control measures prior to any planned construction in the future, and ongoing rehabilitation efforts. Overall, it is unlikely that the project will significantly contribute to this KTP given appropriate measures are implemented as recommended.

Loss/degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

Field inspection of the study area recorded a total of 43 exotic species. While it is hard to determine from these species which were introduced as garden plants, management of all species considered invasive (i.e. forming populations beyond their original introduction and having a detrimental effect on native biodiversity) should be undertaken to limit the potential spread of these species through the proposed works. There is the potential that some of these species will inevitability be spread through the proposed works given that areas of exotic species dominance occur within the study area. To reduce the potential impact of the KTP it is strongly recommended that the strict mitigation measures set out in **Section 6** are implemented. Nevertheless, even though the implementation of these mitigation measures there remains the potential that the proposed works could lead to the loss/degradation of native plant and animal habitat by escaped garden plants given the wide variety of exotic species that occur within the project area. However, it is considered unlikely that if the provided mitigation measures are implemented the proposed works will introduce an exotic species that has not been thus far recorded and identified in this report.

C5.3 Habitat modification

Clearing of native vegetation

Clearing is defined in section 3 of the BC Act as:

> "*the destruction of a sufficient proportion of one or more strata (layers) within a stand or stands of native vegetation so as to result in the loss, or long-term modification, of the structure, composition and ecological function of stand or stands*".

Clearing of native vegetation for the proposed works is estimated to be of a relatively small scale, impacting up to 0.43 ha mixed native and exotic grassland (**Section 4.2**). It is not considered to likely contribute to this KTP due to the small area of impact if mitigation measure outlined in **Section 6** are adhered to. The area should be further supported in regenerating naturally so that no long-term modification occurs. Furthermore, the impact area is of small scale and does not constitute "a sufficient proportion".