Lot 1 DP224861 The Northern Road, Mulgoa

Flora and Fauna Assessment

Prepared for
CCL Developments Pty Ltd.

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Abbreviations

Abbreviation	Description
°C	Degrees Celsius
CEEC	Critically Endangered Ecological Community
CPW	Cumberland Plain Woodland
DA	Development Application
DotE	Department of the Environment (formerly DSEWPaC)
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*
ESCP	Erosion and Sediment Control Plan
FFA	Flora and Fauna Assessment
GHFF	Grey-headed Flying-fox
GPS	Global Positioning System
HBT	Hollow Bearing Tree
LEP	Local Environment Plan
NW Act	NSW *Noxious Weeds Act 1993*
OEH	Office of Environment and Heritage
PCC	Penrith City Council
PLEP	*Penrith Local Environmental Plan 2010*
RFEF	River-flat Eucalypt Forest
WM Act	NSW *Water Management Act 2000*
TEC	Threatened Ecological Community
TSC Act	NSW *Threatened Species Conservation Act 1995*

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Executive summary

CCL Developments Pty Ltd proposes to develop a residential subdivision of 2183 – 2205 The Northern Road, Mulgoa (**Figure 1**). The site covers a total area of 24.84 ha. The majority of study area is currently zoned as R1 (General Residential) and a small section of vegetation has been zoned as E2 (Environmental Conservation) under the *Penrith Local Environmental Plan 2010* (PLEP).

The proposed works will require the removal of 0.58 ha of remnant native vegetation, 0.06 ha of aquatic habitat consisting of two farm dams and 21.57 ha of exotic pasture, for a 375 lot subdivision with associated infrastructure and roads, with an expected footprint of 22.21 ha (**Figure 2**).

This report assesses the full extent of direct and indirect impacts from the proposed works, and will form part of the development application (DA) to Penrith City Council (PCC) for the proposed sub-division.

Database records and relevant literature pertaining to the ecology of the study area and the broader landscape were reviewed. The study area was surveyed by ecologists Rebecca Dwyer and Danielle Adams-Bennett on 29 October 2015 for a total period of approximately six person hours. The entire study area was traversed slowly on foot, with all visible flora species identified. Each traverse included an assessment of all vegetation communities and their condition, floristic structure, and various microhabitats on site (e.g. hollow bearing trees). This assessment was to validate vegetation communities against the mapped vegetation (NPWS 2002) and ensure that all potential habitat niches were examined. The three riparian corridors were also traversed on foot to undertake a rapid appraisal of streamside vegetation and hydrology. The likelihood of occurrence of threatened species previously recorded (or with potential habitat) within the area was also assessed.

A review of the NSW National Parks and Wildlife Service (2002) vegetation mapping identified two vegetation types, Shale Plains Woodland and Cleared land, within the study area. The field survey confirmed the presence of Shale Plains Woodland (SPW) and cleared land within the study area. However, a further two vegetation communities, Alluvial Woodland and exotic vegetation were recorded within the subject site (see **Figure 3**).

SPW is equivalent to the Threatened Ecological Community (TEC) Cumberland Plain Woodland in the Sydney Basin Bioregion listed as Critically Endangered under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the TEC Cumberland Plain Shale Woodlands and Shale-Gravel Forest listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The patch of Shale Plains Woodland along the northern boundary was observed to contain > 50% native grasses and forbs, however the patch is below the 0.5 ha threshold, therefore it does not meet the EPBC Act condition thresholds for the Critically Endangered Ecological Community (CEEC).

Alluvial Woodland corresponds to the TEC, River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (RFEF), listed as an endangered ecological community (EEC) under the TSC Act.

An Assessment of Significance consistent with s5A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) was undertaken for CPW and RFEF, and found that the removal of 0.33 ha of CPW and 0.25 ha of RFEF will not be a significant impact. See **Appendix C** for an assessment of significance for these TECs.

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The desktop review identified a total of 17 threatened flora species listed under the TSC or EPBC Acts, which may have the potential to occur within a 5 km radius of the study area (locality). An assessment of the likelihood of occurrence of threatened flora species within the study area is provided in Appendix A. No threatened flora species have previously been recorded within the study area, or considered likely to occur.

Opportunistic sightings of fauna were undertaken during the survey, with 12 fauna species recorded consisting of eight indigenous bird species, one amphibian, on reptile and two exotic mammals. The desktop review identified a total of 35 threatened fauna species listed under the TSC or EPBC Acts, which may have the potential to occur within a 5 km radius of the study area (locality). No threatened fauna species were recorded within the study area during the survey. Potential breeding and/or foraging habitat was recorded within the study area for five threatened bat species.

Assessments of Significance consistent with s5A of the EP&A Act and impact assessment under the EPBC Act was undertaken for the bat species. Given only 0.58 ha of native vegetation will be removed as a result of the proposed works, the highly mobile nature of these species, and higher quality habitat is available in the surrounding landscape, any impact from the proposed works is not considered to be significant the long-term survival of these five threatened bat species. See **Appendix C** for an assessment of significance for these species.

ELA understands that the riparian corridors within the study area have been assessed as part of the Voluntary Planning Agreement (VPA) with Council for the proposed development. It is understood that the riparian buffer for Surveyor's Creek (Category 1 watercourse), within the centre of the study area, is to be revegetated as per the VPA. It was noted during the field survey that the two watercourses to the west and east were non-functioning, therefore a riparian corridor is not required.

Four dams were recorded within the study area. The proposed works will remove 0.06 ha of aquatic habitat consisting of two farm dams. The additional two dams in the centre of the study area will be retained.

Recommendations have been provided in **Chapter 6** to mitigate the potential impacts of the proposed works on the surrounding environment.

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1 Introduction

CCL Developments Pty Ltd proposes to develop a residential subdivision of 2183 – 2205 The Northern Road, Mulgoa (**Figure 1**). The site covers a total area of 24.84 ha. The majority of study area is currently zoned as R1 (General Residential) and a small section of vegetation has been zoned as E2 (Environmental Conservation) under the *Penrith Local Environmental Plan 2010* (PLEP).

The proposed works will require the removal of 0.58 ha of remnant native vegetation, 0.06 ha of aquatic habitat consisting of two farm dams and 21.57 ha of exotic pasture, for a 375 lot subdivision with associated infrastructure and roads, with an expected footprint of 22.21 ha (**Figure 2**).

Eco Logical Australia Pty Ltd (ELA) was commissioned by CCL Developments Pty Ltd to prepare a Flora and Fauna Assessment (FFA) of the above lots. This report assesses the full extent of direct and indirect impacts from the proposed works, and will form part of the development application (DA) to Penrith City Council (PCC) for the proposed sub-division.

1.1 Description of the subject site and study area

The study area is located approximately 81 kilometres (km) south-west of the Sydney Central Business District, to the east of the Northern Road and south of Bradley Street, Glenmore Park, within the Penrith Local Government Area (LGA). The location of the study area is shown in **Figure 1**.

The 'subject site' is the area directly impacted upon by the proposal and is defined as the area proposed for earthworks and subdivision, as shown in Error! Reference source not found.**.** The 'study area' includes all areas surveyed as part of this assessment that may be directly or indirectly impacted by the proposal.

1.1.1 **Objectives of this study**

The key objectives of the Flora and Fauna Impact Assessment are to:

- Identify and describe any threatened flora and fauna species, populations, ecological communities, as well as migratory species and their habitats, that may occur within the study area.
- Assess the impact of the proposed works on threatened flora and fauna species, populations and ecological communities, and migratory species, likely to occur in the study area through assessment of significance in accordance with the EP&A Act and the EPBC Act.
- Recommend measures to avoid, reduce or mitigate the impacts of the proposal on native flora and fauna and their habitats.

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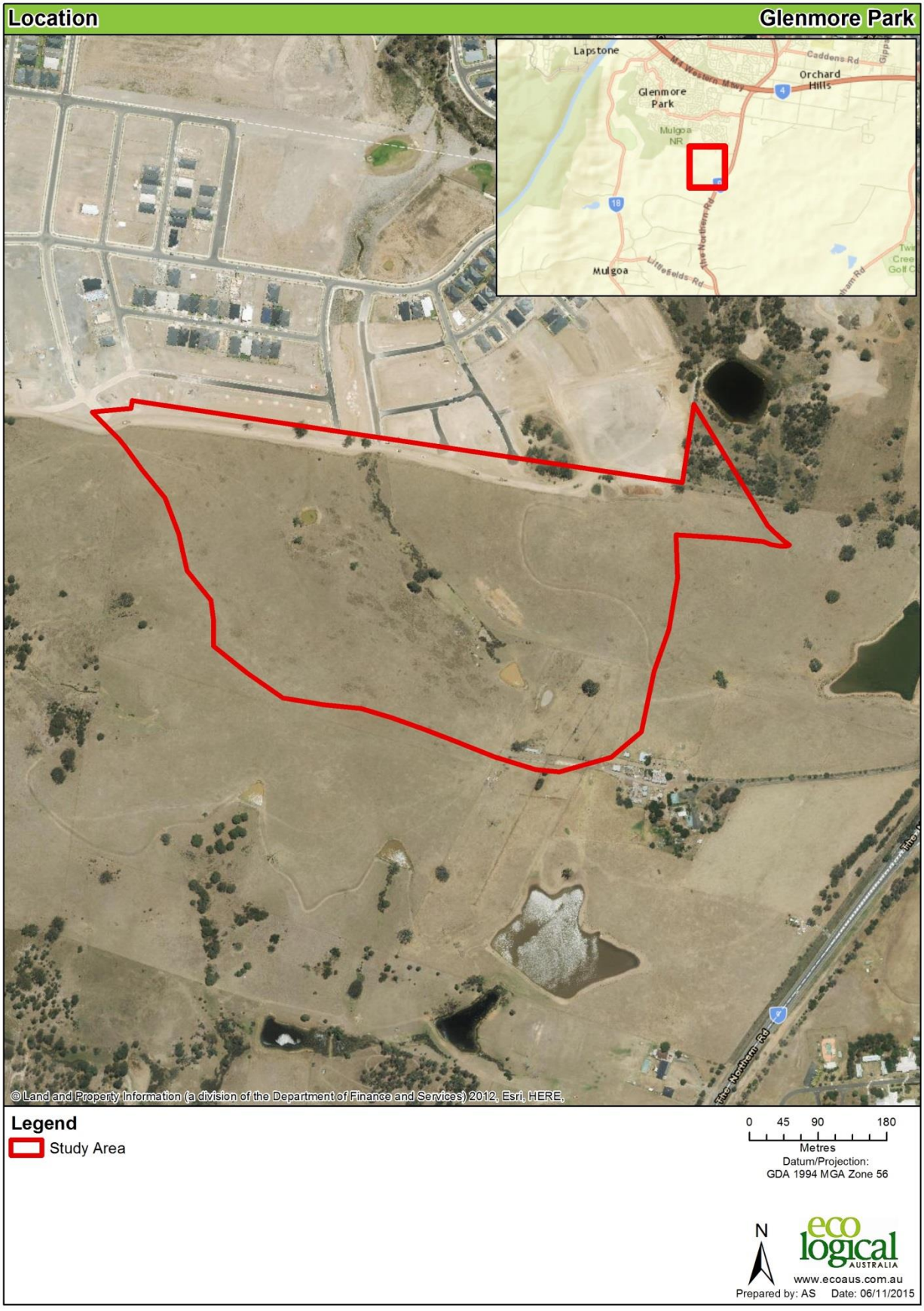

