Gundy Road
Flora and Fauna Assessment Report (FFAR)

150 Gundy Road, Scone NSW

NCA21R125969

09 June 2021

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150 Gundy Road, Scone NSW

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

Kleinfelder was engaged by Perception Planning to prepare a Flora and Fauna Assessment Report (FFAR) for a proposed residential sub-division, located at 150 Gundy Road, Scone, New South Wales (NSW) (Lot 2 DP 1169320) (hereafter the "Study Area") (**Figure 1**). This report aims to assess ecological values within the Study Area and satisfy comments pertaining to the Hunter and Central Coast Regional Planning Panel determination and refusal of consent for DA 163/2017 (lodged 22 November 2017, comments received 30 September 2020). Furthermore, this report assesses potential impacts following amendment to the previous development design from that of the initial development application.

The following terms are used throughout this report to describe geographical areas (**Figure 2**):

- Study Area – 150 Gundy Road, Scone, NSW (Lot 2 DP 1169320).
- Subject Site (development footprint) – areas of the Study Area proposed for development.
- Locality – land within a 5 km radius of the Study Area.

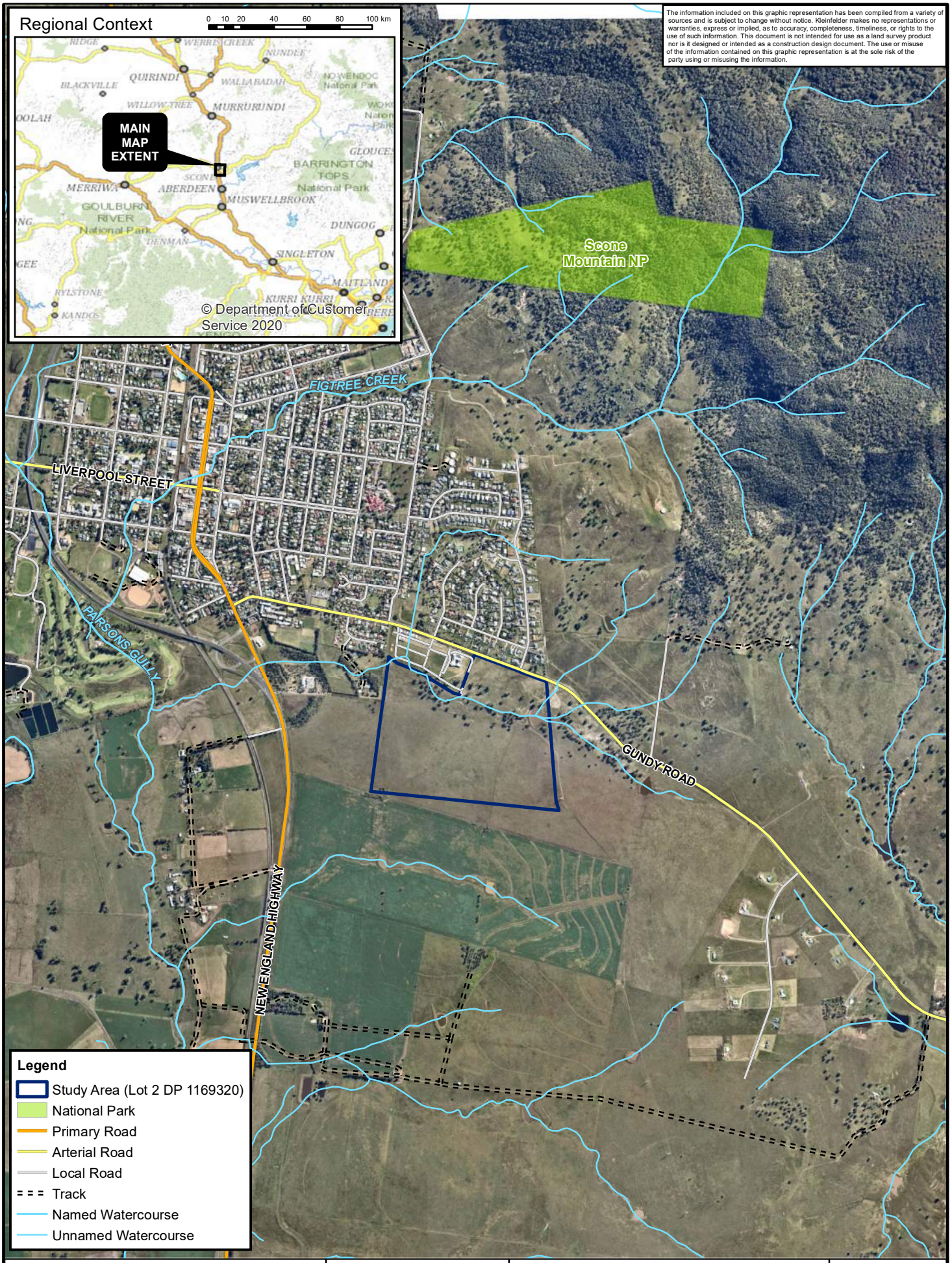
This report identifies flora, fauna and threatened species present, or likely to occur within the Study Area based on species and/or habitats detected during field surveys and threatened flora and fauna records from the locality. An assessment of the likely impacts on identified threatened species, habitat features, wildlife corridors and vegetation communities as a result of the proposed development is also undertaken.

1.2 SITE DESCRIPTION

The Study Area is located within the Upper Hunter Council Local Government Area (LGA) and is zoned 'R1 – General Residential' under the Upper Hunter Local Environmental Plan 2013.

The Study Area (approximately 57 ha) is positioned to the South-East of the township of Scone and is characterised by a mix of native woodland vegetation and grassland/ pastures (**Figure 2**). The topography within the Study Area is characterised by predominantly level grassland along the northern boundary, a low drainage channel fringed by remnant woodland traversing east to west, bisecting the site, and inclines steadily towards the southern boundary. The majority of the remnant woodland vegetation occurs alongside the drainage feature.

Site photographs are provided in **Appendix A.**



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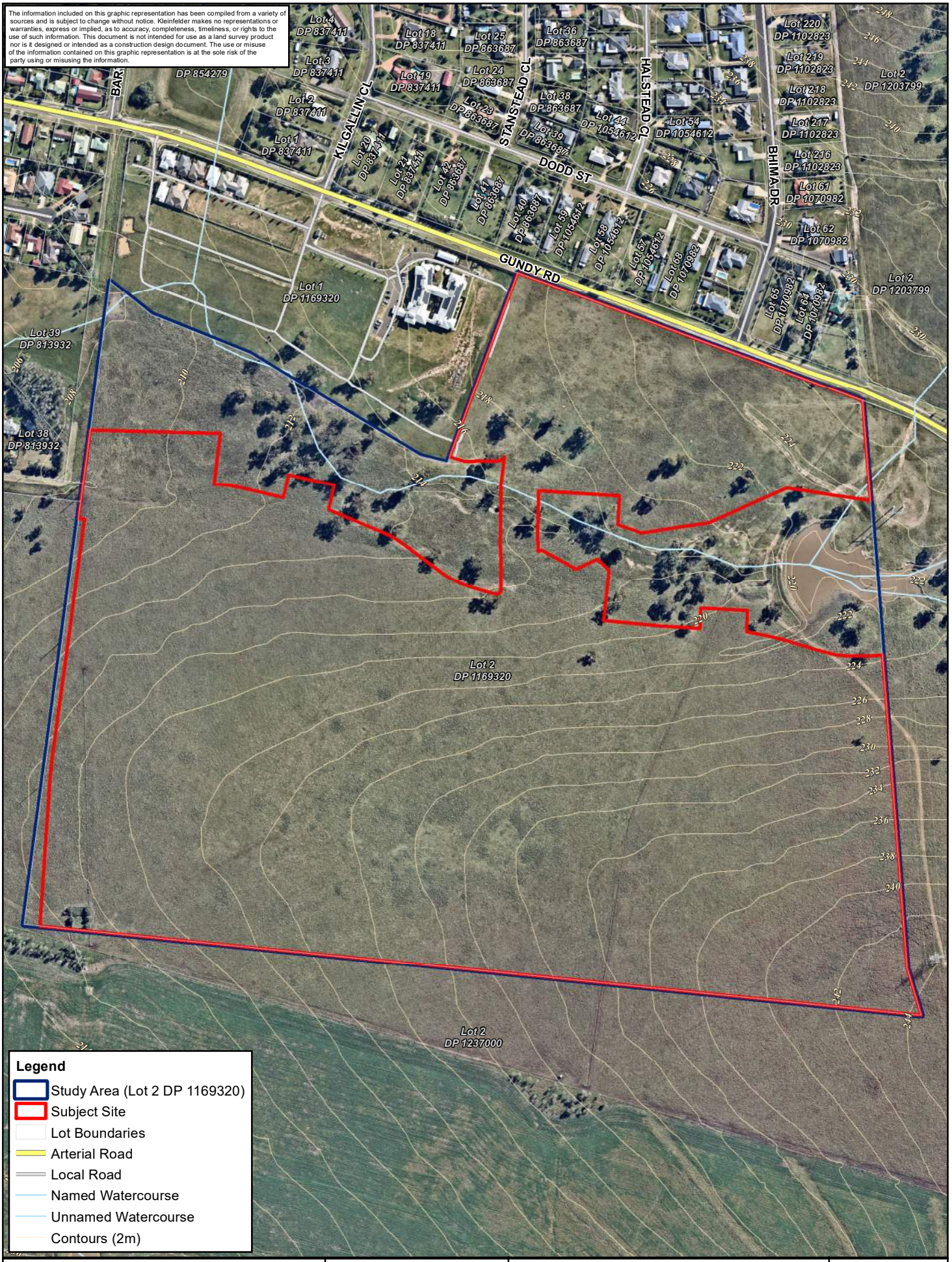

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DATA SOURCE:
NSW DFSI - 2020
Nearmap - 2021

Study Area and Subject Site

Perception Planning
Flora and Fauna Assessment Report
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:
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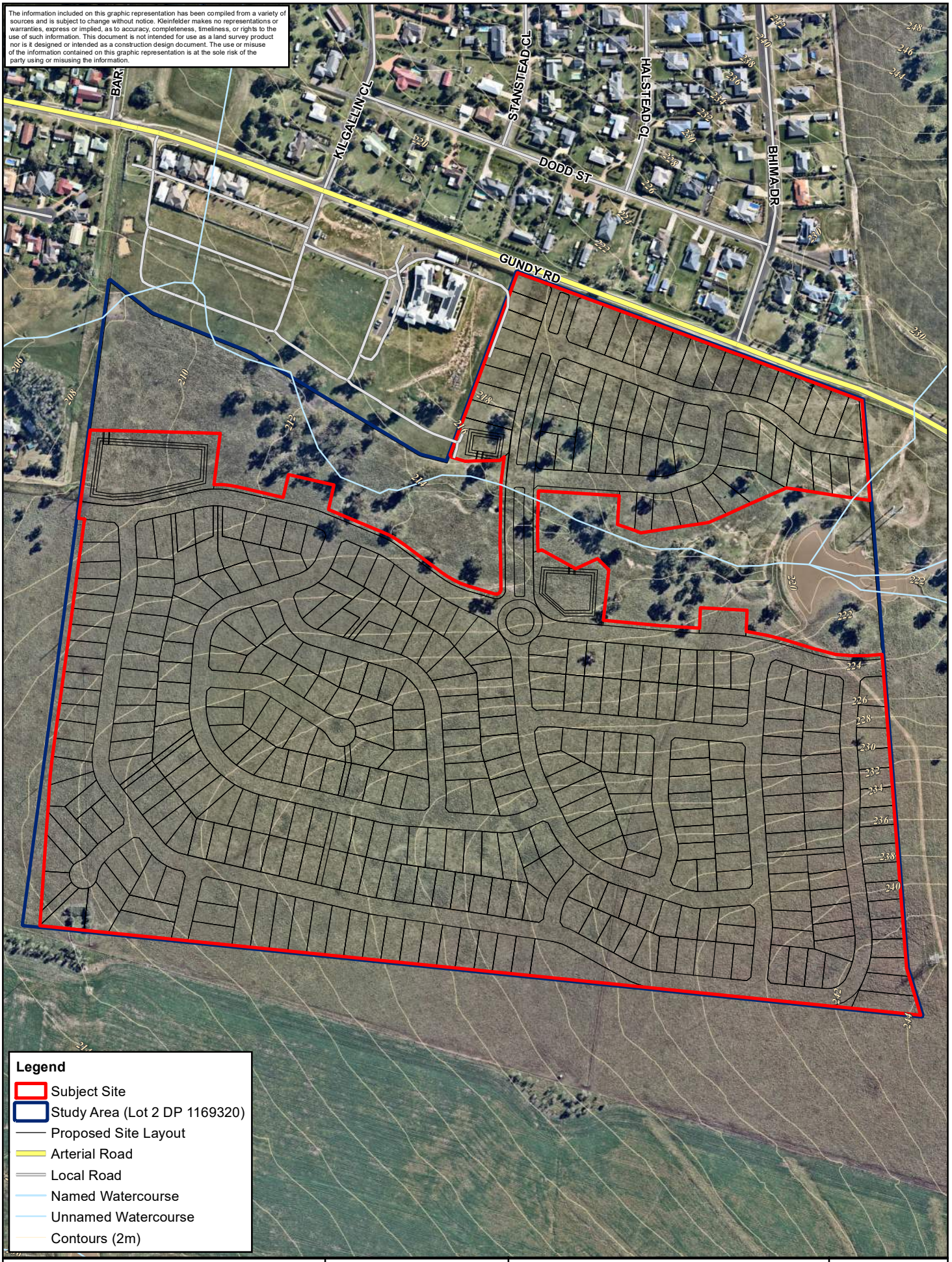
1.3 PROPOSED DEVELOPMENT

The proposed development at 150 Gundy Road Scone will include the subdivision of the site into 407 residential lots. The proposal also includes a large drainage reserve running from east to west intersecting the site and three stormwater detention basins which would be include within the drainage reserve. Additionally, there are roads, public parks, pathways and open spaces throughout the development. A 5m disturbance buffer has been applied to all roads for batters and road construction. The proposed project layout is provided in **Figure 3.** The proposed design has been modified from the initial DA, with the aim of reducing ecological impacts.

1.4 REPORT OBJECTIVES

The objective of this Flora and Fauna Assessment Report is to provide updates to an existing flora and fauna assessment completed and lodged under the original Development Application (DA 163-2017), based on the revised development design. Amendments and additional ecological assessment also considered comments received by the Upper Hunter Shire Council on 26 August 2020 (Upper Hunter Council 2020).

- Complete a desktop assessment including of relevant threatened biota and regional vegetation mapping.
- Describe the flora and fauna (and their habitats) present on, or likely to occur on the Subject Site. Including:
  - Nocturnal spotlighting, hollow/stag watching and call playback.
  - Harp trapping for threatened microbats (specifically Corben's Long-eared Bat).
- Identification of native vegetation, noting the extent and condition of plant community types, as well as the presence, condition and extent of any threatened ecological communities.
- Assess the relevance and value of the Subject Site for threatened species and ecological communities (and their habitats) listed under the NSW Biodiversity Conservation Act 2016 (BC Act).
- Assess the potential impacts of the proposed development on threatened species and ecological communities, pursuant to Section 7.3 of the TSC Act (7-part test). Specifically including the following amendments/further assessments:
  - Assessment of significance for *Nyctophilus corbeni* (Corben's Long-eared Bat), *Micronomus norfolkensis* (Eastern Freetail-bat), *Scoteanax rueppellii* (Greater Broad-nosed Bat) and *Vespadelus troughtoni* (Eastern Cave Bat).
  - Assessment of significance for White Box-Yellow Box Grassy Woodland
- Comment on the likely occurrence and relevance of matters of national environmental significance (MNES) listed under the Commonwealth Environment Planning and Biodiversity Conservation Act 1999 (EPBC Act). Specifically including amendments and/or further assessment of EPBC listed communities and migratory species.
- Describe steps to avoid and mitigate any identified impacts on flora and fauna and to protect the natural environment of the Subject Site, including indirect impacts.
- Identification of slope, aspect and other site characteristics relevant to the APZ considering proposed width, constraints and feasibility.



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Nearmap - 2021

Proposed Site Layout

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Flora and Fauna Assessment Report
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:
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2 LEGISLATIVE CONTEXT

2.1 STATE LEGISLATION

2.1.1 Environmental Planning and Assessment Act 1979

The EP&A Act forms the legal and policy platform for proposal assessment and approval in NSW and aims to 'encourage the proper management, development and conservation of natural and artificial resources'. All development in NSW is assessed in accordance with the provisions of the EP&A Act and the EP&A Regulation 2000.

Development activities that require consent are assessed and determined in accordance with Part 4 of the EP&A Act. The determining authority for the project is Upper Hunter Regional Council.

2.1.2 Biodiversity Conservation Act 2016 (BC Act)

The NSW BC Act, the NSW *Biodiversity Conservation Regulation 2017* (NSW BC Regulation) and amendments to the NSW *Local Land Services Act 2013* (LLS Act) commenced on 25 August 2017. The legislation aims to deliver "a strategic approach to conservation in NSW whilst supporting improved farm productivity and sustainable development". The NSW BC Act repeals several pre-existing Acts, most notably the NSW *Threatened Species Conservation Act 1995* (TSC), the NSW *Nature Conservation Trust Act 2001* and the NSW *Native Vegetation Act 2003*.

Note: The BC Act commenced on the 25th August 2017, repealing the TSC Act. However, as per Section 29 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017, former planning provisions continue to apply to pending and lodged Part 4 assessments lodged prior to the 25th of November 2017. This assessment constitutes an amendment to an existing Development Application lodged to the Upper Hunter Shire Council on 22 November 2017. Therefore, amendments detailed within this report have been undertaken in accordance with the TSC Act as stated below (**Section 2.1.3**). Despite this, threatened species, populations, and ecological communities have also been assessed in accordance with current conservation status under relevant legislation (i.e. the BC Act, and EPBC Act).

2.1.3 Threatened Species Conservation Act 1995 (TSC Act)

Schedules 1 and 2 of the TSC Act contain lists of flora and fauna species and communities, which have been determined by the NSW Scientific Committee as being under threat of serious decline that could ultimately lead to extinction. The TSC Act, pursuant to section 5A of the EP&A Act provides for a seven-part test of significance and impact to be applied to any of these listed species or communities that are found in an area subject to proposed development. Schedule 3 of the TSC Act contains a list of 'key threatening processes' that are deemed to have a negative impact on threatened species, populations or communities. While the TSC Act has been repealed, this legislation applied at the time of DA lodgement, as such, this FFAR complies with the TSC Act.

Assessments of Significance for threatened species and communities likely to be affected by the proposal have been undertaken as part of this assessment (see **Appendix E**).

2.1.4 Biosecurity Act 2015

The NSW Biosecurity Act 2015 provides a streamlined statutory framework to protect the NSW economy, environment and community from the negative impact of pests, diseases and weeds. The primary objective of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

In NSW, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Weed species recorded within the Subject Site during the current investigation are discussed in **Section 4**.

2.1.5 National Parks and Wildlife Act 1974

The NSW National Parks and Wildlife Act 1979 (NPWS Act) aims to conserve nature, objects, places or features (including biological diversity) of cultural value within the landscape. The Act also aims to foster public appreciation, understanding and enjoyment of nature and cultural heritage, and provides for the preservation and management of national parks, historic sites and certain other areas identified under the Act.

No areas of National Park estate occur within or adjacent to the Subject Site.

2.1.6 Water Management Act 2000

Controlled activities carried out in, on or under waterfront land are regulated by the NSW WM Act. The NSW Natural Resource Asset Regulator (NRAR) administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to 'waterfront land' as a consequence of carrying out the controlled activity. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 m of the highest bank of the river, lake or estuary (NRAR, 2018). This means that a controlled activity approval must be obtained from the NRAR before commencing the activity.

One natural watercourse occurs within the Study Area (**Figure 2**), therefore the WM Act applies to the proposed development. An assessment of indirect impacts of the proposed development on aquatic habitat and downstream aquatic habitats is provided in Section 5.1.6.

2.1.7 Fisheries Management Act 1994

The objects of the *Fisheries Management Act 1994* (Fisheries Management Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.

Objects of this Act which relate directly to the assessment include:

a) to conserve fish stocks and key fish habitats, and

b) to conserve threatened species, populations and ecological communities of fish and marine vegetation, and

c) to promote ecologically sustainable development, including the conservation of biological diversity.

Part of the proposed development (road) involves the crossing of a first order watercourse. The development is also not anticipated to interrupt the flow of water of this watercourse. Furthermore, the first order watercourse present on site does not represent mapped threatened freshwater fish species habitat (DPI 2021). The nearest

mapped area of threatened freshwater fish species habitat is located within Kingdon Ponds (for Darling River Hardyhead [*Craterocephalus amniculus*]), approximately two kilometers west of the Subject Site. No habitat for this species occurs within the Subject Site.

Impacts to aquatic habitat are considered within **Section 5.1.5**, mitigation measures are detailed in **Section 5.2.2.**

2.1.8 SEPP 44 – Koala Habitat Protection

SEPP 44 encourages the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. The initial Koala assessment was undertaken prior to the repeal of SEPP 44, and as such, still applies to this assessment.

Under SEPP 44, the identification of Potential Koala habitat and Core Koala habitat is outlined. Potential Koala habitat is defined as areas of native vegetation where the trees of the types outlined in Table 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. Refer to section 4.2.3.2 for results of the Koala habitat assessment.

Table 1: List of SEPP 44 Schedule 2 preferred Koala feed trees

Scientific Name	Common Name
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus punctata	Grey Gum
Eucalyptus viminalis	Ribbon or Manna Gum
Eucalyptus camaldulensis	River Red Gum
Eucalyptus haemastoma	Broad-leaved Scribbly Gum
Eucalyptus signata	Scribbly Gum
Eucalyptus albens	White Box
Eucalyptus populnea	Bimble Box or Poplar Box
Eucalyptus robusta	Swamp Mahogany

2.2 Local Planning Instruments

2.2.1 Upper Hunter Shire Local Environmental Plan 2013

The Study Area is located within the Upper Hunter Shire Council LGA. The Upper Hunter Local Environmental Plan 2013 (Upper Hunter LEP) controls development within the Study Area through zoning and development controls. These controls are described in greater detail by the supporting Upper Hunter Shire Development Control Plan 2013 (Upper Hunter DCP).

2.2.2 Upper Hunter Development Control Plan 2013

The Upper Hunter DCP supports the Upper Hunter LEP by providing additional detail and guidance on addressing biodiversity issues associated with development. In regard to biodiversity, the DCP contains provisions that relate

to environmental effects, soil and erosion control and vegetation. These provisions have been considered during the assessment.

2.3 COMMONWEALTH LEGISLATION

2.3.1 Environment Protection & Biodiversity Conservation Act 1999

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on 'matters of national environmental significance' (MNES) undergo an assessment and approval process. Under the EPBC Act, an action includes a proposal, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. An action that 'has, will have or is likely to have a significant impact on a MNES is deemed to be a 'controlled action' and may not be undertaken without prior approval from the Australian Minister for the Environment.

The EPBC Act identifies nine MNES:

- World heritage properties.
- National heritage places.
- Wetlands of international importance (Ramsar Wetlands).
- Threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development.

As part of the current assessment, MNES that are predicted to occur within the locality (applying a 10 km buffer) were obtained from the on-line Protected Matters Search Tool (DoEE 2021a). These records are discussed in Section 4. The EPBC Act has been further addressed in this assessment through:

- Field surveys for EPBC Act listed threatened biota and migratory species.
- Assessment of potential impacts on EPBC Act listed threatened species and migratory biota.
- Identification of suitable impact mitigation and environmental management measures for EPBC Act listed threatened species and migratory biota.

3 MATERIALS AND METHODS

3.1 DESKTOP ASSESSMENT

Existing information on the flora and fauna of the Subject Site and the locality, including relevant threatened biota was obtained from:

- Regional vegetation mapping: State Vegetation Map – Upper Hunter v1.0 VIS_ID 4894 (DPIE 2019).
- The BioNet Atlas of NSW Wildlife (DPIE, 2020a) for previous records of threatened species, populations and ecological communities (as listed under the BC Act) within a 10 km radius of the Subject Site (data retrieved 12/03/2021).
- The Department of the Environment and Energy (DoEE 2021a) Protected Matters Search Tool, which involved a search for matters of national environmental significance within a 10 km radius of the Subject Site (conducted on 19/04/2021).
- Relevant published literature on threatened biota (see References).

The results of the database searches were used to compile a list of threatened species, populations and communities, as listed under the BC Act and EPBC Act that could potentially occur on the Subject Site, and their likelihood of occurrence (**Appendix B**).

3.2 FIELD SURVEY

3.2.1 Vegetation Assessment

A diurnal inspection of the Subject Site and surrounds was undertaken on 7 and 8 April 2021 to provide specific observations for this report.

Native vegetation types were identified based on dominant flora species present within each structural layer (i.e. canopy, shrub and ground layers). Exotic or highly modified native vegetation was defined based on structure and species composition. Boundaries of vegetation types and communities were marked with a hand-held GPS and mapped using geographical information system (GIS) software.

Vegetation types were assessed against identification criteria for State and Commonwealth listed threatened ecological communities (DoEE 2021b; DPIE 2021d). Vegetation and habitats were compared with descriptions provided in the BioNet Vegetation Classification to identify Plant Community Types (PCTs).

Eight (8) 400 m² floristic plot/transects were sampled in accordance with Section 5.3.4 of the NSW Biodiversity Assessment Method (BAM) (DPIE, 2020). Percentage cover and relative abundance was recorded for all plant species within each plot/transect. Plot/ transects were positioned to sample areas that were most representative of the floristic characteristics of each PCT.

