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# Sydney Science Park – Luddenham Road LUD3 Intersection - Flora and Fauna Assessment Report

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**Prepared for Celestino Developments SSP Pty Ltd**

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Template 2.8.1

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## Abbreviations

Abbreviation	Description
BC Act	<i>Biodiversity Conservation Act 2016</i>
CPW	Cumberland Plain Woodland
DAWE	Commonwealth Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and the Environment
ELA	Eco Logical Australia Pty Ltd
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFA	Flora and Fauna Assessment
FM Act	<i>NSW Fisheries Management Act 1994</i>
KTP	Key Threatening Process
LEP	Local Environment Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	Office of Environment and Heritage (now Environment and Heritage)
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
TEC	Threatened ecological community
WM Act	<i>NSW Water Management Act 2000</i>
WoNS	Weeds of National Significance

## Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Celestino Developments SSP Pty Ltd to prepare a Flora and Fauna Assessment Report (FFA) for the proposed LUD3 Intersection at Sydney Science Park (SSP), Lot 206 DP1280188, Lot 205 DP1280188, Lot 204 DP1280188 Lot 24 DP1277418, Lot 25 DP1277418 Road, Luddenham NSW 2745. The proposal is within Lot 6 DP 255578. The total study area size is 4.69 ha. The works are to be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Flora and Fauna Assessment documents the ecological values within the study area and considers the current environmental planning legislation.

The study area is wholly located within the Cumberland Plain Conservation Plan (CPCP) Area, released in August 2022. The proposal is within 'excluded land' under the CPCP, which is not biodiversity certified and hence requires assessment of biodiversity values under the *Biodiversity Conservation Act 2016* (BC Act).

A total of 0.13 ha of Plant Community Type (PCT) 3320 *Cumberland Shale Plains Woodland* was identified within the study area in poor condition. Of this, 0.13 ha will be removed because of the proposal. PCT 3320 corresponds to the Threatened Ecological Community (TEC) *Cumberland Plains Woodland in the Sydney Basin Bioregion* under the BC Act. A Test of Significance was undertaken which determined that a significant impact is unlikely to result from the proposal. This PCT does not meet the definition of a TEC under the EPBC Act due to the patch being <0.5 ha in size and the lack of native groundcover (< 30%). As such, no Assessment of Significance was required to be undertaken. Mitigation measures have been recommended within this report to ameliorate potential direct and indirect impacts on planted native vegetation within and adjacent to the proposal.

A total of 4.57 ha of the 4.69 ha development footprint is previously cleared or exotic land that does not conform to a PCT. No threatened flora or fauna BioNet records have previously been recorded within the study area. One potential hollow-bearing trees was identified within the study area and will be removed as a result of the proposal. No threatened flora or fauna species were opportunistically identified during the field survey. Several threatened fauna species were identified through a Likelihood of Occurrence assessment as having the potential to occur within the study area, being:

- *Daphoenositta chrysoptera* (Varied Sittella) – Vulnerable - BC Act listed
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) – Vulnerable - BC Act listed
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat) – Vulnerable - BC Act listed
- *Myotis macropus* (Southern Myotis) – Vulnerable - BC Act listed
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat) – Vulnerable – BC Act listed
- *Scoteanax rueppellii* (Greater Broad-nosed Bat) – Vulnerable - BC Act listed
- *Pteropus poliocephalus* (Grey-headed Flying-fox) – Vulnerable - BC Act and EPBC Act listed
- *Gallinago hardwickii* (Latham's Snipe) – Marine - EPBC Act listed

Tests of Significance were undertaken for species listed under the BC Act, and Assessments of Significance were undertaken for the two species listed under the EPBC Act, which determined that no significant impact is likely to result from the proposal. As such, a Biodiversity Development Assessment Report (BDAR) is not recommended.

# 1. Introduction

This Flora and Fauna Assessment (FFA) has been prepared by Eco Logical Australia Pty Ltd (ELA) for Celestino Developments SSP Pty Ltd, for the proposed Sydney Science Park (SSP) - LUD3 Intersection works at Lot 206 DP1280188, Lot 205 DP1280188, Lot 204 DP1280188 Lot 24 DP1277418, Lot 25 DP1277418, Luddenham NSW 2745. The proposal is known as 'LUD3 Intersection', referred to as the proposal or proposed works in this report. The study area is located within the Northern Gateway precinct of the Western Sydney Aerotropolis, within the City of Penrith Local Government Area (LGA). The proposal will be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

## 1.1. Background and purpose

This report describes impacts as a result of the proposal on native vegetation, threatened species, populations and communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and associated habitat features as a result of the proposal. The impact assessment in this report is based on information gathered from data searches and field investigations. The report sets out the legislative context, methods used, impacts to the environment and recommendations to minimise these impacts.

## 1.2. Terms used in this report

The following terminology has been used for this report:

- *Study area* – the area subject to development and encompasses part of the following lots: Lot 206 DP1280188, Lot 205 DP1280188, Lot 204 DP1280188 Lot 24 DP1277418, Lot 26 DP1277418. The study area is presented in Figure 1.
- *Development footprint* – describes the boundary of the proposal where impacts are proposed, which is the same as the study area presented in Figure 1. This refers to the direct impact area and does not include the area of potential indirect impacts resulting from construction.
- *Buffer* – a nominal 10m buffer which may be required to facilitate development.

## 1.3. Description of the study area

The study area encompasses a section of the existing road reserve on Luddenham Road (approximately 650 m in length) and land within properties either side of this section, in the following Lot and Deposited Plan (DP) numbers and landownership:

- Lot 204 DP 1280188 (Celestino) known as 581 Luddenham Road, Luddenham
- Lot 206 DP 1280188 (Celestino) known as 599 Luddenham Road, Luddenham
- Lot 205 DP 1280188 (Metro)
- Lot 24 DP1277418 (Metro)
- Lot 26 DP1277418 (Metro)
- Road reserve (Penrith City Council)

The study area comprises a total of 4.69 ha of land. The study area is approximately 11 km southwest of the Penrith city centre and 42 km east of the Sydney central business district (CBD). The development footprint is approximately 3.22 ha in size, and the construction buffer is 1.47 ha.



The entire study area is within the Cumberland Plain Conservation Plan (CPCP) Area (Figure 1). The development footprint is not biodiversity certified (Figure 2).

#### 1.4. Description of proposal

The works (the proposal) includes the construction of a 650 m upgrade of part of Luddenham Road including provision of a new interim signalised intersection, relocation of services and associated site works (Figure 1).

The proposed development seeks development consent for the following works:

- removal of trees and vegetation
- construction of 650 m road including the following:
  - road widening to facilitate dual approach and departure lanes on Luddenham Road within an approximate road reserve width of 20m to 31m including kerbs, medians, traffic islands and footpaths;
  - provision of a three-way signalised intersection to provide principal access to Sydney Science Park (SSP);
  - provision of a signalised pedestrian crossing on all approaches of the intersection; and
  - installation of safety barrier, signage, line marking and lighting;
- Construction of access road including slip lanes on the western side of Luddenham Road to provide access to SSP. Construction of internal access track to facilitate access to Sydney Water Corporation Integrated Water Recycling Facility located within SSP; Reconstruction of slip lane on eastern side of Luddenham road to maintain construction access to the Metro Viaduct. Reconstruction of temporary left in/left out construction access for Sydney Metro.
- Removal and relocation of the overhead and underground electrical services located in the existing road reserve. *Note: The intent is to not relocate an existing 132 kV line within the existing Luddenham Road reserve; however, this is subject to detailed design.*
- Removal and relocation of the underground telecommunication services located in the existing road reserve.
- Reconfiguration of the existing stormwater inlet and outlet headwalls in the existing road reserve; and
- associated demolition works, earthworks, environmental management, civil and stormwater management, and landscaping works.

The DA also seeks consent for construction staging works, as noted below:

- Stage 1: Construct northbound carriageway including access road to Sydney Science Park and carry out west verge electrical relocation.
- Stage 2: Divert traffic to northbound lanes with east lane to operate as a southbound lane temporarily during construction work. Demolish existing Luddenham Road pavement and construct southbound carriageway including Metro construction access road. Carry out telecommunications relocation.