Figure 1: Location of the study area

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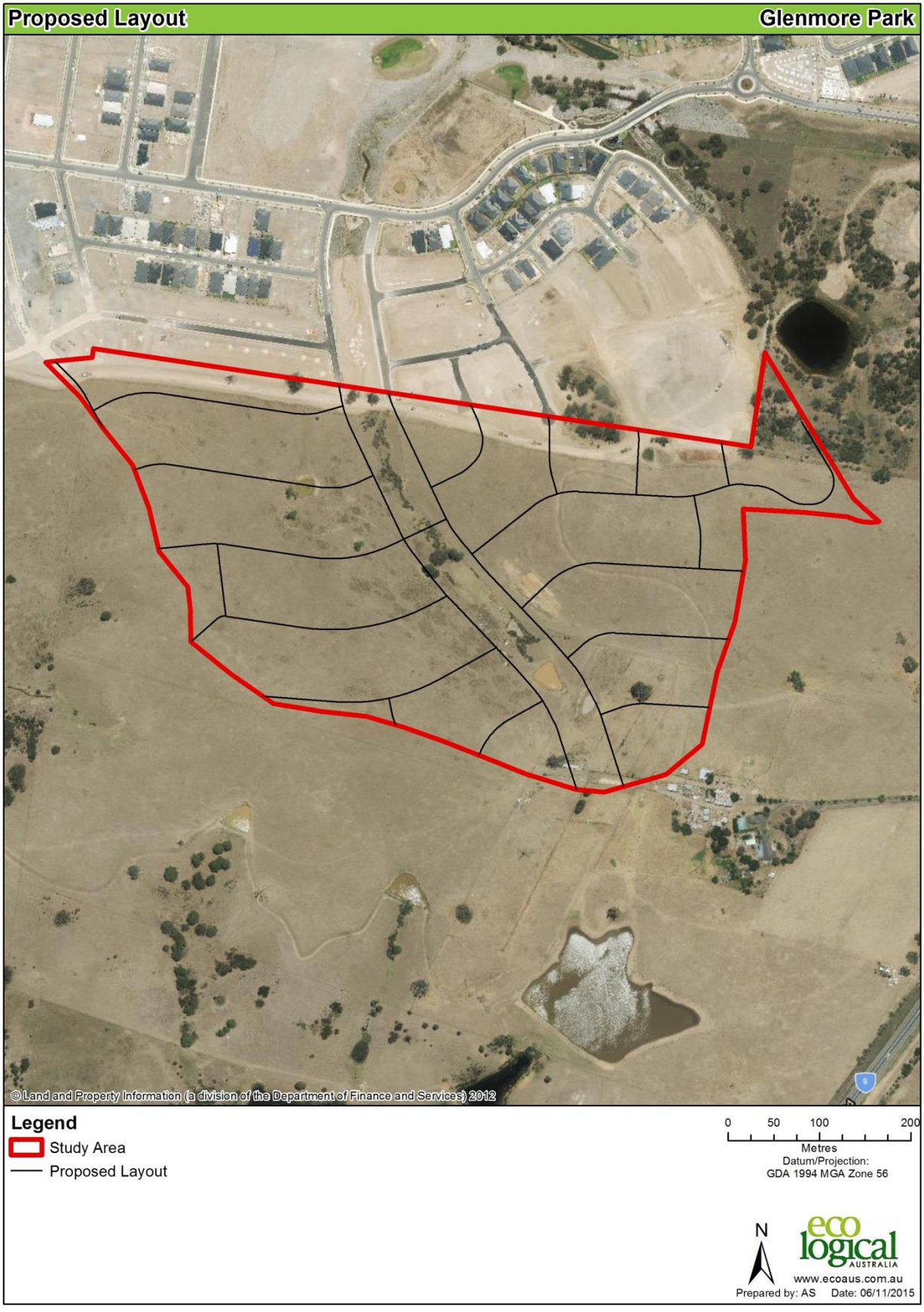

Figure 2: Proposed site layout

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2 Legislative requirements

2.1 Commonwealth legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The primary objective of the EPBC Act is to 'provide for the protection of the environment, especially those aspects of the environment that are Matters of National Environmental Significance.'

Environmental approvals under the EPBC Act are required for an 'action' that is likely to have a significant impact on Matters of National Environmental Significance (known as 'MNES') including:

- World Heritage Areas
- National Heritage Places
- Ramsar wetlands of international importance
- Nationally listed threatened species and ecological communities
- Listed migratory species
- Commonwealth marine areas
- Nuclear actions
- Great Barrier Reef Marine Park.

MNES relevant to the study area are nationally listed threatened species and ecological communities and listed migratory species. Matters of NES that were recorded or have the potential to occur within the study area are listed in **Appendix A**. An assessment of the potential impacts of the project in accordance with the EPBC Act has been undertaken and provided in **Chapter 4**.

2.2 New South Wales legislation

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act is the principal planning legislation for NSW. It provides a framework for land use control and assessment, determination and management of development. Various legislation and instruments, such as the TSC Act, are integrated with the EP&A Act and have been reviewed separately.

2.2.2 Threatened Species Conservation Act 1995

The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. The Act is integrated with the NSW EP&A Act and requires consideration of whether a major infrastructure or other project (Part 3A of the EP&A Act), a development (Part 4 of the EP&A Act) or an activity (Part 5 of the EP&A Act), is likely to significantly affect threatened species, populations and ecological communities or their habitats.

Threatened species, populations and ecological communities that were recorded or have the potential to be present on or use the study area are listed in **Appendix A**. An assessment of the potential impacts of the project has been undertaken in accordance with the EP&A and TSC Acts and provided in **Appendix A.**

2.2.3 Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* (NW Act) defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds. The Act sets up categorisation and control actions for the various noxious weeds, according to their potential to cause harm to our local environment.

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The objectives of the NW Act include:

- To identify noxious weeds in respect of which particular control measures need to be taken.
- To specify those control measures.
- To specify the duties of public and private landholders as to the control of those noxious weeds.
- To provide a framework for the State-wide control of those noxious weeds by the Minister and local control authorities.

Under this Act, noxious weeds have been identified for Local Government Areas (LGAs) and assigned Control Classes. Part 3 provides that occupiers of land (this includes owners of land) have responsibility for controlling noxious weeds on the land they occupy.

2.2.4 **Penrith Development Control Plan 2014**

This FFA has been prepared to satisfy the requirements under Chapter C2 of the *Penrith Development Control Plan 2014.*

Chapter C2 outlines Council's guidelines for Vegetation Management including protecting threatened species and their habitats, protecting other significant native vegetation and bushland and preserving significant non-native or introduced vegetation. Cause 2.1 seeks to reinforce and supplement the controls set out in Clause 5.9 of Penrith LEP 2010, which apply to the preservation of trees and vegetation in all areas of the LGA.

2.2.5 **Penrith Local Environmental Plan 2010**

This FFA has been prepared to satisfy the requirements under Chapter C2 of the *Penrith Local Environmental Plan 2010.*

Clause 5.9 of Penrith LEP 2010 states that, a person must not ringbark, cut down, top, lop, remove, injure or wilfully destroy any tree or other vegetation which is prescribed by the Development Control Plan without development consent, or a permit granted by Council.

This FFA has been prepared as part of a DA for the proposed development to address the proposed impacts on vegetation within the subject site.

2.2.6 **Water Management Act 2000**

Controlled activities carried out in, on or under waterfront land are regulated by the *Water Management Act* 2000 (WM Act). Waterfront land is defined as the bed and bank of any river, lake or estuary whether flowing or intermittent and any land within 40m of the top of bank. Where development is proposed on waterfront land, a Controlled Activity Approval is required from NoW.

Waterfront land is defined as the bed and bank of any river, lake or estuary and all land within the core riparian corridor zone as identified by the Strahler method. The two watercourses mapped within the study area are non-functioning, therefore a riparian corridor is not required. Subsequently a controlled activity approval is also required.

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3 Methodology

3.1 Data audit

The following information and databases were reviewed prior to field survey:

- OEH Atlas of NSW Wildlife Database (OEH 2015a)
- EPBC Act Protected Matters Search Tool (DotE 2015a)
- Native vegetation maps of the Cumberland Plain Western Sydney (NPWS 2002)
- Aerial photographs
- Site plans.

A search of the Atlas of NSW Wildlife and the EPBC Act Protected Matters Search Tool was performed on 26 October 2015, using a radius of 5 km around the coordinates -38.80986, 150.68596 (Datum GDA94). Species from the database searches were combined to produce a list of threatened fauna and flora species that may potentially utilise the study area, with an assessment of the likelihood of occurrence for each species included in **Appendix A**. The likely occurrence of each species was determined by reviewing records in the area, considering the habitat available and using expert knowledge of the ecology of each species.

Five terms for the likelihood of occurrence of species are used in this report, as defined below:

- "known" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat on site and in the vicinity is unsuitable for the species

3.2 Field survey

The study area was surveyed by ecologists Rebecca Dwyer and Danielle Adams-Bennett on 29 October 2015 for a total period of approximately six person hours. Temperature ranged from 11.8 – 25.5°C during the survey period and conditions were clear with no rain (BOM 2015).

The entire study area was traversed slowly on foot, with all visible flora species identified. Each traverse included an assessment of all vegetation communities and their condition, floristic structure, and various microhabitats on site (e.g. hollow bearing trees). This assessment was to validate vegetation communities against the mapped vegetation (NPWS 2002) and ensure that all potential habitat niches were examined. The three riparian corridors were also traversed on foot to undertake a rapid appraisal of streamside vegetation and hydrology. Potential habitat for threatened flora and fauna species were assessed. Flora species recorded within the study area are provided in **Appendix B**.

3.2.1 Riparian zones

The watercourse was traversed on foot to undertake a rapid appraisal of hydrology, physical form and streamside vegetation. Top of Bank (ToB) mapping was not undertaken but was estimated using desktop methods.

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4 Results

4.1 Vegetation communities

A review of the NSW National Parks and Wildlife Service (2002) vegetation mapping identified two vegetation types within the study area:

- Shale Plains Woodland
- Cleared land.

The field survey confirmed the presence of Shale Plains Woodland (SPW) and cleared land within the study area. However, a further two vegetation communities, Alluvial Woodland and exotic vegetation were recorded within the subject site during the field survey (see **Figure 3**).

SPW corresponds to the Threatened Ecological Community (TEC) Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW), listed as a critically endangered ecological community (CEEC) under the TSC Act and EPBC Act.

Alluvial Woodland corresponds to the TEC, River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (RFEF), listed as an endangered ecological community (EEC) under the TSC Act.

4.1.1 Shale Plains Woodland

SPW is an open woodland dominated by a canopy of *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by *Bursaria spinosa* (Blackthorn), and it is common to find abundant grasses such as *Themeda triandra* (Kangaroo Grass) and *Microlaena stipoides* var. *stipoides* (Weeping Grass) (OEH 2015).

Three patches of this community within the study area were dominated by a canopy of *Eucalyptus tereticornis* and *E. crebra* with *E. moluccana* occurring less frequently. The mid-storey was sparse consisting of *Bursaria spinosa*. The ground cover contained > 50% native grasses and forbs including *Themeda triandra*, *Bothriochloa macra* (Red Grass), *Dichelachne crinita* (Longhair Plumegrass), *Cheilanthes sieberi* (Mulga Fern), *Solanum prinophyllum* (Forest Nightshade), *Einadia hastata* (Berry Saltbush), *Glycine* spp., *Pratia purpurascens* (Whiteroot), *Goodenia hederacea* (Forest Goodenia) and *Wahlenbergia* spp. This community was found to be highly modified, with a scattered occurrence of exotic grasses and forb species were recorded including *Paspalum dilatatum* (Paspalum), *Plantago lanceolata* (Plantain), *Cirsium vulgare* (Spear Thistle), *Solanum pseudocapsicum* (Madeira Winter) and *Lycium ferocissimum* (African Boxthorn). The other patches of SPW within the study area occur as scattered paddock trees with an exotic ground cover (**Plate 1**).

SPW is equivalent to the TEC Cumberland Plain Woodland in the Sydney Basin Bioregion listed as Critically Endangered under the TSC Act and the TEC Cumberland Plain Shale Woodlands and Shale-Gravel Forest listed as Critically Endangered under the EPBC Act. The patch of Shale Plains Woodland along the northern boundary was observed to contain > 50% native grasses and forbs, however the patch is below the 0.5 ha threshold, therefore it does not meet the EPBC condition thresholds for the CEEC.