Plant identification and nomenclature were based on species descriptions presented within The Flora of New South Wales Volumes 1 to 4 (Harden, 1993) and with reference to taxonomic updates in PlantNET - The Plant Information Network System of Botanic Gardens Trust, Sydney, Australia (Botanic Gardens Trust, 2020). The locations of all floristic plot/ transects are presented in **Figure 4**.

3.2.2 Fauna Habitat Assessment

The locations of any important habitat features, such as microbat roosting habitat, hollow-bearing trees, terrestrial refugia and nests/burrows were captured with a handheld Trimble device and photographed where appropriate.

Searches for potential habitat for threatened fauna species included but were not limited to:

- Koala feed trees.
- Foraging trees for threatened birds.
- Hollow-bearing trees, including tree species, diameter at breast height (DBH), height of hollow, type of hollow and diameter of hollow entrance.
- Potential roosts for microbats.
- Vegetated ponds, riparian vegetation and drainage lines for frogs and waterbirds.
- Woody debris, leaf litter and bush rock.

Diurnal opportunistic and incidental observations of fauna species were recorded during field surveys. These included opportunistic observation of fauna activity such as scats, tracks, burrows or other traces.

3.2.3 Nocturnal Surveys

Spotlighting was undertaken by two ecologists for a two-hour period over two nights night (7 and 8 April 2021) to determine the presence of nocturnal fauna within the Subject Site and its surrounds. In conjunction with spotlighting surveys, calls of the Powerful Owl (*Ninox strenua*), Barking Owl (*Ninox connivens*), Masked Owl (*Tyto novaehollandiae*), and Koala (*Phascolarctos cinereus*) were broadcast via megaphone within the Subject Site.

During these surveys, trees proposed for removal that contain hollows suitable for threatened species were stag watched from dusk (30 minutes prior to last light) for a period of 1-hour after last light.

3.2.4 Microbat Surveys

Microbat surveys were conducted using high frequency call recorders called ‘Anabats’, which capture call signatures specific to each microbat species. Three Anabat Express detectors (Titley Scientific) were deployed for two nights. One unit was installed adjacent to the dam in the eastern extent of the site and two units within the woodland vegetation portion of the Subject Site to collect microbat call data (**Figure 4**).

Analysis of all bat calls was completed using zero-crossing analysis and Anabat Insight software by visually comparing the time-frequency graph and call characteristics (e.g. characteristic frequency and call shape) with reference calls and/or species call descriptions from published guidelines. Call identification was also assisted by consulting distribution information for possible species (Churchill, 2009; Duffy, Lumsden, Caddle, Chick, & Newell, 2000; Pennay, Law, & Reinhold, 2004).

3.2.5 Bird Surveys

Two 30-minute diurnal bird census were conducted during the survey period, one at dawn and one at dusk. The dawn survey was conducted in the morning when bird activity is at a maximum (Bibby et al. 2000). The dusk census targeted hollows that may be suitable for large species of birds such as cockatoos.

3.2.6 Remote Cameras

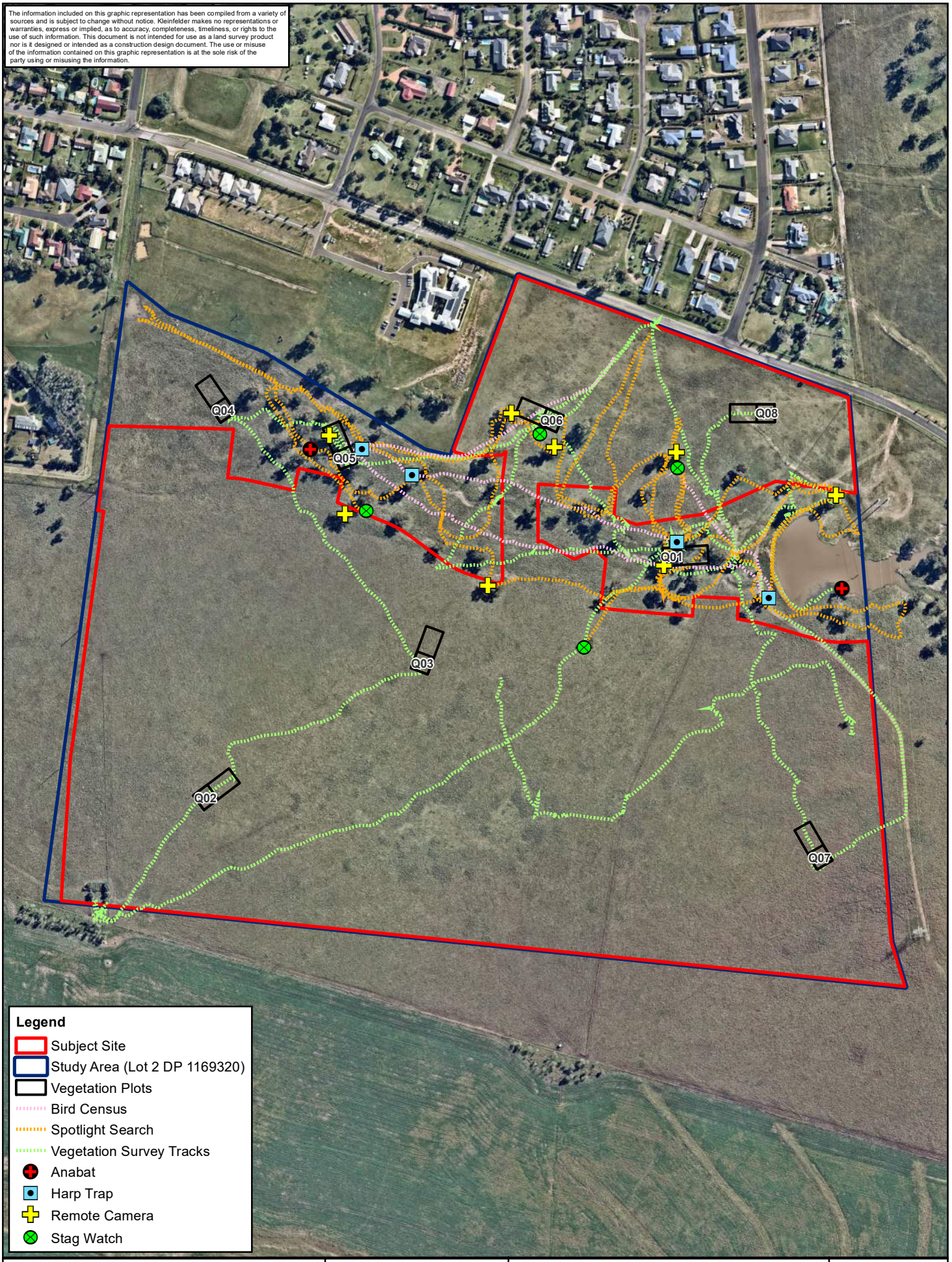
Eight (8) remote cameras were installed on trees within Study Area. The cameras were positioned at approximately 3 m high to target arboreal species. Cameras were positioned to face opposing branches or trunks which were baited with a mixture of oats, honey, peanut butter and treacle. Baits were enclosed within a tea strainer and fixed to the trunk or branch. A 30 cm ruler was fixed beside the bait to provide a scale for fauna caught on the cameras. Trunks and branches were sprayed with a mixture of honey and water. Cameras were left in position for two consecutive nights. Baits were checked and replaced if necessary, during the survey period, and trunks and branches re-sprayed.

3.3 Survey Limitations

The survey techniques and survey effort applied for this study were commensurate with the nature and condition of the Subject Site. Due to these limitations, priority was given to habitat assessment for relevant threatened biota. A 'likelihood of occurrence' assessment was applied to all species previously recorded or predicted to occur within the locality based on State and Commonwealth information sources.

The field survey was undertaken over two and a half days by two ecologists (40 person hours total). While a moderate diversity of native and exotic flora species was recorded, a longer survey duration or multiple seasonal surveys would likely result in the detection of a greater diversity of species. The majority of the Subject Site is considered to be degraded and unsuitable for most threatened plant species known to occur in the locality; therefore, the survey effort that is recommended in The NSW Guide to Surveying Threatened Plants (OEH, 2016) is not considered to be applicable. Searches for threatened plants were focussed in areas where a greater diversity of flora was detected - such as near the bases of trees.

Nocturnal fauna surveys were completed over a two-hour period (four person hours) on the 7 and 8 April 2021. Given the limited availability of native vegetation within the Subject Site, the survey effort was considered adequate to detect the fauna species most likely to be present.



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Survey Effort

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FIGURE:
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4 RESULTS

4.1 PLANT DIVERSITY

A total of 88 plant species were identified during the assessment. These were comprised of 39 exotics and 49 natives, including the following growth forms:

- Three (3) Trees (TG)
- Five (5) Shrubs (SG)
- 20 Grass and grasslike (GG) species
- 17 Forbs (FG)
- One (1) Fern (EG)
- Three "Other" growth forms (i.e. vines, epiphytes etc.)
- 39 Exotics, including five (5) High Threat Exotic (HTE) species

A complete list of flora species is presented in **Appendix C**.

4.2 WEEDS

A total of four (4) Priority Weed species for the Hunter Local Land Services Region (DPI, 2021) were identified within the Subject Site, three of which are also listed as Weeds of National Significance (WoNS) (DoEE 2021c), these include the following species:

- *Echium plantagineum* (Patterson's Curse) [Priority Weed]
- *Opuntia stricta* (Common Prickly Pear) [WoNS and Priority Weed]
- *Senecio madagascariensis* (Fireweed) [WoNS and Priority Weed]
- *Lycium ferocissimum* (African Boxthorn) [WoNS and Priority Weed]

Minor infestations of other exotic species were also identified within the site, including the following species:

- *Salvia reflexa* (Mintweed)
- *Cirsium vulgare* (Spear Thistle),

A comprehensive list of exotic species is presented in **Appendix C**. Mitigation measures to prevent the spread of weeds are presented in **Section 5.2.2**.

4.3 PLANT COMMUNITY TYPES

Regional Vegetation Mapping i.e. State Vegetation Type Map: Upper Hunter Version 1.0. VIS_ID 4894 (DPIE 2019) indicates two native vegetation communities are mapped within the Subject Site, these include:

- PCT 1693 – *Yellow Box – Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains*.
- PCT 796 – *Derived grassland of the NSW South Western Slopes*

The site assessment determined that the regional vegetation mapping is partially inaccurate, with the woodland vegetation within the Subject Site more closely aligned with PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley*. Three condition classes of PCT 618 were identified within the Subject Site, one woodland form and two constituting derived grassland forms of the vegetation community. Descriptions of each vegetation zone are detailed below.

Vegetation Zone 1

Plate 1 **PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Moderate Condition)**

PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Moderate Condition)	
Vegetation Formation and Class	Grassy Woodlands Coastal Valley Grassy Woodlands
Area within Subject Site	1.21 ha
Survey Effort	**Conducted: 3** plot/transect.
Floristic description	The vegetation within this zone was characterised as an open grassy woodland, dominated by a sparse canopy of *Eucalyptus 'albemol'* (presumed intergrade between *Eucalyptus albens* and *Eucalyptus moluccana*) and *Eucalyptus melliodora* (Yellow Box). The midstorey within this vegetation community is absent. The shrub layer is sparse comprising of occasional native species including: *Notelaea microcarpa* (Native Olive), *Sclerolaena muricata* (Black Rolypoly), and *Maireana microphylla* (Small-leaf Bluebush). The groundcover within this community is diverse, dominated by native grasses including: *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass). The groundcover is also characterised by a mix of native forbs (*Wahlenbergia communis* [Tufted Bluebell], *Einadia nutans* [Climbing Saltbush], *Cyperus gracilis*, and *Oxalis perennans*).

PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Moderate Condition)	
	Exotic flora species recorded within the vegetation zone include, *Cirsium vulgare* (Spear Thistle), *Lycium ferocissimum* (African Boxthorn), *Sida rhombifolia* (Paddy's Lucerne), *Salvia reflexa* (Mintbush), and *Senecio madagascariensis* (Fireweed).
Condition within Subject Site	The vegetation within this zone is in moderate condition with an intact native woodland canopy, naturally sparse midstorey and shrub layer, and a diverse native-dominated grassy groundcover. Disturbances including historic vegetation clearing, grazing, and minor weed invasion.
Justification for PCT selection	The vegetation within this zone most closely resembles a Grassy Woodland due to the dominance of an open eucalypt canopy, and conspicuous and diverse ground cover of native grasses and herbs. Within this formation, the vegetation is most closely aligned with the Coastal Valley Grassy Woodlands class due to the presence of a canopy dominated by box species *Eucalyptus 'albemol'* and *Eucalyptus melliodora* (Yellow Box). PCT 618 was deemed to be most closely aligned PCT to the vegetation within the Subject Site due to the presence the following key features: ▪ Open canopy of *Eucalyptus 'albemol'* and *Eucalyptus melliodora* (Yellow Box) ▪ Reduced midstorey and shrub layer with *Notelaea microcarpa* (Native Olive) ▪ Diverse grassy groundcover with species including *Austrostipa scabra* (Speargrass), *Geranium solanderi* (Native Geranium), and *Chloris truncata* (Windmill Grass). ▪ Location within the Hunter (SYD)/ Ellerston (NNC) IBRA sub-regions ▪ Landscape position within creek flats, lower slopes and alluvial plains
Status	**BC Act:** The vegetation within this zone meets the definition for *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC under the BC Act. See **Section 4.4** for TEC determination.
	EPBC Act: The vegetation within this zone meets the definition for *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* CEEC under the EPBC Act. See **Section 4.4** for TEC determination.
PCT % Cleared	73%

Vegetation Zone 2

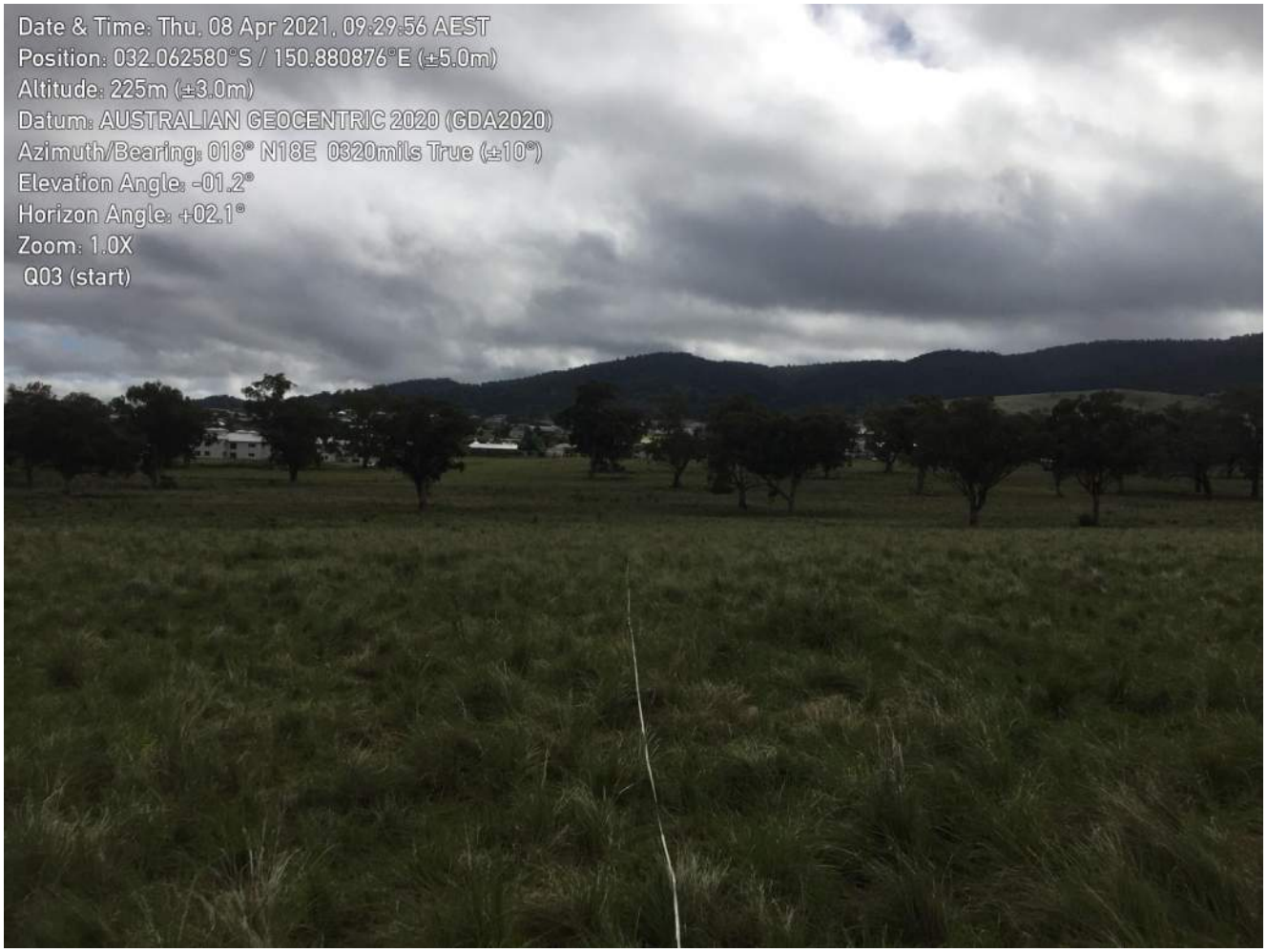


Plate 2 **PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland - Moderate Condition)**

PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland - Moderate Condition)	
Vegetation Formation and Class	Grassy Woodlands Coastal Valley Grassy Woodlands
Area within Development Site	40.86 ha
Survey Effort	**Conducted:** 4 plot/transect.
Floristic description	The vegetation within this zone was considered a derived grassland form of Vegetation Zone 1. The community is characterised by the absence of a native canopy and midstorey typified by the adjacent woodland community (Vegetation Zone 1). The groundcover is dominated by native grasses including: *Austrostipa aristiglumis* (Plains Grass), *Aristida ramosa* (Purple Wiregrass), *Dichanthium sericeum* (Queensland Bluegrass), and *Digitaria diffusa* (Open Summer-grass). The groundcover is also characterised by a mix of native forbs (Geranium solanderi [Native Geranium], *Wahlenbergia communis* [Tufted Bluebell], *Einadia nutans* [Climbing Saltbush], and *Oxalis perennans*). Exotic flora species within this zone include: *Cirsium vulgare* (Spear Thistle), *Lycium ferocissimum* (African Boxthorn), *Sida rhombifolia* (Paddy's Lucerne), *Salvia reflexa* (Mintbush), and *Senecio madagascariensis* (Fireweed).

PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland - Moderate Condition)	
Condition within Subject Site	The vegetation within this zone represents moderate condition derived native grassland form of Vegetation Zone 1, characterised by an absence of canopy and midstorey as a result of historic vegetation clearing. Disturbances including vegetation clearing, grazing, and weed invasion.
Justification for PCT selection	The vegetation within this zone is considered a derived grassland form of Vegetation Zone 1: PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* due to: • the proximity of remnant woodland, • evidence of historic clearing, and • a groundcover consistent with that of mapped woodland within Vegetation Zone 1. The community is therefore considered to be commensurate with a Grassy Woodland formation and aligned with the Coastal Valley Grassy Woodlands class due to the historic presence of a canopy dominated by box species *Eucalyptus 'albemol'* and *Eucalyptus melliodora* (Yellow Box).. PCT 618 was deemed to be most closely aligned PCT to the vegetation within the Subject Site due to the presence the following key features: ▪ Historic open canopy of *Eucalyptus 'albemol'* and *Eucalyptus melliodora* (Yellow Box) based on floristic composition of adjacent woodland community. ▪ Diverse grassy groundcover with species including *Austrostipa scabra* (Speargrass), *Geranium solanderi* (Native Geranium), and *Chloris truncata* (Windmill Grass). ▪ Location within the Hunter (SYD)/ Ellerston (NNC) IBRA sub-regions ▪ Landscape position within creek flats, lower slopes and alluvial plains
Status	**BC Act:** The vegetation within this zone meets the definition for *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC under the BC Act. See **Section 4.4** for TEC determination.
	EPBC Act: The vegetation within this zone **does not meet** the definition for *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* CEEC under the EPBC Act. See **Section 4.4** for TEC determination.
PCT % Cleared	73%

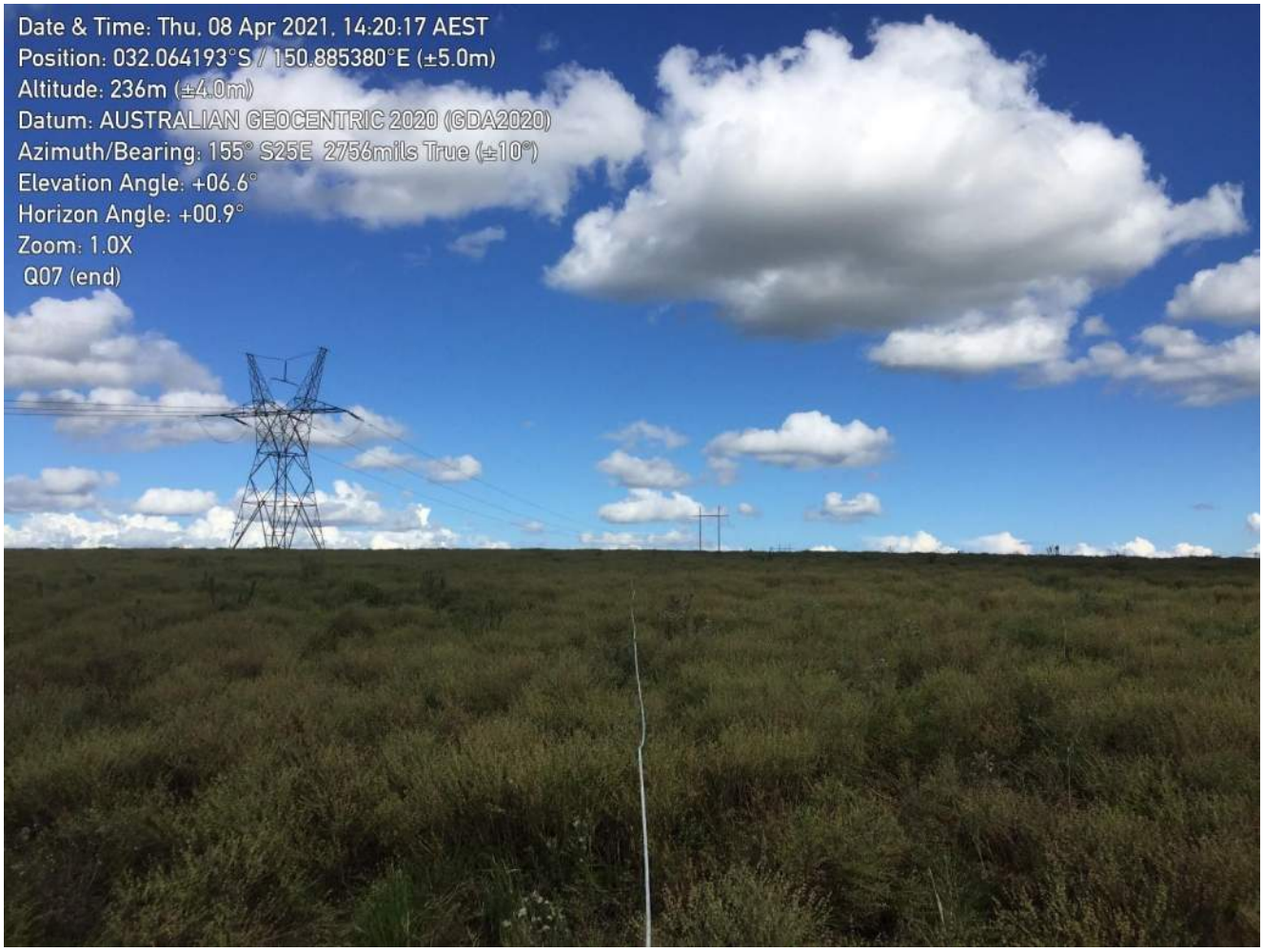
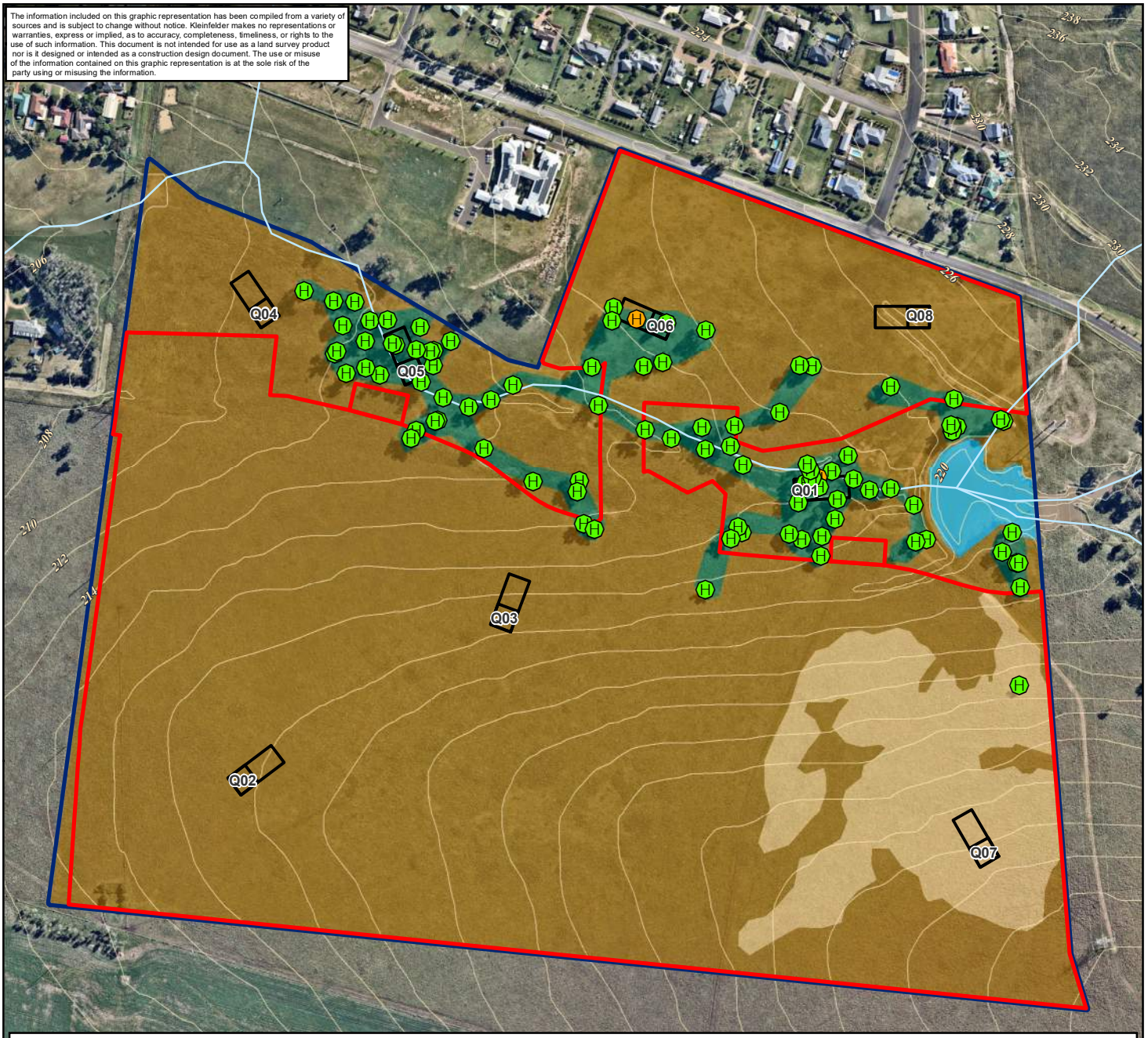


Plate 3 **PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland - Low Condition)**

PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland - Low Condition)	
Vegetation Formation and Class	Grassy Woodlands Coastal Valley Grassy Woodlands
Area within Subject Site	5.51 ha
Survey Effort	**Conducted:** 1 plot/transect.
Floristic description	The vegetation within this zone was characterised by an absence of canopy and midstorey species occurring within the woodland community on site (Vegetation Zone 1). The groundcover is dominated by exotic *Salvia reflexa* (Mintbush), with a lower cover of other exotics including *Conyza bonariensis* (Flaxleaf Fleabane), and Opuntia stricta (Common Prickly Pear), and native grasses *Austrostipa aristiglumis* (Plains Grass) and *Digitaria diffusa* (Open Summer-grass). A small number of native herbs persist at low abundance within the community including *Oxalis perennans*, *Hydrocotyle laxiflora* (Stinking Pennywort), and *Einadia nutans* (Climbing Saltbush).
Condition within Subject Site	The vegetation within this zone represents low condition derived grassland, dominated by exotic species and characterised by an absence of canopy and midstorey as a result of historic vegetation clearing. Disturbances including vegetation clearing, grazing, and weed invasion.

PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland - Low Condition)	
Justification for PCT selection	See determination of Vegetation Zone 2.
Status	**BC Act:** The vegetation within this zone does not meet the definition for *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC under the BC Act. See **Section 4.4** for TEC determination.
	EPBC Act: The vegetation within this zone does not meet the definition for *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* CEEC under the EPBC Act. See **Section 4.4** for TEC determination.
PCT % Cleared	73%



Legend

- Subject Site
- Study Area (Lot 2 DP 1169320)
- Vegetation Plots
- Named Watercourse
- Unnamed Watercourse
- Contours (2m)

Habitat Features

- Hollow-bearing Tree
- Dead Stag

Plant Community Types and Vegetation Zones

- Zone 1: PCT 618: White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Moderate Condition - CEEC)
- Zone 2: PCT 618: White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley – Moderate Condition)
- Zone 3: PCT 618: White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley – Low Condition)
- Dam

Metres
0 25 50 100 150 200 250
N

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DRAWN BY: GJoyce
DATA SOURCE:
NSW DFSI - 2020
Nearmap - 2021

Vegetation Mapping and Habitat Features

Perception Planning
Flora and Fauna Assessment Report
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:
5

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4.4 THREATENED ECOLOGICAL COMMUNITIES

Two Threatened Ecological Communities (TECs) were identified within the Subject Site, the EPBC Act listed *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* (known hereafter as *Box-Gum Grassy Woodland*) Critically Endangered Ecological Community (CEEC), and the NSW BC Act listed equivalent *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (CEEC).

Threatened Ecological Community determinations are detailed in **Appendix D**, with a summary provided in **Table 2**. See **Figure 7** for mapping of Threatened Ecological Communities within the Study Area.

An 'Assessment of Significance' on direct and indirect impacts to *Box Gum Grassy Woodland* CEEC is presented in **Appendix E .**

Table 2: Threatened Ecological Community Determination Summary

Vegetation Zone	Plant Community Type	EPBC Act *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* (CEEC)	BC Act *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (CEEC)
Zone 1	PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Moderate Condition)	Yes	Yes
Zone 2	PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland – Moderate Condition)	No	Yes
Zone 3	PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived Grassland – Low Condition)	No	No

4.5 THREATENED FLORA SPECIES

No threatened flora species were identified within the Subject Site during the assessment.

A search of the BioNet Atlas of NSW Wildlife (DPIE, 2021a) returned four (4) records of threatened plant species within a 5 km radius of the Study Area. An EPBC Protected Matters Search returned a list of twelve (12) threatened plant species predicted to occur within the locality of the Subject Site.

A "likelihood of occurrence' assessment determined that the Subject Site is likely to constitute suitable habitat for one threatened plant species predicted or recorded within the locality, *Dichanthium setosum* (Bluegrass (**Appendix B**). An 'Assessment of Significance' on direct and indirect impacts to *Dichanthium setosum* (Bluegrass) is presented in **Appendix E .**

4.6 Fauna Habitat

The Subject Site is characterised by mostly derived native grassland and a drainage surrounded by and area open Grassy woodland and a sparse shrub layer. The vegetation within the grassland areas of the site is likely to represent minimal foraging habitat for a number of fauna species with the open woodland area representing foraging and denning/roosting habitat for numerous Microchiropteran bat, bird and mammal species.

Key fauna habitat features identified during the site assessment include the following:

- Eighty-eight (88) Hollow-bearing Trees (HBT) either *Eucalyptus 'albemol'* or *Eucalyptus melliodora* (Yellow Box) inclusive of three dead stags. Thirteen (13) HBTs are located within the Subject Site and are proposed for removal (see **Figure 6**).
- Multiple fallen logs/timber scattered throughout the woodland area creating habitat for reptiles and mammals.
- Mature trees within the Subject Site provide foraging and nesting habitat for several common native bird species. Other species include several microbats and other arboreal mammals may occupy these large mature trees.
- One permanent waterbody exists within the eastern extent of the Subject Site which is positioned along an ephemeral drainage line.

4.7 Fauna Species

A total of 46 fauna species were identified during the assessment. Diurnal surveys detected a number of common bird species such as the Australian Magpie, Galahs, Red-rumped Parrots and Striated Pardalote. Nocturnal surveys discovered four amphibians and five mammals, including the Grey-headed Flying Fox (*Pteropus poliocephalus*). Anabat surveys detected eleven (11) Microchiropteran bats including five (5) threatened species (see **Section 4.8** and **Figure 7**).

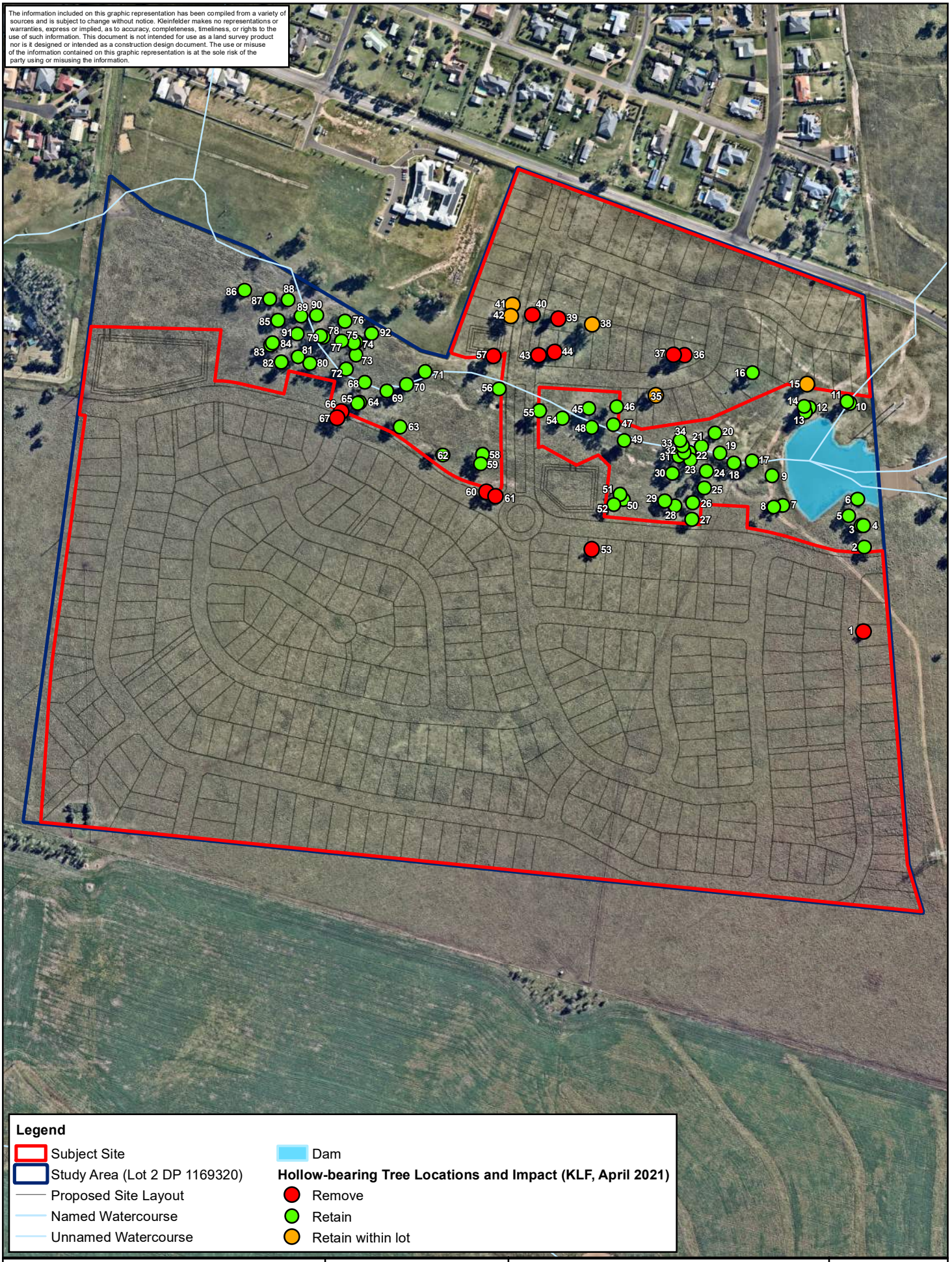
A complete list of fauna species is presented in **Appendix C**.

4.8 Threatened Fauna Species

Seven (7) threatened fauna species were detected within the Study Area, including: Yellow-bellied Sheathtail Bat *(Saccolaimus flaviventris)*, Southern Myotis (*Myotis macropus*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern Cave Bat (*Vespadelus troughtoni*) [Vulnerable BC Act], Grey-headed Flying-fox (*Pteropus poliocephalus*), and Corben's Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable BC Act and EPBC Act).

A search of the BioNet Atlas of NSW Wildlife (DPIE, 2021a) returned a list of 19 threatened fauna species that have previously been recorded within 10 km of the Subject Site. An EPBC Protected Matters Search returned an additional of 23 threatened fauna species predicted to occur within the locality of the Subject Site.

A "likelihood of occurrence" assessment (see **Appendix B**) determined a low likelihood of occurrence for 22 fauna species according to the habitat present within the Subject Site, inclusive of 14 birds, five (5) mammals, two (2) reptiles and one migratory species. Twelve (12) species were determined to have no likelihood of occurrence. One fauna species was considered to have a moderate or high likelihood of occurrence, with another six (6) fauna species detected on site.



Metres
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DATA SOURCE:
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MM HYNDES BAILEY & CO - 2021
Nearmap - 2021

Fauna Habitat Features

Perception Planning
Flora and Fauna Assessment Report
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:
6

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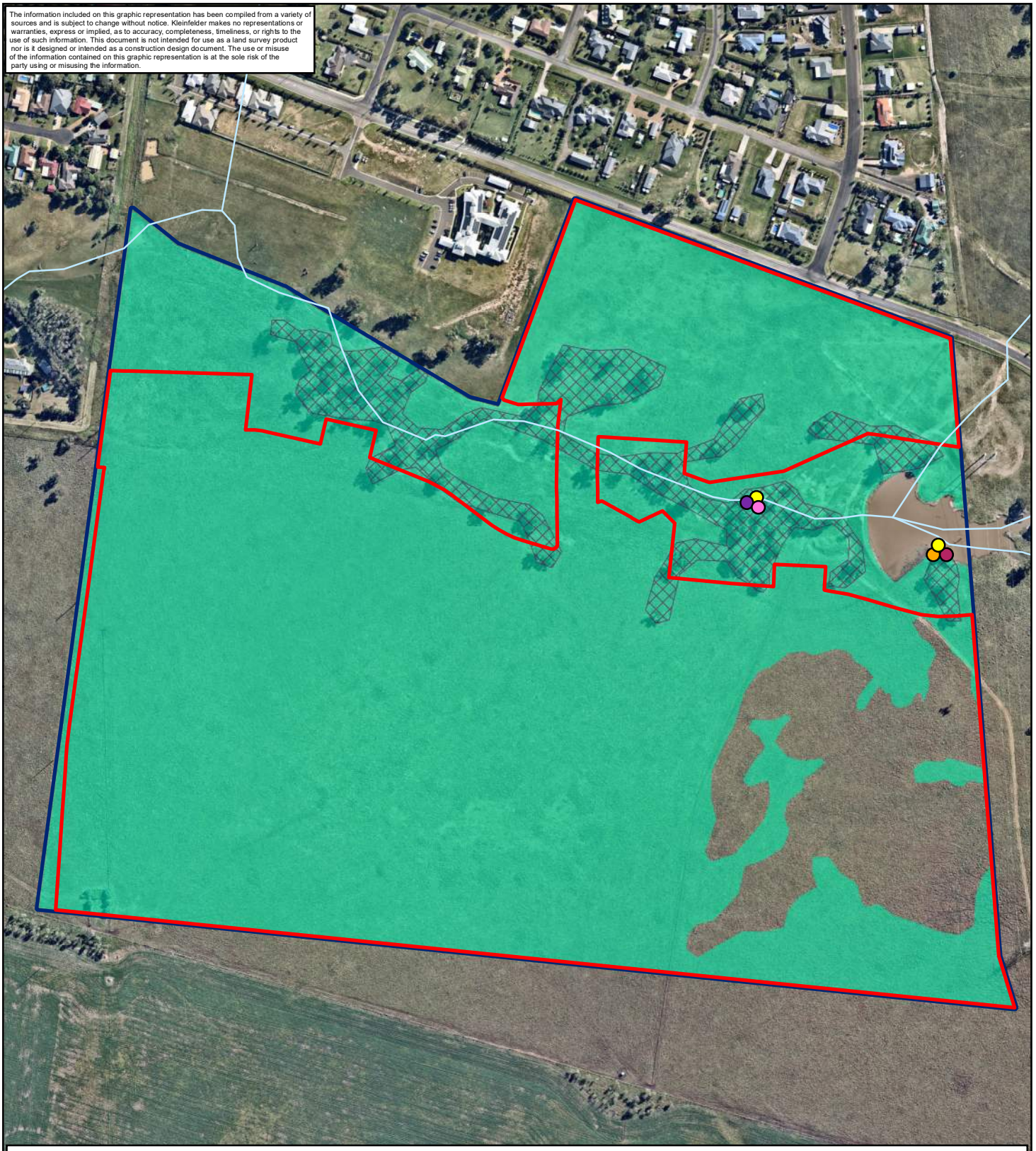

Legend

- Subject Site
- Study Area (Lot 2 DP 1169320)
- Named Watercourse
- Unnamed Watercourse

Threatened Ecological Communities

- White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands (CEEC) (EPBC Act)
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC) (BC Act)

Threatened Fauna Detections

- Eastern Cave Bat (*Vespadelus troughtoni*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
- Southern Myotis (*Myotis macropus*)
- Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)

Metres
0 25 50 100 150 200 250

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DATA SOURCE:
NSW DFSI - 2020
Nearmap - 2021

Threatened Species and Ecological Communities

Perception Planning
Flora and Fauna Assessment Report
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:

7

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4.9 KOALA HABITAT

The vegetation within the Subject Site is dominated by *Eucalyptus 'albemol'* and *Eucalyptus melliodora* (Yellow Box). *Eucalyptus 'albemol'* was identified within the Subject Site representing greater than 15% of the trees which is listed under Schedule 2 (Koala Feed Tree Species) under SEPP 44. Therefore, the Subject Site meets the definition of 'Potential Koala Habitat' as defined by SEPP 44.

No evidence or sightings of Koalas (*Phascolarctos cinereus)* were recorded within the site. A BioNet atlas search was conducted and there were no records within a 5kms of the Subject Site. There was one record approximately 6.5km to the South-West which was found along a riparian corridor in back in 2016. Due to the distance and highly fragmented habitat present within the area and the Subject Site we conclude that the site would not constitute 'Core Koala Habitat' as defined by SEPP 44. No further provisions of the SEPP 44 apply to the Subject Site.

4.10 EPBC PROTECTED MATTERS

A 'likelihood of occurrence' assessment was conducted for all threatened ecological communities, threatened species and migratory species returned by the EPBC Protected Matters Search (**Appendix B**).

One EPBC Act listed Critically Endangered Ecological Community *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* was recorded within the Subject Site (see **Figure 7**).

Two EPBC Act listed threatened/migratory species was detected within the Subject Site, the Grey-headed Flying-fox (*Pteropus poliocephalus*) and Corben's Long-eared Bat (*Nyctophilus corbeni*).

Habitat within the Subject Site provides foraging habitat for the Grey-headed Flying-fox, however, no roosting colonies were observed on the Subject Site. Therefore, the proposed development will not remove important habitat features for the species. The extent of foraging habitat for this species is unlikely to be significantly reduced.

The presence of Corben's Long-Eared Bat was not confirmed within the Study Area through the various surveys undertaken (harps trapping and Anabat acoustic records). Within the genus, *Nyctophilus,* individual species cannot be discerned via call analysis. The Subject Site has the potential to provide foraging and roosting habitat for the species (Vegetation Zone 1). The extent of foraging habitat and roosting habitat will be largely unaffected with only 13 hollow-bearing trees requiring removed for the development while 3.04 ha of woodland vegetation will be retained, including 79 hollow-bearing trees.

Impacts to the above-mentioned matters of national environmental significance have been assessed as per the EPBC Act Significant Impact Guidelines (DoE 2013) in **Appendix F**.

5 DISCUSSION

5.1 IMPACT ASSESSMENT

5.1.1 Impacts to Native Vegetation

The proposed development has the potential to impact 47.59 ha of native vegetation within the Subject Site (**Figure** 5), including:

- **1.21 ha of Vegetation Zone 1 -** PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition) – Impacts within this Vegetation Zone are predominantly on intact groundcover, with minimal impacts to canopy (removal of 13 trees).
- **40.86 ha of Vegetation Zone 2** - PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Moderate Condition).
- **5.51 ha of Vegetation Zone 3** - PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Low Condition).

Mitigation measures to minimise the potential for disturbance of native vegetation within the Subject Site are presented in **Section 5.2.2**.

5.1.2 Impacts to Fauna

Direct impacts of the proposed development on fauna habitat includes the following:

- The clearing of 13 Hollow-bearing Trees
- The removal of a stack of fallen logs/timber

Potential indirect impacts of the proposed development on resident fauna populations include the following:

- Noise and lighting during the construction phase may cause minor disturbance to resident fauna within the locality and disrupt their natural behaviour.
- Pollution such as chemical spills from construction machinery may have adverse effects on the water quality and biota within drainage line.
- Ground disturbance by machinery during the construction phase may create dust and facilitate the movement of sediment. Sedimentation could adversely affect the water quality within any downstream aquatic habitat.

Management measures are presented in **Section 5.2.2** to reduce the potential for these impacts.

5.1.3 Impacts to Threatened Species

Threatened Flora Species

No threatened flora species was recorded within the Subject Site.

The Subject Site is considered to represent potential habitat for one threatened flora species, *Dichanthium setosum* (Bluegrass). The proposed development proposes to clear approximately 1.21 ha of vegetation representing marginally suitable habitat for the species.

In accordance with Section 7.3 of the BC Act, an 'assessment of significance' determined that the proposed development is unlikely to have a significant impact on this species (**Appendix D**). An assessment of the impacts to this species have also been assessed in accordance with the EPBC Act in **Appendix E**.

Threatened Fauna Species

Seven (7) threatened fauna species were detected within the Study Area, including: Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*), Southern Myotis (*Myotis macropus*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern Cave Bat (*Vespadelus troughtoni*) [Vulnerable BC Act], Grey-headed Flying-fox (*Pteropus poliocephalus*) and Corben's Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable BC Act and EPBC Act). Also included are the further five (5) species assessed to have preferred habitat onsite these include: Dusky Woodswallow (*Artamus cyanopterus cyanopterus*), Little Eagle (*Hieraaetus morphnoides*), White-throated Needletail (*Hirundapus caudacutus*), Swift Parrot (*Lathamus discolor*) and Diamond Firetail (*Stagonopleura guttata*).

The Subject Site is considered to represent potential foraging habitat for all the species above and potential roosting habitat for some a selection of the species either surveyed to be onsite or likely to occur within the Subject Site. In accordance with Section 7.3 of the BC Act, an 'assessment of significance' determined that the proposed development is unlikely to have a significant impact on these species (**Appendix D**).

An assessment of the impacts for four of the species that have been assessed in accordance with the EPBC Act is provided in **Appendix E**.

5.1.4 Impacts to Threatened Ecological Communities

Environment Protection and Biodiversity Conservation Act 1999

One Critically Endangered Ecological Community listed under the EPBC Act was recorded within the Subject Site, *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box-Gum Grassy Woodland). Only one vegetation zones within the Subject Site meets the definition of the listed CEEC:

- **Vegetation Zone 1:** PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition). **Subject Site 1.21 ha** (Study Area total: 4.26 ha).

Therefore, the proposed development will impact a total of 1.21 ha of Box-Gum Grassy Woodland. However, impacts are predominantly within areas of grassland with only 13 mature trees proposed to be removed. The majority of the CEEC within the Subject Site (3.04 ha) will be retained (inclusive of 79 HBTs) and managed as the Gundy Road Drainage Reserve.

Biodiversity Conservation Act 2016

One Critically Endangered Ecological Community listed under the BC Act was recorded within the Subject Site, *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box-Gum Grassy Woodland). Two vegetation zones within the Subject Site were confirmed to meet the definition of the listed CEEC, these include:

- **Vegetation Zone 1:** PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition). **Subject Site 1.21 ha** (Study Area: 4.26 ha).
- **Vegetation Zone 2:** PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Moderate Condition). **Subject Site 40.86 ha** (Study Area: 47.03 ha).

The proposed development will impact a total of 42.08 ha of Box-Gum Grassy Woodland as listed under the BC Act. Impacts are predominantly within areas constituting the derived grassland form of the CEEC (Vegetation Zone 2: 40.86 ha), with only 1.21 ha of the woodland community to be impacted. The majority of the woodland (3.04 ha) will be retained (inclusive of 79 HBTs) and managed as the Gundy Road Drainage Reserve under the proposed development.

5.1.5 Impacts to Aquatic Habitat

There is a first order stream within the Study Area running from east to west. There are potential direct impacts to the waterway where the road dissects the drainage line. Potential indirect impacts include the following:

- The excavation of soil within the Subject Site during the construction phase has the potential to facilitate erosion and sediment movement. Runoff from the Subject Site has the potential to introduce nutrients and other toxins to downstream aquatic habitats.
- The introduction of chemicals such as fuels for vehicles and machinery during the construction phase has the potential to cause pollution to downstream aquatic habitat.

Recommendations to reduce the potential for adverse environmental impacts to aquatic habitat are presented in **Section 5.2.2**.

5.1.6 Cumulative Impacts

Cumulative impacts arise from the interaction of individual elements associated with the proposed development and the additive effects of other external projects. No other known projects within the locality are known to have relevance to this project that could exacerbate cumulative impacts.

5.2 Impact Amelioration

5.2.1 Avoidance Measures

Impacts on biodiversity values have been addressed through an iterative design process to avoid areas of higher biodiversity value within the Subject Site. Avoidance measures include the following:

- A redesign of the development has been undertaken to allow for greater retention of hollow bearing trees within the Study Area and woodland areas within the drainage reserve.