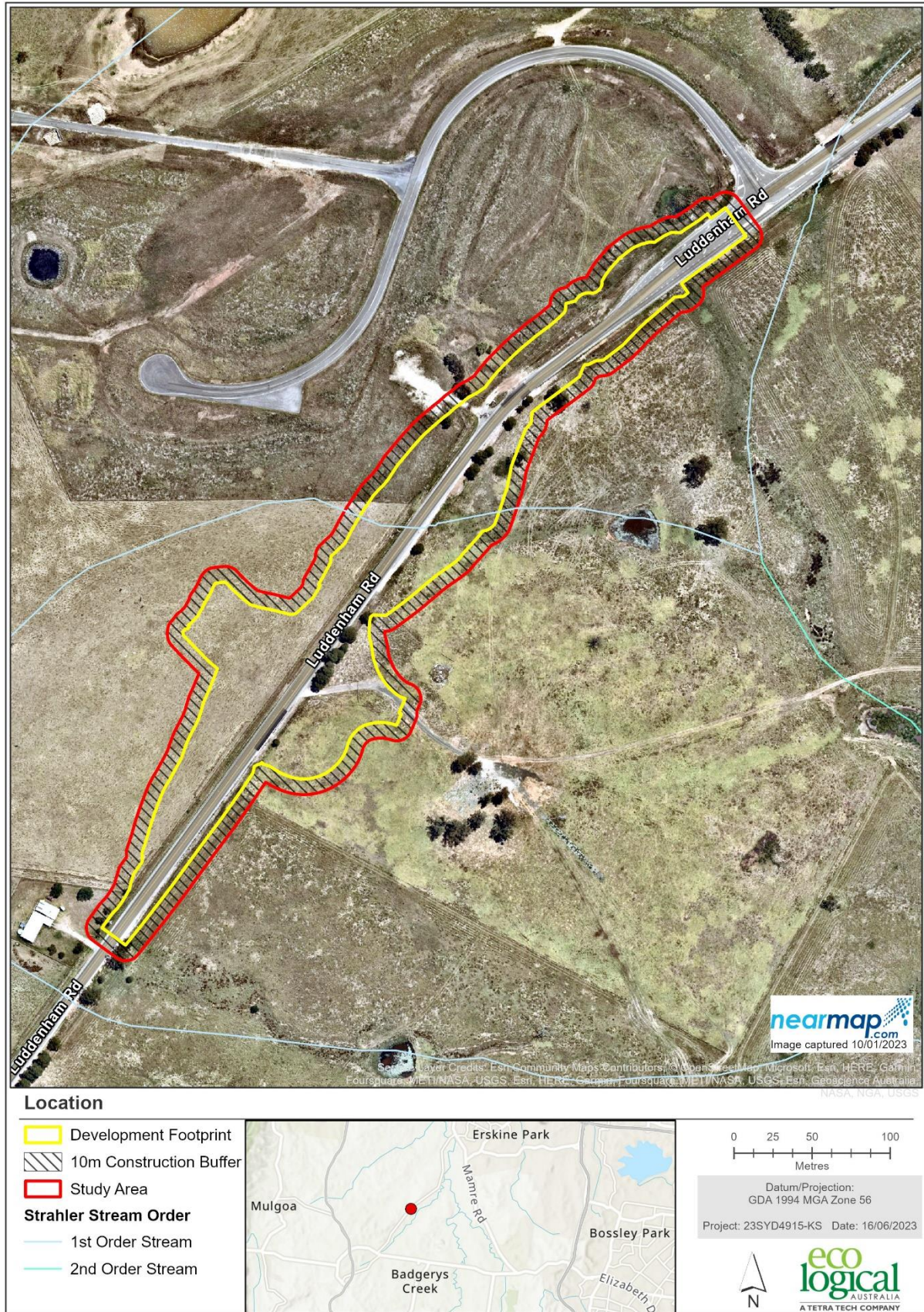


Figure 1: Location of the proposal



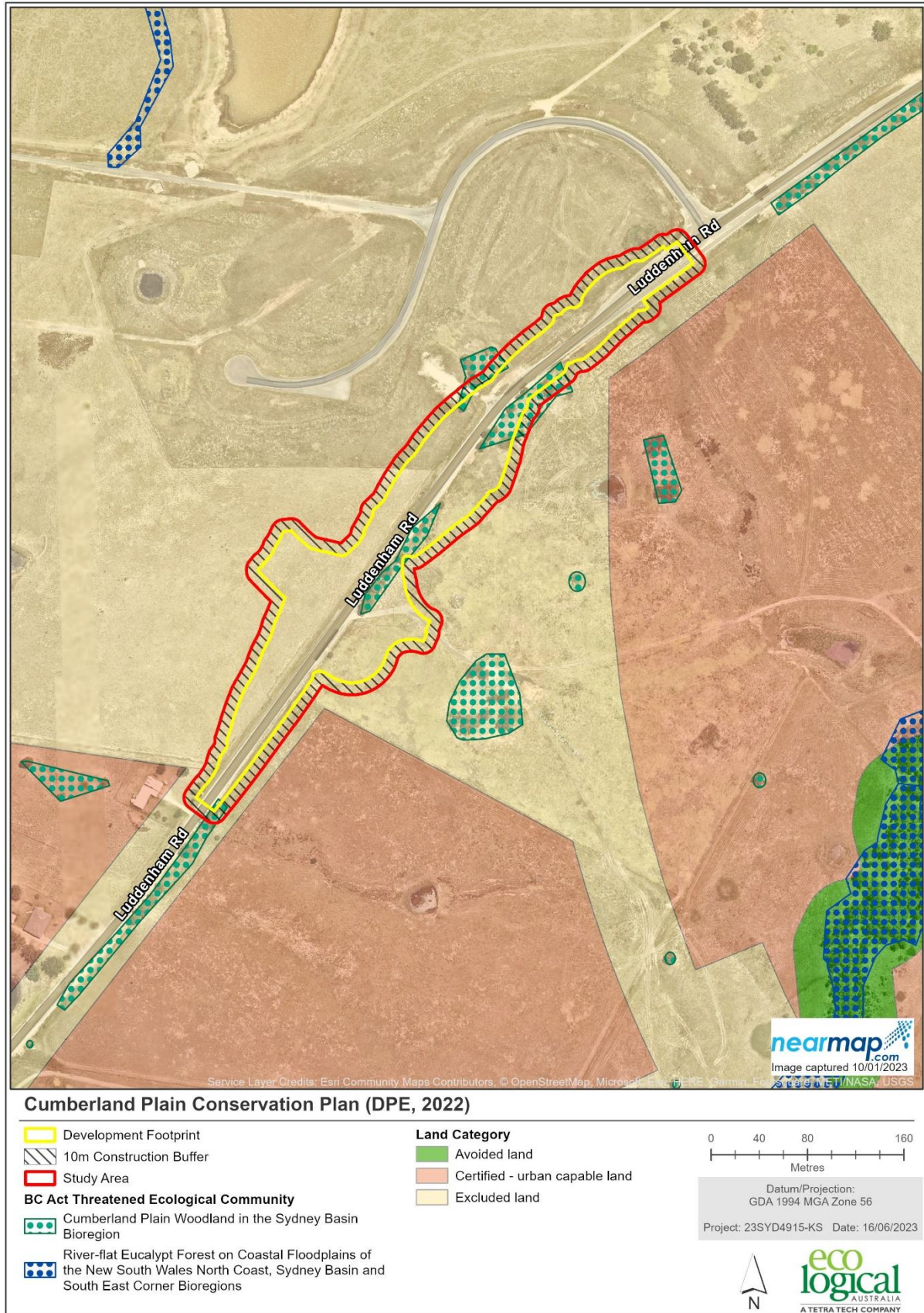


Figure 2: Cumberland Plain Conservation Plan (CPCP) certification in relation to the study area.

## 2. Legislative context

### 2.1. Commonwealth and State Legislation

**Table 1: Legislation relevant to the proposal**

Name	Relevance to the project	Section
<b>Commonwealth Legislation</b>		
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)	<p>The EPBC Act aims to protect Matters of National Environmental Significance (MNES) including wetlands of international importance, threatened species and communities, and listed migratory species. An action that may or is likely to have a significant impact on MNES should be referred to the Commonwealth to determine whether it is a Controlled Action that requires approval from the Commonwealth.</p> <p>The following MNES were identified as having the potential to occur within the study area:</p> <ul style="list-style-type: none"> <li><i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)</li> <li><i>Gallinago hardwickii</i> (Latham's Snipe).</li> </ul> <p>An Assessment of Significance was prepared for each of these species and determined that the proposed impacts are unlikely to result in a significant impact.</p>	Section 5.3
<b>State Legislation</b>		
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act)	<p>The EP&amp;A Act is the principal planning legislation for NSW, providing a framework for the overall environmental planning and assessment of development proposals. The EP&amp;A Act places a duty on the determining authority to adequately address a range of environmental matters including maintenance of biodiversity and the likely impact to threatened species, populations, or ecological communities.</p> <p>The proposal are to be assessed under Part 4 of the EP&amp;A Act.</p>	All sections
<i>Biodiversity Conservation Act 2016</i> (BC Act)	<p><b>Threatened species</b></p> <p>Section 7.3 of the BC Act requires proponents of activities subject to Part 4 of the EP&amp;A Act to determine whether they will have a significant impact on threatened species. The test for significant impact is described in Section 7.3 of the BC Act. A significant impact also occurs if the activity is carried out in an area of outstanding biodiversity value.</p> <p>A Likelihood of Occurrence assessment has been completed (Appendix A). It was concluded that 9 threatened fauna species recorded within 5 km of the study area has the potential to be affected by the proposal. Therefore, Tests of Significance under the BC Act were undertaken (Appendix B).</p> <p>It was determined that no significant impact is likely to result from the proposal and the preparation of a Biodiversity Development Assessment Report (BDAR) is not required.</p> <p><b>Threatened Ecological Communities</b></p> <p>One threatened ecological community (TEC), being <i>Cumberland Plain Woodland in the Sydney Basin Bioregion</i>, was identified within the study area. A Test of Significance under the BC Act was undertaken (Appendix B). It was determined that no significance impact is likely to result from the proposal.</p> <p><b>Biodiversity Certification</b></p> <p>The study area is within the CPCP Area (Figure 2), being entirely within excluded land. This land category definition under the CPCP is:</p> <ul style="list-style-type: none"> <li><b>Excluded land</b> is land for which biodiversity certification and the Commonwealth strategic assessment approval will not be sought.</li> </ul> <p>The study area is within proximity to, but not within, Certified – urban capable land. This land category definition under the CPCP is:</p>	Section 5.2

Name	Relevance to the project	Section
	<ul style="list-style-type: none"> <li><b>Certified – urban capable land</b> identifies land for future urban development. Certified-urban capable land is biodiversity certified under the BC Act.</li> </ul> <p>Biodiversity certification removes the need for biodiversity assessment under BC Act. As the proposal takes place within ‘excluded land’ under the CPCP, this report has been prepared to address the assessment requirements under the BC Act.</p>	
<i>Fisheries Management Act 1994</i> (FM Act)	<p>The objectives of the FM Act are to conserve, develop and share the fishery resources of the State for the benefits of present and future generations. The FM Act provides protection and approval processes for activities which may impact on threatened species, protected marine vegetation, or involve dredging, reclamation, or obstruction of fish passage.</p> <p>The proposal does not involve impacts to Key Fish Habitat, harm to marine vegetation, dredging, reclamation or obstruction of fish passage. A permit or consultation under Part 7 of the FM Act is not required.</p>	N/A
<i>Water Management Act 2000</i> (WM Act)	<p>The WM Act aims to provide for the sustainable and integrated management of the state’s water for the benefit for both present and future generations. If a local development is proposed on ‘waterfront land’ (within 40 m of the top of bank), it is considered a Controlled Activity and requires a Controlled Activity Approval (CAA) approval under s91 of the WM Act.</p> <p>The proposal is located within 40 m of waterfront land; therefore, a CAA is required.</p>	N/A

## 2.2. Environmental Planning Instruments (EPI)

**Table 2: Environmental Planning Instruments relevant to the project**

Name	Relevance to the project	Section
Cumberland Plain Conservation Plan 2022 (CPCP)	<p>The Cumberland Plain Conservation Plan (the CPCP) is one of the largest strategic conservation plans to be undertaken in Australia. It identifies strategically important biodiversity areas within the Cumberland subregion to offset the biodiversity impacts of future urban development to facilitate a green and liveable city.</p> <p>The CPCP provides for biodiversity certification within certain land categories. Works in certified-urban capable or major transport corridor land does not require further site by site biodiversity assessment or approval under the BC Act, if consistent with the CPCP and its approvals. The study area is located within the CPCP Area, within excluded land (non-certified). Assessment of biodiversity under the BC Act has been undertaken within this report.</p>	Section 5.2.2

Name	Relevance to the project	Section
State Environmental Planning Policy (Precincts – Western Parkland City) 2021 Western Parkland City SEPP	<p>The study area is within the Northern Gateway Precinct of the Western Sydney Aerotropolis, pursuant to Section 4.3 of the Western Parkland City SEPP.</p> <p>Land use zoning is presented in Figure 3. The following land use zones and objectives apply to the study area under Chapter 4 of the SEPP:</p> <p><b>ENT Enterprise</b></p> <ul style="list-style-type: none"> <li>• <i>To encourage employment and businesses related to professional services, high technology, aviation, logistics, food production and processing, health, education and creative industries.</i></li> <li>• <i>To provide a range of employment uses (including aerospace and defence industries) that are compatible with future technology and work arrangements.</i></li> <li>• <i>To encourage development that promotes the efficient use of resources, through waste minimisation, recycling and re-use.</i></li> <li>• <i>To ensure an appropriate transition from non-urban land uses and environmental conservation areas in surrounding areas to employment uses in the zone.</i></li> <li>• <i>To prevent development that is not compatible with or that may detract from the future commercial uses of the land.</i></li> <li>• <i>To provide facilities and services to meet the needs of businesses and workers.</i></li> </ul> <p><b>MU Mixed Use Zone</b></p> <ul style="list-style-type: none"> <li>• <i>To integrate a mixture of compatible land uses in accessible locations.</i></li> <li>• <i>To promote business, office, retail, entertainment and tourist uses.</i></li> <li>• <i>To promote a high standard of public amenity and convenient urban living.</i></li> <li>• <i>To provide for residential and other accommodation that includes active non-residential uses at street level.</i></li> <li>• <i>To ensure an appropriate transition from non-urban land uses and environmental conservation areas in surrounding areas to urban land uses in the zone.</i></li> </ul>	All sections