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Plate 1: Shale Plains Woodland within the study area

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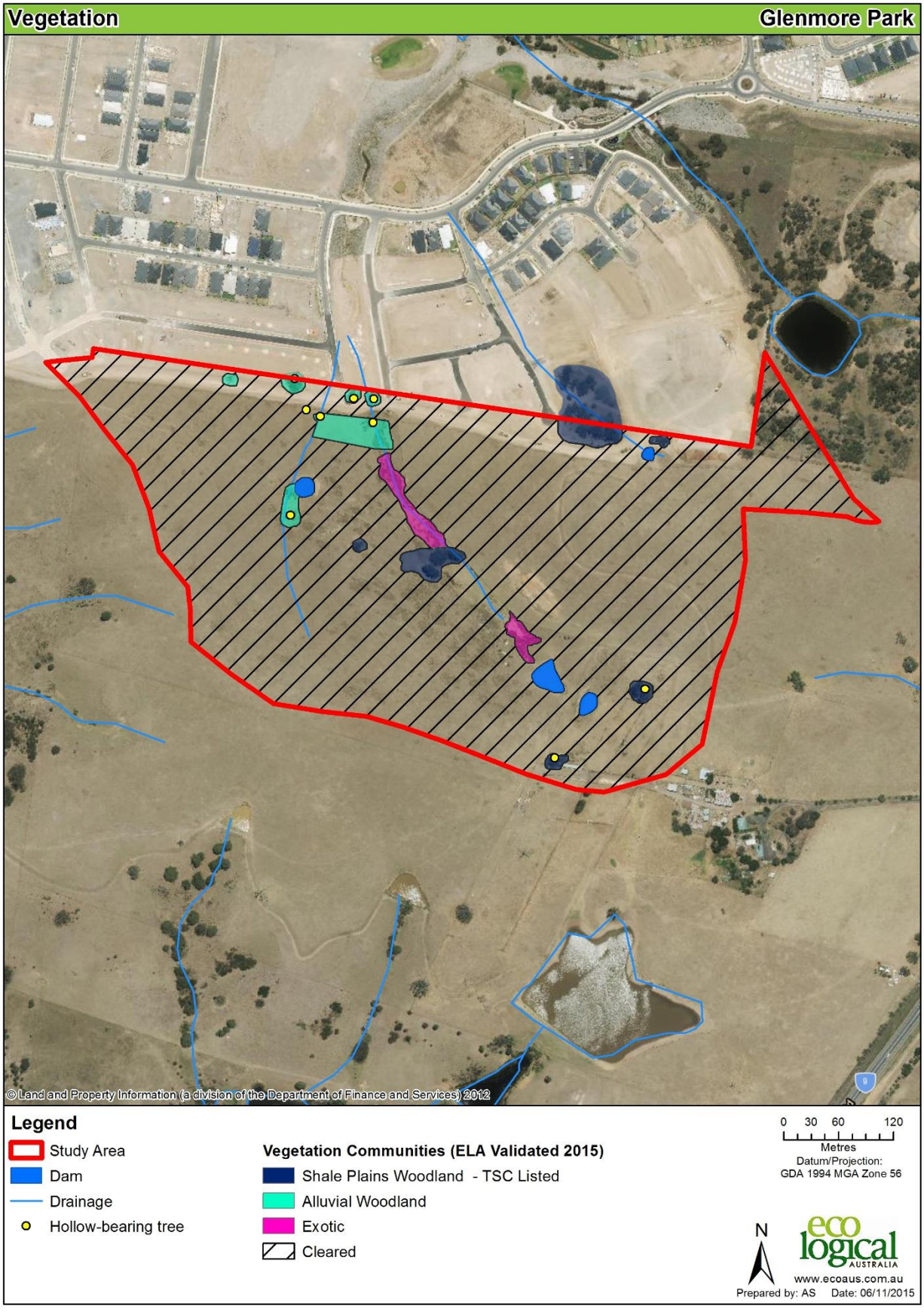

Figure 3: Vegetation communities and hollow bearing trees within the study area

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4.1.2 **Alluvial Woodland**

Alluvial woodland is an open woodland community associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplain. The community has a tall open tree layer of eucalypts, dominated by *Eucalyptus tereticornis E. amplifolia* (Cabbage Gum), *Angophora floribunda* (Rough-barked Apple) and *A. subvelutina* (Broad-leaved Apple). A small layer of trees and scattered shrubs may be present. The groundcover is composed of abundant forbs, scramblers and grasses (OEH 2015).

Alluvial Woodland within the study area occurred as mature scattered paddock trees and regrowth, and was dominated by a canopy of *Angophora floribunda* with *E. tereticornis* occurring less frequently. The mid-storey was absent. The ground cover contained < 50% native grasses and forbs including *Themeda triandra*, *Bothriochloa macra*, *Dichelachne crinita*, *Pratia purpurascens* and *Wahlenbergia* spp. This community was found to be highly modified. Exotic grasses and forb species dominated the groundcover including *Paspalum dilatatum* (Paspalum), *Pennisetum clandestinum* (Kikuyu), *Briza minor* (Shivery Grass), *Juncus acutus* (Sharp Rush), *Rumex crispus* (Curled Dock), *Cyperus eragrostis* (Umbrella sedge) and *Senecio madagascariensis* (Fireweed) (**Plate 2**).

Plate 2: Alluvial Woodland within the study area

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4.1.3 **Weeds and exotics**

The area of exotic vegetation across the study area is dominated by *Juncus acutus with Olea europaea* subsp*. cuspidata* (African Olive), *Senecio madagascariensis*, *Cirsium vulgare, Sida rhombifolia* (Paddy's Lucerne) and *Verbena bonariensis* (Purpletop) occurring occasionally (**Plate 3**).

Plate 3: Weeds and exotics within the study area

4.1.4 **Cleared land**

The area of cleared land across the study area was a mix of native and exotic species. The vegetation community was found to be heavily impacted by previous clearing and grazing activities and contained >50% exotic cover including *Pennisetum clandestinum*, *Paspalum dilatatum*, *Nassella neesiana* (Chilean Needlegrass), *Briza minor, Sporobolus africanus, Senecio madagascariensis, Plantago lanceolata, Cirsium vulgare, Sida rhombifolia* and *Verbena bonariensis.*

Themeda triandra was the most common native species in the pasture and is present throughout the site in varying densities. Other less common native species include *Bothriochloa macra, Dichelachne crinita, Pratia purpurascens* and *Wahlenbergia* spp.

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Plate 4: Cleared land within the study area

4.2 Flora species

A total of 56 flora species were identified within the study area during field investigations, of which 29 are exotic species. Five noxious weeds, including three Weeds of National Significance (WoNS) were also recorded within the study area (**Appendix B**).

Seventeen threatened flora species listed under either the TSC Act and/or EPBC Act were identified by the data audit as known, or with the potential, to occur within a 5 km radius of the study area. The likelihood of these species occurring on site is presented in **Appendix A**.

No threatened flora species were recorded within the study area during the survey.

4.3 Fauna habitat

A range of fauna habitat features are present throughout the study area:

- vegetated areas of tall open woodland
- hollow bearing trees
- dam
- pasture
- woody debris

Habitat within the study area provides potential foraging, breeding and nesting resources for a range of fauna. Nine hollow bearing trees (HBT) were recorded within the study area during field surveys. The habitat features relevant to each fauna group are identified in **Table 1** below.

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Table 1: Key fauna habitat features present across the study area

Habitat features	Fauna species
Vegetated areas of tall open forest	Arboreal mammals, microchiropteran bats and owls
HBTs	Habitat for birds, microchiropteran bats and marsupials
Dam	Habitat for amphibians; foraging for birds, microbats, reptiles and marsupials
Pasture	Birds, microchiropteran bats and reptiles
Woody debris	Foraging resources for birds, mammals, frogs and reptiles

4.4 Fauna species

Opportunistic sightings of fauna were undertaken during the survey, with 12 fauna species recorded, consisting of eight indigenous bird species, one amphibian, on reptile and two exotic mammals (**Table 2**).

Thirty five threatened fauna species listed under either the TSC Act and/or EPBC Act were identified by the data audit as known, or with the potential, to occur within a 5 km radius of the study area. The likelihood of these species occurring on site is presented in **Appendix A**. No threatened fauna species listed under the TSC Act or EPBC Act were recorded within the study area during field survey.

Ten migratory species listed under the EPBC Act were identified by the desktop assessment as known or with the potential to occur within a 5 km radius of the study area. One migratory species, Cattle Egret (*Ardea ibis)* was recorded within the study area during field survey. The likelihood of these species occurring on site is presented in **Appendix A**.

Table 2: Fauna species recorded at the study area

Class	Family	Scientific name	Common name
Aves	Anatidae	*Chenonetta jubata*	Australian Wood Duck
	Ardeidae	*Ardea ibis*	Cattle Egret
	Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo
	Corvidae	*Corvus coronoides*	Australian Raven
	Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet
	Rhipiduarae	*Rhipidura leucophrys*	Willie Wagtail
	Sturnidae	*Sturnus vulgaris*	Common Starling
		Acridotheres tristis	Common Myna
Amphibia	Myobatrachidae	*Crinia signifera*	Common Froglet
Reptilian	Chelidae	*Chelodina longicollis*	Eastern long-necked Turtle
Mammals	Bovidae	*Bos taurus**	Cow
		*Ovis aries**	Sheep

* Exotic species

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4.5 Riparian Corridors

The riparian corridors within the study area have been assessed in relation to the WM Act. The three watercourses mapped within the study area were classified as 1st order streams.

ELA understands that the riparian corridors within the study area have been assessed as part of the Voluntary Planning Agreement (VPA) with Council. It is understood that the riparian buffer for Surveyor's Creek (Category 1 watercourse), within the centre of the study area, has been agreed upon to be revegetated as per the VPA. It was noted during the field survey that the two watercourses to the west and east were non-functioning, therefore a riparian corridor is not required (**Figure 4)**.

Four dams were also recorded within the study area. The two dams to the north contained fringing native vegetation including *Typha orientalis* (Broadleaf Cumbungi), *Juncus usitatus* and *Eleocharis sphacelata* (**Plate 6**). The other two dams to the south were found to contain no vegetation. One *Chelodina longicollis* (Eastern long-necked Turtle), was observed in the largest dam to the south during field survey.

Plate 5: Surveyor's Creek within the centre of the study area

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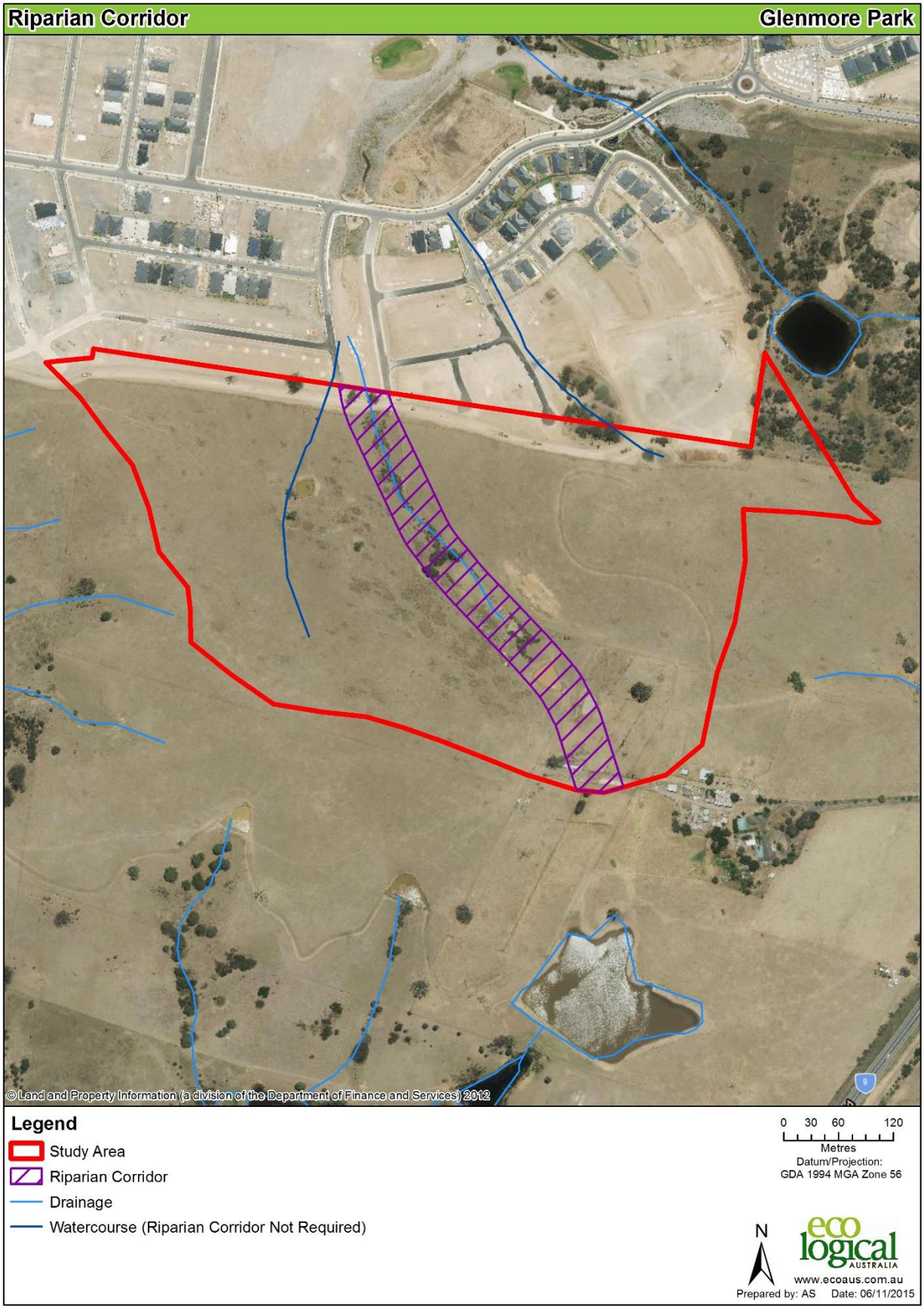

Figure 4: Riparian Corridors

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Plate 6: Dam with fringing vegetation to the north of the study area

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5 Impact assessment

5.1 Direct impacts

The proposed works will require the removal of 0.58 ha of remnant native vegetation, 0.06 ha of aquatic habitat consisting of two farm dams and 21.57 ha of exotic pasture, for a 375 lot subdivision with associated infrastructure and roads, with an expected footprint of 22.21 ha (**Figure 2**).