5.2.2 Mitigation Measures

5.2.2.1 Erosion Control

Mitigation measures to reduce soil erosion and pollutant run-off during construction activities should include:

- Installation of erosion and sediment control structures within 40 m of development site prior to any construction works and in accordance with Managing Urban Stormwater: Soils and Construction.
- Regular inspection of erosion and sediment control measures, particularly following rainfall events to ensure their ongoing functionality.
- The immediate removal offsite of any excavated materials.
- Avoid stockpiling of materials adjacent to native vegetation, but instead use areas that are already cleared/ disturbed.
- Undertake maintenance of silt fences and other mitigation measures to isolate runoff.

5.2.2.2 Dust Control

Specific measures to minimise the generation of dust and associated impacts on adjacent natural environments should include:

- Setting maximum speed limits for all traffic within the Subject Site to limit dust generation.
- Use of a water tanker to spray unpaved access tracks during the construction phase where required.
- Application of dust suppressants or covers on soil stockpiles.

5.2.2.3 Chemical Spills

Specific measures to minimise the potential for chemical spills and associated impacts on adjacent natural environments should include the following:

- All chemicals must be kept in clearly marked bunded areas.
- Regularly inspect vehicles and mechanical plant for leakage of fuel or oil.
- No re-fuelling of vehicles, washing of vehicles or maintenance of vehicles and plant to be undertaken within 20 m of natural drainage lines.

5.2.2.4 Vegetation Clearing (Tree Removal)

The following recommendations are to be implemented during vegetation clearing:

- A suitably qualified Ecologist should complete a pre-clearance assessment prior to the commencement of works. A suitably trained Ecologist should be present onsite to supervise vegetation clearing activities and manage displaced fauna species. An arborist should be utilised to section hollow limbs and safely lower to the ground for inspection, prior to the tree being felled.
- Areas of vegetation outside the development footprint are to be clearly demarcated to prevent accidental clearing during the construction phase.
- Vegetation should be cleared in a way that will allow fauna species living in or near the clearing site enough time to move out of the area without additional human intervention.
- No clearing should occur during the early evening or at night. Also clearing needs to take place out of the breeding season for birds and microbat species.

5.2.2.5 Management of Displaced Fauna

The following recommendations apply to the management of any displaced fauna species during vegetation clearing activities:

- Clearing of any hollow bearing trees need to be supervised by an experienced Ecologist due to the high likelihood of fauna species to occur within these trees. It is recommended that an arborist facilitate the removal hollows to reduce potential injury to hollow-dependent fauna which may inhabit trees.
- All handling of fauna species should be conducted by a suitably trained Ecologist. Displaced fauna species are to be relocated to adjacent bushland if in good health. If any fauna are to be found injured they are to be taken to the nearest vet for assessment and then to a local carer for rehabilitation if required.
- Nocturnal fauna species, such as microbats, are to be 'soft released' using bat boxes placed in adjacent habitat. Nocturnal fauna species, such as gliders and possums, are to be secured in suitable enclosures and kept in a quiet, dark and cool environment until they can be released into suitable habitat after dark.
- If any injured fauna species are found during the construction period, construction must stop immediately so that the injured animal is to be taken to a vet or wildlife carer.

5.2.2.6 Management of Weeds

Three listed Priority Weeds were recorded within the Subject Site during the site assessment, including:

- *Echium plantagineum* (Patterson's Curse)
- *Opuntia stricta* (Common Prickly Pear)
- *Senecio madagascariensis* (Fireweed), and
- *Lycium ferocissimum* (African Boxthorn)

Weed management within areas of remnant vegetation will be completed in accordance with the Plan of Management for the Drainage Reserve.

6 CONCLUSION

The proposed development will require the removal of 1.21 ha of woodland vegetation PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley*, Box-Gum Grassy Woodland CEEC under the BC Act and EPBC Act, and removal of 13 hollow-bearing trees (including one dead stag). The proposed development will also require the removal of 40.86 ha of derived grassland PCT 618 (Box-Gum Grassy Woodland CEEC under the BC Act).

No threatened flora species were recorded within the Subject Site during site assessments.

Seven (7) threatened fauna species were detected within the Study Area, including: Yellow-bellied Sheathtail Bat *(Saccolaimus flaviventris)*, Southern Myotis (*Myotis macropus*), Large Bent-winged Bat (*Miniopterus orianae oceanensis*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), Eastern Cave Bat (*Vespadelus troughtoni*) [Vulnerable BC Act], Grey-headed Flying-fox (*Pteropus poliocephalus*), and Corben's Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable BC Act and EPBC Act).

The proposed development is unlikely to cause a significant impact to any threatened species, populations or ecological communities listed under the NSW BC Act. An assessment of significance determined that significant impacts to commonwealth listed threatened species are unlikely. However, an EPBC referral to the Commonwealth Minister for the Environment is required to assess the significance of proposed impacts to the Commonwealth listed Box-Gum Grassy Woodland CEEC.

Avoidance and mitigation measures have been presented to reduce potential impacts to biodiversity values within the Subject Site and the environment. A Plan of Management (PoM) for retained vegetation within the Study Area (the “Drainage Reserve”) will be developed to support the proposed Development Application (DA).

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APPENDIX A – SITE PHOTOGRAPHS

Photo 1: Subject Site native grassland and remnant woodland in valley

Photo 2: Existing dam within Subject Site

Photo 3: Vegetation Plot 1 start of transect

Photo 4: Vegetation Plot 2 start of transect

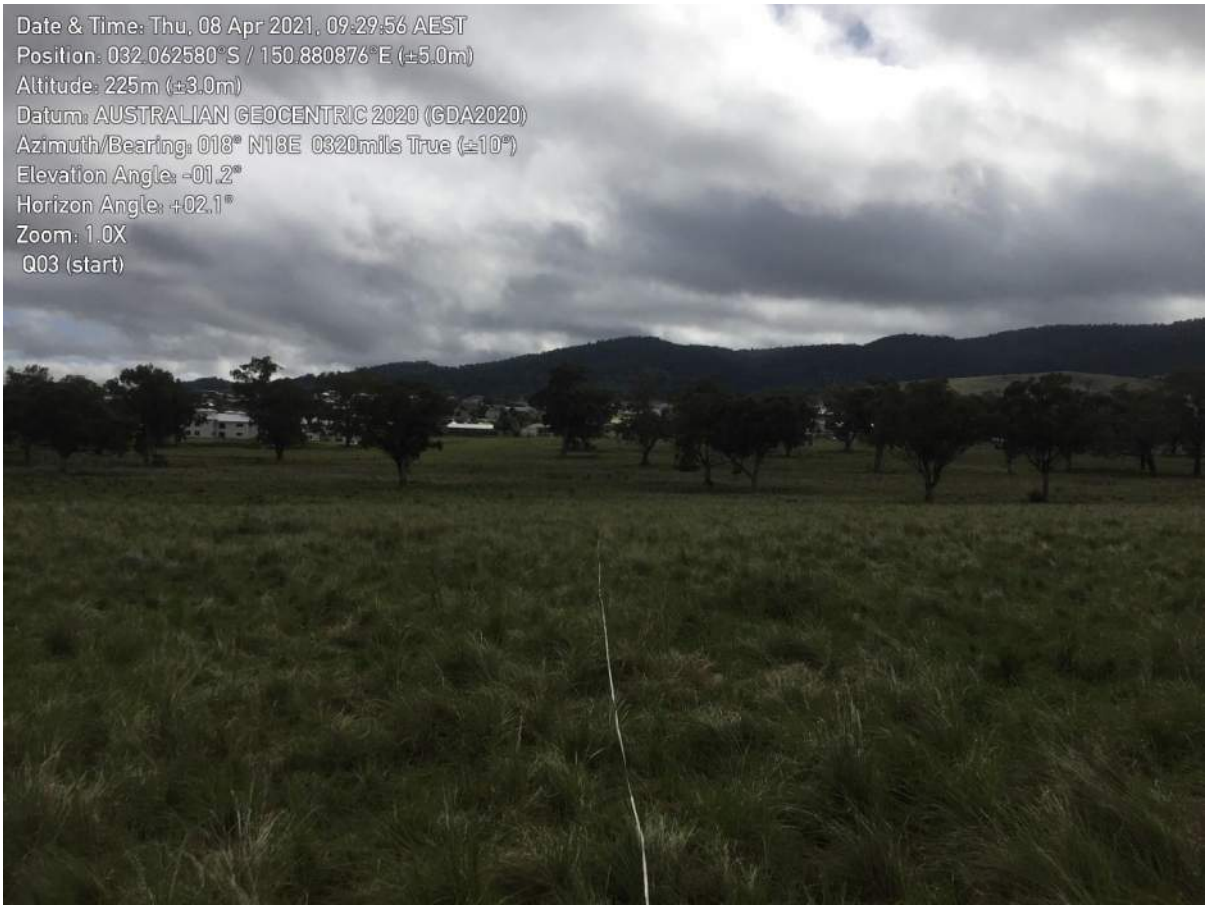

Photo 5: Vegetation Plot 3 start of transect

Photo 6: Vegetation Plot 4 start of transect

Photo 7: Vegetation Plot 5 start of transect

Photo 8: Vegetation Plot 6 start of transect

Photo 9: Vegetation Plot 7 start of transect

Photo 10: Vegetation Plot 8 start of transect

APPENDIX B – THREATENED SPECIES 'LIKELIHOOD OF OCCURRENCE'

THREATENED SPECIES 'LIKELIHOOD OF OCCURRENCE'

A list of threatened species, populations and ecological communities that have been reported or modelled to occur from within a five-kilometre radius of the Study Area was obtained from the following databases:

- NSW Office of Environment and Heritage (OEH) BioNet Atlas: (http://www.bionet.nsw.gov.au/); and
- Department of Environment and Energy (DoTEE) Protected Matters search tool: (www.environment.gov.au/erin/ert/epbc/index.html).

An assessment was then made of the likelihood of the threatened species, populations, and ecological communities reported or modelled to occur in the locality occurring within the Study Area or using the habitat within the Study Area as an essential part of a foraging range.

The table below summarises the likelihood of threatened species and EPBC Act listed migratory species occurring within the Study Area based on the habitat requirements of each species. A brief definition of the likelihood of occurrence criteria is provided below:

- Known – species identified within the site during surveys;
- High – species known from the area (OEH Wildlife Atlas records), suitable habitat (such as roosting and foraging habitat) present within the site;
- Moderate – species may be known from the area, potential habitat is present within the site;
- Low – species not known from the area and/or marginal habitat is present within the site; and
- Nil – habitat requirements not met for this species within the site

Table B1 – Likelihood of occurrence

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
Flora								
1.	*Acacia Pendula* Acacia pendula population in the Hunter catchment	E	-	1	BioNet Atlas	This Hunter population is known to occur naturally as far east as Warkworth and extends northwest to Muswellbrook and to the west of Muswellbrook at Wybong. Only recorded to date at 6 locations: Jerrys Plains, Edderton, Wybong, Appletree Creek, Warkworth and Appletree Flat. These locations occur within the Muswellbrook and Singleton Local Government Areas, with the population potentially also occurring within the Mid-Western Regional and Upper Hunter LGA's.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
2.	*Androcalva procumbens*	V	V	P	PMST	The species occurs in sandy soils, often in disturbed habitats such as road verges, quarry boundaries, gravel stockpiles, and power line easements. The distribution of this species overlaps with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EPBC Act-listed threatened ecological community.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
3.	*Cymbidium canaliculatum* Cymbidium canaliculatum population in the Hunter Catchment	E	-	11	PMST	In NSW the species is restricted to the north-eastern quarter of the State, occurring chiefly in inland districts west to New Angledool and Walgett on the north western plains and north of the Hunter River, through the north western slopes, northern tablelands and north coast into south-eastern Queensland. Typically grows in the hollows, fissures, trunks and forks of trees in dry sclerophyll forest or woodland, where its host trees typically occur on Permian Sediments of the Hunter Valley floor	Low	Broadly suitable woodland habitat on site. Records within locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
4.	*Dichanthium setosum* Bluegrass	V	V	P	PMST	Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.	Moderate	Suitable Habitat for species exists throughout Subject Site, albeit degraded. No records within locality. **Not recorded during site assessment.**
5.	*Eucalyptus camaldulensis* Eucalyptus camaldulensis population in the Hunter catchment	E	-	38	BioNet	The Hunter population occurs from the west at Bylong, south of Merriwa, to the east at Hinton, on the bank of the Hunter River, in the Port Stephens local government area. It has been recorded in the local government areas of Lithgow, Maitland, Mid-Western Regional, Muswellbrook, Port Stephens, Singleton and Upper Hunter. May occur with *Eucalyptus tereticornis*, *Eucalyptus melliodora*, *Casuarina cunninghamiana* subsp. *cunninghamiana* and *Angophora floribunda.*	Low	Broadly suitable habitat on site. Records within locality. **Not recorded during site assessment.**
6.	*Eucalyptus glaucina* Slaty Red Gum	V	V	P	PMST	Found only on the north coast of NSW and in separate districts: near Casino where it can be locally common, and farther south, from Taree to Broke, west of Maitland. Grows in grassy woodland and dry eucalypt forest. Grows on deep, moderately fertile and well-watered soils.	Nil	No suitable habitat on site. No records within locality. **Not recorded during site assessment.**
7.	*Euphrasia arguta*	CE	CE	P	PMST	Known from Nundle State Forest and adjacent private land, in New South Wales. The species is known from three locations in two areas approximately 14 km apart. Occur in eucalypt forest with a mixed grass and shrub understorey within Nundle State Forest.	Nil	No suitable habitat on site. No records within locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
8.	*Homoranthus darwinioides* Fairy Bells	V	V	P	PMST	Rare in the central tablelands and western slopes of NSW, occurring from Putty to the Dubbo district. It is found west of Muswellbrook between Merriwa and Bylong, and north of Muswellbrook to Goonoo SCA. The species has been collected from Lee's Pinch, but not relocated at its original locality north of Mt Coricudgy above the headwaters of Widden Brook. Grows in in various woodland habitats with shrubby understoreys, usually in gravely sandy soils. Landforms the species has been recorded growing on include flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
9.	*Prasophyllum petilum* Tarengo Leek Orchid	E	E	P	PMST	Natural populations are known from a total of five sites in NSW. These are near Boorowa, Queanbeyan area, Ilford, Delegate and a newly recognised population c.10 km west of Muswellbrook. The species is also known from Hall in the ACT. Grows in open sites within Natural Temperate Grassland, open grassland dominated by wallaby grasses *Austrodanthonia* spp. near Boorowa, and grassy woodland in association with River Tussock Poa labillardieri, Black Gum *Eucalyptus aggregata* and tea-trees *Leptospermum* spp. near Queanbeyan and within the grassy groundlayer dominated by Kangaroo Grass under Box-Gum Woodland at Ilford (and Hall, ACT).	Nil	No suitable habitat on site. **Not recorded during site assessment.**
10.	*Prasophyllum* sp. *Wybong* (C.Phelps ORG 5269) A Leek Orchid	-	CE	P	PMST	The species occurs within the Sydney Basin, New England Tablelands, Brigalow Belt South and NSW South Western Slopes IBRA Bioregions and the Border Rivers–Gwydir, Namoi, Hunter–Central Rivers and Central West Natural Resource Management Regions. The distribution of this species overlaps with the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EPBC Act-listed threatened ecological community.	Low	Broadly suitable habitat on site, albeit highly degraded. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
11.	*Prostanthera cineolifera* Singleton Mint Bush	V	V	P	PMST	Restricted to only a few localities near Scone, Cessnock and St Albans. Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands.	NIl	No suitable habitat on site. **Not recorded during site assessment.**
12.	*Swainsona sericea* Silky Swainson-pea	V	-	1	BioNet	Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Found in Natural Temperate Grassland and Snow Gum Eucalyptus pauciflora Woodland on the Monaro.Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes.	Low	Broadly suitable habitat on site, albeit highly degraded **Not recorded during site assessment.**
13.	*Swainsona recta* Small Purple-pea	E	E	P	PMST	Small Purple-pea was recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Grows in association with understorey dominants that include *Themeda australis* (Kangaroo Grass), *Poa* spp. (poa tussocks), and *Austrostipa* spp. (spear-grasses).	Nil	No suitable habitat on site. **Not recorded during site assessment.**
14.	*Thesium australe* Austral Toadflax	V	V	P	PMST	The species occurs in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Habitat for this species includes grassland on coastal headlands or grassland and grassy woodland away from the coast.	Nil	Broadly suitable habitat on site. No records within the locality. **Not recorded during site assessment.**
15.	*Tylophora linearis*	V	E	P	PMST	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa*, *E. sideroxylon*, *E. albens*, *Callitris endlicheri*, *C. glaucophylla*, *Allocasuarina luehmannii*, and in association with *Acacia hakeoides*, *A. lineata*, *Myoporum* spp., and *Casuarina* spp.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
Birds								

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
1.	*Actitis hypoleucos* Common Sandpiper	P	C,J,K	2	BioNet	The Common Sandpiper is found in coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
2.	*Anthochaera phrygia* Regent Honeyeater	CE	CE	P	PMST	In NSW the species is confined to two known breeding areas: the Capertee Valley and Bundarra-Barraba region. Non-breeding flocks are seen occasionally in coastal areas foraging in flowering Spotted Gum and Swamp Mahogany forests. Habitat for the species includes dry open forest and woodlands, particularly Box-Ironbark woodland and riparian forests of River Sheoak, with an abundance of mature trees, high canopy cover and abundance of mistletoes.	Low	Marginal habitat on site. No records within locality. Majority of the habitat being retained. **Not recorded during site assessment.**
3.	*Artamus cyanopterus* cyanopterus Dusky Woodswallow	V,P		2	BioNet	A woodland dependent bird with a wide distribution and occurrence in a variety of habitats. The Tasmanian breeding population migrates north during the cooler months and can be found in southeast NSW. The species is an aerial forager and prefers woodland habitats.	**Low-Moderate**	Suitable aerial foraging habitat over the site. Only two records within locality. **Not recorded during site assessment.**
4.	*Botaurus poiciloptilus* Australasian Bittern	E	E	P	PMST	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.).	Nil	No suitable habitat on site. **Not recorded during site assessment.**
5.	*Calidris ferruginea* Curlew Sandpiper	E	CE	P	PMST	The species occurs along the entire coast of NSW, particularly in the Hunter Estuary, and freshwater wetlands in the Murray-Darling Basin. Breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving between August and November, and departing between March and mid-April. It generally occupies littoral and estuarine habitats, and in New South Wales can be found mainly in intertidal mudflats of sheltered coasts.	Nil	No suitable habitat on site. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
6.	*Chthonicola sagittata* Speckled Warbler	V,P		3	BioNet	Within NSW most frequently reported from the hills and tablelands of the Great Dividing Range, rarely from the coast. The species inhabits a wide range of Eucalypt-dominated communities with a grassy understorey, a sparse shrub layer, often on rocky ridges or in gullies. Sedentary and requires large, relatively undisturbed remnants to persist in an area. Forages on the ground for seeds and insects, and nests in a slight hollow in the ground or at the base of low dense plants.	Low	Marginal habitat on site. Records within locality. **Not recorded during site assessment.**
7.	*Climacteris picumnus victoriae* Brown Treecreeper (eastern subspecies)	V,P		2	BioNet	Small grey-brown bird with black streaking on the lower breast/belly and black bars on the undertail. Inhabits Box-Gum woodlands and dry open forest of inland slopes and plains. Preferred woodlands dominant by stringybarks or other rough-barked eucalypts. Forages in trees and on the ground. Endemic to eastern Australia, occurring from the coast to inland plains and western slopes of the great dividing range. Nests in tree or stump hollows greater than 6cm.	Low	Marginal habitat on site. Only two records within locality. **Not recorded during site assessment.**
8.	*Erythrotriorchis radiatus* Red Goshawk	CE	V	P	PMST	The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Inhabit open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands.	Low	Marginal habitat present on site. No records within locality. **Not recorded during site assessment.**
9.	*Falco hypoleucos* Grey Falcon	E		P	PMST	Medium-sized, compact, pale falcon with a heavy, thick-set, deep-chested appearance. The species is 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, although it is occasionally found in open woodlands near the coast.	Low	Marginal habitat on site. No records within the locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
10.	*Glossopsitta pusilla* Little Lorikeet	V,P	-	1	BioNet	The species occurs from the coast to western slopes of the Great Dividing Range and inhabits dry, open eucalypt forests and woodlands. Occurrence is positively associated with patch size, and with components of habitat complexity including canopy cover, shrub cover, ground cover, logs, fallen branches and litter. Feed primarily on profusely flowering eucalypts and a variety of other species including melaleucas and mistletoes. On the western slopes and tablelands *Eucalyptus albens* and *E. melliodora* are particularly important food sources for pollen and nectar respectively. Mostly nests in small (opening approx. 3cm) hollows in living, smooth-barked eucalypts, especially *Eucalyptus viminalis*, *E. blakelyi* and *E. dealbata*. Most breeding records are from the western slopes.	Low	Marginal habitat on site. Only one record within locality. **Not recorded during site assessment.**
11.	*Grantiella picta* Painted Honeyeater	V,P	V	-	PMST	The species is nomadic, occurring in low densities across most of NSW. Highest concentrations and almost all breeding occur on inland slopes of the Great Dividing Range. Habitat for the species includes Boree, Brigalow and Box Gum woodlands and Box-Ironbark forests.	Low	Marginal habitat on site. No records within the locality. No mistletoes **Not recorded during site assessment.**
12.	*Haematopus longirostris* Pied Oystercatcher	E	-	5	BioNet	In NSW the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. Favours intertidal flats of inlets and bays, open beaches and sandbanks.	Nil	No suitable habitat on site. Records within locality. **Not recorded during site assessment.**
13.	*Hieraaetus morphnoides* Little Eagle	V,P		1	BioNet	Occurs throughout NSW except most densely forested parts of the Dividing Range escarpment. Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring.	**Moderate**	Marginal habitat on site. No recorded during site assessment **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
14.	*Hirundapus caudacutus* White-throated Needletail	P	V,C,J,K	P	PMST	Widespread in eastern and south-eastern Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.	**Low-Moderate**	Suitable habitat present for foraging. No records within the locality. **Not recorded during site assessment.**
15.	Lathamus discolor Swift Parrot	E1, P,3	CE	2, P	BioNet, PMST	A migratory species that travels to the mainland from March to October, the species breeds in Tasmania from September to January. Principal over-winter habitat is box-ironbark communities on the inland slopes and plains. *Eucalyptus robusta*, *Corymbia maculata* and *C. gummifera* dominated coastal forests are also important habitat.	**Low-Moderate**	Potential marginal foraging habitat only on site. Only 2 records within the locality. **Not recorded during site assessment.**
16.	*Numenius madagascariensis* Eastern Curlew		CE	P	PMST	The eastern curlew is Australia's largest shorebird and a long-haul flyer. It is easily recognisable, with its long, down-curved bill. The species takes an annual migratory flight to Russia and northeastern China to breed, arriving back home to Australia in August.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
17.	*Petroica phoenicea* Flame Robin	V	-	1	BioNet	In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes.Prefers clearings or areas with open understoreys.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
18.	*Polytelis swainsonii* Superb Parrot	V	V	P	PMST	Slim medium-sized parrot (37 to 42 cm) with a long narrow tail and pointed backswept wings, the eastern subspecies is restricted to areas around the Murray River in South Australia, Victoria and NSW. The species nests within River Red Gum forests along the Murray, Wakool and lower Murrumbidgee Rivers. Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands	Low	Marginal habitat on site. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
19.	*Pomatostomus temporalis temporalis* Grey-crowned Babbler (eastern subspecies)	V,P		5	BioNet	Fairly large brown babbler with distinctive white/grey crown and brow. Live in family groups of up to 15 birds. Inhabits Box-Gum woodlands on slopes, and Box-Cypress pine and Open-Box woodlands when on Alluvial plains. Distribution along most of the eastern side of Australia, particularly the western slopes of the Great Dividing Range. Breeding occurs between July and February. Several conspicuous dome-shaped nests are built and maintained in shrubs, sapling eucalypts or lower branches of larger eucalypts. Territories are usually around 10ha, but can be up to 50ha.	**Low-Moderate**	Broadly suitable habitat on site. Records within locality. **Not recorded during site assessment.**
20.	*Rostratula australis* Australian Painted Snipe	E	E	P	PMST	Normally found in permanent or ephemeral shallow inland wetlands, either freshwater or brackish. The species nests on the ground amongst tall reed-like vegetation near water. Habitat for the species includes the fringes of swamps, dams and nearby marshy areas with cover of grasses, lignum, low scrub or open timber.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
21.	*Stagonopleura guttata* Diamond Firetail	V,P		1	BioNet	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (Eucalyptus pauciflora) Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Groups separate into small colonies to breed, between August and January.	**Low-Moderate**	No suitable habitat on site. **Not recorded during site assessment.**
22.	*Tyto novaehollandiae* Masked Owl	V,P	-	2	BioNet	Occurs across NSW except NW corner. Most common on the coast. Inhabits dry eucalypt woodlands from sea level to 1100 m. Roosts and breeds in large (>40cm) hollows and sometime caves in moist eucalypt forested gullies. Hunts along the edges of forests and roadsides. Home range between 500 ha and 1000 ha. Prey mostly terrestrial mammals but arboreal species may also be taken.	Low	Marginal habitat on site. Only two records within locality. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
Mammals								
1.	*Chalinolobus dwyeri* Large-eared Pied Bat	V,P	V	1, P	BioNet, PMST	The species occurs from the coast to the western slopes of the divide. The largest numbers of records are from sandstone escarpment country in the Sydney Basin and Hunter Valley. The species roosts in caves and mines and most commonly recorded from dry sclerophyll forests and woodlands. In southern Sydney appears to be largely restricted to the interface between sandstone escarpments and fertile valleys.	Low	Suitable foraging habitat on site no breeding habitat present. Only one record within locality. **Not recorded during site assessment.**
2.	*Dasyurus maculatus maculatus* Spotted Tailed Quoll (SE mainland population)	V	E	3	PMST	Found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania the species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline	Low	Marginal foraging habitat on site. Record within locality. **Not recorded during site assessment.**
3.	*Miniopterus australis* Little Bent-winged Bat	V,P	-	1	BioNet	The species occurs from Cape York to Sydney. Inhabits rainforests, wet and dry sclerophyll forests, paperbark swamps and vine thickets. Only one maternity cave known in NSW, shared with Eastern Bentwing-bats at Willi Willi, near Kempsey. Outside breeding season roosts in caves, tunnels and mines and has been recorded in a tree hollow on one occasion. Forages for insects beneath the canopy of well-timbered habitats.	Low	Marginal foraging habitat on site. Only one record within locality. **Not recorded during site assessment.**
4.	*Miniopterus orianae oceanensis* Large Bent-winged Bat	V,P	-	1	BioNet, Surveys	Occurs along the east and north-west coasts of Australia. Primary roosting habitat comprises caves, but they also use derelict mines, storm water tunnels, buildings and other man-made structures. Breeding or roosting colonies can number 100-150,000 individuals. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves.	**Present**	Foraging habitat only no roosting habitat. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
5.	*Myotis macropus* Southern Myotis	V	-	-	Surveys	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	**Present**	Foraging and roosting habitat present onsite. **Not recorded during site assessment.**
6.	*Nyctophilus corbeni* Corben's Long-eared Bat	V	V	P	PMST	Inhabits a variety of vegetation types, including mallee, Bulloke Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	**Moderate**	Suitable foraging and roosting habitat on site. Record within locality. **Not recorded during site assessment.**
7.	*Petauroides volans* Greater Glider		V	P	PMST	The species occurs in eucalypt forests and woodlands along the east coast of Australia from north east Queensland to the Central Highlands of Victoria. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Occupy a relatively small home range with an average size of 1 to 3 ha .	Nil	No suitable habitat on site. **Not recorded during site assessment.**
8.	*Petaurus norfolcensis* Squirrel Glider	V,P		1	BioNet	The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. 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 midstorey.	Low	Marginal habitat on site. Records within the locality. **Not recorded during site assessment.**
9.	*Petrogale penicillata* Brush-tailed Rock-wallaby	E1, P	V	P	PMST	Occurring from Shoalhaven to the Queensland border the species is now mostly extinct west of the Great Dividing Range, except in the Warrumbungles and Mt Kaputar. The species inhabits rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north.	Nil	No suitable habitat on site. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
10.	*Phascolarctos cinereus* Koala	V,P	V	1, P	BioNet, PMST	Fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	Low	Low suitability habitat on site. Only one record within the locality. **Not recorded during site assessment.**
11.	*Pteropus poliocephalus* Grey-headed Flying-fox	V	V	10	BioNet PMST	Generally this species is found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. Inhabit subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	**Present**	Suitable foraging habitat onsite no roosting colonies observed.
12.	*Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat	V,P	-	2	Surveys	Migrates from tropics to SE Aust in summer. Forages across a range of habitats including those with and without trees, from wet and dry sclerophyll forest, open woodland, Acacia shrubland, mallee, grasslands and desert. Seasonal movements are unknown.	**Present**	Foraging habitat and roosting habitat present. **Not recorded during site assessment.**
13.	*Scoteanax rueppellii* Greater Broad-nosed Bat	V	-	-	Surveys	In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	**Present**	Foraging habitat and roosting habitat present. **Not recorded during site assessment.**
14.	*Vespadelus troughtoni* Eastern Cave Bat	V,P	-	1	BioNet	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest.	**Present**	Foraging Habitat present no Breeding habitat **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
Reptiles								
1.	*Aprasia parapulchella* Pink-tailed Worm-lizard	V	V	P	PMST	Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Commonly found beneath small, partially-embedded rocks and appear to spend considerable time in burrows below these rocks.	Low	Broadly suitable habitat on site. No record within the locality. **Not recorded during site assessment.**
2.	*Delma impar* Striped Legless Lizard	V	V	P	PMST	The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Also occurs in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, spear-grasses *Austrostipa* spp. and poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp.	Low	Broadly suitable habitat on site. No record within the locality. **Not recorded during site assessment.**
Amphibians								
1.	*Heleioporus australiacus* Giant Burrowing Frog	V	V	P	PMST	The species occurs along the coast and eastern slopes of the Great Dividing Range south from Wollemi National Park, appearing to exist as 2 populations between Jervis Bay and Eden. Habitat for the species includes sandy soils supporting heath, woodland or open forest. The species breeds in ephemeral to intermittent streams with persistent pools. Only infrequently moves to breeding sites, most commonly found on ridges away from creeks, several hundred metres from water.	Nil	No suitable habitat on site. **Not recorded during site assessment.**