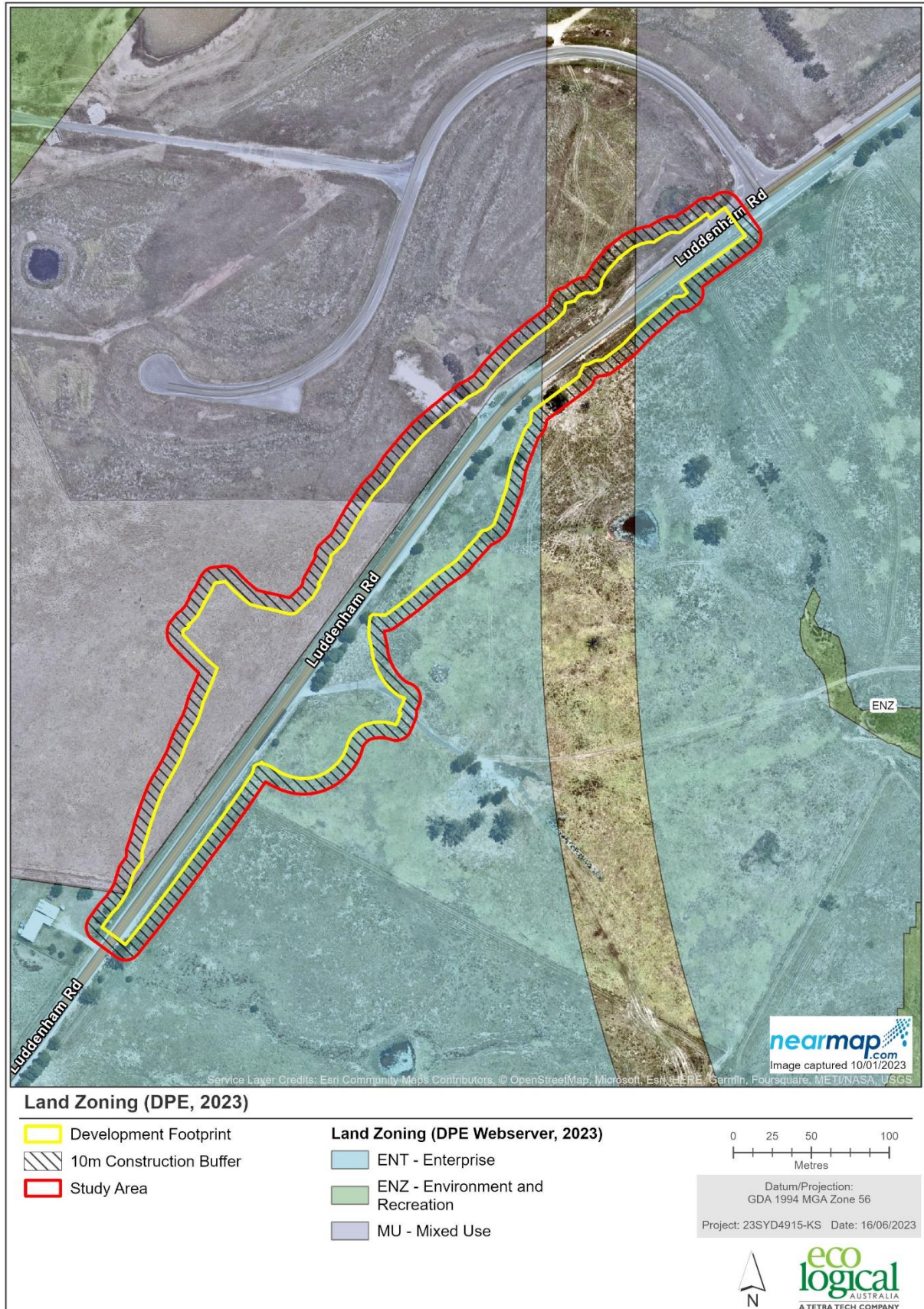


Figure 3: Land Zoning

## 3. Methodology

### 3.1. Literature review and database search

A review of readily available databases pertaining to the ecology and environmental features of the entire extent of the study area and surrounding area, and existing vegetation mapping was conducted to identify records of threatened species, populations and communities and their potential habitat.

Databases and vegetation mapping that were reviewed included:

- Previous vegetation mapping under the State Vegetation Type Map (DPE, 2022a)
- BioNet (Atlas of NSW Wildlife) database search (5 km) for threatened species, populations and ecological communities listed under the BC Act (DPE, 2023b) (Accessed March 2023).
- EPBC Act Protected Matters Search Tool (PMST) within a 5 km radius for threatened and migratory species, populations and ecological communities listed under the Commonwealth EPBC Act (DCCEEW, 2023a).
- Review of relevant planning instruments, documentation, and information relating to biodiversity values and threatened habitat.
- Aerial photography (Google Street View and Google Earth) of the study area and surrounds were also used to investigate the extent of vegetation cover and landscape features.
- Relevant Geographic Information System (GIS) datasets (including soil, geology) via eSpade (DPE, 2023c).

Species from both the BioNet Wildlife Atlas and DCCEEW online search were combined to produce a list of threatened species, populations and communities that may occur within the study area. The likelihood of occurrences for threatened species, populations and communities in the study area were then determined based on location of database records, the likely presence or absence of suitable habitat in the study area, and knowledge of the species' ecology. This information informed the subsequent field assessments.

After the field inspections had been completed the likelihood of occurrence of each species, population or community was revised. This was based on the increase in knowledge about the extent and type of habitats and which species were present on the study area. The likelihood of occurrence of species, populations and communities following the field inspection is presented within the likelihood table in Appendix A.

### 3.2. Field survey

The field survey was conducted by ELA ecologist Tim Maher on 16 March 2023. The field survey covered the study area and included:

- validation of existing vegetation mapping, determining type, condition and extent within the study area;
- threatened flora and fauna habitat assessment;
- assessment of waterbodies, dams, leaf litter, fallen logs and nests
- opportunistic fauna sightings.



Vegetation mapping was completed using Avenza Maps on a smart phone. Sections of the study area were inaccessible, so vegetation in these areas was mapped based on what could be observed from the road verge of Luddenham Road. Vegetation mapping was also based on previous vegetation survey done by ELA adjacent the study area. Where a habitat feature was identified, it was marked using Avenza Maps and details of the habitat feature noted down, including type, signs of use and size. Opportunistic sightings of fauna were recorded on a smart phone.

#### 3.2.1. Habitat assessment

The presence of threatened fauna species identified as having potential to occur in the study area was determined through a habitat assessment. One hollow bearing tree was spatially recorded in the development footprint.

#### 3.2.2. Survey limitations

The entire study area could not be accessed on foot due to access restrictions. This assessment was not intended to provide an inventory of all species across the study area. Instead, it provides an overall assessment of the ecological values of the study area with emphasis on threatened species, endangered communities, and key fauna habitat features such as hollow-bearing trees.

## 4. Results

### 4.1. Literature Review

#### 4.1.1. Soils, geology, and topography

The study area is located on Blacktown soil landscapes near an interchange into the South Creek soil landscape (DPE, 2023c). Blacktown soils lie on Wianamatta Group shale geology and consist of shallow to moderately deep hard setting texture contrast soils.

#### 4.1.2. Hydrology and waterways

Three mapped first order watercourses (Strahler classification) are located within the development footprint. There is no Key Fish Habitat in proximity to the study area.

#### 4.1.3. Vegetation mapping

Previous vegetation mapping within the study area (DPE, 2022a) identified PCT 3320 *Cumberland Shale Plains Woodland*, previously known as the decommissioned PCT 849: *Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*. PCT 3320 is associated with the critically endangered ecological community listed as *Cumberland Plain Woodland in the Sydney Basin Bioregion* under the BC Act and *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* under the EPBC Act. This mapping is presented in Figure 5.

#### 4.1.4. Threatened flora and fauna

The BioNet Atlas search (DPE, 2022b) returned 11 threatened flora species and 31 threatened fauna species previously recorded within a 5 km radius of the study area (Figure 6). No BioNet records for threatened flora or fauna species were identified as having been previously recorded within the study area.

A further 35 species were identified through the Protected Matters Search Tool (PMST) which identifies MNES with the potential to occur within the study.

A Likelihood of Occurrence assessment has been completed in Appendix A.



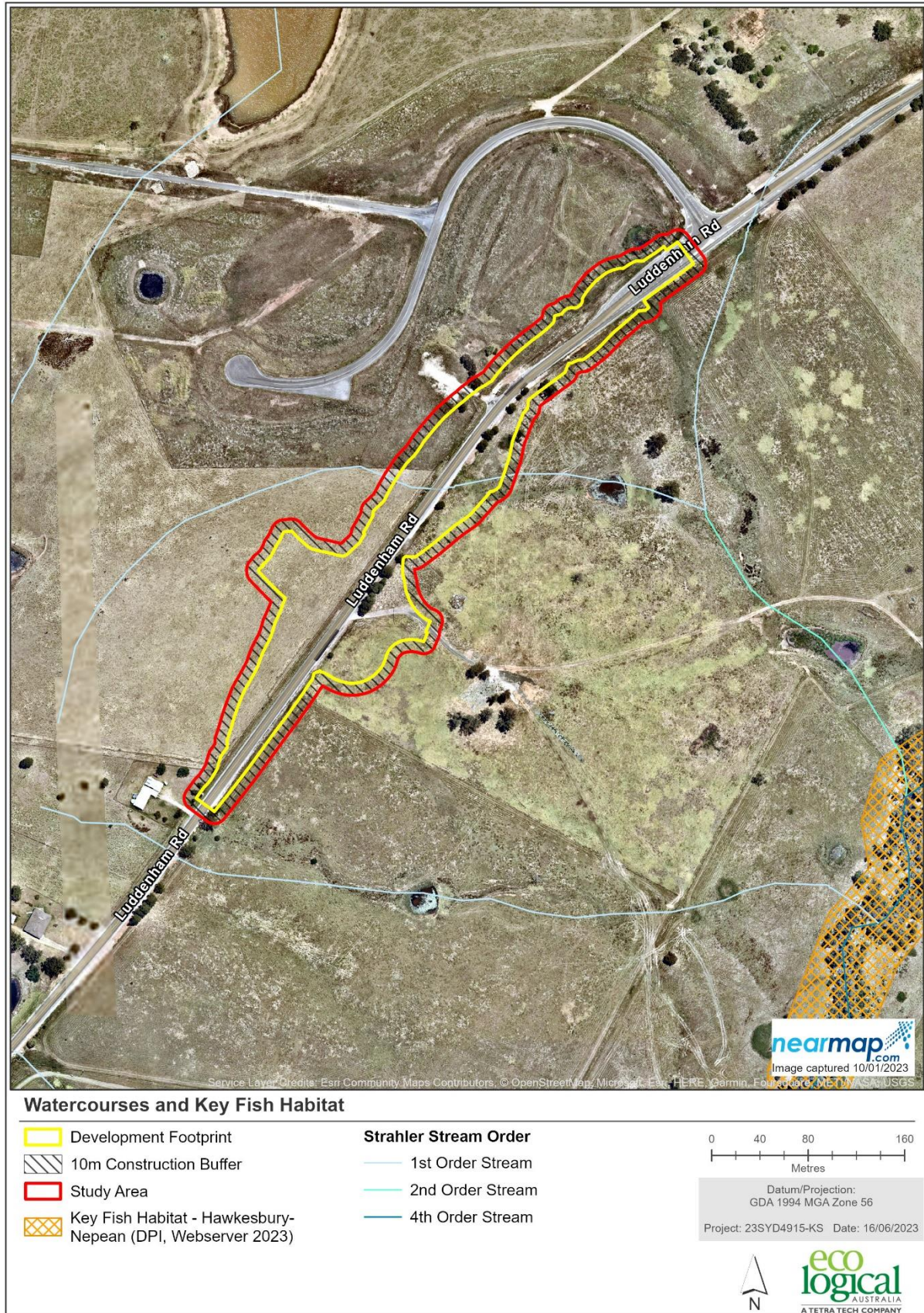


Figure 4: Mapped Strahler streams and Key Fish Habitat in relation to the study area