5.1.1 Threatened Ecological Communities

Two TECs, CPW and RFEF were recorded within the study area.

CPW is listed as a CEEC under the TSC Act and EPBC Act. The patch of Shale Plains Woodland along the northern boundary contained > 50% native grasses and forbs, however the patch is below the 0.5 ha threshold, therefore it does not meet the EPBC Act condition thresholds for the CEEC. The proposed development will result in the removal of 0.33 ha of CPW listed under the TSC Act.

RFEF is listed as an EEC under the TSC Act. The proposed development will result in the removal of 0.25 ha of RFEF listed under the TSC Act.

An Assessment of Significance consistent with s5A of the EP&A Act was undertaken for CPW and RFEF, and found that the removal of 0.33 ha of CPW and 0.25 ha of RFEF will not be significant. See **Appendix C** for an assessment of significance for these TECs.

5.1.2 Threatened flora

No threatened flora species were recorded or likely to occur within the study area.

5.1.3 Threatened fauna

Potential foraging habitat has been recorded within the study area for five threatened fauna species and one migratory species:

- Large-eared Pied-bat (*Chalinolobus dwyeri)*
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis)*
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Southern Myotis (*Myotis macropus)*
- Grey-headed Flying-fox (*Pteropus poliocephalus)*
- Cattle Egret (*Ardea ibis*)

The threatened bat species listed above are known or are likely to occur within a 5 km radius of the site. Nine hollow bearing trees were recorded within the study area during field surveys providing potential roosting habitat for the threatened microchiropteran bat species.

Assessments of Significance consistent with s5A of the EP&A Act and impact assessment under the EPBC Act was undertaken for these fauna species. Given only 0.58 ha of native vegetation will be removed as a result of the proposed works, the highly mobile nature of these species, and higher quality habitat is available in the surrounding landscape, any impact from the proposed works is not considered to be significant the long-term survival of these five threatened bat species. See **Appendix C** for an assessment of significance for these species.

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5.2 Riparian Corridors

ELA understands that the riparian corridors within the study area have been assessed as part of the Voluntary Planning Agreement (VPA) with Council for the proposed development. It is understood that the riparian buffer for Surveyor's Creek (Category 1 watercourse), within the centre of the study area, is to be revegetated as per the VPA. It was noted during the field survey that the two watercourses to the west and east were non-functioning, therefore a riparian corridor is not required.

Four dams were recorded within the study area. The propose works will remove 0.06 ha of aquatic habitat consisting of two farm dams. The additional two dams in the centre of the study area will be retained as part of the riparian buffer.

5.3 Indirect impacts

The indirect impacts of construction and occupation of a future dwelling considered within this FFA include potential increases in:

- Spread of weeds into native vegetation to the south-west
- Dust during construction from disturbed soils and stockpiles
- Noise and vibration (particularly during construction)
- Surface and stormwater runoff from increased impervious areas of future dwellings.

Indirect impacts will be managed through the mitigation measures provided in **Chapter 6.**

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6 Recommendations

The following recommendations have been developed to mitigate the potential impacts of the proposed works:

- Establish and implement a pre-clearing procedure to avoid direct impacts on any threatened fauna species that may be present within the study area prior to vegetation removal.
- The removal of the hollow bearing trees are offset by installation of one and two tier bat boxes within the riparian corridor, at a ratio of 1:1.
- A dewatering procedure should be implemented for the two farm dams.
- A qualified ecologist should be onsite during the felling of the hollow bearing trees and dewatering of the two farm dams.
- Any coarse woody debris moved from the proposed impact area will be retained and placed in adjacent vegetated areas in order to maintain the level of shelter and food resource for invertebrates, small reptiles and mammals that may occur in the area.
- Wash down machinery before conducting works to limit weed spread.

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7 Conclusions

The proposed works will require the removal of 0.58 ha of remnant native vegetation, 0.06 ha of aquatic habitat consisting of two farm dams and 21.57 ha of exotic pasture, for a 375 lot subdivision with associated infrastructure and roads, with an expected footprint of 22.21 ha (**Figure 2**).

A review of the NSW National Parks and Wildlife Service (2002) vegetation mapping identified two vegetation types, Shale Plains Woodland and Cleared land, within the study area. The field survey confirmed the presence of SPW and cleared land within the study area. However, a further two vegetation communities, Alluvial Woodland and exotic vegetation were recorded within the subject site (see **Figure 3**).

SPW is equivalent to the TEC Cumberland Plain Woodland in the Sydney Basin Bioregion listed as Critically Endangered under the TSC Act and the TEC Cumberland Plain Shale Woodlands and Shale-Gravel Forest listed as Critically Endangered under the EPBC Act. The patch of Shale Plains Woodland along the northern boundary was observed to contain > 50% native grasses and forbs, however the patch is below the 0.5 ha threshold, therefore it does not meet the EPBC Act condition thresholds for the CEEC.

Alluvial Woodland corresponds to the TEC, River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (RFEF), listed as an endangered ecological community (EEC) under the TSC Act.

An Assessment of Significance consistent with s5A of the EP&A Act was undertaken for CPW and RFEF, and found that the removal of 0.33 ha of CPW and 0.25 ha of RFEF will not be significant. See Appendix C for an assessment of significance for these TECs.

No threatened flora species have previously been recorded within the study area, or considered likely to occur.

No threatened fauna species were recorded within the study area during the survey. However, potential breeding and/or foraging habitat was recorded within the study area for five threatened fauna species. Assessments of Significance consistent with s5A of the EP&A Act and impact assessment under the EPBC Act was undertaken for these fauna species. Given only 0.58 ha of native vegetation will be removed as a result of the proposed works, the highly mobile nature of these species, and higher quality habitat is available in the surrounding landscape, any impact from the proposed works is not considered to be significant the long-term survival of these five threatened bat species.

ELA understands that the riparian corridors within the study area have been assessed as part of the Voluntary Planning Agreement (VPA) with Council for the proposed development. It is understood that the riparian buffer for Surveyor's Creek (Category 1 watercourse), within the centre of the study area, is to be revegetated as per the VPA. It was noted during the field survey that the two watercourses to the west and east were non-functioning, therefore a riparian corridor is not required. Four dams were recorded within the study area. The proposed works will remove 0.06 ha of aquatic habitat consisting of two farm dams. The additional two dams in the centre of the study area will be retained as part of the riparian buffer.

Recommendations have been provided in **Chapter 6** to mitigate the potential impacts of the proposed works on the surrounding environment.

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Appendix A: Threatened species and communities likelihood of occurrence

Threatened ecological communities

Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion		V	E	Occurs within the local government areas of Bankstown, Blacktown, Campbelltown, Hawkesbury, Liverpool and Penrith. Mainly found in the Castlereagh area of the Cumberland Plain, with small patches occurring at Kemps Creek and Longneck Lagoon; also present around Holsworthy.	No
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion		E	CE	Occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain.	No
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest		CE	CE	Cumberland Plain Woodland (CPW) occurs on soils derived from Wianamatta Shale, and throughout the driest part of the Sydney Basin. The dominant canopy trees of Cumberland Plain Woodland are *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by *Bursaria spinosa* (Blackthorn), and it is common to find abundant grasses such as *Themeda australis* (Kangaroo Grass) and *Microlaena stipoides* var. *stipoides* (Weeping Meadow Grass) (OEH 2015). Cumberland Plain Woodland also forms part of Cumberland Plain Shale Woodlands and Shale –Gravel Transition forest under the EPBC Act if it meets condition thresholds under the EPBC Act.	Yes

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions		E	-	River-flat eucalypt forest is found on the river flats of the coastal floodplains. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees species include *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and A. *subvelutina* (broad-leaved apple).	Yes
Shale Sandstone Transition Forest in the Sydney Basin Bioregion		CE	CE	Occurs at the edges of the Cumberland Plain, where clay soils from the shale rock intergrade with earthy and sandy soils from sandstone, or where shale caps overlay sandstone. The boundaries are indistinct, and the species composition varies depending on the soil influences. The main tree species include Forest Red Gum (*Eucalyptus tereticornis*), Grey Gum (*E. punctata*), Stringybarks (*E. globoidea*, *E. eugenioides*) and Ironbarks (*E. fibrosa* and *E. crebra*). Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Cumberland Plain Woodland (OEH 2015). This community is also listed under the EPBC Act as Shale Sandstone Transition Forest of the Sydney Basin Bioregion.	No
Upland Basalt Eucalypt Forest in the Sydney Basin Bioregion		E	E	The Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion is typically tall open eucalypt forests found on basalt and basalt-like substrates in, or adjacent to, the Sydney Basin Bioregion. Typically, the ecological community has a sparse to dense layer of shrubs and vines, and a diverse understorey of native grasses, forbs, twiners and ferns Parts of the national ecological community are listed as endangered communities in New South Wales: Robertson Basalt Tall Open Forest in the Sydney Basin Bioregion and Mount Gibraltar Forest in the Sydney Basin Bioregion, both of which do not occur in the Blue Mountains.	No.

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Western Sydney Dry Rainforest and Moist Woodland on Shale		E	CE	This is a very restricted and occurs most commonly in the far southern section of the Cumberland Plain, in the Razorback Range near Picton. Outlying occurrences have been recorded at Grose Vale and Cattai. There are 338 hectares remaining intact, the majority of these occurring in the Wollondilly local government area, but occurring to a lesser extent in the Baulkham Hills, Camden, Hawkesbury, Parramatta and Ryde local government areas. A small remnant can be seen in Fairfield City Farm (OEH 2015).	No.

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Flora					
Allocasuarina glareicola	-	E	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Grows in Castlereagh woodland on lateritic soil (OEH 2015).	Unlikely; no individuals recorded on site
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	*Cryptostylis hunteriana* is known from a range of vegetation communities including swamp-heath and woodland (OEH 2015). The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); where it appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*) (OEH 2015). Bell (2001) has identified Coastal Plains Scribbly Gum Woodland and Coastal Plains Smoothed-barked Apple Woodland as potential habitat on the Central Coast. Flowers between November and February, although may not flower regularly (OEH 2015).	No, lack of suitable habitat
Cynanchum elegans	White-flowered Wax Plant	E	E	*Cynanchum elegans* is a climber or twiner with a variable form, and flowers between August and May, peaking in November (OEH 2015). It occurs in dry rainforest gullies, scrub and scree slopes, and prefers the ecotone between dry subtropical rainforest and sclerophyll woodland/forest (NPWS 1997). The species has also been found in littoral rainforest; *Leptospermum laevigatum – Banksia integrifolia* subsp. *integrifolia* coastal scrub; *Eucalyptus tereticornis* open forest/ woodland; *Corymbia maculata* open forest/woodland; and *Melaleuca armillaris* scrub to open scrub (OEH 2015).	No, lack of suitable habitat

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Dillwynia tenuifolia		V	-	In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland (OEH 2015).	No, lack of suitable habitat
Eucalyptus benthamii	Camden White Gum	V	V	Occurs in open forest. Associated species at the Bents Basin site include *Eucalyptus elata, E. bauerina, E. amplifolia, E. deanei* and *Angophora subvelutina*. Understorey species include *Bursaria spinosa, Pteridium esculentum* and a wide variety of agricultural weeds. The Kedumba Valley site lists *E. crebra, E. deanei, E. punctata, Leptospermum flavescens, Acacia filicifolia* and *Pteridium esculentum* among its associated species (OEH 2015).	No, lack of suitable habitat
Genoplesium baueri	Yellow Gnat-orchid	V	E	Known from coastal areas from northern Sydney south to the Nowra district. Previous records from the Hunter Valley and Nelson Bay are now thought to be erroneous. Grows in shrubby woodland in open forest on shallow sandy soils (OEH 2015).	No, outside of species range
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	V	-	Associated canopy species within Cumberland Plain Woodland and Shale/Gravel Transition Forest include *Eucalyptus tereticornis, E. moluccana, E. crebra, E. fibrosa and E. eugenioides. Understorey species include Bursaria spinosa, Dillwynia sieberi, Ozothamnus diosmifolius, Daviesia ulicifolia, Acacia falcata, Acacia parramattensis, Themeda australis, Aristida ramosa, Cymbopogon refractus, Eragrostis brownii, Cheilanthes sieberi, Dianella revoluta* and *Goodenia hederacea (OEH 2015).*	Unlikely; no individuals recorded on site
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	V	Disjunct distribution in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Protected and shaded damp situations in riparian habitats (OEH 2015).	No, lack of suitable habitat