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
2.	*Litoria booroolongensis* Booroolong Frog	E	E	P	PMST	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Breeding occurs in spring and early summer.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
Migratory Terrestrial Species								
1.	*Hirundapus caudacutus* White-throated Needletail		M, V	P	PMST	Widespread in eastern and south-eastern Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.	**Low-Moderate**	Foraging habitat present over the Subject Site. **Not recorded during site assessment.**
2.	*Monarcha melanopsis* Black-faced Monarch		M	P	PMST	The Black-faced Monarch is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
3.	*Motacilla flava* Yellow Wagtail		M	P	PMST	Open country near swamps, saltmarshes, sewage ponds, grassed surrounds to airfields, bare ground; occasionally on drier inland plains.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
4.	*Myiagra cyanoleuca* Satin Flycatcher		M	P	PMST	Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
5.	*Rhipidura rufifrons* Rufous Fantail		M	P	PMST	The Rufous Fantail is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas.	Nil	No suitable habitat on site. **Not recorded during site assessment.**
Threatened Ecological Communities								

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
1.	Central Hunter Valley Eucalypt Forest and Woodland	E	CE	K	PMST	The Central Hunter Valley eucalypt forest and woodland ecological community is an open forest or woodland—typically with a tree canopy dominated by eucalypt species; an open to sparse mid-layer of shrubs; and a ground layer of native grasses, forbs and small shrubs. The composition of a particular area (patch) of the ecological community is influenced by its size, recent rainfall, drought conditions and by its disturbance history (e.g. clearing, grazing and fire).	Absent	-
2.	The Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland ecological community		CE	P	PMST	The ecological community generally occurs on flat to low slopes, of no more than 5% (or less than 1 degree) inclination. As slope increases, grassy woodlands dominated by trees such as Acacia pendula (weeping myall), Eucalyptus coolabah (coolibah), E. populnea (poplar box) or E. melliodora (yellow box) occur. The ground layer component of these woodlands may be similar to the grasslands but the soils are not generally the same cracking clays as on the plains.	Absent	-
3.	Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion	E	CE	K	PMST	Currently known from parts of the Muswellbrook and Singleton Local Government Areas, but may occur elsewhere in the bioregion. This community is associated with heavy clay soils on depositional landforms in the south-western part of the Hunter River valley floor.	Absent	-
4.	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	CE	P	PMST	Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions.	Absent	-

	Species	Status*		Records**	Source***	Habitat	LoO	Summary
		BC	EPBC					
5.	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions	E	CE	P	PMST	The Hawkesbury River notionally marks the southern limit of Lowland Rainforest in the NSW North Coast and Sydney Basin bioregions. South of the Sydney metropolitan area, Lowland Rainforest is replaced by Illawarra Subtropical Rainforest of the Sydney Basin Bioregion, which is listed as an endangered ecological community. Milton Ulladulla Subtropical Rainforest is also a related rainforest endangered ecological community that occurs still further south in the South East Corner Bioregion.	Absent	-
6.	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	E4B	CE	K	PMST, BioNet	Box-Gum Woodland is found from the Queensland border in the north, 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	Present	**Vegetation Zone 1** constitutes EPBC Act listed *White-box Yellow-box Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC. **Vegetation Zone 1** and **Vegetation Zone 2** constitute BC Act listed *White-box Yellow-box Blakely's Red Gum Grassy Woodland and Derived Native Grassland* CEEC. See **Section 4.4**

APPENDIX C – FLORA AND FAUNA SPECIES LIST

Table C1 - Flora Species List

No.	Family	Scientific Name	Common Name	Form	Q01		Q02		Q03		Q04		Q05		Q06		Q07		Q08	
					Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab
1.	**Aizoaceae**	*Galenia pubescens*	Galenia	HTW	-	-	-	-	-	-	-	-	0.1	15	10	500	-	-	0.2	30
2.	**Aizoaceae**	*Zaleya galericulata*	Hogweed	FG	0.1	20	0.1	10	0.1	10	0.1	5	0.1	5	-	-	0.1	30	-	-
3.	**Amaranthaceae**	*Alternanthera pungens*	Khaki Weed	HTW	0.1	10	-	-	-	-	-	-	0.2	50	-	-	-	-	-	-
4.	**Amaranthaceae**	*Amaranthus retroflexus*	Redroot Amaranth	Exotic	0.2	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	**Amaranthaceae**	*Gomphrena celosioides*	Gomphrena Weed	Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	**Apiaceae**	*Hydrocotyle laxiflora*	Stinking Pennywort	FG	0.1	10	-	-	-	-	-	-	-	-	-	-	0.2	20	-	-
7.	**Apocynaceae**	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	Exotic	0.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	**Asteraceae**	*Bidens pilosa*	Cobbler's Pegs	Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.	**Asteraceae**	*Calotis lappulacea*	Yellow Burr-daisy	FG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	**Asteraceae**	*Chrysocephalum apiculatum*	Common Everlasting	FG	-	-	-	-	-	-	-	-	-	-	-	-	0.1	10	-	-
11.	**Asteraceae**	*Cirsium vulgare*	Spear Thistle	Exotic	0.1	2	0.1	2	-	-	0.2	50	0.1	3	-	-	0.2	3	0.1	4
12.	**Asteraceae**	*Conyza bonariensis*	Flaxleaf Fleabane	Exotic	-	-	0.5	50	1	30	5	100	0.2	20	0.2	20	4	40	0.2	30
13.	**Asteraceae**	*Euchiton japonicus*		FG	-	-	0.1	10	0.1	30	0.1	20	-	-	-	-	-	-	-	-
14.	**Asteraceae**	*Hypochaeris radicata*	Catsear	Exotic	-	-	0.1	5	-	-	-	-	-	-	-	-	-	-	-	-
15.	**Asteraceae**	*Senecio madagascariensis*	Fireweed	Exotic	0.2	20	0.5	30	0.5	15	0.1	5	0.1	3	-	-	0.2	5	0.1	10
16.	**Asteraceae**	*Silybum marianum*	Variegated Thistle	Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17.	**Asteraceae**	*Soliva sessilis*	Bindyi	Exotic	-	-	-	-	-	-	-	-	-	-	0.1	40	-	-	-	-
18.	**Asteraceae**	*Taraxacum officinale*	Dandelion	Exotic	-	-	0.2	7	0.1	5	0.1	3	-	-	0.1	5	-	-	-	-

No.	Family	Scientific Name	Common Name	Form	Q01		Q02		Q03		Q04		Q05		Q06		Q07		Q08	
					Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab
19.	**Asteraceae**	*Vittadinia cuneata*		FG	0.1	20	0.1	30	0.1	10	0.2	20	-	-	-	-	0.3	30	0.1	5
20.	**Asteraceae**	*Vittadinia muelleri*		FG	-	-	0.2	40	-	-	-	-	-	-	-	-	-	-	-	-
21.	**Asteraceae**	*Xanthium strumarium*			-	-	-	-	-	-	-	-	0.1	5	-	-	-	-	-	-
22.	**Boraginaceae**	*Echium plantagineum*	Patterson's Curse	Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23.	**Brassicaceae**	*Lepidium africanum*	Common Peppercress	Exotic	0.2	10	-	-	-	-	0.1	5	0.1	3	2	50	-	-	0.1	10
24.	**Brassicaceae**	*Rapistrum rugosum*	Turnip Weed	Exotic	0.1	5	0.1	30	0.1	20	-	-	-	-	-	-	0.3	50	-	-
25.	**Cactaceae**	*Opuntia stricta*	Common Prickly Pear	Exotic	-	-	-	-	0.2	2	-	-	-	-	-	-	1	2	-	-
26.	**Campanulaceae**	*Wahlenbergia communis*	Tufted Bluebell	FG	0.1	10	-	-	-	-	-	-	-	-	-	-	-	-	0.1	5
27.	**Caryophyllaceae**	*Stellaria media*	Common Chickweed	Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28.	**Chenopodiaceae**	*Einadia nutans*	Climbing Saltbush	FG	0.5	100	-	-	0.1	5	0.2	50	-	-	0.1	20	0.1	20	-	-
29.	**Chenopodiaceae**	*Enchylaena tomentosa*	Ruby Saltbush	SG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30.	**Chenopodiaceae**	*Maireana microphylla*	Small-leaf Bluebush	SG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	2
31.	**Chenopodiaceae**	*Salsola australis*		SG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	2
32.	**Chenopodiaceae**	*Sclerolaena muricata*	Black Rolypoly	SG	-	-	0.2	5	-	-	-	-	-	-	0.1	2	-	-	-	-
33.	**Chenopodiaceae**	*Sclerolaena muricata var. villosa*	Black Rolypoly	SG	-	-	-	-	0.1	3	-	-	-	-	-	-	0.5	3	0.2	3
34.	**Convolvulaceae**	*Convolvulus angustissimus*		OG	-	-	-	-	0.1	5	0.2	50	-	-	-	-	-	-	-	-
35.	**Convolvulaceae**	*Dichondra repens*	Kidney Weed	FG	0.1	20	0.1	40	0.1	20	-	-	0.1	100	-	-	-	-	-	-
36.	**Cyperaceae**	*Cyperus gracilis*	Slender Flat-sedge	GG	-	-	-	-	-	-	-	-	0.2	100	-	-	-	-	-	-

No.	Family	Scientific Name	Common Name	Form	Q01		Q02		Q03		Q04		Q05		Q06		Q07		Q08	
					Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab
37.	**Cyperaceae**	*Fimbristylis dichotoma*	Common Fringe-sedge	GG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	30
38.	**Euphorbiaceae**	*Euphorbia drummondii*	Caustic Weed	FG	0.1	10	0.1	15	-	-	-	-	-	-	-	-	-	-	-	-
39.	**Fabaceae (Faboideae)**	*Desmodium varians*	Slender Tick-trefoil	OG	-	-	0.2	100	2	100	-	-	0.1	20	-	-	-	-	-	-
40.	**Fabaceae (Faboideae)**	*Glycine tabacina*	Variable Glycine	OG	1	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41.	**Fabaceae (Faboideae)**	*Medicago lupulina*	Black Medic	Exotic	0.1	30	0.1	20	0.1	10	-	-	0.1	20	0.1	20	-	-	-	-
42.	**Fabaceae (Faboideae)**	*Trifolium repens*	White Clover	Exotic	0.1	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43.	**Geraniaceae**	*Geranium solanderi*	Native Geranium	FG	0.1	15	0.1	50	1	50	0.2	10	-	-	-	-	-	-	-	-
44.	**Lamiaceae**	*Lamium amplexicaule*	Dead Nettle	Exotic	-	-	0.1	100	0.1	40	0.1	5	-	-	0.1	3	-	-	-	-
45.	**Lamiaceae**	*Marrubium vulgare*	White Horehound	Exotic	-	-	-	-	-	-	-	-	0.2	20	-	-	-	-	-	-
46.	**Lamiaceae**	*Salvia reflexa*	Mintweed	Exotic	0.1	5	2	40	0.2	20	-	-	0.1	10	0.1	5	80	1000	-	-
47.	**Malvaceae**	*Malva parviflora*	Small-flowered Mallow	Exotic	0.2	40	0.1	10	-	-	0.5	70	0.5	500	0.1	30	-	-	-	-
48.	**Malvaceae**	*Pavonia hastata*		Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49.	**Malvaceae**	*Sida rhombifolia*	Paddy's Lucerne	Exotic	15	200	-	-	0.1	3	-	-	5	50	0.1	5	-	-	-	-
50.	**Malvaceae**	*Sida spinosa*		Exotic	0.5	20	0.5	50	2	50	3	50	0.5	50	0.5	20	0.5	20	0.2	10
51.	**Myrtaceae**	*Eucalyptus melliodora*	Yellow Box	TG	20	2	-	-	-	-	-	-	-	-	15	1	-	-	-	-
52.	**Myrtaceae**	*Eucalyptus moluccana*	Grey Box	TG	10	2	-	-	-	-	-	-	20	1	-	-	-	-	-	-
53.	**Oleaceae**	*Notelaea microcarpa*	Native Olive	TG	0.5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
54.	**Oxalidaceae**	*Oxalis bowiei*		Exotic	-	-	-	-	-	-	0.2	20	2	40	-	-	-	-	-	-

No.	Family	Scientific Name	Common Name	Form	Q01		Q02		Q03		Q04		Q05		Q06		Q07		Q08	
					Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab
55.	**Oxalidaceae**	*Oxalis perennans*		FG	0.2	100	0.1	30	0.1	20	2	200	0.5	500	1	60	0.5	60	-	-
56.	**Plantaginaceae**	*Plantago lanceolata*	Lamb's Tongues	Exotic	-	-	-	-	-	-	0.1	20	0.1	30	-	-	-	-	-	-
57.	**Poaceae**	*Aristida ramosa*	Purple Wiregrass	GG	20	1000	-	-	-	-	60	1000	-	-	5	100	-	-	5	80
58.	**Poaceae**	*Austrostipa aristiglumis*	Plains Grass	GG	15	100	70	1000	65	1000	30	1000	40	1000	-	-	5	30	-	-
59.	**Poaceae**	*Austrostipa scabra*	Speargrass	GG	5	200	-	-	-	-	-	-	-	-	3	50	-	-	-	-
60.	**Poaceae**	*Austrostipa verticillata*	Slender Bamboo Grass	GG	7	100	-	-	-	-	-	-	10	100	20	700	-	-	-	-
61.	**Poaceae**	*Bothriochloa macra*	Red-legged Grass	GG	0.1	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62.	**Poaceae**	*Chloris truncata*	Windmill Grass	GG	-	-	-	-	5	200	-	-	0.5	10	1	30	-	-	0.2	2
63.	**Poaceae**	*Cynodon dactylon*	Common Couch	GG	20	1000	-	-	-	-	-	-	15	500	45	1000	-	-	50	1000
64.	**Poaceae**	*Dichanthium sericeum*	Queensland Bluegrass	GG	3	100	5	100	10	1000	-	-	-	-	1	50	1	30	10	100
65.	**Poaceae**	*Digitaria diffusa*	Open Summer-grass	GG	30	1000	15	500	10	1000	-	-	5	100	10	100	3	40	5	200
66.	**Poaceae**	*Digitaria divaricatissima*	Umbrella Grass	GG	-	-	-	-	-	-	-	-	-	-	0.5	20	-	-	-	-
67.	**Poaceae**	*Echinochloa esculenta*	Japanese Millet	Exotic	-	-	0.1	100	-	-	-	-	-	-	-	-	-	-	-	-
68.	**Poaceae**	*Eleusine tristachya*	Goose Grass	Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69.	**Poaceae**	*Entolasia marginata*	Bordered Panic	GG	2	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70.	**Poaceae**	*Eragrostis brownii*	Brown's Lovegrass	GG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	10
71.	**Poaceae**	*Eragrostis leptostachya*	Paddock Lovegrass	GG	-	-	-	-	-	-	-	-	-	-	0.5	30	-	-	5	100

No.	Family	Scientific Name	Common Name	Form	Q01		Q02		Q03		Q04		Q05		Q06		Q07		Q08	
					Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab	Co	Ab
72.	**Poaceae**	*Panicum queenslandicum*	Yadbila Grass	GG	-	-	-	-	1	40	-	-	-	-	-	-	-	-	-	-
73.	**Poaceae**	*Panicum simile*	Two-colour Panic	GG	0.2	20	-	-	-	-	-	-	5	100	-	-	-	-	5	80
74.	**Poaceae**	*Paspalum dilatatum*	Paspalum		-	-	-	-	-	-	5	100	10	100	-	-	-	-	-	-
75.	**Poaceae**	*Rytidosperma bipartitum*	Wallaby Grass	GG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	20
76.	**Poaceae**	*Sporobolus caroli*	Fairy Grass	GG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77.	**Poaceae**	*Sporobolus creber*	Slender Rat's Tail Grass	GG	2	50	-	-	-	-	-	-	2	50	-	-	-	-	5	100
78.	**Polygonaceae**	*Polygonum aviculare*	Wireweed	Exotic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79.	**Polygonaceae**	*Rumex brownii*	Swamp Dock	FG	-	-	-	-	-	-	-	-	0.1	5	0.1	5	-	-	-	-
80.	**Portulacaceae**	*Portulaca oleracea*	Pigweed	FG	-	-	-	-	-	-	-	-	-	-	0.1	20	0.1	30	-	-
81.	**Primulaceae**	*Lysimachia arvensis*	Scarlet Pimpernel	Exotic	-	-	-	-	-	-	0.1	5	-	-	-	-	0.1	30	-	-
82.	**Pteridaceae**	*Cheilanthes sieberi*	Rock Fern	EG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	5
83.	**Rubiaceae**	*Galium gaudichaudii*	Rough Bedstraw	FG	0.1	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84.	**Solanaceae**	*Lycium ferocissimum*	African Boxthorn		5	10	-	-	-	-	-	-	-	-	5	3	-	-	-	-
85.	**Solanaceae**	*Solanum esuriale*	Quena	FG	0.1	10	0.1	30	0.1	10	0.1	5	-	-	-	-	0.1	10	-	-
86.	**Solanaceae**	*Solanum nigrum*	Black-berry Nightshade	Exotic	-	-	-	-	-	-	-	-	-	-	0.1	5	-	-	-	-
87.	**Verbenaceae**	*Verbena bonariensis*	Purpletop	Exotic	0.1	2	0.2	4	-	-	1	30	-	-	0.1	5	-	-	-	-
88.	**Zygophyllaceae**	*Tribulus terrestris*	Cat-head	Exotic	0.1	10	0.1	30	0.1	20	-	-	-	-	-	-	-	-	-	-

Table C2 Fauna Species List

No.	Scientific Name	Common Name	Status		Observation Type*
			BC	EPBC	
Amphibians					
1.	*Limnodynastes peronii*	Brown-striped Frog	P	-	H
2.	*Limnodynastes tasmaniensis*	Spotted Grass Frog	P	-	H
3.	*Litoria caerulea*	Green Tree Frog	P	-	O
4.	*Litoria latopalmata*	Broad-palmed Frog	P	-	O
Birds					
1.	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	P	-	O
2.	*Acridotheres tristis*	Common Myna	Invasive	-	O
3.	*Alisterus scapularis*	Australian King-Parrot	P	-	H
4.	*Anthochaera carunculata*	Red Wattlebird	P	-	H
5.	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	P	-	H
6.	*Corvus coronoides*	Australian Raven	P	-	O
7.	*Cracticus nigrogularis*	Pied Butcherbird	P	-	H
8.	*Dacelo novaeguineae*	Laughing Kookaburra	P	-	H
9.	*Eolophus roseicapilla*	Galah	P	-	O
10.	*Falco cenchroides cenchroides*	Nankeen Kestrel	P	-	O
11.	*Grallina cyanoleuca*	Magpie-lark	P	-	O
12.	*Gymnorhina tibicen*	Australian Magpie	P	-	O
13.	*Manorina melanocephala*	Noisy Miner	P	-	O
14.	*Pardalotus striatus*	Striated Pardalote	P	-	O
15.	*Platycercus eximius*	Eastern Rosella	P	-	O
16.	*Psephotus haematonotus*	Red-rumped Parrot	P	-	O
17.	*Rhipidura leucophrys*	Willie Wagtail	P	-	O
18.	*Sturnus vulgaris*	Common Starling	Invasive	-	O
19.	*Trichoglossus haematodus*	Rainbow Lorikeet	P	-	H
20.	*Vanellus miles*	Masked Lapwing	P	-	H
Mammals					
1.	*Austronomus australis*	White-striped Freetail-bat	P	-	R, C
2.	*Chalinolobus gouldii*	Gould's Wattled Bat	P	-	R, C
3.	*Chalinolobus morio*	Chocolate Wattled Bat	P	-	R, C

No.	Scientific Name	Common Name	Status		Observation Type*
			BC	EPBC	
4.	*Microchiroptera suborder*	Unidentified Microbat	0	-	O
5.	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P	-	R, Pr
6.	*Mormopterus planiceps*	Little Mastiff-bat	P	-	R, Pr
7.	*Mus musculus*	House Mouse	0	-	O
8.	*Myotis macropus*	Southern Myotis	V,P	-	R, C
9.	*Nyctophilus sp.*	long-eared bat	P	-	R, C
10.	*Ozimops ridei*	Eastern Free-tailed Bat	P	-	R, C
11.	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	O
12.	*Rattus rattus*	Black Rat	Invasive	-	O
13.	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P	-	R, C
14.	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P	-	R, Pr
15.	*Scotorepens balstoni*	Inland Broad-nosed Bat	P	-	R, Pr
16.	*Trichosurus vulpecula*	Common Brushtail Possum	P	-	O
17.	*Vespadelus darlingtoni*	Large Forest Bat	P	-	R, Pr
18.	*Vespadelus pumilus*	Eastern Forest Bat	P	-	R, C
19.	*Vespadelus regulus*	Southern Forest Bat	P	-	R, Pr
20.	*Vespadelus troughtoni*	Eastern Cave Bat	V,P	-	R, Pr
21.	*Vespadelus vulturnus*	Little Forest Bat	P	-	R, C
22.	*Vulpes vulpes*	Fox	Invasive	-	O

*Observation Type: O (Visual Observation), H (Heard whilst on site), E (Evidence recorded inc scats, tracks or markings), R (Recorded through the use of call detectors [level of confidence C: Confident, Pr: Probable, Po: Possible]).