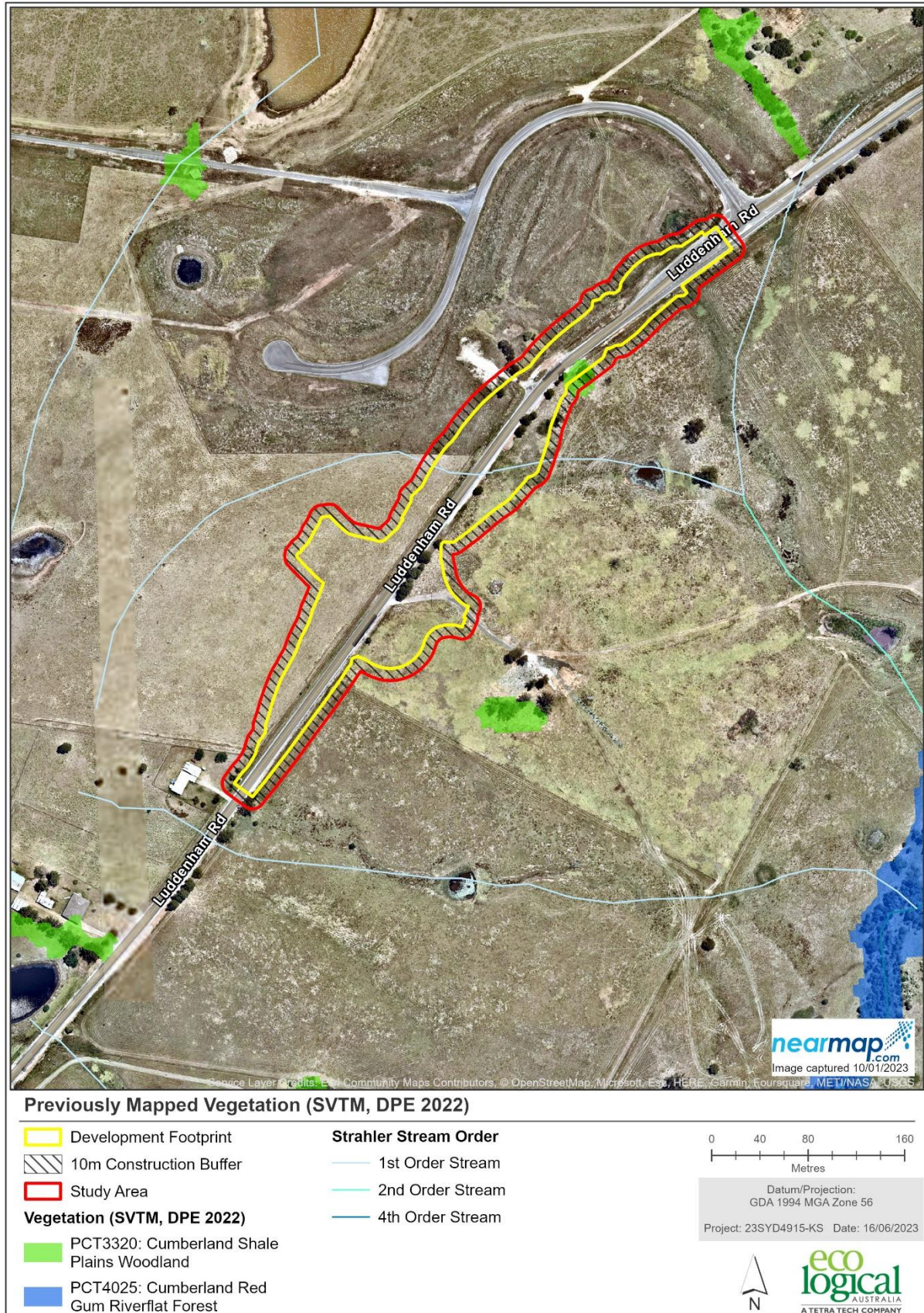


Figure 5: Previous vegetation mapping under the State Vegetation Type Map (SVTM) (DPE 2022a)



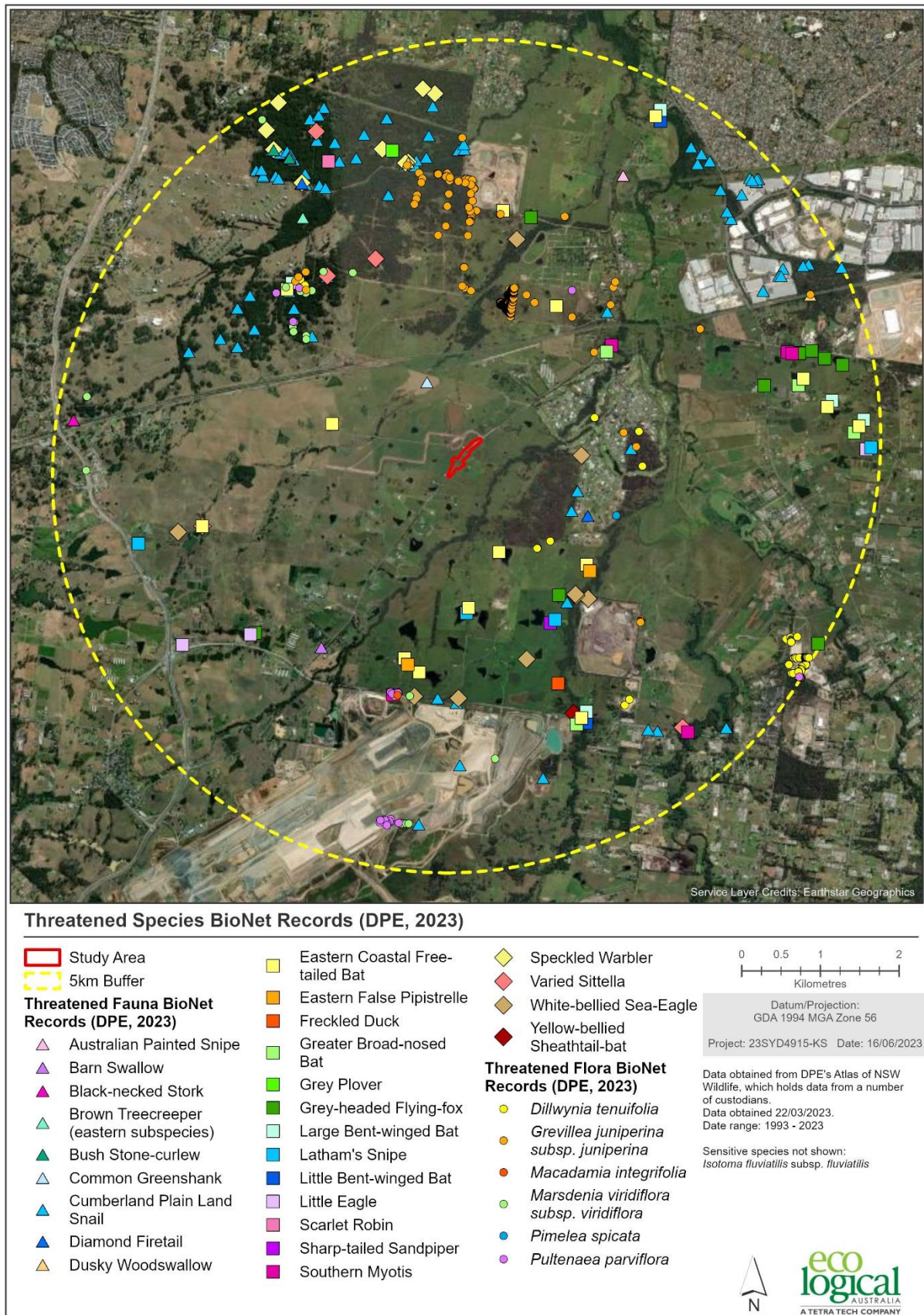


Figure 6: Threatened species records within 5 km radius of the study area (DPE 2023b)

## 4.2. Field Survey

### 4.2.1. Vegetation validation

Vegetation validation of ecological communities was limited to the road verge for the eastern section of the development footprint.

The field survey identified PCT 3320 *Cumberland Shale Plains Woodland* in poor condition. Field survey also identified areas of ‘planted native vegetation’, ‘exotic grass’ vegetation, which did not meet the description of any native PCT. A description of Cumberland Plain Woodland and the associated Threatened Ecological Communities (TEC) is provided in Table 3 below. Table 4 describes the planted native vegetation and Table 5 describes exotic grass also located within the study area.

**Table 3: PCT 3320 description**


PCT 3320 <i>Cumberland Shale Plains Woodland</i>	
<b>Associated TEC</b>	Cumberland Plain Woodland in the Sydney Basin Bioregion
<b>BC Act Conservation Status</b>	Critically Endangered
<b>EPBC Act Conservation Status</b>	No areas of PCT 3320 meet the EPBC Act condition criteria for the threatened ecological community listing.
<b>Vegetation Description</b>	This PCT was present in a few patches located in the east and west of the study area, from Luddenham Road. The canopy of this community consisted of <i>Eucalyptus moluccana</i> (Grey Box) and <i>E. tereticornis</i> (Forest Red Gum), <i>E. fibrosa</i> (Red Iron-bark) and <i>Melaleuca decora</i> . No midstorey was present. The understorey was dominated by exotic pasture grasses and herbaceous weeds including <i>Chloris gayana</i> , <i>Senecio madagascariensis</i> , <i>Paspalum dilatatum</i> and <i>Verbena bonariensis</i> .
<b>Impact area (ha)</b>	0.13 ha
<b>Photo</b>	



Table 4: Planted native vegetation

Exotic grass Vegetation		
Associated TEC	N/A	
BC Conservation Status	Act	N/A
Vegetation Description	Callistemon viminalis (Drooping Bottlebrush) , Lagunaria patersonia (Norfolk Island hibiscus), exotic understorey, including Chloris gayana, Senecio madagascariensis, Paspalum dilatatum and Ehrarta erecta.	
Impact area (ha)	0.01 ha	