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Marsdenia viridiflora subsp. *viridiflora*	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP	-	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. Grows in vine thickets and open shale woodland (OEH 2015).	No, lack of suitable habitat
Pelargonium sp. Striatellum	Omeo's Stork's-bill	E	E	The species is known to occur in habitat usually located just above the high water level of irregularly inundated or ephemeral lakes. During dry periods, the species is known to colonise exposed lake beds. It is not known if the species' rhizomes and/or soil seedbank persist through prolonged inundation or drought (DotE 2015).	No, lack of suitable habitat
Persoonia nutans	Nodding Geebung	E	E	Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest (OEH 2015).	No, lack of suitable habitat

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Pimelea spicata	Spiked Rice-flower	E	E	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark. The co-occurring species in the Cumberland Plain sites are grey box (Eucalyptus moluccana), forest red gum (E. tereticornis) and narrow-leaved ironbark (E. crebra). Blackthorn (Bursaria spinosa) is often present at sites (and may be important in protection from grazing) and kangaroo grass (Themeda australis) is usually present in the groundcover (also indicative of a less intense grazing history) (OEH 2015).	Unlikely; no individuals recorded on site
Pomaderris brunnea	Rufous Pomaderris	V	V	*Pomaderris brunnea* occurs in a limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria It grows in moist woodland or forest on clay or alluvial soils of floodplains and creek lines (OEH 2015).	Unlikely; no individuals recorded on site
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. There are very few known populations and they are all very small and isolated. Only one population occurs within a conservation reserve (Georges River National Park). Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils (OEH 2015).	No, outside of species range

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Pultenaea parviflora		E	V	May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. *Eucalyptus fibrosa* is usually the dominant canopy species. *Eucalyptus globoidea, E. longifolia, E. parramattensis, E. sclerophylla* and *E. sideroxylon* may also be present or co-dominant, with *Melaleuca decora* frequently forming a secondary canopy layer (OEH 2015).	No, lack of suitable habitat
Thelymitra kangaloonica	Kangaloon Sun Orchid	CE	CE	*Thelymitra kangaloonica* (Thelymitra sp. Kangaloon) is only known to occur on the southern tablelands of NSW in the Moss Vale / Kangaloon / Fitzroy Falls area at 550-700 m above sea level. It is known to occur at three swamps that are above the Kangaloon Aquifer. These swamps are a part of the ecological community "Coastal Upland Swamp" which is listed under the NSW Threatened Species Conservation Act 1995 as an Endangered Ecological Community, also known as “Temperate Highland Peat Swamps on Sandstone” which is listed under the Environment Protection and Biodiversity Conservation Act 1999. It is found in swamps in sedgelands over grey silty grey loam soils (OEH 2015).	No, outside of species range
Thesium austral	Austral Toadlflax	V	V	Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*). It is a root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass (OEH 2015).	No, lack of suitable habitat
Fish					

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Macquarie australasica	Macquarie Perch	E (under FM Act)	E	Habitat for the Macquarie perch is bottom or mid-water in slow-flowing rivers with deep holes, typically in the upper reaches of forested catchments with intact riparian vegetation. Macquarie perch also do well in some upper catchment lakes. In some parts of its range, the species is reduced to taking refuge in small pools which persist in midland–upland areas through the drier summer periods (OEH 2015).	No, lack of suitable habitat
Prototroctes maraena	Australian Grayling	E	V	The Australian Grayling is diadromous, spending part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults (including pre spawning and spawning adults) inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones such as the Tambo River, which is also known to have granite outcrops (DotE 2015).	No, lack of suitable habitat
Invertebrates					
Meridolum corneovirens	Cumberland Plain Land Snail	E	-	Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. Known from over 100 different locations, but not all are currently occupied, and they are usually isolated from each other as a result of land use patterns (OEH 2015). Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities (OEH 2015).	No, lack of suitable habitat

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Pommerhelix duralensis	Dural Land Snail	-	E	Endemic to NSW. Occurs along the northwest fringes of the Cumberland Plain, within the Hills Shire, Blue Mountains City, Penrith City, Hornsby Shire and Parramatta City LGAs. Occurs in shale-sandstone transitional landscapes. Found in Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest; Turpentine-Ironbark Forest; Shale/Sandstone Transition Forest; Turpentine Ironbark Margin Forest; Hinterland Sandstone Gully Forest and Sydney Hinterland Transition Woodland (DotE 2015).	No, lack of suitable habitat
Frogs					
Heleioporus australiacus	Giant Burrowing Frog	V	V	Forages in woodlands, wet heath, dry and wet sclerophyll forest (Ehmann 1997). Associated with semi-permanent to ephemeral sand or rock based streams (Ehmann 1997), where the soil is soft and sandy so that burrows can be constructed (Environment Australia 2000).	Unlikely, lack of suitable habitat
Litoria aurea	Green and Golden Bell Frog	E	V	This species has been observed utilising a variety of natural and man-made waterbodies (Pyke & White 1996) such as coastal swamps, marshes, dune swales, lagoons, lakes, other estuary wetlands, riverine floodplain wetlands and billabongs, stormwater detention basins, farm dams, bunded areas, drains, ditches and any other structure capable of storing water (OEH 2015). Fast flowing streams are not utilised for breeding purposes by this species (Mahony 1999). Preferable habitat for this species includes attributes such as shallow, still or slow flowing, permanent and/or widely fluctuating water bodies that are unpolluted and without heavy shading (OEH 2015). Large permanent swamps and ponds exhibiting well-established fringing vegetation (especially bulrushes–*Typha sp*. and spikerushes–Eleocharis sp.) adjacent to open grassland areas for foraging are preferable (Ehmann 1997; Robinson 1993). Ponds that are typically inhabited tend to be free from predatory fish such as Mosquito Fish (*Gambusia holbrooki*) (OEH 2015).	Unlikely, lack of suitable habitat

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Litoria littlejohni	Littlejohn's Tree Frog	V	V	Littlejohn's Tree Frog has a distribution that includes the plateaus and eastern slopes of the Great Dividing Range from Watagan State Forest (90 km north of Sydney) south to Buchan in Victoria (OEH 2015). It occurs along permanent rocky streams with thick fringing vegetation associated with eucalypt woodlands and heaths among sandstone outcrops. It appears to be restricted to sandstone woodland and heath communities at mid to high altitude (NSW Scientific Committee 2000). It forages both in the tree canopy and on the ground, and it has been observed sheltering under rocks on high exposed ridges during summer (NSW Scientific Committee 2000). It hunts either in shrubs or on the ground. Breeding is triggered by heavy rain and can occur from late winter to autumn, but is most likely to occur in spring when conditions are favourable. Males call from low vegetation close to slow flowing pools. Eggs and tadpoles are mostly found in slow flowing pools that receive extended exposure to sunlight, but will also use temporary isolated pools (OEH 2015).	Unlikely, lack of suitable habitat

Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Reptiles					
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Typical sites consist of exposed sandstone outcrops and benching where the vegetation is predominantly woodland, open woodland and/or heath on Triassic sandstone of the Sydney Basin (OEH 2015). They utilise rock crevices and exfoliating sheets of weathered sandstone during the cooler months and tree hollows during summer (Webb & Shine 1998).	Unlikely, lack of suitable sandstone outcrops

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Diurnal birds					
Anthochaera phrygia (aka *Xanthomyza phrygia*)	Regent Honeyeater	E	E, M	Associated with temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak) (Garnett 1993). Areas containing *Eucalyptus robusta* (Swamp Mahogany) in coastal areas have been observed to be utilised (NPWS 1997). The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and occasionally from banksias and mistletoes (NPWS 1995). As such it is reliant on locally abundant nectar sources with different flowering times to provide reliable supply of nectar (Environment Australia 2000).	Unlikely
Botaurus poiciloptilus	Australasian Bittern	V	-	Terrestrial wetlands with tall dense vegetation, occasionally estuarine habitats (Marchant & Higgins 1993). Reedbeds, swamps, streams, estuaries (Simpson & Day 1999).	Unlikely
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Associated with a variety of forest types containing *Allocasuarina* species, usually reflecting the poor nutrient status of underlying soils (Environment Australia 2000; NPWS 1997; OEH 2015). Intact drier forest types with less rugged landscapes are preferred (OEH 2015). Nests in large trees with large hollows (Environment Australia 2000).	Unlikely
Chthonicola sagittata	Speckled Warbler	V	-	he Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area (OEH 2015).	

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Daphoenositta chrysoptera	Varied Sittella	V	-	Distribution includes most of mainland Australia except deserts and open grasslands. Prefers eucalypt forests and woodlands with rough-barked species, or mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods from bark, dead branches, or small branches and twigs (OEH 2015).	Unlikely
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries (OEH 2015).	Unlikely
Grantiella picta	Painted Honeyeater	V	V	Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema (OEH 2015).	Unlikely
Lathamus discolor	Swift Parrott	E	E	Breeds in Tasmania between September and January. Migrates to mainland in autumn, where it forages on profuse flowering Eucalypts (Blakers et al. 1984; Schodde and Tidemann 1986; Forshaw and Cooper 1981). Hence, in this region, autumn and winter flowering eucalypts are important for this species. Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *Corymbia maculata* (Spotted Gum), *C. gummifera* (Red Bloodwood), *E. sideroxylon* (Mugga Ironbark), and *E. albens* (White Box) (OEH 2015).	Unlikely

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Limosa limosa	Black-tailed Godwit	V	M	he Black-tailed Godwit forages on wide intertidal mudflats or sandflats, in soft mud or shallow water and occasionally in shallow estuaries. They use similar habitats on shores of inland lakes and other wetlands. They are found in muddy areas often open and unvegetated, but commonly use drying marshy wetlands preferred by Pectoral Sandpipers, Calidris melanotus, and Long-toed Stints, C. subminuta, sometimes they forage among mangroves (DotE 2015).	Unlikely
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses (OEH 2015).	Unlikely
Petroica boodang	Scarlet Robin	V	-	The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. Lives in dry eucalypt forests and woodlands with an open and grassy understorey with few scattered shrubs. This species lives in both mature and regrowth vegetation with abundant logs and fallen timber: these are important components of its habitat (OEH 2015b).	Unlikely
Petroica phoenicea	Flame Robin	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense (OEH 2015).	Unlikely

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Rostratula australis	Australian Painted Snipe	E	V	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber (OEH 2015). Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds (ibid.). Breeding is often in response to local conditions; generally occurs from September to December (OEH 2015). Roosts during the day in dense vegetation (NSW Scientific Committee 2004). Forages nocturnally on mud-flats and in shallow water (OEH 2015). Feeds on worms, molluscs, insects and some plant-matter.	Unlikely
Stagonopleura guttata	Diamond Firetail	V	-	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 (OEH 2015)	Unlikely
Nocturnal birds					
Ninox connivens	Barking Owl	V	-	Associated with a variety of habitats such as savanna woodland, open eucalypt forests, wetland and riverine forest. The habitat is typically dominated by Eucalypts (often Redgum species), however often dominated by Melaleuca species in the tropics (OEH 2015). It usually roosts in dense foliage in large trees such as Allocasuarina cunninghamiana (River She-oak), other Casuarina and Allocasuarina, eucalypts, Angophora, Acacia and rainforest species from streamside gallery forests. It usually nests near watercourses or wetlands in large tree hollows with entrances averaging 2-29 m above ground, depending on the forest or woodland structure and the canopy height (Debus 1997).	Unlikely

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Ninox strenua	Powerful Owl	V	-	Powerful Owls are associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes (Environment Australia 2000, Debus & Chafer 1994). Large trees with hollows at least 0.5m deep are required for shelter and breeding (Environment Australia 2000).	Unlikely
Tyto novaehollandiae	Masked Owl	V	-	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides (OEH 2015b).	Unlikely
Mammals (excluding bats)					
Dasyurus maculatus *Dasyurus maculatus maculatus*	Spotted-tailed Quoll Spotted-tailed Quoll (SE Mainland Population)	V -	- E	The Spotted-tailed Quoll inhabits a range of forest communities including wet and dry sclerophyll forests, coastal heathlands and rainforests (Mansergh 1984; OEH 2015), more frequently recorded near the ecotones of closed and open forest. This species requires habitat features such as maternal den sites, an abundance of food (birds and small mammals) and large areas of relatively intact vegetation to forage in (OEH 2015). Maternal den sites are logs with cryptic entrances; rock outcrops; windrows; burrows (Environment Australia 2000).	Unlikely
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Rocky areas in a variety of habitats, typically north facing sites with numerous ledges, caves and crevices (Strahan 1998).	Unlikely