APPENDIX D – THREATENED ECOLOGICAL COMMUNITY DETERMINATIONS

Appendix D-1: Threatened Ecological Community Determination – EPBC Act *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* CEEC

Vegetation Zone 1 – Patch 1/1 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition)

Table D-1-1: Assessment of Conservation Status - *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* CEEC (EPBC Act). – Vegetation Zone 1: PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Moderate Condition)

Decision Key Criteria	Answer	Justification
1. Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum (or Western Grey Box or Coastal Grey Box in the Nandewar Bioregion)? (i). ***Yes*** – Go to 2. (ii). *No* – Not the listed ecological community.	Yes	The vegetation within this zone was characterised as an open grassy woodland, dominated by a sparse canopy of *Eucalyptus 'albemol'* (*Eucalyptus albens* x *moluccana*) and *Eucalyptus melliodora* (Yellow Box).
2. Does the patch[1] have a predominantly native understorey[2]? (i). ***Yes –*** Go to 3. (ii) *No* - Not the listed ecological community.	Yes	The groundcover within this community is diverse, dominated by native grasses including: *Austrostipa scabra* (Speargrass), *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), and a mix of native forbs (*Cheilanthes sieberi* [Rock

Decision Key Criteria	Answer	Justification
		Fern], *Wahlenbergia communis* [Tufted Bluebell], *Geranium solanderi [*Native Geranium], *Einadia nutans* [Climbing Saltbush], and *Oxalis perennans*)
3. Is the patch 0.1 hectare or greater in size? (i). ***Yes –*** Go to 4. (ii) *No* - Not the listed ecological community.	Yes	The Patch is 4.26 ha in size.
4. There are 12 or more native understorey species present (excluding grasses). There must be at least one (1) Important species*. (i). *Yes* – The listed ecological community. (ii) ***No –*** Go to 5.	Yes	The vegetation comprises a diverse mix of native understorey species including four Important Species, *Desmodium varians* (Slender Tick-trefoil), *Chrysocephalum apiculatum* (Common Everlasting), *Glycine tabacina* (Variable Glycine) and *Calotis lappulacea* (Yellow Burr-daisy).
5. Is the patch 2 hectares or greater in size? (i). ***Yes –*** Go to 6. (ii) *No* – Not the listed ecological community.	Yes	The Patch is 4.26 ha in size.
6. Does the patch have an average of 20 or more mature trees per hectare[3], or is there natural regeneration of the dominant overstorey eucalypts[4]? (i). *Yes* – The listed ecological community. (ii) *No* – Not the listed ecological community.	Yes	The average number of mature trees per hectare (from three one hectare plots) is 21.4 trees/ha. Regeneration of dominant eucalypt species was also identified within the patch (see **Photo D-1-1**).
Determination	The vegetation within Vegetation Zone meets the definition of the Critically Endangered Ecological Community *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* as listed under the Commonwealth's Environment Protection Biodiversity Conservation Act 1999.	

Key notes pertaining to the decision criteria in the above table.
[1] Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size, it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
An area that contains five or more trees in which no tree is greater than 75 meters from another tree, or
The area over which the understorey is predominantly native.
Patches must be assessed at a scale of 0.1 hectares or greater.
[2] A predominantly native ground layer is one where at least 50% of the perennial vegetation cover in the ground layer is made up of native species. The best time of year to determine this is late autumn when the annual species have died back and have not yet started to regrow (at other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily).
[3] Mature trees are trees with a circumference of at least 125cm at 130cm above the ground.
[4] Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15cm circumference at 130cm above the ground.
* Important Species list obtained from www.deh.gov.au/box-gum
Note: For criteria relating to the understorey, apply this flowchart to the 0.1 hectare of your patch that contains the most native species in the ground layer.

Photo D-1-1 Evidence of Canopy Regeneration along site boundary, within the Ecological Community

Vegetation Zone 2 – Patch 1/1 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Derived – Moderate Condition)*

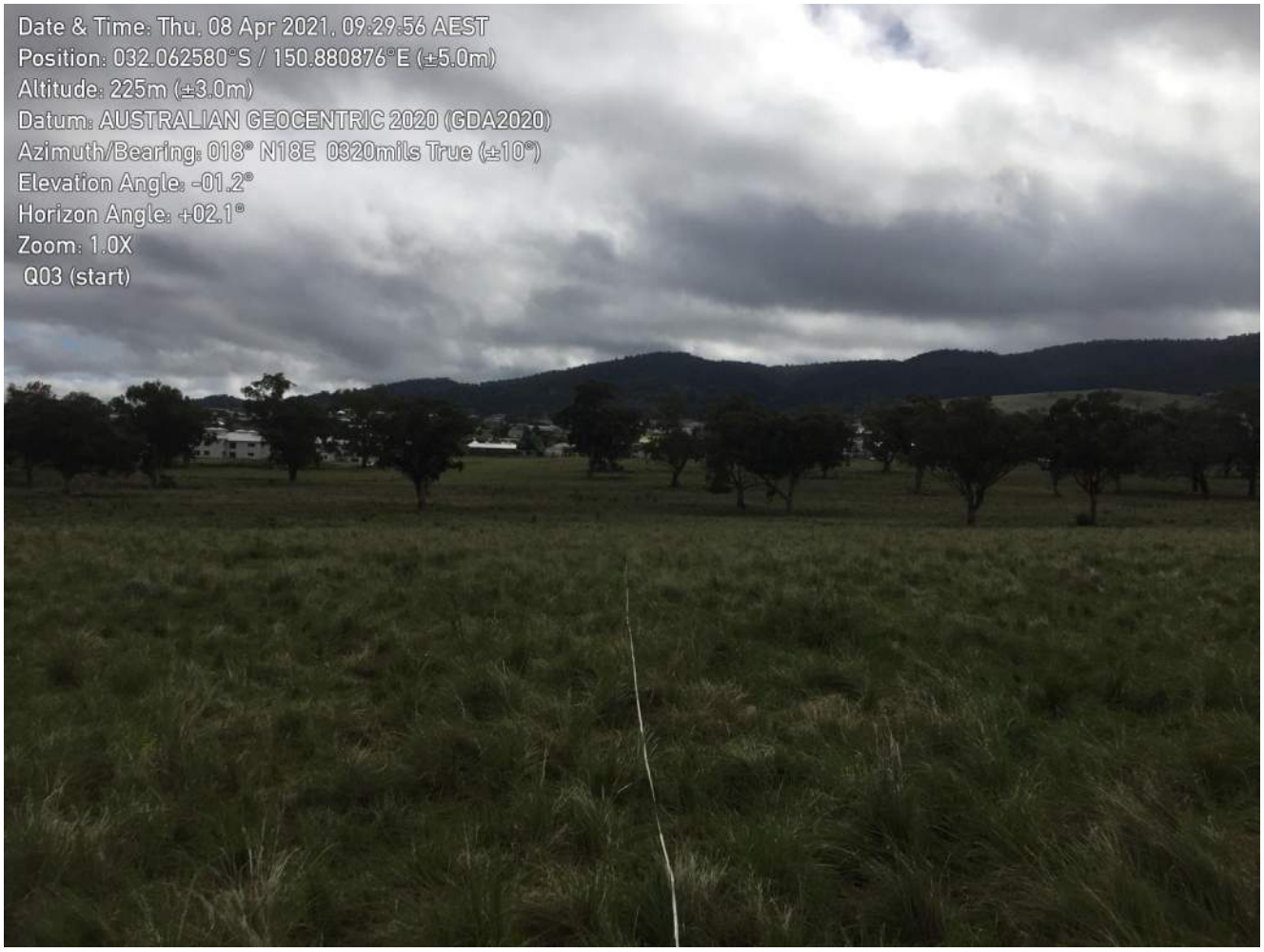

Table D-1-1: Assessment of Conservation Status - *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* CEEC (EPBC Act). – Vegetation Zone 2: PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Moderate Condition)

Decision Key Criteria	Answer	Justification
1. Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum (or Western Grey Box or Coastal Grey Box in the Nandewar Bioregion)? (i). ***Yes*** – Go to 2. (ii). *No* – Not the listed ecological community.	Yes	The vegetation within this zone was characterised as a native grassland, dominated by *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), with a mix of native herbs. Historic aerial images of the vegetation zone indicate the long-term absence of canopy species. However, it is considered likely that this vegetation zone was once characterised by an open woodland community commensurate with that in Vegetation Zone 1, with *Eucalyptus 'albemol'* (*Eucalyptus albens* x *moluccana*) and *Eucalyptus melliodora* (Yellow Box).
2. Does the patch[1] have a predominantly native understorey[2]? (i). ***Yes –*** Go to 3.	Yes	The groundcover within this community is diverse, dominated by native grasses including: *Austrostipa scabra* (Speargrass), *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender

Decision Key Criteria	Answer	Justification
(ii) *No* - Not the listed ecological community.		Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), and a mix of native forbs (*Cheilanthes sieberi* [Rock Fern], *Wahlenbergia communis* [Tufted Bluebell], *Geranium solanderi [*Native Geranium], *Einadia nutans* [Climbing Saltbush], and *Oxalis perennans*)
3. Is the patch 0.1 hectare or greater in size? (i). ***Yes –*** Go to 4. (ii) *No* - Not the listed ecological community.	Yes	The Patch is >47.03 ha in size (with the inclusion of grassland vegetation outside of the Study Area)
4. There are 12 or more native understorey species present (excluding grasses). There must be at least one (1) Important species*. (i). *Yes* – The listed ecological community. (ii) ***No –*** Go to 5.	Yes	The vegetation comprises a diverse mix of native understorey species including two Important Species, *Desmodium varians* (Slender Tick-trefoil) and *Chrysocephalum apiculatum* (Common Everlasting).
5. Is the patch 2 hectares or greater in size? (i). ***Yes –*** Go to 6. (ii) *No* – Not the listed ecological community.	Yes	The Patch is >47.03 ha in size (with the inclusion of grassland vegetation outside of the Study Area)
6. Does the patch have an average of 20 or more mature trees per hectare[3], or is there natural regeneration of the dominant overstorey eucalypts[4]? (i). *Yes* – The listed ecological community. (ii) *No* – Not the listed ecological community.	No	The average number of mature trees per hectare 0 trees/ha. There is no evidence of regeneration of eucalypt canopy within this vegetation zone.
Determination	The vegetation within Vegetation Zone <u>does not meet</u> the definition of the Critically Endangered Ecological Community *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* as listed under the Commonwealth's Environment Protection Biodiversity Conservation Act 1999.	

Key notes pertaining to the decision criteria in the above table.
[1] Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size, it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
An area that contains five or more trees in which no tree is greater than 75 meters from another tree, or
The area over which the understorey is predominantly native.
Patches must be assessed at a scale of 0.1 hectares or greater.
[2] A predominantly native ground layer is one where at least 50% of the perennial vegetation cover in the ground layer is made up of native species. The best time of year to determine this is late autumn when the annual species have died back and have not yet started to regrow (at other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily).
[3] Mature trees are trees with a circumference of at least 125cm at 130cm above the ground.
[4] Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15cm circumference at 130cm above the ground.
* Important Species list obtained from www.deh.gov.au/box-gum
Note: For criteria relating to the understorey, apply this flowchart to the 0.1 hectare of your patch that contains the most native species in the ground layer.

Photo D-1-2 Historic Aerial Imagery of Scone and The Subject Site circa 1953

Vegetation Zone 3 – Patch 1/1 – *PCT 618 – White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (*Derived - Low Condition*)*

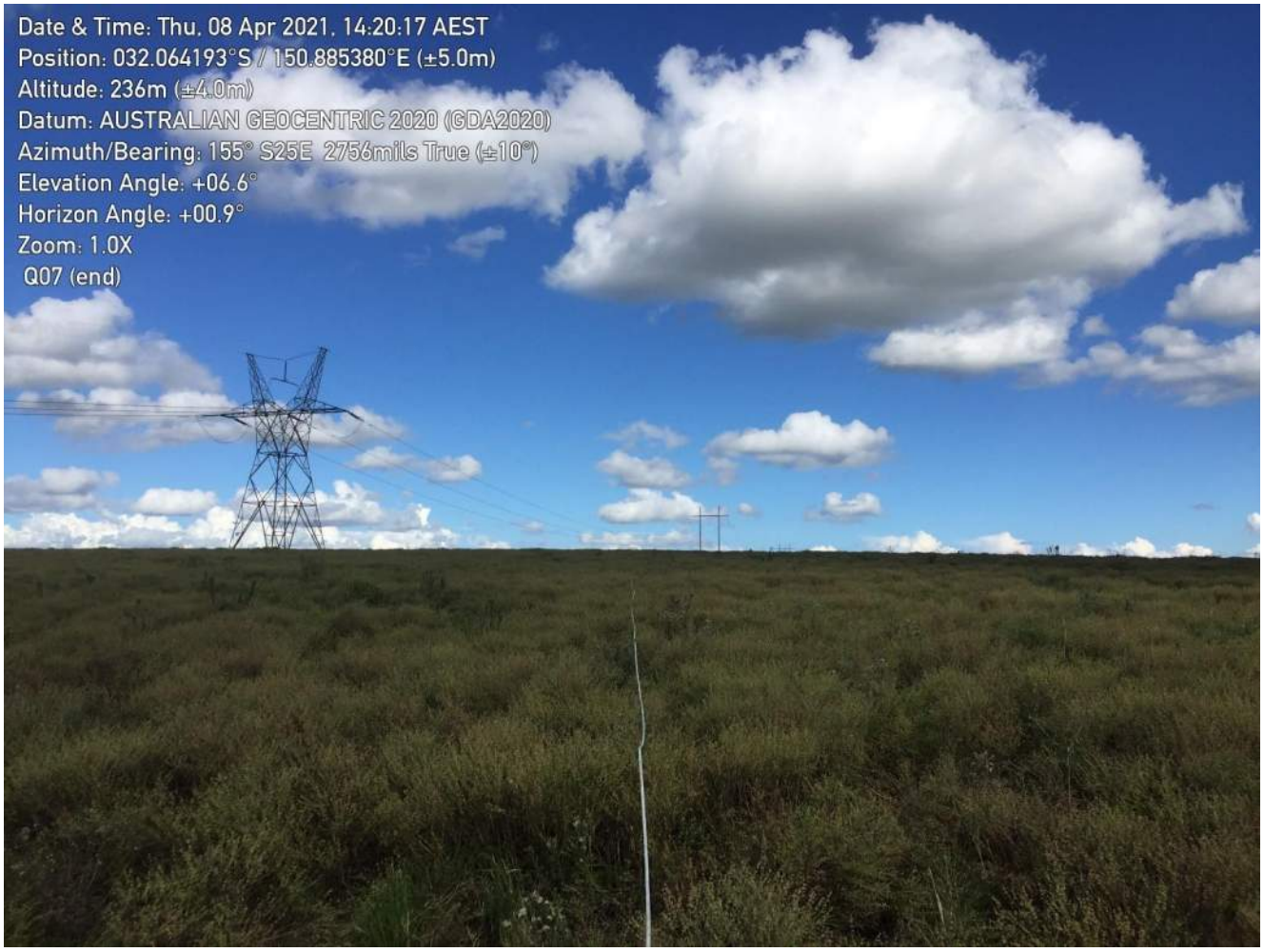

Table D-1-1: Assessment of Conservation Status - *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* CEEC (EPBC Act). – Vegetation Zone 3: PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Low Condition)

Decision Key Criteria	Answer	Justification
1. Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum (or Western Grey Box or Coastal Grey Box in the Nandewar Bioregion)? (i). ***Yes*** – Go to 2. (ii). *No* – Not the listed ecological community.	Yes	The vegetation within this zone was characterised as a native grassland, dominated by *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), with a mix of native herbs. Historic aerial images of the vegetation zone indicate the long-term absence of canopy species. However, it is considered likely that this vegetation zone was once characterised by an open woodland community commensurate with that in Vegetation Zone 1, with *Eucalyptus 'albemol'* (*Eucalyptus albens* x *moluccana*) and *Eucalyptus melliodora* (Yellow Box).
2. Does the patch[1] have a predominantly native understorey[2]? (i). ***Yes –*** Go to 3.	No	The groundcover within this community is dominated by exotic species.

Decision Key Criteria	Answer	Justification
(ii) *No* - Not the listed ecological community.		
3. Is the patch 0.1 hectare or greater in size? (i). ***Yes –*** Go to 4. (ii) *No* - Not the listed ecological community.	NA	NA
4. There are 12 or more native understorey species present (excluding grasses). There must be at least one (1) Important species*. (i). *Yes* – The listed ecological community. (ii) ***No –*** Go to 5.	NA	NA
5. Is the patch 2 hectares or greater in size? (i). ***Yes –*** Go to 6. (ii) *No* – Not the listed ecological community.	NA	NA
6. Does the patch have an average of 20 or more mature trees per hectare[3], or is there natural regeneration of the dominant overstorey eucalypts[4]? (i). *Yes* – The listed ecological community. (ii) *No* – Not the listed ecological community.	NA	NA
Determination	The vegetation within Vegetation Zone does not meet the definition of the Critically Endangered Ecological Community *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* as listed under the Commonwealth's Environment Protection Biodiversity Conservation Act 1999.	

Key notes pertaining to the decision criteria in the above table.
[1] Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size, it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
An area that contains five or more trees in which no tree is greater than 75 meters from another tree, or
The area over which the understorey is predominantly native.
Patches must be assessed at a scale of 0.1 hectares or greater.
[2] A predominantly native ground layer is one where at least 50% of the perennial vegetation cover in the ground layer is made up of native species. The best time of year to determine this is late autumn when the annual species have died back and have not yet started to regrow (at other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily).
[3] Mature trees are trees with a circumference of at least 125cm at 130cm above the ground.
[4] Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15cm circumference at 130cm above the ground.
* Important Species list obtained from www.deh.gov.au/box-gum
Note: For criteria relating to the understorey, apply this flowchart to the 0.1 hectare of your patch that contains the most native species in the ground layer.

Appendix D-2: Threatened Ecological Community Determination – BC Act *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC*

Vegetation Zone 1 – Patch 1/1 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition)

Table D-2-1: Assessment of Conservation *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* (BC Act). – Vegetation Zone 1 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition)

Determination Criteria	Presence	Justification
The vegetation is located within the area defined in the Determination (i.e. within 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)	Yes	The site is located along the boundary of The Sydney Basin IBRA Bioregion(Hunter IBRA Sub-region) and NSW North Coast IBRA Bioregion (Ellerston IBRA Sub-region).
The vegetation is characteristically dominated by one or more of the species *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box), and *E. blakelyi* (Blakely's Red Gum). *Eucalyptus moluccana* may be co-dominant in the Nadewar Bioregion and in the north-western corner of the Sydney Basin Bioregion in the upper Hunter valley. Hybrids or	Yes	The vegetation within this zone was characterised as an open grassy woodland, dominated by a sparse canopy of *Eucalyptus 'albemol'* (*Eucalyptus albens* x *moluccana*) and *Eucalyptus melliodora* (Yellow Box).

Determination Criteria	Presence	Justification
intergrades between these and other species of *Eucalyptus* listed in Part 1 of the determination are considered to be part of the characteristic assemblage of species, e.g. *Eucalyptus* '*albemol'* (a presumed intergrade between *E*. *albens* and *E. moluccana*). Conversely, the canopy may be completely absent in areas of derived native grassland where tree removal has occurred. In such cases the historic presence of characteristic canopy species is to be considered.		
The vegetation is characterised by a grassy ground layer, including: "the dominant tussock grasses *Themeda triandra* and *Poa sieberiana* and a range of other forbs and grasses such as *Chrysocephalum apiculatum*, *Hypericum gramineum*, *Geranium solanderi*, *Glycine clandestina*, *Dianella revoluta*, *D. longifolia*, *Asperula conferta*, *Leptorhynchos squamatus*, *Goodenia pinnatifida*, *Pimelea curviflora*, *Stackhousia monogyna*, *Cheilanthes sieberi*, *Austrostipa scabra*, *Bulbine bulbosa*, *Lomandra filiformis* and *Oxalis perennans* occupying the inter-tussock spaces	Yes	The groundcover within this community is diverse, dominated by native grasses including: *Austrostipa scabra* (Speargrass), *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), and a mix of native forbs (*Cheilanthes sieberi* [Rock Fern], *Wahlenbergia communis* [Tufted Bluebell], *Geranium solanderi [*Native Geranium], *Einadia nutans* [Climbing Saltbush], and *Oxalis perennans*)
If the site is degraded, the vegetation has the potential for assisted natural regeneration of the overstorey or understorey.	Yes	The condition of this patch is considered to represent partially cleared/thinned stands with a mixture of native and exotic understorey species. Evidence of natural regeneration of the eucalypt canopy was observed within the ecological community.
Determination	The vegetation within Vegetation Zone meets the definition of the Critically Endangered Ecological Community *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* as listed under the New South Wales Biodiversity Conservation Act 2016.	

Vegetation Zone 2 – Patch 1/1 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Moderate Condition)

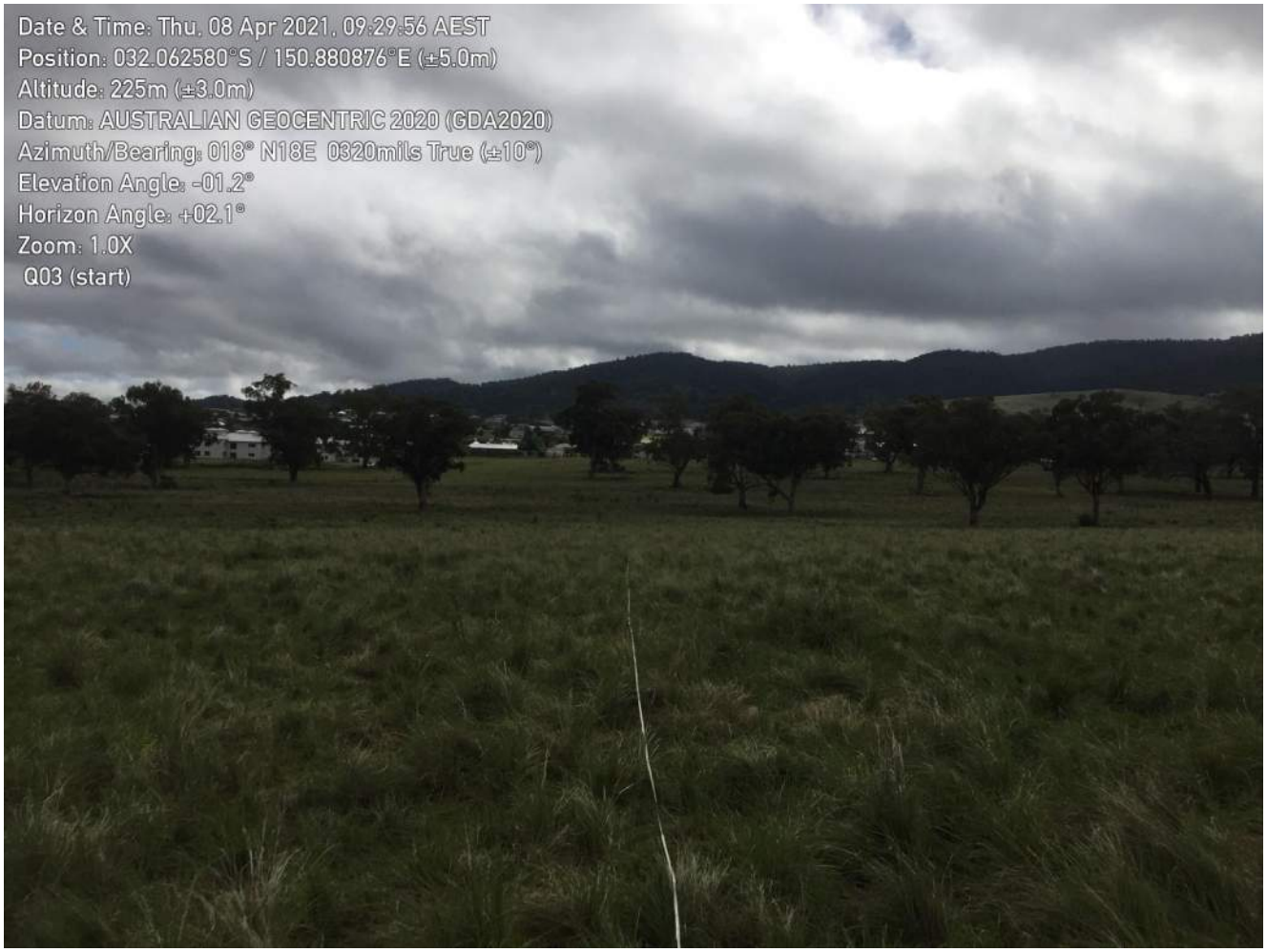

Table D-2-2: Assessment of Conservation *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* (BC Act). – Vegetation Zone 1 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Moderate Condition)

Determination Criteria	Presence	Justification
The vegetation is located within the area defined in the Determination (i.e. within 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)	Yes	The site is located along the boundary of The Sydney Basin IBRA Bioregion(Hunter IBRA Sub-region) and NSW North Coast IBRA Bioregion (Ellerston IBRA Sub-region).
The vegetation is characteristically dominated by one or more of the species *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box), and *E. blakelyi* (Blakely's Red Gum). *Eucalyptus moluccana* may be co-dominant in the Nadewar Bioregion and in the north-western corner of the Sydney Basin Bioregion in the upper Hunter valley. Hybrids or intergrades between these and other species of *Eucalyptus* listed in Part 1 of the determination are considered to be part of the characteristic assemblage of species, e.g.	Yes	The vegetation within this zone was characterised as a native grassland, dominated by *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), with a mix of native herbs. Historic aerial images of the vegetation zone indicate the long-term absence of canopy species. However, it is considered likely that this vegetation zone was once characterised by an open woodland community commensurate with that in Vegetation Zone 1, with *Eucalyptus 'albemol'*

Determination Criteria	Presence	Justification
Eucalyptus '*albemol'* (a presumed intergrade between *E*. *albens* and *E. moluccana*). Conversely, the canopy may be completely absent in areas of derived native grassland where tree removal has occurred. In such cases the historic presence of characteristic canopy species is to be considered.		(*Eucalyptus albens* x *moluccana*) and *Eucalyptus melliodora* (Yellow Box).
The vegetation is characterised by a grassy ground layer, including: "the dominant tussock grasses *Themeda triandra* and *Poa sieberiana* and a range of other forbs and grasses such as *Chrysocephalum apiculatum*, *Hypericum gramineum*, *Geranium solanderi*, *Glycine clandestina*, *Dianella revoluta*, *D. longifolia*, *Asperula conferta*, *Leptorhynchos squamatus*, *Goodenia pinnatifida*, *Pimelea curviflora*, *Stackhousia monogyna*, *Cheilanthes sieberi*, *Austrostipa scabra*, *Bulbine bulbosa*, *Lomandra filiformis* and *Oxalis perennans* occupying the inter-tussock spaces	Yes	The groundcover within this community is diverse, dominated by native grasses including: *Austrostipa scabra* (Speargrass), *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), and a mix of native forbs (*Cheilanthes sieberi* [Rock Fern], *Wahlenbergia communis* [Tufted Bluebell], *Geranium solanderi [*Native Geranium], *Einadia nutans* [Climbing Saltbush], and *Oxalis perennans*)
If the site is degraded, the vegetation has the potential for assisted natural regeneration of the overstorey or understorey.	Yes	The condition of this patch is considered to represent grasslands (secondary or derived grasslands), where the tree overstorey has been removed and only the Box-Gum Woodland understorey is present. There was no evidence of natural eucalypt regeneration within this vegetation zone, likely due to the continuation of grazing on site. The persistence of a natural ground layer suggests that assisted natural regeneration of this community is possible.
Determination	The vegetation within Vegetation Zone meets the definition of the Critically Endangered Ecological Community *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* as listed under the New South Wales Biodiversity Conservation Act 2016.	