Photo



Table 5: exotic grass description

Exotic grass		
Associated TEC	N/A	
BC	Act	N/A
Conservation Status		
Vegetation Description	Areas mapped as cleared / exotic had been previously cleared and subject to agricultural grazing practices. The canopy and midstorey were absent. The groundcover was dominated by exotic pasture grasses including <i>Chloris gayana</i> , <i>Senecio madagascariensis</i> , <i>Paspalum dilatatum</i> and <i>Ehrarta erecta</i> .	
Impact area (ha)	3.73 ha	

Photo





Exotic grass





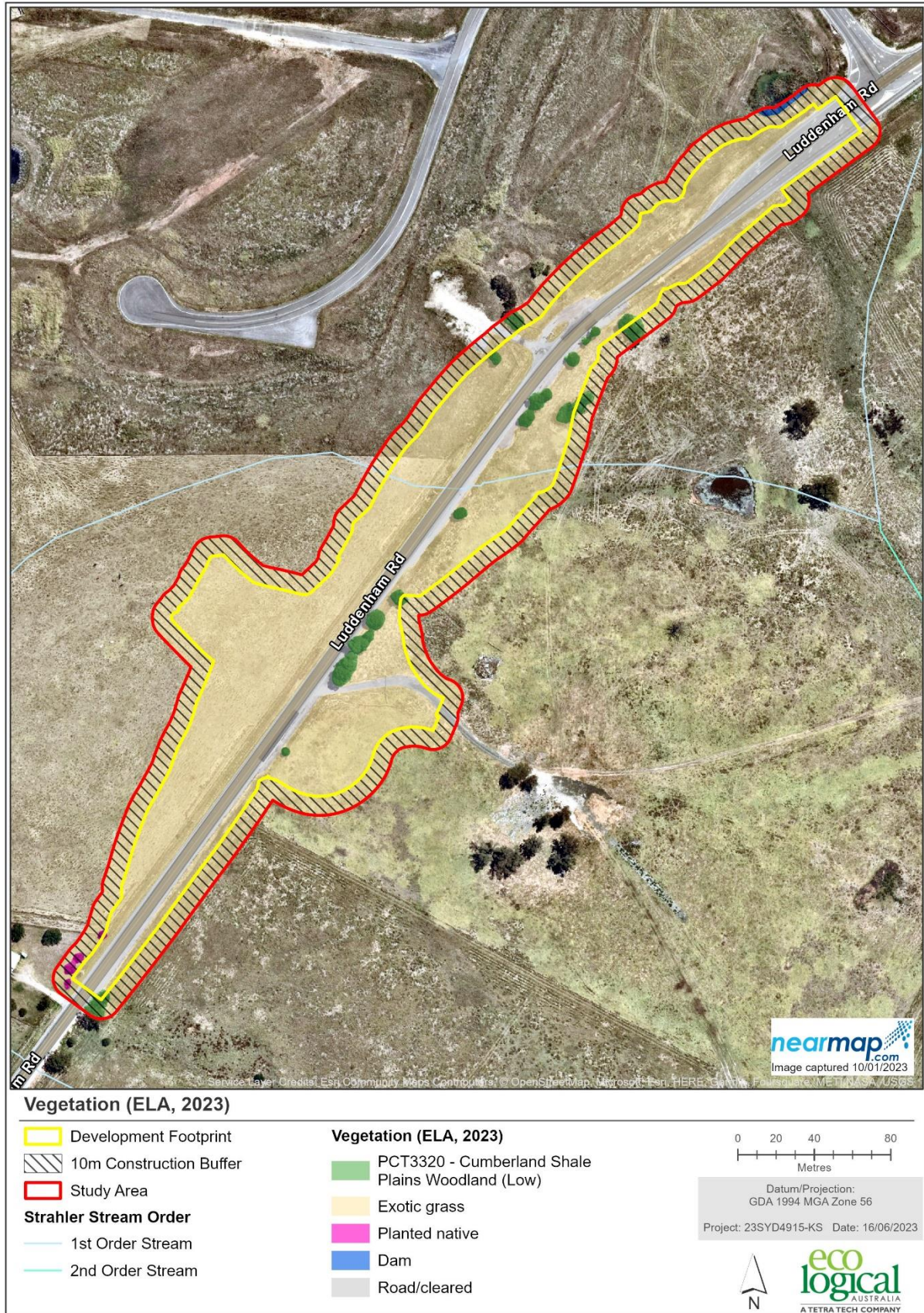


Figure 7: Validated vegetation within the study area (ELA 2023)



#### 4.2.2. Threatened ecological communities

The patches of Cumberland Plain Woodland within the study area are associated with the TEC listed under the BC Act *Cumberland Plain Woodland in the Sydney Basin Bioregion*. A Test of Significance has been undertaken for this TEC in Appendix B1.

The patches of Cumberland Plain Woodland in the study area did not meet the EPBC Act condition thresholds for *Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest*. The patch size was > 0.5 ha and the groundcover did not contain the minimum 30% native perennial species. The groundcover was dominated by exotic pasture grasses.

#### 4.2.3. Flora

A total of 30 flora species were identified during the field survey undertaken in April 2023 (Appendix D). Of these, 24 were exotic species and 6 were identified as native.

##### 4.2.3.1. Threatened flora species habitat

No threatened flora species or flora species habitat was identified within the study area due to its highly degraded nature, being subject to historic clearing and grazing.

##### 4.2.3.2. Priority weeds

Of the exotic flora identified during the field survey, five are listed as priority weeds under the NSW *Biosecurity Act 2015* and two of these are listed as Weeds of National Significance (WoNS). The weeds present and associated information is presented in Table 6 below.

**Table 6: Priority Weeds and other weeds of concern identified during field survey**

Scientific Name	Common Name	WoNS	Priority weed obligations
<b>State Priority Weeds</b>			
<i>Lycium ferocissimum</i>	African Boxthorn	Yes	Asset protection
<i>Senecio madagascariensis</i>	Fireweed	Yes	Asset protection
<i>Araujia sericifera</i>	Moth Vine	No	General Biosecurity Duty
<i>Rubus fruticosus</i> species aggregate	Blackberry	Yes	General Biosecurity Duty
<i>Solanum sisymbriifolium</i>	Sticky Nightshade	No	General Biosecurity Duty

#### 4.2.4. Fauna

##### 4.2.4.1. Threatened fauna species and habitat

No threatened fauna was opportunistically identified during the field survey, however there is potential habitat for threatened fauna within the study area. Fauna opportunistically sighted in the study area are listed in Appendix D. This includes one potential hollow bearing tree, with a hollow of approximately 10cm, identified in the development footprint. This tree will be removed as part of the proposal Figure 7. Native vegetation and hollow bearing trees within and adjacent to the development footprint have the potential to provide roosting and/or foraging habitat for the following threatened fauna species:

- *Daphoenositta chrysoptera* (Varied Sittella)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)

- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Gallinago hardwickii* (Latham's Snipe) – nearby dam offers foraging habitat only. No native vegetation or hollows offer suitable habitat.

Tests of Significance under the BC Act have been applied to these species in Appendix B.

## 5. Impact assessment

### 5.1. Summary of impacts

The majority of the proposal is located on land identified as cleared or exotic grass. A total of 0.13 ha of native vegetation, being PCT 3320 *Cumberland Shale Plains Woodland* in poor condition, would be removed as a result of the proposal. An additional 3.74 ha comprises exotic grass and planted native vegetation. The remaining area of the study area consists of road / cleared surface (0.82 ha) and a dam (0.01 ha). The proposal would have a total development footprint of 4.69 ha.

An area of PCT 3320 proposed for removal as part of this Flora and Fauna Assessment has been approved for removal under a separate Part 5 Review of Environmental Factors (REF) prepared by Sydney Metro (Figure 8). However, when completing the field survey, the patch of vegetation approved for removal under the Part 5 REF was present. Therefore, the vegetation has still been assessed for removal as part of this FFA.

#### 5.1.1. Direct impacts

##### 5.1.1.1. Clearing of vegetation

The majority of the proposal has been located on vegetation within the development footprint identified as 'exotic grass'. A total of 3.87 ha of vegetation would be affected as part of the proposal within the development footprint. This is comprised of 3.73 ha of exotic grass, 0.13 ha of PCT 3320 *Cumberland Shale Plains Woodland* (Cumberland Plain Woodland) and 0.01 ha of planted native vegetation. Direct impact areas to vegetation are presented in Table 7.

The Cumberland Plain Woodland to be directly affected does not contain habitat for threatened flora species due to the highly degraded nature of the patch, dominance of exotic species in the groundcover and evidence of historic use for agricultural purposes.

**Table 7: Vegetation impact areas within the development footprint**

Affected Area	Impact Area (ha)
Cumberland Plain Woodland (Poor)	0.13
Planted native	0.01
Exotic grass	3.73
<b>Total</b>	<b>3.87</b>

##### 5.1.1.2. Watercourses

The proposal directly impacts on three first order watercourses (Strahler classification). Mitigation measures have been provided in Section 6 in relation to erosion and sedimentation of these watercourses.

##### 5.1.1.3. Threatened fauna species

The Cumberland Shale Plains Woodland to be directly affected has the potential to provide roosting and foraging habitat for the following threatened fauna species:

- *Daphoenositta chrysoptera* (Varied Sittella)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)

- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox) – foraging habitat only
- *Gallinago hardwickii* (Latham's Snipe) – nearby dam offers foraging habitat only. No native vegetation or hollows offer suitable habitat.

One hollow-bearing tree would be removed because of the proposal. Mitigation measures have been provided in Section 6 to provide for the protection of these habitat features and avoid accidental damage to vegetation beyond the development footprint.

### 5.1.2. Indirect impacts

Indirect impacts are those that do not directly affect habitat and individuals, but that have the potential to interfere through indirect action. Indirect impacts considered for this assessment include:

- increase in surface water runoff, sedimentation, and nutrients during and following construction
- increase in noise and disturbance to fauna inhabitants in adjacent vegetation
- increased cover of weed species.

During the construction period, noise, dust and to a small degree vibration will be emitted which could have an indirect impact on local fauna. These impacts result from the operation of heavy machinery to clear vegetation and construct the infrastructure. These impacts are short term only and therefore are unlikely to significantly impact fauna. During the construction period there is a risk of sediment runoff. Considering there are nearby watercourses or drainage lines and a nearby dam, mitigation measures have been provided to avoid potential impacts to waterways resulting from runoff. Potential indirect impacts will be managed via an appropriate sediment and erosion control plan. The overall magnitude of impacts is likely to be minor.

Possible weed infestation can result if weed propagules are introduced by machinery during construction. Given the proximity of the study area to the road reserve of Luddenham Road, it is unlikely that the movement of machinery introduces significant additional risk. Potential impacts resulting from any transfer of weed propagules are considered negligible given that the study area is already comprised of mostly weeds. Standard weed control measures are provided in Section 6 to minimise the potential for weed impacts.

As such, indirect impacts to threatened species and native vegetation are unlikely to be significant provided they are managed via the mitigation measures provided in Section 6.

### 5.1.3. Key threatening processes

The key threatening process (KTP), *clearing of native vegetation*, is associated with the proposal. The impact of this KTP is considered minimal given that only 0.14 ha of native vegetation would be removed.

The KTP, *invasion of native plant communities by exotic perennial grasses*, is associated with the proposal. Impacts relating to this key threatening process are considered minimal given that the study area already contains exotic perennial grasses.