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Phascolarctos cinereus	Koala	V	V	Associated with both wet and dry Eucalypt forest and woodland that contains a canopy cover of approximately 10 to 70%, with acceptable Eucalypt food trees. Some preferred Eucalyptus species are: *Eucalyptus tereticornis*, *E. punctata, E. cypellocarpa, E. viminalis*	Unlikely
Pseudomys novaehollandiae	New Holland Mouse	-	V	A small burrowing native rodent with a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Inhabits open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. A social animal, living predominantly in burrows shared with other individuals. The home range of the New Holland Mouse ranges from 0.44 ha to 1.4 ha and the species peaks in abundance during early to mid stages of vegetation succession typically induced by fire (DotE 2015)	Unlikely
Mammals (bats)					
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	The Large-eared Pied Bat has been recorded in a variety of habitats, including dry sclerophyll forests, woodland, sub-alpine woodland, edges of rainforests and wet sclerophyll forests (Churchill 1998; OEH 2015). This species roosts in caves, rock overhangs and disused mine shafts and as such is usually associated with rock outcrops and cliff faces (Churchill 1998; OEH 2015).	Potential foraging and roosting habitat
Miniopterus schreibersii oceanensis	Eastern Bentwing- Bat	V	-	Associated with a range of habitats such as rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland (Churchill 1998). It forages above and below the tree canopy on small insects (AMBS 1995, Dwyer 1995). Will utilise caves, old mines, and stormwater channels, under bridges and occasionally buildings for shelter (Environment Australia 2000, Dwyer 1995).	Potential, foraging habitat only

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Mormopterus norfolkensis	Eastern Freetail Bat	V	-	Most records of this species are from dry eucalypt forest and woodland east of the Great Dividing Range (Churchill 1998). Individuals have, however, been recorded flying low over a rocky river in rainforest and wet sclerophyll forest and foraging in clearings at forest edges (Environment Australia 2000). Primarily roosts in hollows or behind loose bark in mature eucalypts, but have been observed roosting in the roof of a hut (Environment Australia 2000).	Potential foraging and roosting habitat
Myotis macropus	Southern Myotis	V	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, close to water (Churchill 1998). While roosting (in groups of 10-15) is most commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains (Churchill 1998), however with specific roost requirements (Richards 1998). Forages over streams and pools catching insects and small fish. In NSW females have one young each year usually in November or December (OEH 2015).	Potential foraging and roosting habitat
Pteropus poliocephalus	Grey-headed Flying-Fox	V	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Churchill 1998, Eby 1998). Camps are often located in gullies, typically close to water, in vegetation with a dense canopy (Churchill 1998).	Potential, foraging habitat only
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	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. Although this species usually roosts in tree hollows, it has also been found in buildings (OEH 2015b).	Unlikely
Migratory marine species listed under EPBC Act					

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Apus pacificus	Fork-tailed Swift	-	M	Sometimes travels with Needletails. Varied habitat with a possible tendency to more arid areas but also over coasts and urban areas (Simpson & Day 1999).	Unlikely
Migratory terrestrial species listed under EPBC Act					
Hirundapus caudacutus	White-throated Needletail	-	M	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas (Marchant & Higgins 1993; Simpson & Day 1999). Has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather (Marchant & Higgins 1993).	Unlikely
Merops ornatus	Rainbow Bee-eater	-	M	Resident in coastal and subcoastal northern Australia; regular breeding migrant in southern Australia, arriving September to October, departing February to March, some occasionally present April to May. Occurs in open country, chiefly at suitable breeding places in areas of sandy or loamy soil: sand-ridges, riverbanks, road-cuttings, sand-pits, occasionally coastal cliffs. Nest is a chamber at the end of a burrow, up to 1.6 m long, tunneled in flat or sloping ground, sandy back or cutting.	Unlikely
Monarcha melanopsis	Black-faced Monarch	-	M	Rainforest and eucalypt forests, feeding in tangled understorey (Blakers et al. 1984).	Unlikely
Myiagra cyanoleuca	Satin Flycatcher	-	M	Wetter, denser forest, often at high elevations (Simpson & Day 2004).	Unlikely
Rhipidura rufifrons	Rufous Fantail	-	M	The Rufous Fantail is a summer breeding migrant to southeastern Australia (Morcombe, 2004). The Rufous Fantail is found in rainforest, dense wet eucalypt and monsoon forests, paperbark and mangrove swamps and riverside vegetation (Morcombe, 2004). Open country may be used by the Rufous Fantail during migration (Morcombe, 2004).	Unlikely

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Xanthomyza phrygia	Regent Honeyeater	E	E, M	SEE DIURNAL BIRDS ABOVE	
Migratory wetland species listed under EPBC Act					
Ardea alba	Great Egret	-	M	The Great Egret is common and widespread in Australia (McKilligan, 2005). It forages in a wide range of wet and dry habitats including permanent and ephemeral freshwaters, wet pasture and estuarine mangroves and mudflats (McKilligan, 2005).	Unlikely
Ardea ibis	Cattle Egret	-	M	Cattle Egrets forage on pasture, marsh, grassy road verges, rain puddles and croplands, but not usually in the open water of streams or lakes and they avoid marine environments (McKilligan, 2005). Some individuals stay close to the natal heronry from one nesting season to the next, but the majority leaves the district in autumn and return the next spring. Cattle Egrets are likely to spend the winter dispersed along the coastal plain and only a small number have been recovered west of the Great Dividing Range (McKilligan, 2005).	Yes, recorded on site

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Scientific name	Common name	TSC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Gallinago hardwickii	Latham's Snipe	-	M	A variety of permanent and ephemeral wetlands, preferring open fresh water wetlands with nearby cover (Marchant and Higgins 1993). Occupies a variety of vegetation around wetlands (Marchant and Higgins 1993) including wetland grasses and open wooded swamps (Simpson and Day 1999). Latham's Snipe sometimes occur in habitats that have saline or brackish water, such as saltmarsh, mangrove creeks, around bays and beaches, and at tidal rivers, most commonly on migration (Frith et al. 1977; Naarding 1983; Patterson 1991). They are regularly recorded in or around modified or artificial habitats including pasture, ploughed paddocks, irrigation channels and drainage ditches, ricefields, orchards, saltworks, and sewage and dairy farms (Frith et al. 1977; Lane & Jessop 1985; Naarding 1982, 1983). They can also occur in various sites close to humans or human activity (e.g. near roads, railways, airfields, commercial or industrial complexes) (Frith et al. 1977; Naarding 1983).	Unlikely

E = Endangered; CE = Critically Endangered; V = Vulnerable; M = Migratory

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Appendix B: Flora species recorded within the study area

Scientific Name	Common Name	Native / Exotic	Noxious Weeds	WoNS
Angophora floribunda	Rough-barked Apple	N		
Aristida vagans		N		
Axonopus compressus	Broad-leafed Carpet Grass	E		
Avena barbata	Bearded Oats	E		
Bothriochloa macra	Red Grass	N		
Breynia oblongifolia	Coffee Bush	N		
Briza minor	Shivery Grass	E		
Bromus catharticus	Prairie Grass	E		
Brunoniella australis	Blue Trumpet	N		
Bursaria spinosa	Blackthorn	N		
Cheilanthes sieberi	Mulga Fern	N		
Chloris gayana	Rhodes Grass	E		
Cirsium vulgare	Spear Thistle	E		
Cynodon dactylon	Couch	E		
Cyperus eragrostis	Umbrella Sedge	E		
Dianella caerulea	Blue Flax-lily	N		
Dichelachne crinita	Longhair Plumegrass	N		
Dichondra repens	Kidney Weed	N		
Digitaria sp.		E		
Echinopogon caespitosus	Bushy Hedge-hog Grass	N		
Einadia hastata	Berry Saltbush	N		
Eleocharis sphacelata		N		
Eragrostis curvula	African Lovegrass	E		
Eucalyptus crebra	Narrow-leaved Ironbark	N		
Eucalyptus moluccana	Grey Box	N		
Eucalyptus tereticornis	Forest Red Gum	N		
Glycine clandestina		N		
Glycine tabacina		N		
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	E		

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Scientific Name	Common Name	Native / Exotic	Noxious Weeds	WoNS
Goodenia hederacea	Forest Goodenia	N		
Hypericum perforatum	St John's Wort	E	Class 4	
Hypochaeris radicata	Catsear	E		
Juncus acutus	Sharp Rush	E		
Juncus usitatus	Common Rush	N		
Lolium perenne	Perennial Ryegrass	E		
Lycium ferocissimum	African Boxthorn	E	Class 4	Yes
Modiola caroliniana	Red-flowered Mallow	E		
Nassella neesiana	Chilean Needlegrass	E	Class 4	Yes
Olea europaea subsp. *cuspidata*	African Olive	E	Class 4	
Oplismenus aemulus	Australian Basket Grass	N		
Oxalis perennans		E		
Paspalum dilatatum	Paspalum	E		
Pennisetum clandestinum	Kikuyu	E		
Plantago lanceolata	Lamb's Tongues	E		
Pratia purpurascens	Whiteroot	N		
Rumex crispus	Curled Dock	N		
Senecio madagascariensis	Fireweed	E	Class 4	Yes
Sida rhombifolia	Paddy's Lucerne	E		
Solanum nigrum	Black-berry Nightshade	E		
Solanum prinophyllum	Forest Nightshade	N		
Solanum pseudocapsicum	Madeira Winter	E		
Sporobolus africanus	Parramatta Grass	E		
Themeda triandra	Kangaroo Grass	N		
Typha orientalis	Broadleaf Cumbungi	N		
Verbena bonariensis	Purpletop	E		
Wahlenbergia communis	Tufted Bluebell	N		
Wahlenbergia gracilis	Sprawling Bluebell	N		

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Appendix C: Assessments of significance

EP&A Act Assessment of Significance (7-Part Test)

The Assessment of Significance (7-part test) is applied to species, populations and ecological communities listed on Schedules 1, 1A and 2 of the TSC Act and Schedules 4, 4A and 5 of the Fisheries Management Act. The assessment sets out 7 factors, which when considered, allow proponents to undertake a qualitative analysis of the likely impacts of an action and to determine whether further assessment is required via a Species Impact Statement (SIS). All factors must be considered and an overall conclusion made based on all factors in combination. An SIS is required if, through application of the 7-part test, an action is considered likely to have a significant impact on a threatened species, population or ecological community.

Threatened species, populations and ecological communities which may be directly or indirectly affected by the current proposal include:

Threatened Ecological Communities

- Cumberland Plain Woodland in the Sydney Basin Bioregion
- River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

Megachiropteran bat

- Grey-headed Flying-fox *(Pteropus poliocephalus*)

Microchiropteran bats

- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*)
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Southern Myotis (*Myotis macropus*).

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TEC- *Cumberland Plain Woodland in the Sydney Basin Bioregion*

In the NPWS vegetation mapping of the Cumberland Plain, two forms of Cumberland Plain Woodland have been identified: Shale Hills Woodland and Shale Plains Woodland. Shale Hills Woodland occurs mainly on the elevated and sloping southern half of the Cumberland Plain and is the most widely distributed form of CPW (NPWS 2002).

Before European settlement, CPW was extensive across western Sydney, covering 125,000 hectares. In 2002 there was only 9% of the original extent, with a further 14 % remaining as scattered trees across the landscape (NPWS 2002). CPW occurs in the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly Local Government Areas (OEH 2014).

Clearing for agriculture and urban development is the greatest threat to CPW. Given it exists now only in fragments, CPW is vulnerable to disturbances, such as weed invasion, increased soil nutrients, rubbish dumping and frequent fire. Weeds, such as *Eragrostis curvula* (African Lovegrass), *Olea europaea* subsp. *cuspidata* (African Olive) and *Chloris gayana* (Rhodes Grass), are major threats to the community (NSW SC 2011).

CPW was recorded within the study area during field survey.

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 the risk of extinction.

This is not a threatened 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

This is not an endangered population.

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

The local occurrence of the EEC within the study area consists of two small patches of remnant native vegetation and three scattered paddock trees totalling 0.45 ha. There is an additional 0.97 ha located directly adjacent to the study are offsite, which is also considered part of the local occurrence. The vegetation community was found to be heavily impacted by grazing and clearing activities and the ground cover was dominated by exotic grasses and forbs.

The proposed development will result in the removal of 0.33 ha of CPW within the study area. However, 0.12 ha of CPW will be retained within the study area and there is 0.97 ha located directly adjacent to the study area, which will also be retained, and is considered part of the local occurrence. Therefore, it is considered unlikely that the proposal would place the local occurrence of CPW at risk of extinction.