Vegetation Zone 3 – Patch 1/1 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Low Condition)

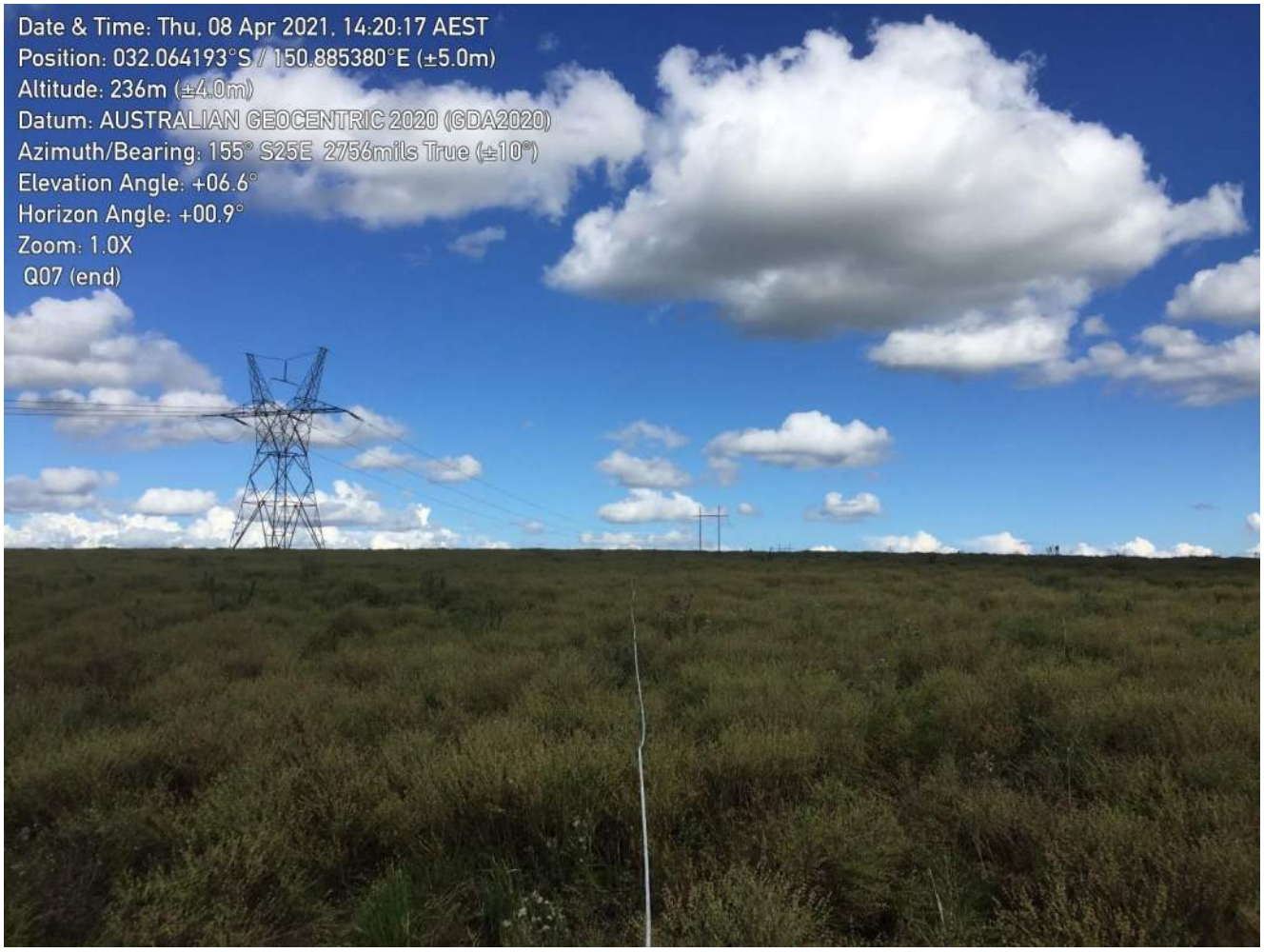

Table D-2-3: Assessment of Conservation *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC* (BC Act). – Vegetation Zone 3 – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Low Condition)

Determination Criteria	Presence	Justification
The vegetation is located within the area defined in the Determination (i.e. within 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)	Yes	The site is located along the boundary of The Sydney Basin IBRA Bioregion (Hunter IBRA Sub-region) and NSW North Coast IBRA Bioregion (Ellerston IBRA Sub-region).
The vegetation is characteristically dominated by one or more of the species *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box), and *E. blakelyi* (Blakely's Red Gum). *Eucalyptus moluccana* may be co-dominant in the Nadewar Bioregion and in the north-western corner of the Sydney Basin Bioregion in the upper Hunter valley. Hybrids or intergrades between these and other species of *Eucalyptus* listed in Part 1 of the determination are considered to be part of the characteristic assemblage of species, e.g.	Yes	The vegetation within this zone was characterised as a native grassland, dominated by *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass), with a mix of native herbs. Historic aerial images of the vegetation zone indicate the long-term absence of canopy species. However, it is considered likely that this vegetation zone was once characterised by an open woodland community commensurate with that in Vegetation Zone 1, with *Eucalyptus 'albemol'*

Determination Criteria	Presence	Justification
Eucalyptus '*albemol'* (a presumed intergrade between *E*. *albens* and *E. moluccana*). Conversely, the canopy may be completely absent in areas of derived native grassland where tree removal has occurred. In such cases the historic presence of characteristic canopy species is to be considered.		(*Eucalyptus albens* x *moluccana*) and *Eucalyptus melliodora* (Yellow Box).
The vegetation is characterised by a grassy ground layer, including: "the dominant tussock grasses *Themeda triandra* and *Poa sieberiana* and a range of other forbs and grasses such as *Chrysocephalum apiculatum*, *Hypericum gramineum*, *Geranium solanderi*, *Glycine clandestina*, *Dianella revoluta*, *D. longifolia*, *Asperula conferta*, *Leptorhynchos squamatus*, *Goodenia pinnatifida*, *Pimelea curviflora*, *Stackhousia monogyna*, *Cheilanthes sieberi*, *Austrostipa scabra*, *Bulbine bulbosa*, *Lomandra filiformis* and *Oxalis perennans* occupying the inter-tussock spaces	No	The groundcover within this community is dominated by exotic species.
If the site is degraded, the vegetation has the potential for assisted natural regeneration of the overstorey or understorey.	Yes	The condition of this patch is considered to represent degraded remnants that have few, if any, native species in the understorey. There was no evidence of natural eucalypt regeneration within this vegetation zone, likely due to the continuation of grazing on site. The dominance of exotic species within this patch suggests little potential for assisted regeneration of the vegetation community.
Determination	The vegetation within Vegetation Zone does not meet the definition of the Critically Endangered Ecological Community *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* as listed under the New South Wales Biodiversity Conservation Act 2016.	

APPENDIX E – ASSESSMENT OF SIGNIFICANCE (PURSUANT TO SECTION 94 OF THE NSW TSC ACT)

E.1 Factors of Assessment – Threatened Species Conservation Act 1995

The seven factors considered in the assessment of significance (s5A of EP&A Act) are shown in the table below. The assessment of significance for all threatened species, populations and ecological communities considered likely to occur within the Subject Site are provided in the following sub-sections.

Factors addressed in the assessment of significance

Factor	Species	Population	Ecological Community
a) 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.	X		
b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.		X	
c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction			X
d) in relation to the habitat of a threatened species, population or ecological community: iii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and iv. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and v. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	X	X	X
e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.	NA	NA	NA
f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan	X	X	X
g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process	X	X	X

Threatened Microchiropteran Bats

Table E2-1 Microchiropteran Bats – Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*), Southern Myotis *(Myotis macropus),* Large Bent-winged Bat *(Miniopterus orianae oceanensis),* Greater Broad-nosed Bat *(Scoteanax rueppellii),* Eastern Cave Bat *(Vespadelus troughtoni) and* Corben's Long-eared Bat *(Nyctophilus corbeni).*

Factor	Consideration
a) 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	The Subject Site represents foraging habitat for these Microchiropteran bat species, and potential roosting habitat due to the presence of hollows and loose bark on canopy species, dead stags and small dead limbs for hollow dependent bats. These species are likely to utilise the site as recorded on the Anabat device and BioNet records. The proposal will remove approximately 1.21 ha of foraging habitat for these species, and only 13 (including one dead stag) out of 88 hollow bearing trees which is unlikely to significantly impact on the lifecycle of any locally occurring populations. The permanent loss of 13 (including one dead stag) out habitat trees due to the proposal is unlikely to significantly impact these highly mobile species. However, there is the potential to impact on the lifecycle of these species if individuals are present in hollows during removal.
b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	Not Applicable
c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	Not Applicable
d) In relation to the habitat of a threatened species, population or ecological community: iii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and iv. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and v. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	The proposal would result in the loss of 1.21 ha of foraging habitat and 13 (including one dead stag) habitat trees for the hollow dependent species. Although 3.04 ha will be retained within the proposed drainage reserve. The Subject Site is isolated from larger areas vegetation in the local area but is connected to a similar sized patch to the East. The removal of 1.21 ha of vegetation within the Subject Site will not fragment or isolate any areas of habitat for these species with trees being removed from the edges of the patch and will not segment the already isolated patch further. The vegetation within the Subject Site is important as foraging habitat to the species and roosting habitat for some. As the proposal will impact on a small area of vegetation (1.21 ha) with the retention of the proposed drainage reserve 3.04 ha,

Factor	Consideration
	the area to be cleared is unlikely to be of high importance to the long term survival of these highly mobile species.
e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.	
f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or TAP	There are recovery strategies for all species under Saving our Species (SOS).
g) Whether the action proposed constitutes or is part of a KTP or is likely to result in the operation of, or increase the impact of, a KTP	The following Key Threatening Processes (KTPs) will occur from the development: • Disturbance to roosting and summer breeding sites. • Foraging habitats are being cleared for residential and agricultural developments, including clearing by residents within rural subdivisions. • Loss of Hollow Bearing Trees Given the small scale of proposed clearing and the retention of the drainage reserve within the Subject Site, the proposed development is likely to facilitate the above listed KTPs to a minor extent. Impacts are likely to be negligible.
Conclusion	The removal of a small area of potential foraging and roosting habitat is unlikely to have a significant impact on these highly mobile Microchiropteran bat species. The removal of the habitat trees within the Subject Site has the potential to impact the species if individuals are roosting in affected trees during felling.

Grey Headed Flying Fox (*Pteropus poliocephalus*)

Table E2-2 Grey-headed Flying-fox (*Pteropus poliocephalus*)

Factor	Consideration
a) 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	The Subject Site represents foraging habitat for the grey-headed flying-fox, and no roosting habitat is present due to lack of a bat colony on the Subject Site. The proposal will remove approximately 1.21 ha of foraging habitat for these species which is unlikely to significantly impact on the lifecycle of any locally occurring populations. The permanent loss of 1.21 ha of foraging habitat due to the proposal is unlikely to significantly impact these highly mobile species.
b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	**Not applicable**
c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:	**Not applicable**

Factor	Consideration
i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	
d) In relation to the habitat of a threatened species, population or ecological community: iii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and iv. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and v. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	The proposal would result in the loss of 1.21 ha of foraging habitat and 3.04 ha will be retained within the proposed drainage reserve. The Subject Site is isolated from larger areas vegetation in the local area but is connected to a similar sized patch to the East. The removal of 1.21 ha of vegetation within the Subject Site will not fragment or isolate any areas of habitat for these species with trees being removed from the edges of the patch and will not segment the already isolated patch further. The vegetation within the Subject Site is important as foraging habitat to the species. As the proposal will impact on a small area of vegetation (1.21 ha) with the retention of the proposed drainage reserve 3.04 ha, the area to be cleared is unlikely to be of high importance to the long term survival of these highly mobile species.
e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.	**Not applicable**
f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or TAP	There is a recovery strategies for the species under Saving our Species (SOS).
g) Whether the action proposed constitutes or is part of a KTP or is likely to result in the operation of, or increase the impact of, a KTP	The following Key Threatening Processes (KTPs) will occur from the development: • Loss of roosting and foraging sites Given the small scale of proposed clearing and the retention of the drainage reserve within the Subject Site, the proposed development is likely to facilitate the above listed KTPs to a minor extent. Impacts are likely to be negligible.
Conclusion	The removal of a small area of foraging habitat is unlikely to have a significant impact on this highly mobile Megachiropteran bat species.

Table E2-3 Woodland Birds: Dusky Woodswallow (*Artamus cyanopterus cyanopterus*), White-throated Needletail (*Hirundapus caudacutus*), Swift Parrot (*Lathamus discolor*), Grey-crowned Babbler (*Pomatostomus temporalis temporalis),* Diamond Firetail (*Stagonopleura guttata*).

Factor	Consideration
a) 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	The Subject Site represents foraging and roosting habitat for woodland birds. The proposal will remove approximately 1.21 ha foraging and 13 (including one dead stag) out of 88 hollow bearing trees (roosting habitat) for these species which is unlikely to significantly impact on the lifecycle of any locally occurring populations. The permanent loss of 1.21 ha of foraging and roosting habitat due to the proposal is unlikely to significantly impact these highly mobile species. However, there is the potential to impact on the lifecycle of these species if individuals are present in hollows during removal.
b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	**Not applicable**
c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	**Not applicable**

Factor	Consideration
d) In relation to the habitat of a threatened species, population or ecological community: iii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and iv. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and v. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	The proposal would result in the loss of 1.21 ha of foraging and removal of 13 (including one dead stag) hollow bearing trees (roosting habitat). Although 3.04 ha and 88 hollow bearing trees will be retained within the proposed drainage reserve. The Subject Site is isolated from larger areas vegetation in the local area but is connected to a similar sized patch to the East. The removal of 1.21 ha of vegetation within the Subject Site will not fragment or isolate any areas of habitat for these species (highly mobile) with trees being removed from the edges of the patch and will not segment the already isolated patch further. The vegetation within the Subject Site represents foraging and breeding habitat (except for the Swift Parrot which breeds in Tasmania) to the species. As the proposal will impact on a small area of vegetation (1.21 ha) with the retention of the proposed drainage reserve 3.04 ha and is only removing 13 (including one dead stag) out of 88 hollow bearing trees, the area to be cleared is unlikely to be of high importance to the long term survival of these highly mobile species.
e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.	**Not applicable**
f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or TAP	There are recovery strategies for the species under Saving our Species (SOS). Except for the White-throated Needletail.
g) Whether the action proposed constitutes or is part of a KTP or is likely to result in the operation of, or increase the impact of, a KTP	The following Key Threatening Processes (KTPs) will occur from the development: • Loss of roosting and foraging sites • Loss of woodland habitat Given the small scale of proposed clearing and the retention of the drainage reserve within the Subject Site, the proposed development is likely to facilitate the above listed KTPs to a minor extent. Impacts are likely to be negligible.
Conclusion	The removal of a small area of foraging habitat is unlikely to have a significant impact on these highly mobile woodland bird species.

Table D2-4 Little Eagle (*Hieraaetus morphnoides*)

Factor	Consideration
a) 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	The Subject Site represents potential foraging and roosting habitat for the Little eagle. The proposal will remove approximately 1.21 ha potential foraging and roosting habitat for these species which is unlikely to significantly impact on the lifecycle of any locally occurring populations. The permanent loss of 1.21 ha of potential foraging and roosting habitat due to the proposal is unlikely to significantly impact these highly mobile species. However, 3.04 ha of potential habitat will be retained within the drainage reserve.
b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	**Not applicable**
c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	**Not applicable**
d) In relation to the habitat of a threatened species, population or ecological community: iii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and iv. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and v. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	The proposal would result in the loss of 1.21 ha of potential foraging and roosting habitat. Although 3.04 ha will be retained within the proposed drainage reserve. The Subject Site is isolated from larger areas vegetation in the local area but is connected to a similar sized patch to the East. The removal of 1.21 ha of vegetation within the Subject Site will not fragment or isolate any areas of habitat for these species (highly mobile) with trees being removed from the edges of the patch and will not segment the already isolated patch further. The vegetation within the Subject Site represents potential foraging and breeding habitat to the species. As the proposal will impact on a small area of vegetation (1.21 ha) with the retention of the proposed drainage reserve 3.04 ha, the area to be cleared is unlikely to be of high importance to the long term survival of these highly mobile species.
e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.	**Not applicable**
f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or TAP	There are recovery strategies for the species under Saving our Species (SOS).

Factor	Consideration
g) Whether the action proposed constitutes or is part of a KTP or is likely to result in the operation of, or increase the impact of, a KTP	The following Key Threatening Processes (KTPs) will occur from the development: • Clearing and degradation of foraging and breeding habitat. Given the small scale of proposed clearing and the retention of the drainage reserve within the Subject Site, the proposed development is likely to facilitate the above listed KTPs to a minor extent. Impacts are likely to be negligible.
Conclusion	The removal of a small area of potential foraging and roosting habitat is unlikely to have a significant impact on the Little Eagle.

E.3. Threatened Flora – Assessment of Significance (7 Part Test)

Dichanthium setosum (Bluegrass)

Background

The Subject Site was considered representative of marginal habitat for *Dichanthium setosum* (Bluegrass), albeit degraded due to continued grazing and weed invasion. The species is listed as Vulnerable under both the NSW BC Act and Commonwealth's EPBC Act.

Table E3-1 Dichanthium setosum (Bluegrass)

Factor	Consideration
a) 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	No, the proposed development proposes to clear approximately 1.21 ha of Vegetation Zone 1, which whilst representing suitable, albeit marginal, habitat for the species is unlikely to represent an adverse impact on the life cycle or viability of the local population. The area in which the species was detected will be retained under this proposal and managed under a suitable Plan of Management for the Drainage Reserve.
b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	**Not Applicable**
c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	**Not Applicable**
d) In relation to the habitat of a threatened species, population or ecological community: iii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and iv. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and v. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	The proposed development proposes to clear approximately 1.21 ha of Vegetation Zone 1 representing suitable habitat for the species. The majority of this vegetation zone is to be retained (3.04 ha) The habitat is unlikely to become isolated from other areas of suitable habitat as connectivity is to be maintained to woodland habitat to the east and west of the Subject Site. The habitat to be removed is likely to represent marginal habitat for the species owing to its position at the edge of the woodland and generally higher weed abundance. The small area of habitat to be removed under this proposal is not expected to important for the long-term survival of the species within the locality.

Factor	Consideration
e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.	The habitat to be removed is likely to represent marginal habitat for the species owing to its position at the edge of the woodland and generally higher weed abundance. The small area of habitat to be removed under this proposal is not expected to important for the long-term survival of the species within the locality.
f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or TAP	**Not Applicable**
g) Whether the action proposed constitutes or is part of a KTP or is likely to result in the operation of, or increase the impact of, a KTP	**Not Applicable**
Conclusion	The proposed development will not result in a significant impact to *Dichanthium setosum* (Bluegrass).

E.4. Threatened Ecological Communities – Assessment of Significance (7 Part Test)

Background

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (BC Act) (Box-Gum Grassy Woodland) was recorded within the Subject Site. Areas which meet the criteria for the CEEC include:

- **Vegetation Zone 1** – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition) – Subject Site 1.21 ha
- **Vegetation Zone 2** – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Moderate Condition) – Subject Site 40.86 ha

Table E4-1 Box-Gum Grassy Woodland

Factor	Consideration
a) 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	**Not Applicable**
b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction	**Not Applicable**
c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	The proposed development will result in the clearing of 42.07 ha of Box-Gum Grassy Woodland within the Subject Area. The proposed development involves the clearing of a small area of Vegetation Zone 1 (Woodland) and only part of a march larger extent of native grassland (Vegetation Zone 2) within the locality. The proposed development is therefore unlikely to have an adverse effect on the extent of the ecological community such that it's occurrence is likely to be placed at risk of extinction.
d) In relation to the habitat of a threatened species, population or ecological community: iii. the extent to which habitat is likely to be removed or modified as a result of the action proposed, and iv. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and v. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality	The ecological community is unlikely to become isolated from other areas as connectivity is to be maintained between woodland habitat within the site and that to the east and west of the Subject Site.
e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly.	**Not Applicable**

Factor	Consideration
f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or TAP	Key Objectives of the National Recovery Plan for *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland* include the following: • achieving no net loss in extent and condition of the ecological community throughout its geographic distribution; • increasing protection of sites with high recovery potential; • increasing landscape functionality of the ecological community through management and restoration of degraded sites; • increasing transitional areas around remnants and linkages between remnants; and • bringing about enduring changes in participating land manager attitudes and behaviours towards environmental protection and sustainable land management practices to increase extent, integrity and function of Box-Gum Grassy Woodland. The proposed action is not consistent with the objective of "no net loss in extent and condition". However, the planned restoration of degraded areas of the woodland component of this community within the Subject Site will likely result in no net loss of woodland area. The proposed development is consistent with the objective of "increasing protection of sites with high recovery potential", with the protection of the majority of woodland within the Subject Site in a planned drainage reserve. The proposed development is consistent with the objective of "increasing landscape functionality of the ecological community through management and restoration of degraded sites" with the protection of the majority of woodland within the Subject Site in a planned drainage reserve.
g) Whether the action proposed constitutes or is part of a KTP or is likely to result in the operation of, or increase the impact of, a KTP	Key threatening processes associated with the proposed development likely to result in adverse impacts to the ecological community include: • Clearing of native vegetation
Conclusion	The proposed development will result in the clearing of 42.07 ha of the derived grassland form of this threatened ecological community (currently used for cattle grazing). The development will also result in the clearing of 1.21 ha of the woodland form of this community; however, this is largely confined to lower condition perimeter of the community. The clearing will also largely be offset by the long-term conservation and remediation of remaining woodland within the drainage reserve. The development is therefore unlikely to constitute a significant impact to the threatened ecological community.

APPENDIX F – EPBC ACT SIGNIFICANT IMPACT ASSESSMENT

F.1 Factors of Assessment – Environment Protection Biodiversity Conservation Act (EPBC Act)

Species Assessed under the EPBC Act Significant Impact Guidelines

The following pertains to Assessments of Significance for direct or indirect impacts to EBPC Act listed threatened species, populations and communities in association with the Gundy Road Flora and Fauna Assessment.