The KTP, *loss of hollow-bearing trees*, is associated with the proposal. The proposal has the potential to impact one potentially hollow bearing tree. A pre-clearance survey as recommended in Section 6 will mitigate potential impacts to fauna resulting from the removal of this tree.

Mitigation measures addressing key threatening processes have been provided in Section 6.

## 5.2. NSW Biodiversity Conservation Act 2016

### 5.2.1. Test of Significance

If a species, population, or ecological community listed under Schedules 1 or 2 of the BC Act is likely to be affected, the factors set out to establish if there is likely to be a significant impact on that species, population, ecological community, or habitat, must be assessed. Section 7.3 of the BC Act sets out five factors that must be addressed as part of a Test of Significance. This enables a decision to be made as to whether there is likely to be a significant impact on the species and if a BDAR is required.

#### *Threatened ecological communities*

Cumberland Plain Woodland, a critically endangered ecological community, was identified within the study area. The proposal would remove 0.13 ha of this ecological community. Therefore, a Test of Significance was undertaken, and it was concluded that the proposal is unlikely to result in a significant impact to the ecological community.

#### *Threatened flora*

The proposal would not impact threatened flora or habitat for threatened flora. Therefore, Tests of Significance were not undertaken for any threatened flora species.

#### *Threatened fauna*

The proposal has the potential to impact native vegetation within the study area, which may provide habitat for the following threatened fauna species:

- *Daphoenositta chrysoptera* (Varied Sittella)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

Tests of Significance were undertaken, which concluded that the proposal is unlikely to result in a significant impact to any of the above threatened fauna species.

### 5.2.2. Biodiversity Certification

The development footprint is not biodiversity certified under the CPCP (Figure 2). This report satisfies the assessment required under the BC Act.

## 5.3. Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

### 5.3.1. Assessment of Significance

The EPBC Act establishes a process for assessing the environmental impacts of activities and developments where Matters of National Environmental Significance (MNES) may be affected. Under the Act any action which “*has, will have, or is likely to have a significant impact on a MNES*” is defined as a “controlled action”, and requires approval from the Commonwealth DEECW which is responsible for administering the EPBC Act.

#### 5.3.1.1. *Threatened ecological communities*

The *Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest*, a critically endangered ecological community, was identified within the study area. The patch of PCT 3320 in the study area had a patch size <0.5 ha and contained <30% native species within the understorey. Therefore, the patches of PCT 3320 did not meet the EPBC Act condition criteria for the corresponding TEC *Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest*. No Assessment of Significance was required to be undertaken.

#### 5.3.1.2. *Threatened flora species*

The proposal would not impact threatened flora or habitat for threatened flora. Therefore, Assessments of Significance were not undertaken for any threatened flora species.

#### 5.3.1.3. *Threatened fauna species*

An Assessment of Significance under the EPBC Act was undertaken for the following fauna species:

- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Gallinago hardwickii* (Latham’s Snipe).

The assessments concluded that no significant impact is likely to result from the proposal.



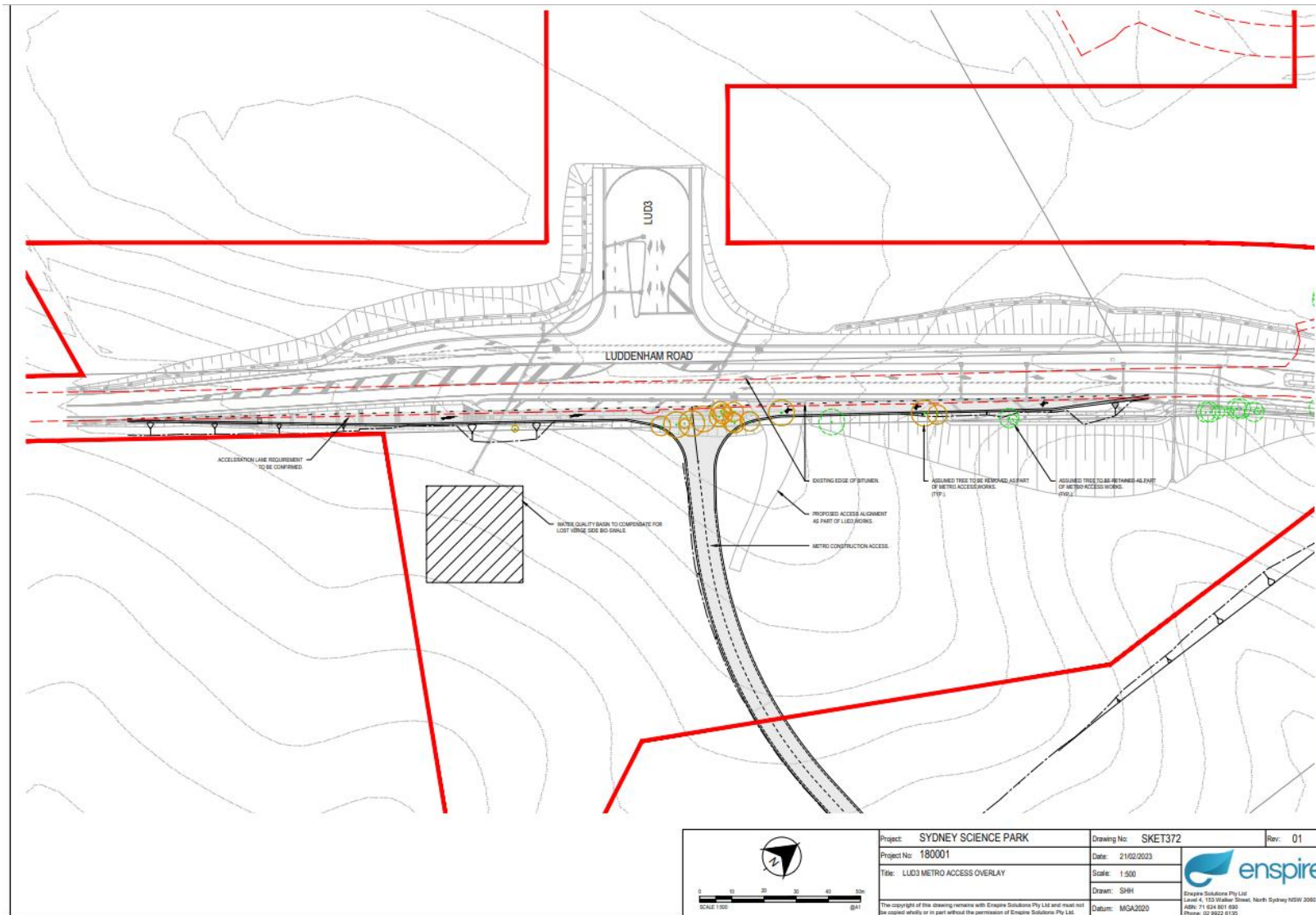


Figure 8: Patch of PCT 3320 approved for removal under a Part 5 REF (identified in orange)

## 6. Mitigation Measures

To minimise the potential impacts on the study area and improve environmental outcomes, the following recommendations to mitigate potential impacts have been recommended.

**Table 8: Recommendations**

Aspect	Potential impact	Appropriate mitigation measure
<b>Pre-Construction</b>		
Sediment and Erosion control	<ul style="list-style-type: none"> <li>• Sedimentation</li> <li>• Erosion</li> <li>• Run-off into waterways/drainage lines</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a Construction Environmental Management Plan (CEMP) with relevant mitigation measures to ameliorate potential impacts to biodiversity values outside of the development footprint. The CEMP should include:               <ul style="list-style-type: none"> <li>○ Sediment and Erosion Control Plan</li> <li>○ establishment of clearly defined areas, such as the approved development footprint and any 'no-go' areas within/adjacent to work site boundaries that are not to be in any way disturbed or damaged by the works, particularly adjacent to vegetation to be retained and the streams within the study area</li> <li>○ construction fencing prior to and during construction to ensure that construction related impacts are contained within the construction areas</li> <li>○ sediment fencing should be placed 2 m within the construction footprint and machinery lay-down areas</li> <li>○ surface runoff should be diverted away from areas of soil disturbance and drainage lines</li> <li>○ prevent tracking of soils / sediments from work site to roadways, footpaths, and drainage lines as a result of work vehicle / machinery movement</li> <li>○ vehicle and machinery movement will be confined to designated tracks and work areas</li> <li>○ work will not take place during or after heavy rain when doing so is likely to cause soil erosion or soil structural damage</li> <li>○ no washing of concrete will be undertaken on site</li> <li>○ the site-specific CEMP must include instructions for dealing with orphaned or injured native animals and include the contact details for the NSW Wildlife Information, Rescue and Education Service Inc. (WIRES).</li> </ul> </li> <li>• Drainage should be controlled in the works footprint in line with the <i>Protection of the Environment Operations Act 1997</i> requirements to avoid impacts on adjacent/nearby habitats and threatened ecological communities including the adjacent extent of CPW.</li> </ul>
Habitat and vegetation	<ul style="list-style-type: none"> <li>• Loss of one hollow-bearing tree</li> </ul>	<ul style="list-style-type: none"> <li>• Clear delineation of vegetation to be removed and establishment of 'No-Go' zones               <ul style="list-style-type: none"> <li>○ Prior to the commencement of any works, all hollow bearing trees should be visually marked within the footprint with blue high visibility spray paint</li> </ul> </li> </ul>

Aspect	Potential impact	Appropriate mitigation measure
	<ul style="list-style-type: none"> <li>Accidental damage to trees and vegetation outside the development footprint</li> <li>Removal of threatened species habitat</li> <li>Removal of a threatened ecological community</li> </ul>	<ul style="list-style-type: none"> <li>Micro-siting of infrastructure or use of construction methods that do not impact trees must be implemented, and arborist must certify tree protection measures that can enable the protection of all hollow-bearing trees outside of the development footprint.</li> <li>Construction activities within the tree protection zone (TPZ) of trees to be retained must be assessed and approved by the project arborist and must comply with AS 4970-2009 - <i>Protection of trees on development sites</i>.</li> <li>The CEMP must detail tree protection measures to retain all hollow-bearing trees outside the development footprint.</li> <li>A pre-clearance survey should be undertaken for the hollow-bearing tree to be removed in the development footprint. The clearance survey would: <ul style="list-style-type: none"> <li>Ensure all non-hollow-bearing vegetation is removed prior to the felling of hollow bearing trees. This should start with under scrubbing the mid-storey layer followed by removal of the non-hollow bearing canopy.</li> <li>Felling is recommended outside of spring or summer because it is primary breeding season for a number of hollow dwelling fauna.</li> <li>During felling of non-hollow-bearing trees, damage to hollow bearing trees should not occur.</li> <li>For trees containing hollows, hollows should be sectionally lopped by a suitably qualified tree climber or tree felling company qualified to operate from an Elevated Work Platform (EWP).</li> <li>Hollow bearing sections should be lowered to the ground by the tree climber or EWP operator for the ecologist to inspect the hollow.</li> <li>Once the hollow is on the ground it would be inspected for any fauna using a torch.</li> <li>The trunk of the tree, when it contains a hollow should remain in situ for 24 hours after felling with no vehicle or machinery movement taking place around the trunk. This is to ensure that if fauna is present within an area of the hollow that could not be inspected, they have an opportunity to self-relocate. The trees should not be pushed over with an excavator.</li> <li>If any nests are identified in the canopy, they should be removed by the suitably qualified tree climber / EWP operator before the tree is felled. The nest should be safely relocated to the ground for the ecologist to inspect.</li> <li>Any injured or exotic fauna species would be taken to the nearest RSPCA or veterinary clinic.</li> <li>Fauna relocation sites should be identified prior to the commencement of felling.</li> </ul> </li> </ul>
During Construction		
Chemicals and waste material	<ul style="list-style-type: none"> <li>Runoff of chemicals</li> <li>Pollution of the environment</li> <li>Spread of pathogens or invasive plant material</li> </ul>	<ul style="list-style-type: none"> <li>Ensure fertilisers, turf, mulch, weeds and imported soils are not unintentionally introduced into areas of ENV and NVR (i.e. through natural drainage pathways or general proximity).</li> <li>Chemicals and rubbish must be contained to the construction area.</li> <li>All chemicals should be correctly stored within bunding.</li> <li>Weed removal should be undertaken using mechanical and manual means. If herbicides are to be used, they should be used as described in the product label. Use in proximity to creek lines should be limited.</li> </ul>