(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

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The proposal will remove 0.33 ha of CPW, consisting of two small patches of remnant native vegetation and three scattered paddock trees. However, 0.12 ha of CPW will be retained within the study area and there is 0.97 ha located directly adjacent to the study area, which will also be retained, and is considered part of the local occurrence.

The composition of the CEEC within the study area will be modified with the removal of 0.33 ha of CPW consisting of a canopy of *E. tereticornis* and *E. moluccana* with a sparse mid-storey of *Bursaria spinosa* and a ground cover of native forbs and grasses. However, 0.12 ha will be retained in the study area consisting of a canopy of *E. crebra* and *E. tereticornis* with an absent understorey and a ground cover of native forbs and grasses.

Therefore, the proposal is unlikely to substantially modify the composition of the CEEC 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:

(i) the extent to which habitat is likely to be remove or modified as a result of the action proposed, and

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

The CPW at the site is largely fragmented. Areas in the west and south comprise scattered trees and the CPW in the north forms part of a larger stand of CPW extending to the north of the site. The proposal would remove only vegetation from the fringe of the CPW and, therefore, would not further isolate or fragment any areas of currently connecting CPW.

(iii) 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 CPW at the site has undergone past disturbance and in some areas remains as scattered trees with an exotic understorey. The vegetation proposed for removal is on the fringe of the CPW community in the north and the remainder is comprised of scattered trees. The patches of CPW are of poor quality, either being under-scrubbed or of a small size. It is unlikely that the small area, 0.33 ha of CPW proposed for removal would represent an area of habitat that is important to the long-term survival of this community within the locality.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared for this community

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

CPW is included in the Cumberland Plain Recovery Plan (DECCW 2010). The Recovery Plan has the overall objective of providing for the long-term survival and protection of the threatened biodiversity of the Cumberland Plain. The specific recovery objectives (DECCW 2010) are:

1. to build a protected area network, comprising public and private lands, focused on the priority conservation lands;
2. to deliver best practice management for threatened biodiversity across the Cumberland Plain, with a specific focus on the priority conservation lands and public lands where the primary management objectives are compatible with biodiversity conservation;

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3. to develop an understanding and enhanced awareness in the community of the Cumberland Plain's threatened biodiversity, the best practice standards for its management, and the recovery program Cumberland Plain Recovery Plan; and
4. to increase knowledge of the threats to the survival of the Cumberland Plain's threatened biodiversity, and thereby improve capacity to manage these in a strategic and effective manner.

In its present form, this proposal is not consistent with the Cumberland Plain Recovery Plan (DECCW 2010)

No relevant threat abatement plans have been prepared for CPW.

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.

Vegetation clearance is listed as a key threatening process. The area of potential habitat to be cleared is small (0.33 ha) and occurs on the disturbed fringe of vegetation. Furthermore, additional areas of potential habitat would remain within the study area and is present adjacent to the study area. Therefore, it is unlikely that the proposal would exacerbate any key threatening processes to such an extent that they would place any local occurrences of CPW at risk of extinction.

Conclusion

The proposal would result in the removal of approximately 0.33 ha of CPW. However, the proposed vegetation removal is unlikely to be considered significant for the following reasons:

- clearance area is very small (0.33 ha)
- clearing is primarily is restricted to the disturbed fringe of the CPW in the north and scattered trees across the remainder of the site
- the site is highly modified and invaded by exotic species
- CPW would remain within the study area (0.12 ha) and additional CPW is present directly adjacent to the site
- the proposal would not fragment any current stands of CPW

On the basis of the above considerations, it is unlikely that the proposed development will result in a significant effect on CPW.

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TEC- ***River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions***

River Flat Eucalypt Forest (RFEF) occurs on the river flats of the coastal floodplains of the NSW North Coast, the Sydney Basin, and the South East Corner Bioregions. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity, and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs (OEH 2015).

RFEF was recorded within the study area during field survey.

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 the risk of extinction.

This is not a threatened 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

This is not an endangered population.

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

The local occurrence of the EEC within the study area consists of six mature scattered paddock trees and regrowth Eucalypts. The vegetation community was found to be heavily impacted by grazing and clearing activities and the ground cover was dominated by exotic grasses and forbs.

The proposed development will result in the removal of 0.25 ha of RFEF, consisting of two mature *Angophora floribunda*, two *Eucalyptus tereticornis* and regrowth, with an exotic understorey. However, 0.18 ha of RFEF will be retained within the study area. In addition, based on the NPWS (2002) mapping there is 2.5 ha of RFEF located 530 m south of the study area which will be retained. Therefore, it is considered unlikely that the proposal would place the local occurrence of RFEF at risk of extinction.

(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 proposal will remove 0.25 ha of RFEF consisting of two mature *Angophora floribunda*, two *Eucalyptus tereticornis* and regrowth, with an exotic understorey. However, 0.18 ha of RFEF will be retained within the study area, and based on the NPWS (2002) mapping there is 2.5 ha of RFEF located 530 m south of the study area which will be retained.

The composition of the EEC within the study area will be modified with the removal of 0.25 ha of RFEF consisting of a canopy *Angophora floribunda* and *E. tereticornis* with an absent mid-storey and exotic ground cover. However, 0.18 ha will be retained in the study area consisting

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of a canopy of *Angophora floribunda and E. tereticornis with an absent mid-storey and exotic ground cover.*

Therefore, the proposal is unlikely to substantially modify the composition of the EEC 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:

(i) the extent to which habitat is likely to be remove or modified as a result of the action proposed, and

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

The RFEF at the site is already fragmented and consists of scattered paddock trees and regrowth with an exotic understorey. Therefore, would not further isolate or fragment any areas of currently connecting RFEF.

(iii) 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 RFEF at the site has undergone past disturbance and consists as scattered trees and regrowth with an exotic understorey. Given the community is comprised of scattered trees, it is unlikely that the small area, 0.25 ha of RFEF proposed for removal would represent and area of habitat that is important to the long-term survival of this community within the locality.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared for this community.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is currently no recovery plan or threat abatement plan for RFEF although priority actions have been identified. The proposal would not conflict with these actions.

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.

A number of Key Threatening Processes (KTP) are relevant to this proposal with respect to RFEF. These include:

- clearing of native vegetation
- invasion and establishment of exotic vines and scramblers
- invasion, establishment and spread of *Lantana camara*
- invasion of native plant communities by exotic perennial grasses
- removal of dead wood and dead trees.

The proposal would not increase these KTP operating on this EEC.

Conclusion

The proposal would result in the removal of approximately 0.25 ha of RFEF. However, the proposed vegetation removal is unlikely to be considered significant for the following reasons:

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- clearance area is very small (0.25 ha)
- clearing is restricted to scattered trees across the site
- the site is highly modified and invaded by exotic species
- RFEF would remain within the study area (0.18 ha)
- the proposal would not fragment any current stands of RFEF

Consequently, a Species Impact Statement (SIS) is not required for the proposal with respect to this TEC.

MEGACHIROPTERAN BAT

Pteropus poliocephalus (Grey-headed Flying-fox)

Grey-headed Flying-fox is listed as a vulnerable species under the TSC Act. It is generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. It occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops, and has been recorded as travelling long distances on feeding forays (up to 50 km). Fruits and flowering plants of a wide variety of species are the main food source (OEH 2015b).

The species roosts in large 'camps' of up to 200,000 individuals. Camps are usually formed within 20 km of a regular food source and are generally close to water and along gullies. However, the species has been known to form camps in urban areas (OEH 2015b).

Key threats to the species are loss of roosting and foraging sites, electrocution on powerlines, entanglement in netting and on barbed-wire, heat stress, and conflict with humans (OEH 2015b).

Grey-headed Flying-fox (GHFF) was not recorded during the survey. There are records of the species within a 5 km radius of the study area (OEH 2015a), and suitable foraging habitat is located within the study area. There is potential that the study area is used occasionally by this species, although it is unlikely that individuals of this species are dependent upon resources in the study area.

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 the risk of extinction.

Impacts likely to have an adverse effect on the life cycle of GHFF would include impacts which resulted in the loss of significant areas of foraging habitat, increases in the mortality rate, and increases in conflicts with humans.

The proposal would remove 0.58 ha potential foraging habitat for the GHFF consisting of remnant native vegetation and scattered paddock trees with an exotic ground cover. The closest camp is located approximately 12 km east of the subject site. No known camps would be impacted.

The removal of potential foraging habitat is unlikely to have a significant impact on life cycle of this species such that a viable local population of the species would be placed at risk of extinction. Potential foraging habitat to be removed is present as 0.33 ha of remnant native vegetation and 0.25 ha of scattered paddock trees with an exotic ground cover. This is considered to be marginal foraging habitat for GHFF as they would currently be expected to

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produce minimal amounts of nectar. The species is highly mobile and has a large home range. GHFF can travel long distances on feeding forays (up to 50 km). There is higher quality habitat is available in the surrounding landscape, therefore the species is considered likely to use the study area on an occasional basis and would not be dependent on the foraging resources within the study area. The removal of habitat would not significantly fragment GHFF habitat.

It is unlikely that the proposal would result in increases in mortality rates through heat stress or electrocution and, therefore, impact the life cycle of the species. Also, it is unlikely that the proposal would increase conflicts with humans as it is unlikely it would contribute to GHFF establishing a camp in the locality.

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.

GHFF is not an endangered population.

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.

GHFF is not an endangered ecological community.

d) in relation to the habitat of a threatened species, population or ecological community:

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

The proposal would remove 0.58 ha of remnant native vegetation and scattered paddock trees with an exotic ground cover, representing potential foraging habitat for GHFF. No known camps would be impacted. The species is likely to use the study area on an occasional basis and would not be dependent on the foraging resources within the study area.

(ii) 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

The proposed works is unlikely to fragment or isolate areas of potential foraging habitat. The area of habitat that would be impacted for the proposed development is already fragmented. Removal of sparse patches of remnant native vegetation and paddock trees would not fragment the habitat of such a wide-ranging and mobile species. Therefore, the proposal will not isolate any currently connecting areas of potential habitat.

(iii) 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,

Given the highly mobile nature of the species and the fact that the vegetation to be removed on site does not represent primary roosting or foraging habitat and extensive areas of habitat

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are present adjacent to the study area and within the LGA, the habitat to be removed is unlikely to be important to the long-term survival of this species.

e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat has been declared for this species.

f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

A draft National Recovery Plan exists for GHFF. The proposal will not conflict with any of the objectives within the recovery plan.

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.

Key threatening processes of relevance to the GHFF include the clearing of native vegetation. The proposal would result in the clearing of native vegetation however, would result in a small disturbance to an area of marginal habitat. As discussed above this disturbance is considered minor due to the size of this habitat relative to the large home ranges of this species, and the areas of habitat in the surrounding landscape available to these highly mobile species.

Conclusion

The proposal is unlikely to constitute a significant impact on Grey-headed Flying-fox given that:

- Area of vegetation to be removed is very small (0.58 ha of native vegetation).
- There are no known camps in the study area or surrounding area
- The species is highly mobile and forages widely.
- The proposal would not fragment or isolate habitat for this species
- Potential habitat for this species would remain adjacent to the study area and is present throughout the locality.

Consequently, a SIS is not required for the proposal with respect to this species.

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MICROCHIROPTERAN BATS

Eastern False Pipistrelle *(Falsistrellus tasmaniensis)*

Eastern False Pipistrelle is listed as Vulnerable under Schedule 2 of the TSC Act. The species is wide-ranging, occurring along the southeast coast of Australia with records indicating that its distribution extends from south-east Queensland to Victoria, but is also found in Tasmania. The species is known to occur in sclerophyll forests stretching from the Great Dividing Range to the coastline, with a general preference for wet habitats where trees are higher than 20 m (OEH 2015b).

Roosting occurs in usually in hollow trunks of eucalyptus trees, typically in single sex colonies, but roosting in caves, under loose bark and occasionally in old wooden buildings is not uncommon. Their flight pattern is high and fast with foraging taking place within or just below the tree canopy feeding on an array of invertebrates and insects (OEH 2015b).

Eastern False Pipistrelle is threatened by a number of processes including loss of trees for foraging and hollow-bearing trees for roosting, disturbance to winter roosting and breeding sites, and application of pesticides in or adjacent to foraging areas (OEH 2015b).

Eastern False Pipistrelle was not recorded during survey (no targeted survey was undertaken). There are known records of the species within a 5 km radius of the study area (OEH 2015a). There is potential for the study area to be used occasionally by this species for foraging only, although it is unlikely that individuals rely upon resources in the study area.

Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*)

Eastern Bentwing-bat is listed as a vulnerable species under the TSC Act. This species occupies a range of forested environments (including wet and dry sclerophyll forests), along the coastal portion of eastern Australia, and through the Northern Territory and Kimberley area (subject to subdivision of this species) (OEH 2015b).

This species has a fast, level flight exhibiting swift shallow dives. It forages from just above the tree canopy, to many times the canopy height in forested areas, and will utilise open areas where it is known to forage at lower levels. Moths appear to be the main dietary component. This highly mobile species is capable of large regional movements in relation to seasonal differences in reproductive behaviour and winter hibernation. Though individuals often use numerous roosts, it congregates in large numbers at a small number of nursery caves to breed and hibernate. Although roosting primarily occurs in caves, it has also been recorded in mines, culverts, stormwater channels, buildings, and occasionally tree-hollows. This species occupies a number of roosts within specific territorial ranges usually within 300 km of the maternity cave, and may travel large distances between roost sites (OEH 2015b).

Eastern Bentwing-bat is threatened by a number of processes including loss of foraging habitat, damage to or disturbance of roosting caves (particularly during winter or breeding), application of pesticides in or adjacent to foraging areas, and predation by feral cats and foxes (OEH 2015b).

Eastern Bentwing-bat was not recorded during the surveys (no targeted survey was undertaken). There are known records of the species within a 5 km radius of the study area (OEH 2015a). There is potential for the study area to be used occasionally by this species for foraging only, although it is unlikely that individuals rely upon resources in the study area.

Eastern Freetail-bat (*Mormopterus norfolkensis*)

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Eastern Freetail-bat is listed as vulnerable under Schedule 2 of the TSC Act. It is found along the east coast from south Queensland to southern NSW in dry eucalypt forests, woodlands, swamp forests and mangrove forests where they forage for insects among canopy gaps and on edges of vegetation and mainly roost in hollow-bearing trees. This species will utilise paddock trees and remnant vegetation in farmland where these are in proximity to larger forest remnants. This species usually forages within a few kilometres of its roost (OEH 2015b).

Eastern Freetail Bat is threatened by a number of processes including loss of trees for foraging and hollow-bearing trees for roosting, and application of pesticides in or adjacent to foraging areas (OEH 2015b).

Eastern Freetail Bat was not recorded during the surveys as no targeted survey was undertaken. There are known records of the species within a 5 km radius of the study area (OEH 2015a). There is potential for the study area to be used occasionally by this species for foraging only, although it is unlikely that individuals rely upon resources in the study area.

Southern Myotis (*Myotis macropus*)

Southern Myotis is listed as vulnerable under Schedule 2 of the TSC Act. The species will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to water. While roosting is most commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains. However the species apparently has specific roost requirements, and only a small percentage of available caves, mines, tunnels and culverts are used (OEH 2015b).

Southern Myotis was not recorded during the surveys as no targeted survey was undertaken. There are known records of the species within a 5 km radius of the study area (OEH 2015a). There is potential for the study area to be used occasionally by this species for foraging only, although it is unlikely that individuals rely upon resources in the study area.

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.

Factors likely to have an adverse effect on the life cycle of the Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis would include a substantial loss of roosting habitats such as cliffs, mines and caves, loss and/or fragmentation of foraging habitat around these roosting sites, pesticide usage and inappropriate fire regimes.

The proposal will remove 0.33 ha of remnant native vegetation, 0.25 ha of scattered paddock trees and 0.06 ha of aquatic habitat, representing potential foraging and roosting habitat for the Large-eared Pied Bat, Eastern Freetail Bat and Southern Myotis, and foraging habitat only for the Eastern Bentwing Bat.

The Large-eared Pied Bat, Eastern Bentwing Bat, Eastern Freetail Bat and Southern Myotis are highly mobile and has a large home range. There is higher quality habitat available in the surrounding landscape, therefore the species is considered likely to use the study area on an occasional basis and would not be dependent on the foraging resources within the study area.

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The proposal will remove six hollow-bearing trees with providing potential roosting habitat for Large-eared Pied Bat, Eastern Freetail Bat and Southern Myotis. However, the removal of the hollow bearing trees will be offset by installation of bat boxes within the riparian corridor, at a ratio of 1:1. In addition, pre-clearance surveys will be undertaken to mitigate injury and mortality impacts on any roosting microbats.

The habitat to be removed is already fragmented therefore the proposed works would not significantly fragment Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis habitat.

Thus, it is unlikely that the loss of vegetation/potential foraging habitat will significantly disrupt the life cycle of these species such that a viable local population is placed at risk.

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. Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis are not an endangered population.

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. Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis are not an endangered ecological community.

d) in relation to the habitat of a threatened species, population or ecological community:

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

The proposal would remove 0.33 ha of remnant native vegetation, 0.25 ha of scattered paddock trees and 0.06 ha of aquatic habitat, representing potential foraging habitat for Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis.

The proposal will remove six hollow-bearing trees. However, three hollow bearing trees will be retained within the study area and the removal of the hollow bearing trees will be offset by installation of bat boxes within the riparian corridor, In addition, pre-clearance surveys will be undertaken to mitigate injury and mortality impacts on any roosting microbats.

The proposed disturbance of potential habitat is minimal when considering that large areas of potential foraging habitat are present on surrounding lands and accessible to these highly mobile species, and removal of potential roosting habitat will be offset at a ratio of 1:1 within

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the riparian corridor. Therefore, the amount of potential foraging and roosting habitat disturbed due to the proposal is not likely to represent a significant loss to the species.

(ii) 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

The vegetation with the site has undergone past disturbance and in some areas remains as scattered trees with an exotic understorey. Given the vegetation proposed for removal is on the fringe of the community in the north and the remainder is comprised of scattered trees, the proposed works will not fragment or isolate areas of potential breeding or foraging habitat for the Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis.

(iii) 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 remove 0.33 ha of remnant native vegetation, 0.25 ha of scattered paddock trees and 0.06 ha of aquatic habitat. However, the potential habitat that will be removed is not likely to be important habitat to these species. This is due primarily to the relatively small area of the proposed clearing when considering the extent of surrounding vegetation which constitutes potential foraging and roosting habitat, no caves will be disturbed, and removal of hollow bearing tree will be offset at a ratio of 1:1 within the riparian corridor.

The proposal will remove six hollow-bearing trees. However, three hollow bearing trees will be retained within the study area and a large number of hollow-bearing trees are likely to occur within the surrounding landscape. In addition, pre-clearance surveys will be undertaken to mitigate injury and mortality impacts on any roosting microbats.

Therefore, the disturbance of a small amount of potential foraging and roosting habitat is unlikely to affect the long-term survival of the species in the locality.

e) Whether the action proposed is likely to have an adverse effect on critical habitat.

No critical habitat has been declared for the Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

No recovery plan or threat abatement plan has been prepared for the Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis.

g) 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.

Two key threatening processes are relevant to this proposal with respect to the Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis:

- clearing of native vegetation
- loss of hollow bearing trees
- .

Whilst the proposal would increase the impact of these key threatening process, the scale of the impact is not considered significant, given the relatively small area of the proposed clearing

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when considering the extent of surrounding vegetation which constitutes foraging habitat and that removal of hollow bearing tree will be offset at a ratio of 1:1 within the riparian corridor.

Conclusion

The proposal is unlikely to constitute a significant impact on Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Southern Myotis, given that:

- The proposed works would constitute a minor disturbance to an area of foraging and roosting habitat within the study areas.
- The proposed works will not disturb any caves or adjacent habitat.
- The proposal will remove six hollow-bearing trees. However, three hollow bearing trees will be retained within the study area.
- Removal of hollow bearing trees will be offset at a ratio of 1:1 within the riparian corridor.
- Larger areas of suitable foraging habitat are present within the surrounding landscape.
- The proposal would not isolate or fragment any currently connecting areas of habitat in terms of use by highly mobile species.

Consequently, a SIS is not required for the proposal with respect to these species.

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EPBC Act Significance Impact Assessment

The EPBC Act Administrative Guidelines on Significance set out 'Significant Impact Criteria' that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance include:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of International Importance
- The Commonwealth marine environment
- World heritage properties
- National heritage places
- Nuclear actions

Specific 'Significant Impact Criteria' are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for species listed as critically endangered, endangered and vulnerable under the EPBC Act.

THREATENED ECOLOGICAL COMMUNITIES

MAMMALS

***Pteropus poliocephalus* (Grey-headed Flying-fox)**

Grey-headed Flying-fox (GHFF) is listed as a vulnerable threatened species under the EPBC Act.

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

Criterion a: lead to a long-term decrease in the size of an important population of a species

The proposal would remove 0.33 ha of remnant native vegetation and 0.25 ha of scattered paddock trees, with an exotic ground cover, representing potential foraging habitat for the GHFF. No known camps would be impacted.

There is a single interbreeding population of GHFF in Australia, and as such, any colony or individual of the species is an important population of the species. The proposal is unlikely to lead to a long-term decrease in the size of an important population. The amount of potential foraging habitat that would be removed is minimal. The closest camp is located approximately 12 km east of the subject site. No camps would be impacted. The study area would only be used on an occasional basis for foraging. Foraging habitat exists in the surrounding landscape, and this species is wide-ranging, travelling up to 50 km in one night.

Therefore, the proposal will not lead to a long-term decrease in the size of an important population.

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Criterion b: reduce the area of occupancy of an important population

There is a single interbreeding population of GHFF in Australia, and as such, any colony or individual of the species is an important population of the species. The proposal is unlikely to reduce the area of occupancy of an important population given that no campsites have been recorded within the study area and that extensive foraging habitat exists in the surrounding landscape.

Criterion c: fragment an existing important population into two or more populations

There is a single interbreeding population of GHFF in Australia, and as such, any colony or individual of the species is an important population of the species. The proposal is unlikely to fragment an existing important population into two or more populations as the species is highly mobile; the proposed work would not be a barrier to movement. The area of habitat that would be impacted for the proposed development is already fragmented. Removal of sparse patches of remnant native vegetation and scattered paddock tree, with an exotic ground cover, would not fragment the habitat of such a wide-ranging and mobile species. Therefore, the proposed action would not fragment an existing population into two or more populations.

Criterion d: adversely affect habitat critical to the survival of a species

Habitat critical to the survival of the GHFF is any habitat within 50 km of a known camp with over 20,000 roosting individuals. The study area is located 12 km west of a known camp however the camp does not meet this criteria. The proposed works will not directly impact the camp and would result in the removal of a small amount of marginal foraging habitat consisting of 0.33 ha of remnant native vegetation and 0.25 ha of scattered paddock trees, with an exotic ground cover. Given the highly mobile nature of the species and the fact that the vegetation to be removed on site does not represent primary roosting or foraging habitat and extensive areas of habitat are present adjacent to the study area and within the locality, the proposed works is not considered to have an adverse impact of habitat critical to the survival of the species.

Criterion e: disrupt the breeding cycle of an important population

As no roosting habitat would be removed or disturbed, it is unlikely the proposed work would disrupt the breeding cycle of an important population. Potential foraging habitat to be removed is minimal and unlikely to affect the amount of resources available to any breeding individuals.

Criterion f: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

Given the highly mobile nature of the species and the fact that the vegetation to be removed on site does not represent primary roosting or foraging habitat and extensive areas of habitat are present adjacent to the study area and within the LGA, the proposed works will not modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;

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The proposal would not result in invasive species, such as weeds, that would be harmful to GHFF. It is unlikely that the proposed works will result in an increased number of weeds due to the current disturbed nature of the site and mitigation measures.

Criterion h: Introduce disease that may cause the species to decline;

GHFF are reservoirs for the Australian bat lyssavirus and can cause clinical disease and mortality in the species. The proposed works are unlikely to present a significant ecological stress on known individuals or camps utilizing the subject site and therefore unlikely to affect this species. The proposed works would be unlikely to introduce a disease that may cause this species to decline.

Criterion i: Interfere substantially with the recovery of the species;

Draft National Recovery Plan for the GHFF was developed in 2009.

Specific objectives to be met in the 5-year timeframe of the recovery plan relevant to this project include:

- To identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes throughout their range.
- To protect and increase the extent of key winter and spring foraging habitat of
- Grey-headed Flying-foxes
- To identify roosting habitat critical to the survival of Grey-headed Flying-foxes
- To protect and enhance roosting habitat critical to the survival of Grey-headed
- Flying-foxes

As no roosting habitat would be removed and foraging habitat exists in the surrounding landscape, the proposed works would be unlikely to interfere with the recovery of this species.

Conclusion

Based on the above assessment it is concluded that the proposed works is unlikely to have a significant impact on a population of GHFF. As such, no referral to the Commonwealth Department of Environment for assessment and approval by the Environment Minister is recommended.

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