The following species have been assessed under the EPBC Act Significant Impact Guidelines:

- Critically Endangered Species
  - Swift Parrot (*Lathamus discolor*)
- Critically Endangered Ecological Communities
  - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Endangered Species
  - NONE
- Vulnerable Species
  - Grey-headed Flying-fox (*Pteropus poliocephalus*)
  - Corben's Long-eared Bat (*Nyctophilus corbeni*)
  - *Dichanthium setosum* (Bluegrass)
- Migratory Species
  - White-throated Needletail (*Hirundapus caudacutus*)

F.2 Critically Endangered and Endangered Species – EPBC Act Assessment of Significance

The EPBC Act Significant Impact Guidelines (DOE 2013) state:

- An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:
  - lead to a long-term decrease in the size of a population
  - reduce the area of occupancy of the species
  - fragment an existing population into two or more populations
  - adversely affect habitat critical to the survival of a species
  - disrupt the breeding cycle of a population
  - modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
  - result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat
  - introduce disease that may cause the species to decline, or
  - interfere with the recovery of the species.
- A 'population of a species' is defined under the EPBC Act as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:
  - *a geographically distinct regional population, or collection of local populations, or*
  - a population, or collection of local populations, that occurs within a particular bioregion.
- An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.
  - 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:
  - for activities such as foraging, breeding, roosting, or dispersal
  - for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
  - to maintain genetic diversity and long term evolutionary development, or
  - for the reintroduction of populations or recovery of the species or ecological community.
- Such habitat may be, but is not limited to: habitat identified in a recovery plan for the species or ecological community as habitat critical for that species or ecological community; and/or habitat listed on the Register of Critical Habitat maintained by the minister under the EPBC Act.

Swift Parrot (*Lathamus discolor*).

The **Swift Parrot (*Lathamus discolor*)** is small parrot about 25 cm long. It is bright green with red around the bill, throat and forehead. The red on its throat is edged with yellow. Its crown is blue-purple. There are bright red patches under the wings. One of most distinctive features from a distance is its long (12 cm), thin tail, which is dark red. This species breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *Corymbia maculata* (Spotted Gum), *C. gummifera* (Red Bloodwood), *E. tereticornis* (Forest Red Gum), *E. sideroxylon* (Mugga Ironbark), and *E. albens* (White Box). Commonly used lerp infested trees include *E. microcarpa* (Inland Grey Box), *E. moluccana* (Grey Box), *E. pilularis* (Blackbutt), and *E. melliodora* (Yellow Box). Individuals return to some foraging sites on a cyclic basis depending on food availability (OEH, 2019).

Table F2-1: Swift Parrot species significant impact criteria

Swift Parrot	
Is the action likely to lead to a long-term decrease in the size of an important population of a species?	An 'important population' is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • Key source populations either for breeding or dispersal • Populations that are necessary for maintaining genetic diversity, and/or • Populations that are near the limit of the species range. Swift Parrots were not detected within the Development Site or in the Study Area during the assessment, however there are two records within 10 km of the site (dated 2021) and the site broadly constitutes potential foraging habitat for the species. This is known to breed exclusively in Tasmania and migrates to the mainland during winter to foraged on flowering trees. As the proposed development will only impact potential marginal foraging habitat for the species, there is a low number of records of the species within the area, and the majority of the habitat for the species will be retained. The proposed development is considered unlikely to lead to a long-term decrease in the size of an important population of the Swift Parrot.
Will the action reduce the area of occupancy of an important population of the species?	Targeted surveys for the Swift Parrot diurnal bird surveys to locate any Swift Parrots did not detect any within the Study Area. It is likely that the species uses the Study Area as part of its broad foraging range. Potential habitat for the species is likely to occur off-site to the north and east. When the species is utilising foraging habitat in the region, the increased noise due to the construction phase has the potential to reduce the area of utilised habitat. This impact is unlikely to be significant due to the large area of suitable habitat occurring in the locality. Due to the large area of suitable foraging habitat in the surrounding area, the proposed Action will not significantly reduce the area of occupancy of an important population of the species.
Will the action fragment an existing important population into two or more populations?	Given the mobility of the species, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	Under the Significant Impact Guidelines (Commonwealth of Australia 2013), habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. Potential marginal foraging habitat present within the Study Area for the Swift parrot is not considered critical to the survival of the species. The proposed action will not adversely affect habitat critical to the survival of the species.

Swift Parrot	
Will the action disrupt the breeding cycle of an important population?	The proposed action will not impact on the breeding cycle of the Swift Parrot with all breeding for the species occurring in Tasmania and not on the mainland of Australia.
6. Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	The loss of potential marginal foraging habitat within the Development Site is not considered critical to the survival of the species. Extensive areas of similar vegetation representative of the region occur to the north and east of the Development Site and will continue to provide habitat in the wider area. The proposed action is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
7. Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	A site-specific Vegetation Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens along with invasive fauna species. It is unlikely that the proposed action will result in invasive species becoming established in the vulnerable species habitat with the implementation of the Management Plan and the ongoing management of the Development Site.
Will the action introduce disease that may cause the species to decline?	A site-specific Vegetation Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens. It is unlikely that the proposed action will result in the introduction of disease causing the species to further decline.
Will the action interfere substantially with the recovery of the species?	The Development Site provides potential foraging habitat only. The proposed action will not interfere substantially with the recovery of the species.
Conclusion	Based on the above assessment it is considered unlikely that this Commonwealth-listed species will be significantly impacted by the proposal.

References

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Office of Environment and Heritage (2021). *Threatened biodiversity profile search.* Available: https://www.environment.nsw.gov.au/threatenedSpeciesApp/. Accessed May 2021.

Saunders, D.L. and Tzaros, C.L. (2011). *National Recovery Plan for the Swift Parrot Lathamus discolor*. Birds Australia, Melbourne.

F.3 Critically Endangered Ecological Communities (CEEC) – EPBC Act Assessment of Significance

The EPBC Act Significant Impact Guidelines (DOE 2013) state:

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- reduce the extent of an ecological community
- fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
- adversely affect habitat critical to the survival of an ecological community
- modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting
- cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
    - assisting invasive species, that are harmful to the listed ecological community, to become established, or
    - causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or
- interfere with the recovery of an ecological community.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC)

White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grasslands (Box-Gum Grassy Woodland or BGGW) is listed critically endangered ecological community under the Federal EPBC Act.

This ecological community can occur as either a woodland or a derived grassland and has a ground layer of native tussock grasses and herbs and a sparse scattered shrub layer (DEH 2006a). This community is characterised by the dominance of *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) and/ or *E. blakelyi* (Blakely's Red Gum) (DEH 2006a). Sites dominated by other tree species that do not contain Yellow Box, White Box or Blakely's Red Gum are not considered to be part of the ecological community.

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (BC Act) (Box-Gum Grassy Woodland) was recorded within the Subject Site. Areas which meet the criteria for the CEEC include:

- **Vegetation Zone 1** – PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition) - total area 1.21 ha.

An assessment of significance pursuant to EPBC Act Significant Impact Guidelines (DOE 2013) is provided below.

Table F3-1: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC) significant impact criteria

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC)	
Will the action reduce the extent of an ecological community	Yes, the proposed development will result in the clearing of 1.21 ha of the ecological community.
Will the action reduce fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	Yes, the proposed development will result in the clearing of an area of the ecological community for the construction of an access road connecting northern and southern portions of the proposed subdivision.
Will the action adversely affect habitat critical to the survival of an ecological community	No, the majority of the ecological community within the Study Area will be retained and conserved within the proposed drainage reserve.
Will the action modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	No, the majority of the ecological community within the Study Area will be retained and conserved within the proposed drainage reserve. The retained vegetation is positioned adjacent to the only mapped watercourse within the Study Area which is not expected to be adversely impacted by the proposed development.
Will the action cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	No, the majority of the ecological community within the Study Area will be retained and conserved within the proposed drainage reserve. Areas reserved represent the highest condition form of the community within the Study Area.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC)	
Will the action cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • assisting invasive species, that are harmful to the listed ecological community, to become established, or • causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or	No, the majority of the ecological community within the Study Area will be retained and conserved within the proposed drainage reserve. Appropriate stormwater management within the Study Area, including basins, minimises impacts from surrounding land uses on the ecological community.
Will the action interfere with the recovery of an ecological community?	No, the majority of the ecological community within the Study Area will be retained and conserved within the proposed drainage reserve. Restoration of suitable areas of the ecological community is proposed within the Plan of Management for the drainage reserve.
Conclusion	As the proposed development will result in a reduction of the extent of the ecological community, the action is likely to have a significant impact due to the proposed removal of 1.21 ha of the CEEC.

References

Department of Environment, Climate Change and Water NSW (2010). National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Department of Environment, Climate Change and Water NSW, Sydney

Department of the Environment and Energy (2021). *Species Profile and Threats Database*. Available: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl. Accessed: May 2021.

Office of Environment and Heritage (2021). *Threatened biodiversity profile search.* Available: https://www.environment.nsw.gov.au/threatenedSpeciesApp/. Accessed May 2021.

F.4 Vulnerable Species – EPBC Act Assessment of Significance

The EPBC Act Significant Impact Guidelines (DOE 2013) state:

- An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
  - lead to a long-term decrease in the size of an important population of a species
  - reduce the area of occupancy of an important population
  - fragment an existing important population into two or more populations
  - adversely affect habitat critical to the survival of a species
  - disrupt the breeding cycle of an important population
  - modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
  - result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
  - introduce disease that may cause the species to decline, or
  - interfere substantially with the recovery of the species.

- An 'important population' is a population that is necessary for a species' long-term survival and recovery.

  This may include populations identified as such in recovery plans, and/or that are:
  - key source populations either for breeding or dispersal
  - populations that are necessary for maintaining genetic diversity, and/or
  - populations that are near the limit of the species range.

Corben's Long-eared Bat (*Nyctophilus corbeni*)

Corben's Long-eared Bat (*Nyctophilus corbeni*) is a relatively large, solid bat. Overall, the distribution of this species coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Corben's Long-eared Bat is found in a wide range of inland woodland vegetation types. These include box/ironbark/cypress pine woodlands, Buloke woodlands, Brigalow woodland, Belah woodland, Smooth-barked Apple Woodland, River Red Gum Forest, Black Box Woodland, and various types of tree mallee (Duncan *et al*., 1999; Schulz and Lumsden, 2010; Woinarski *et al*., 2014). The species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches (Turbill and Ellis, 2006), suggesting its home range is probably large (Lumsden *et al*., 2008). This species is an insectivorous bat that hunts by taking flying prey or by foliage-gleaning in flight or by foraging on the ground (Lumsden and Bennett, 2000; Schulz and Lumsden, 2010). Foraging appears to be concentrated around patches of trees in the landscape, with many individuals from different species of bat sharing the same foraging area (DoEE, 2019). Studies have found that this species roosts solitarily, mainly in dead trees or dead spouts of live trees (Lumsden *et al*., 2008).

Table F4-1: Corben's Long-eared Bat species significant impact criteria

Corben's Long-eared Bat	
Is the action likely to lead to a long-term decrease in the size of an important population of a species?	Under the Significant Impact Guidelines (Commonwealth of Australia 2013), an important population is defined as a key source population for breeding or dispersal, one necessary for maintaining genetic diversity and/or ones at the limit of the species range. The Corben's Long-eared Bat is a highly mobile species and utilise a variety of forested habitats within inland areas of NSW. Potential roost sites for Corben's Long-eared Bat exists within the Study Area within the grassy open woodland. The species may forage for insects and grubs within PCT 618 of the Subject Site. The species may use habitats within the Study Area as part of its broader foraging and roosting range. The removal of potential foraging and roosting habitat is not anticipated to lead to a long-term decrease in the size of an important population due to the availability of similar suitable foraging habitat to the east and the south of the Study Area and within the wider area.
Will the action reduce the area of occupancy of an important population of the species?	Targeted surveys for the species (Acoustic recordings, harp trapping and stag watching) did not confirm the species presence within the Study Area. The species may use habitats within the Study Area as part of its foraging range and roosting habitat with numerous hollow bearing trees. Potential habitat for the species is likely to occur off-site to the north and east. The removal of 13 (including one dead stag) hollow bearing trees and 1.21 ha of foraging habitat is unlikely to be significant due to the large area of suitable habitat occurring in the locality and the retention of the majority of the open grassy woodland within the drainage reserve. Due to the large area of suitable foraging and roosting habitat in the surrounding area and the retention of this habitat within the drainage reserve, the proposed Action is unlikely to significantly reduce the area of occupancy of an important population of the species.
Will the action fragment an existing important population into two or more populations?	Given the mobility of the species, the proposed action is unliekly to fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	Under the Significant Impact Guidelines (Commonwealth of Australia 2013), habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. Potential foraging and roosting habitat present within the Study Area for the Corben's Long-eared Bat is unlikely to be critical to the survival of the species. The proposed action is unlikely to adversely affect habitat critical to the survival of the species.
Will the action disrupt the breeding cycle of an important population?	Potential breeding habitat was identified within the Development Site and the drainage reserve within the hollow bearing trees present. The proposed action is unlikely to disrupt the breeding cycle of an important population of the species given the removal of 13 (including one dead stag) hollow-bearing trees and in consideration that 79 trees will be retained within the drainage reserve and within lots of the proposed development.

Corben's Long-eared Bat	
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	The loss of potential foraging and roosting habitat within the Development Site is not considered critical to the survival of the species. Extensive areas of similar vegetation representative of the region occur to the north and east of the Development Site within the drainage reserve and will continue to provide habitat in the wider area. The proposed action is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	A site-specific Vegetation (Drainage reserve) Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens. It is unlikely that the proposed action will result in invasive species becoming established in the vulnerable species habitat with the implementation of the Management Plan and the ongoing management of the Development Site.
Will the action introduce disease that may cause the species to decline?	A site-specific Vegetation (Drainage reserve) Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens. It is unlikely that the proposed action will result in the introduction of disease causing the species to further decline.
Will the action interfere substantially with the recovery of the species?	The Development Site provides potential foraging and roosting habitat. The proposed action will not interfere substantially with the recovery of the species.
Conclusion	Based on the above assessment it is considered unlikely that this Commonwealth-listed species will be significantly impacted by the proposal.

References

Department of Environment and Resource Management (2011). *National recovery plan for the large-eared pied bat* Chalinolobus dwyeri. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-large-eared-pied-bat-chalinolobus-dwyeri. In effect under the EPBC Act from 10-Feb-2012.

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Schulz, M. and Lumsden, L. (2010). *Draft national recovery plan for the south-eastern long-eared bat* Nyctophilus corbeni. Victorian Government Department of Sustainability and Environment. Melbourne, Australia.

Grey-headed Flying Fox (Pteropus poliocephalus)

The Grey-headed Flying-fox (*Pteropus poliocephalus*) occurs along the eastern seaboard of Australia roosting in large communal aggregations known as 'camps'. These camps are used permanently, annually, or occasionally, varying in size from hundreds to many thousands of individuals, fluctuating according to food resources (Eby and Law, 2008; Parry-Jones and Augee, 1991; Tidemann, 1995). This species forages on nectar and pollen from flowers of canopy trees (particularly *Eucalyptus, Melaleuca* and *Banksia*) and fleshy fruits from rainforest trees and vines. This species is highly mobile, dispersing to sites as far as 40 km to forage and returning to the camp in one night, and seasonally they may move hundreds of kilometres in response to variation in food resource productivity which largely explains the extensive migration movement of this species (Eby and Law, 2008). Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of *Melaleuca*, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban areas.

Table F4-2: Grey-headed Flying fox species significant impact criteria

Grey-headed Flying-fox	
Is the action likely to lead to a long-term decrease in the size of an important population of a species?	Under the Significant Impact Guidelines (Commonwealth of Australia 2013), an important population is defined as a key source population for breeding or dispersal, one necessary for maintaining genetic diversity and/or ones at the limit of the species range. Grey-headed Flying Fox are a highly mobile species and utilise a variety of forested habitats within near coastal areas of south-eastern Australia. No roost sites for Grey-headed Flying-fox were detected during surveys within the Development Site or wider area. However, the species was detected foraging among the canopies of flowering Eucalypt species within the PCT 618 of the Development Site. It is likely that the species utilised habitats within the Study Area as part of its broader foraging range. The removal of potential foraging habitat is not anticipated to lead to a long-term decrease in the size of an important population due to the availability of similar suitable foraging habitat to the east and the south of the Study Area and within the wider area.
Will the action reduce the area of occupancy of an important population of the species?	Targeted surveys for the Grey-headed Flying-fox (diurnal inspection to locate any flying-fox camps and spotlighting surveys) did not detect any roosting sites for the species within the Study Area. It is likely that the species uses the Study Area as part of its broad foraging range given the presence of a range of flowering eucalyptus species within the Development Site and wider area. The proposal also has the potential to reduce the area of occupancy of foraging habitat surrounding the Development site, due to increased noise the construction of the subdivision. Potential habitat for the species is likely to occur off-site to the north and east. When the species is utilising foraging habitat in the region, the increased noise due to the events has the potential to reduce the area of utilised habitat. This impact is unlikely to be significant due to the large area of suitable habitat occurring in the locality. Due to the large area of suitable foraging habitat in the surrounding area, the proposed Action will not significantly reduce the area of occupancy of an important population of the species.
Will the action fragment an existing important population into two or more populations?	Given the mobility of the species, the proposed action will not fragment an existing population into two or more populations.
Will the action adversely affect habitat critical to the survival of a species?	Under the Significant Impact Guidelines (Commonwealth of Australia 2013), habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. Potential foraging habitat present within the Study Area for the Grey-headed Flying-fox is not considered critical to the survival of the species. The proposed action will not adversely affect habitat critical to the survival of the species.
Will the action disrupt the breeding cycle of an important population?	No breeding habitat was identified within the Development Site and/ or the Study Area. The proposed action will not disrupt the breeding cycle of an important population of the species.

Grey-headed Flying-fox	
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	The loss of potential foraging habitat within the Development Site is not considered critical to the survival of the species. Extensive areas of similar vegetation representative of the region occur to the north and east of the Development Site and will continue to provide habitat in the wider area. The proposed action is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	A site-specific Vegetation (Drainage Reserve) Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens. It is unlikely that the proposed action will result in invasive species becoming established in the vulnerable species habitat with the implementation of the Management Plan and the ongoing management of the Development Site.
Will the action introduce disease that may cause the species to decline?	A site-specific Vegetation (Drainage Reserve) Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens. It is unlikely that the proposed action will result in the introduction of disease causing the species to further decline.
Will the action interfere substantially with the recovery of the species?	The Development Site provides potential foraging habitat only. The proposed action will not interfere substantially with the recovery of the species.
Conclusion	Based on the above assessment it is considered unlikely that this Commonwealth-listed species will be significantly impacted by the proposal.

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Dichanthium setosum (Bluegrass)

Dichanthium setosum occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas.

D. setosum is associated with heavy basaltic black soils and red-brown loams with clay subsoil. The species is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. (Often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously grazed, nutrient-enriched and water-enriched). It is open to question whether the species tolerates or is promoted by a certain amount of disturbance, or whether this is indicative of the threatening processes behind its depleted habitat.

Table F4-3: *Dichanthium setosum* (Bluegrass) species significant impact criteria

***Dichanthium setosum* (Bluegrass)**	
Is the action likely to lead to a long-term decrease in the size of an important population of a species?	Under the Significant Impact Guidelines (Commonwealth of Australia 2013), an important population is defined as a key source population for breeding or dispersal, one necessary for maintaining genetic diversity and/or ones at the limit of the species range. The majority of suitable woodland habitat for this species (Vegetation Zone 1) will be retained and restored as part of the proposed development. Therefore, the proposed development is not anticipated to lead to a long-term decrease in the size of an important population due to the protection of suitable habitat and maintenance of connectivity with further suitable habitat to the east and west of the Study Area and locality.
Will the action reduce the area of occupancy of an important population of the species?	The proposed development proposes to clear approximately 1.21 ha of Vegetation Zone 1 representing suitable habitat for the species. The majority of this vegetation zone is to be retained (3.04 ha). The habitat to be removed is likely to represent marginal habitat for the species owing to its position at the edge of the woodland and generally higher weed abundance. The small area of habitat to be removed under this proposal is not expected to important for the long-term survival of the species within the locality.
Will the action fragment an existing important population into two or more populations?	The proposed development will not fragment an existing important population. The habitat is unlikely to become isolated from other areas of suitable habitat as connectivity is to be maintained to woodland habitat to the east and west of the Subject Site.
Will the action adversely affect habitat critical to the survival of a species?	Under the Significant Impact Guidelines (Commonwealth of Australia 2013), habitat critical to the survival of a species is defined as areas that are necessary: for breeding or dispersal, for the long-term maintenance of the species, to maintain genetic diversity, or for the recovery of the species. The proposed development proposes to clear approximately 1.21 ha of Vegetation Zone 1 representing suitable habitat for the species. The majority of this vegetation zone is to be retained (3.04 ha). The habitat to be removed is likely to represent marginal habitat for the species owing to its position at the edge of the woodland and generally higher weed abundance. The small area of habitat to be removed under this proposal is not expected to important for the long-term survival of the species within the locality.
Will the action disrupt the breeding cycle of an important population?	The proposed action is unlikely disrupt the breeding cycle of an important population of the species.

Dichanthium setosum (Bluegrass)	
Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	The loss of suitable habitat within the Subject Site is not considered critical to the survival of the species. The majority of the woodland community will be retained and actively restored as part of the proposed development and establishment of the Drainage Reserve. Connectivity will be maintained between woodland vegetation within the Study Area and similar areas of vegetation to the east and west of the site. The proposed action is unlikely to destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	A site-specific Vegetation (Drainage Reserve) Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant pathogens. It is unlikely that the proposed action will result in invasive species becoming established in the vulnerable species habitat with the implementation of the Management Plan and the ongoing management of the Drainage Reserve.
Will the action introduce disease that may cause the species to decline?	A site-specific Vegetation (Drainage Reserve) Management Plan will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens. It is unlikely that the proposed action will result in the introduction of disease causing the species to further decline.
Will the action interfere substantially with the recovery of the species?	The proposed action unlikely to interfere substantially with the recovery of the species as the majority of suitable habitat within the site will be retained.
Conclusion	Based on the above assessment it is considered unlikely that this Commonwealth-listed species will be significantly impacted by the proposal.

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F.5 Migratory Species – EPBC Act Assessment of Significance

The EPBC Act Significant Impact Guidelines state:

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species*
- *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 behaviour) of an ecologically significant proportion of the population of a migratory species.*

An area of 'important habitat' for a migratory species is:

(a) habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or

(b) habitat that is of critical importance to the species at particular life-cycle stages, and/or

(c) habitat utilised by a migratory species which is at the limit of the species range, and/or

(d) habitat within an area where the species is declining.

White-throated Needletail (*Hirundapus caudacutus*)

The White-throated Needletail (Hirundapus caudacutus) is a large swift with a thickset, cigar-shaped body, stubby tail and long pointed wings. Sexes are alike, with no seasonal variation, and juveniles are separable with good visibility (Higgins, 1999). The White-throated Needletail is generally gregarious when in Australia, sometimes occurring in large flocks, comprising hundreds or thousands of birds, though they are occasionally seen singly, and occasionally occur in mixed flocks with other aerial insectivores, including Fork-tailed Swifts (Apus pacificus) and Fairy Martins (Hirundo ariel) (Learmonth, 1950, 1951; McMicking, 1925; Wheeler, 1959). The White-throated Needletail is 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 (Barrett et al., 2003; Blakers et al., 1984; Higgins, 1999). The White-throated Needletail breeds in Asia (Chantler, 1999; de Schauensee, 1984; Dement'ev and Gladkov, 1951; Ornithological Society of Japan, 2000). In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground (Coventry, 1989; Tarburton, 1993; Watson, 1955).

Table F5-1: White-throated Needletail species significant impact criteria

White-throated Needletail	
Is the action likely to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	Important habitat for a migratory species is: habitat that supports an ecologically significant proportion of a species population, habitat that is of critical importance to a species at a particular life cycle stage, habitat that is at the limit of a species range and/or habitat within an area where the species is declining. Potential foraging habitat for these species has been identified within the Study Area, however, is not considered to be important habitat for any of the species. Considering the amount of similar habitat both within the Study Area that will be retained and in the locality, the proposal is unlikely to significantly impact on migrant populations of these species occurring in the locality. The implementation of Management Plans will assist in mitigating edge effects on remaining foraging habitat. The proposal is unlikely to have any significant effect on these species in the locality or significantly modify, destroy or isolate important habitat for these species.
Will the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	A site-specific Drainage Reserve Plan of Management will be prepared and implemented prior to the commencement of any clearing or construction works to ensure that impacts are minimised. Management measures will prevent construction activities from introducing or spreading new or existing environmental and noxious weeds or plant and animal pathogens. It is unlikely that the proposed action will result in invasive species becoming established in an area of important habitat for migratory species with the implementation of the Management Plan and the ongoing management of the Development Site.
Will the action seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of a migratory species?	The Study Area forms part of a foraging range for these species, as such it is unlikely that an ecologically significant proportion of the population of these species occur within the Development Site and/or the Study Area. The proposal also has the potential to reduce the area of available foraging habitat surrounding the Development Site, due to increased noise from the construction phase. Potential habitat for these species is likely to occur off-site to the north and to the east. Also the retention of the majority of the open grassy woodland within the drainage reserve. As such, the proposed action will not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the migratory species.
Conclusion	Based on the above assessment it is considered unlikely that these Commonwealth-listed migratory species will be significantly impacted by the proposal.

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APPENDIX G – STAFF CONTRIBUTIONS

The following staff were involved in the compilation of this report.

Name	Qualification	Title/Experience	Contribution
David Martin	MSc	Ecologist (Botanist)	Field surveys, Flora and Fauna Assessment Report Author.
Mark Dean	BEnvSc&Mgnt	Ecologist	Field surveys, Reporting
Dr. Daniel O'Brien	BEnvSc&Mgt (PhD)	Senior Ecologist	Report Review
Gayle Joyce	BSc (Forestry) (Hons)	GIS Specialist	GIS and figure preparation

APPENDIX H – LICENSE AND PERMITS

Kleinfelder employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL100730, Expiry: 31 March 2022) and the *Animal Research Act 1985* to harm/trap/release protected native fauna and to pick for identification purposes native flora and to undertake fauna surveys.