Aspect	Potential impact	Appropriate mitigation measure
		<ul style="list-style-type: none"> <li>The site-specific CEMP should include measures to reduce the spread of weeds, what weed species are present on site and how best to treat them. <ul style="list-style-type: none"> <li>Refer to the <i>Noxious and environmental weed control handbook: a guide to weed control in non-crop, aquatic and bushland situations</i> (5<sup>th</sup> edition, Department of Primary Industries)</li> </ul> </li> </ul>
Habitat	<ul style="list-style-type: none"> <li>Protection of hollow-bearing trees</li> </ul>	<ul style="list-style-type: none"> <li>Temporary tree protection measures (such as machinery exclusion zones from tree roots and tree trunk protection) should be in place for any retained trees and to protect adjacent native vegetation during all construction works. High visibility orange bunting should be placed at a 1 m distance from the trunk of the tree with 'no-go' signage attached.</li> </ul>
Site access	<ul style="list-style-type: none"> <li>Trampling of vegetation</li> <li>Spread of weeds</li> </ul>	<ul style="list-style-type: none"> <li>Work vehicle access should be restricted to designated work areas and existing formed access tracks/roadways.</li> </ul>

## 7. Conclusion

ELA was engaged by Celestino Developments SSP Pty Ltd to prepare a Flora and Fauna Assessment report for the proposed development of Luddenham Road LUD3 Intersection at part of the following lots: Lot 206 DP1280188, Lot 205 DP1280188, Lot 204 DP1280188 Lot 24 DP1277418, Lot 25 DP1277418, Luddenham. The proposal is to be assessed under Part 4 of the EP&A Act.

A total of 0.13 ha of native vegetation, comprising PCT 3320 Cumberland Shale Plains Woodland, would be removed as a result of the proposal. A Test of Significance in accordance with the BC Act was undertaken for Cumberland Plain Woodland and concluded that the proposal is unlikely to result in a significant impact to the threatened ecological community. An Assessment of Significance was not undertaken for this community because it does not meet the EPBC condition criteria for the threatened ecological community listing.

No threatened flora species or habitat for threatened flora would be significantly affected by the proposal. Many exotic flora species were identified within the study area, including five Priority Weeds, two of which are Weeds of National Significance (WoNS). The works would require the management of weeds consistent with *Greater Sydney Regional Strategic Weed Management Plan 2017 – 2022*.

The proposal would impact potential foraging habitat for the following threatened fauna species:

- *Daphoenositta chrysoptera* (Varied Sittella)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Gallinago hardwickii* (Latham's Snipe).

Assessments undertaken for these species concluded that the potential impacts are unlikely to be significant.

Mitigation measures provided in Section 6 to mitigation potential impacts related to sediment and erosion control, hollow bearing trees and construction must be implemented otherwise additional assessment may be required.

## 8. References

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## Appendix A Likelihood of occurrence

The table below provides the collated results from the 5 km database searches (buffered around the study area) of the NSW Wildlife Atlas and the EPBC Protected Matters Search Tool. An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database searches. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the field survey and professional judgement. The terms for likelihood of occurrence are defined below:

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

The likelihood of occurrence was only one factor among other factors, which was used to determine whether to apply the BC Act or EPBC Significant Impact Criteria assessments to threatened species, populations, communities or migratory species.

**Table 9: Threatened ecological communities (TECs) likelihood table**

Scientific Name	BC Status	Act	EPBC Status	Act	Distribution and Habitat	Likelihood Occurrence	of	Impact Assessment Required
Western Sydney Dry Rainforest and Moist Woodland on Shale	E		CE		It generally occurs in rugged terrain and other patches may occur on undulating terrain, with dry rainforest patches typically occupying steep lower slopes and gullies, and moist woodland patches typically occupying upper sections of the slope Occurs almost exclusively on clay soils derived from Wianamatta Group shales.	No community not identified during field survey	- this was	No
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	E		CE		The majority of the community is found in the north-west section of the Cumberland Subregion in the Castlereagh area between Penrith and Richmond. Other significant patches occur in the Kemps Creek and Holsworthy areas. Smaller remnants occur in the eastern section of the Cumberland Subregion	No community not identified during field survey	- this was	No
Eastern Suburbs Banksia Scrub of the Sydney Region	CE		CE		Found on nutrient-poor sand deposits.	No community not identified during field survey	- this was	No
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	E		E		Occurs in low-lying coastal alluvial areas with minimal relief, such as swamps, floodplain pockets, depressions, alluvial flats, back-barrier flats, fans, terraces, and behind fore-dunes.	No community not identified during field survey	- this was	No
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	E		E		The Castlereagh Scribbly Gum and Agnes Banks Woodlands ecological community is located in the Sydney Basin Bioregion. It occurs primarily in the Castlereagh area in the north-west of the Cumberland Plain (also referred to as the Cumberland sub-region), with other known occurrences near Holsworthy (some patches at Holsworthy are just outside the Cumberland sub-region), Kemps Creek and Longneck Lagoon.	No community not identified during field survey	- this was	No
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	E		E		This ecological community associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions. The structure of the community may vary from open forests to low	No community not identified during field survey	- this was	No



Scientific Name	BC Status	Act	EPBC Status	Act	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
					woodlands, scrubs or reedlands with scattered trees. Typically these forests, woodlands, scrubs and reedlands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.		
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	E		CE		Found on the river flats of the coastal floodplains. Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley. Associated with silts, clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.	No - this community was not identified during field survey	No
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. Before European settlement, this community was extensive around the edges of the Cumberland lowlands throughout western Sydney, most particularly in the southern half. Today, only 9,950 ha remains intact (22.6% of its original extent) and the bulk of this occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. Good examples can be seen at Gulguer Nature Reserve, in the Wilton area and in the Sackville - Maroota area.	No - this community was not identified during field survey	No
<b>Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest</b>	<b>CE</b>		<b>CE</b>		<b>Represents certain occurrences of the coastal plain grassy eucalypt woodlands that are endemic to the shale hills and plains of the Sydney Basin Bioregion in NSW and which occur primarily in the Cumberland Sub-region. Incorporates the grassy eucalypt shale hills and plains woodlands and the shale-gravel transition forests of this region. Ranges from grassy woodland to forest, with the understorey (i.e. the ground plus shrub layers) varying from predominately grassy to predominately shrubby. Some stands are much denser than the typical woodland form.</b>  <b>For the purposes of listing under the EPBC Act, the ecological community always has upper tree layer species present and either a shrub or ground layer present.</b>	<b>Yes – this community was identified during field survey (BC Act condition only)</b>	<b>Yes</b>

V = Vulnerable, E= Endangered Ecological Community, CE = Critically Endangered Ecological Community.

Table 10: Threatened fauna species likelihood table

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
<b>Amphibians</b>								
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	South eastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria	Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	0	No – no suitable habitat and no local records within 5 km.	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT region.	Marshes, dams and stream-sides, particularly those containing <i>Typha</i> spp. (bullrushes) or <i>Eleocharis</i> spp. (spikerushes). Some populations occur in highly disturbed areas.	1	Unlikely – no suitable habitat and one local record within 5 km. Previous targeted survey did not identify the species in the study area.	No
<b>Aves</b>								
<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded	Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak).	0	Unlikely – marginal foraging habitat (open eucalypts present, no riparian forest) but no local records within 5 km.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				in the Central Coast and Hunter Valley regions.				
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-	Has two separate populations. The eastern population is found from Atherton Tableland, Queensland, south to Tasmania and west to Eyre Peninsula, South Australia. The other population is found in south-west WA.	Found in open forests and woodlands, and may be seen along roadsides and on golf courses.	7	Unlikely – limited suitable habitat (roadside, small patch of woodland) but limited local records within 5 km.	No
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Found over most of NSW except for the far north-west.	Permanent freshwater wetlands with tall, dense vegetation, particularly <i>Typha</i> spp. (bullrushes) and <i>Eleocharis</i> spp. (spikerushes).	0	No – no suitable habitat (no wetlands) and no local records within 5 km.	No
<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-	Found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range.	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	2	No – some suitable habitat (woodland) but limited local records and grassy ground layer was predominantly to be dense and exotic.	No
<i>Chthonicola sagittata</i>	Speckled Warbler	V	-	Patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the	Wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in	10	No - no suitable habitat (no shrub layer present within	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				Grampians. Most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast.	gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy.		PCT 3320) and limited local records.	
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	-	The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys.	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; woodlands dominated by stringybarks or other rough-barked eucalypts, open grassy understorey, River Red Gum Forest bordering wetlands with open understorey; usually not found in woodlands with a dense shrub layer. Fallen timber is an important habitat component for foraging.	1	Unlikely – suitable geographic range, and record in 5km radius, but habitat too fragmented and without suitable resources (fallen logs).	Yes
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	E	In NSW, distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. Isolated records known from as far north as Coffs Harbour and as far west as Mudgee.	Tall mountain forests and woodlands in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodlands, and urban areas.	0	No – suitable habitat (tall mountain forest) not within study area and no local records.	No
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V	V	Can be found from Mitchell, Queensland, through eastern New	Relies on nine species of sheoaks for feeding. The majority of this species' nesting	0	No – no sheoaks ( <i>Casuarina</i> spp.) identified within	No



Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				South Wales to East Gippsland, Victoria.	hollows are in <i>Eucalyptus crebra</i> . Other species of trees used were <i>E. nubila</i> and <i>E. blakelyi</i> . Known to nest in river red gums ( <i>E. camaldulensis</i> ) along the Murrumbidgee River and other inland waterways in NSW.		study area and no local records.	
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	Distribution in NSW is nearly continuous from the coast to the far west.	Inhabits eucalypt forests and woodlands, mallee and <i>Acacia</i> woodland.	10	Potential patches of suitable habitat (eucalypt woodland) within development footprint and some local records within 5 km.	– Yes
<i>Erythrorhynchus radiatus</i>	Red Goshawk	CE	V	In NSW, extends to ~30°S. Recent records confined to the Northern Rivers region north of the Clarence River.	Open woodland and forest, often along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, <i>Melaleuca</i> swamp forest and coastal riparian <i>Eucalyptus</i> forest.	0	No – no suitable habitat (rainforest, swamp forest or riparian coastal river forest) within development footprint and no local records.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1		Coastal and subcoastal northern and eastern Australia, south to central-eastern NSW and with vagrants recorded further south and inland.	In NSW, floodplain wetlands of the major coastal rivers are key habitat. Also minor floodplains, coastal sandplain wetlands and estuaries.	2	No – suitable habitat not present (no wetlands) , no local records.	No
<i>Erythroriorchis radiatus</i>	Red Goshawk	E4A	V	In NSW, extends to ~30°S. Recent records confined to the Northern Rivers region north of the Clarence River.	Open woodland and forest, often along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and coastal riparian Eucalyptus forest.	0	No – suitable habitat not present (no watercourses or wetlands) , no local records.	No
<i>Falco hypoleucos</i>	Grey Falcon	E	V	Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range.	Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands.	0	No – the study area is not within arid or semi-arid areas where this species is usually confined, no local records.	No
<i>Grantiella picta</i>	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas.	Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	No – suitable habitat not present, no local records.	No
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	V	-	In New South Wales it is widespread along the east coast,	Habitats are characterised by the presence of large areas of open water including larger	12	No – no suitable habitat (large water bodies)	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				and along all major inland rivers and waterways.	rivers, swamps, lakes, and the sea.		within development footprint.	
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW.	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	4	Unlikely – suitable habitat (open eucalypt woodland) within development footprint, limited local records within 5 km.	No
<i>Ixobrychus flavicollis</i>	Black Bittern	V		In NSW, records are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland.	Terrestrial and estuarine wetlands. Also flooded grassland, forest, woodland, rainforest and mangroves where permanent water is present.	0	No – no suitable habitat within development footprint (wetlands, flooded grassland) and no local records within 5 km.	
<i>Lathamus discolor</i>	Swift Parrot	CE	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes.	Box-ironbark forests and woodlands. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	3	Unlikely – no suitable habitat within development footprint and few local records within 5 km.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
<i>Petroica boodang</i>	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. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes.	Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	2	Unlikely – some suitable habitat (woodlands) within development footprint but limited local records within 5 km.	No
<i>Pycnoptilus floccosus</i>	Pilotbird	-	V	Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the ACT, and in the Snowy Mountains in NSW and north-east Victoria. Lowland  Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne.	Wet sclerophyll forests in temperate zones in moist gullies with dense undergrowth and dry sclerophyll forests and woodlands occupying dry slopes and ridges.	0	No – no local records and outside geographic range. No suitable habitat.	No
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys.	Swamps, dams and nearby marshy areas.	1	Unlikely – dam present in study area is in poor and degraded condition. The banks are weedy, do not contain native vegetation that could be used as sheltering habitat. Limited	No



Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
							local records within 5 km.	
<i>Stagonopleura guttata</i>	Diamond Firetail	V	-	It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley.	Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.	2	Unlikely – this species mostly occurs to the west of the study area. where potential habitat is present, it is limited in extent and severely degraded. Limited local records within 5 km.	No
<i>Stictonetta naevosa</i>	Freckled Duck	V	-	Primarily found in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina.	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	1	No – no suitable habitat, limited local records within 5 km.	No
<b>Gastropods</b>								
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	E	-	Primarily inhabits Cumberland Plain Woodland. Also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally		136	Unlikely – patches of PCT 3320 that could represent	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				shelters under rubbish. Can dig several centimetres into soil to escape drought.			potential habitat are severely degraded. The patch does not contain key habitat features (leaf litter, woody debris and native understorey) to support this species.	
<b>Mammals</b>								
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes.	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	0	Unlikely – no suitable habitat in the form of sandstone caves, and no records of species within 5 km.	No
<i>Dasyurus maculatus maculatus</i> (SE mainland population)	Spotted-tail Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld.	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	0	No – no suitable habitat, native vegetation present severely degraded and fragmented, no hollows and no	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
							local records within 5 km.	
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	South-east coast and ranges of Australia, from southern Qld to Victoria and Tasmania. In NSW, records extend to the western slopes of the Great Dividing Range.	Tall (greater than 20m) moist habitats. Predominately roosts in Eucalypt tree hollows. It has also been found to roost under loose bark on trees and in man-made structures. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy, in open forests.	2	Potential – local records, hollows present in development footprint and suitable marginal habitat.	Yes
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW.	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	18	Potential – local records, hollows present in development footprint and suitable marginal habitat.	Yes
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW.	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, <i>Melaleuca</i> swamps, dense coastal forests and banksia scrub.	2	Unlikely – limited records and no potential roosting habitat in the form of caves	No
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-	Along the east and north-west coasts of Australia.	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels,	8	Unlikely – limited records and no potential roosting habitat	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
					buildings and other man-made structures.		in the form of caves	
<i>Myotis macropus</i>	Southern Myotis	V	-	Coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers.	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.  Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	25	Potential – suitable roosting habitat (hollow), and foraging habitat (waterbody nearby).	Yes
<i>Petauroides volans</i>	Greater Glider (southern and central)	-	E	This population on the south coast of NSW is bounded by the Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. Eucalypt forests and woodlands.	Eucalypt forests and woodlands.	0	No – no local records, outside geographic range (south coast NSW).	No
<i>Petaurus australis</i>	Yellow-bellied Glider (south-eastern)	V	V	In NSW, it predominantly occurs in forests along the eastern coast, from the NSW-Qld border to the NSW-Vic border. However, the distribution also extends inland to the western slopes of the Great Dividing Range.	Occurs in eucalypt-dominated woodlands and forests.	0	No – no local records within 5 km and no suitable habitat present due to fragmentation and lack of hollows	No
<i>Phascolarctos cinereus</i>	Koala	E	E	In NSW it mainly occurs on the central and north coasts with some	Eucalypt woodlands and forests.	0	Unlikely – no local records	No



Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands.			within 4 km, habitat degraded and fragmented.	
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V	Fragmented distribution across eastern NSW.	Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	No – no local records, no suitable habitat within development footprint.	No
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria.	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	39	Likely – local records, site contains marginal foraging habitat within 20 km of a known camp.	Yes
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V	-	There are scattered records of this species across the New England Tablelands and North West Slopes. Rare visitor in late summer and autumn to south-western NSW.	Almost all habitats, including wet and dry sclerophyll forest, open woodland, open country, mallee, rainforests, heathland and waterbodies. Forages for insects above the canopy in eucalypt forests, and closer to the ground in more open country. It is dependent on suitable hollow-bearing trees to provide roost sites. The	1	Potential – a local record and suitable habitat (woodland, eucalypt canopy hollow) within development footprint.	Yes

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
species has also been recorded using caves and abandoned sugar glider nests as roost sites.								
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	Found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m.	Woodland, moist and dry eucalypt forest and rainforest.	5	Potential – local records and suitable habitat within development footprint (woodland).	Yes
<b>Reptiles</b>								
<i>Delma impar</i>	Striped Legless Lizard	V	V	Found mainly in natural temperate grassland, but has been found in exotic grasslands.	Habitat is grassland dominated by perennial, tussock-forming grasses including Kangaroo Grass, spear grasses and poa tussocks.	0	No – habitat not present, no local records and geographic distribution is outside study area	No
<b>Terrestrial Migratory and Marine</b>								
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions.	Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	1	No – no suitable habitat within development footprint, limited local records.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
<i>Cuculus optatus</i>	Oriental Cuckoo	-	M	Northern and eastern Australia.	Mainly inhabits forests, occurring in coniferous, deciduous and mixed forest.	0	No – no local records.	No
<i>Gallinago hardwickii</i>	Latham’s Snipe	-	M	A variety of permanent and ephemeral wetlands, preferring open freshwater wetlands with nearby cover. Occupies a variety of vegetation around wetlands including wetland grasses and open wooded swamps. Can occur in habitats that have saline or brackish water, such as saltmarsh, mangrove creeks, around bays and beaches, and at tidal rivers. Regularly recorded in or around modified or artificial habitats including pasture, ploughed paddocks, irrigation channels and drainage ditches and sewage and dairy farms. Can also occur in various sites close to humans or human activity (e.g., near roads, railways, airfields, commercial or industrial complexes).	5	Potential – local records. No wetlands, however development footprint contains canopy cover near open water (dam) and human activity (roads).	Yes	
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	V, M	All coastal regions of NSW, inland to the western slopes and inland plains of the Great Divide.	Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	0	Unlikely – suitable habitat (remnant vegetation in farmland) but no local records within 5 km.	No
<i>Hirundo rustica</i>	Barn Swallow	-	M	Eastern populations are migratory, moving to Northern Australia in the winter and return for breeding.	Prefers open areas, man-made clearings and urban environments. Breeds in southern and Eastern Australia in many habitat types.	1	Unlikely – marginal foraging habitat and limited local records within 5 km.	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
<i>Monarcha melanopsis</i>	Black-faced Monarch	-	M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded further inland.	Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	0	Unlikely – marginal foraging habitat and no local records within 5 km.	No
<i>Motacilla flava</i>	Yellow Wagtail	-	M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA.	Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	0	Unlikely – marginal foraging habitat and no local records within 5 km.	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	M, Mar	Widespread in eastern Australia. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains.	Heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Have also been seen in tall, open stringybark forest with scattered pine saplings	0	Unlikely – marginal foraging habitat and no local records within 5 km.	No
<i>Pluvialis squatarola</i>	Grey Plover	-	M	Breeds around the Arctic regions and migrates to the southern hemisphere. A regular summer migrant to Australia, mostly to the west and south coasts. It is generally sparse but not uncommon in some areas. It is occasionally found inland.	Non-breeding grounds are almost entirely in coastal areas, usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within	0	Unlikely – marginal foraging habitat and limited local records within 5 km.	No



Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
					muddy lagoons. Also occur around terrestrial wetlands (near-coastal lakes and swamps, salt-lakes). Very occasionally recorded further inland, where they occur around wetlands or salt-lakes. On their breeding grounds they inhabit tundra.			
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW.	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	Unlikely – marginal suitable habitat and no local records within 5 km.	No
<i>Tringa nebularia</i>	Common Greenshank	-	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range.	Found in terrestrial wetlands and sheltered coastal habitats.	1	Unlikely – no suitable habitat (wetlands, coastal habitat) and limited local records within 5 km.	No
<b>Total records</b>						<b>308</b>		

BC Act Key: V = vulnerable, E = endangered, E2 = endangered population, E4A = critically endangered

EPBC Act Key: V = vulnerable, E = endangered, CE = critically endangered, X = extinct, M = Migratory, Mar = Marine

Table 11: Threatened flora species likelihood table

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
<i>Acacia pubescens</i>	Downy Wattle	V	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon.	Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	0	No – no records of species within 5 km and marginal habitat (disturbed woodland patches).	No
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains.	Heath or dry sclerophyll forest on sandy soils.	0	No – no records of species within 5 km and unsuitable habitat (no forest).	No
<i>Dillwynia tenuifolia</i>		V	-	Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. Other populations in western Sydney recorded from Voyager Point and Kemps Creek in Liverpool LGA, Luddenham in Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities outside the Cumberland Plain include the Bulga Mountains at Yengo in	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. At Yengo, is	649	Unlikely – many records in 5km radius, but no suitable habitat (scrubby/dry heath areas, or Shale Gravel Transition Forest on	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				the north, and Kurrajong Heights and Woodford in the Lower Blue Mountains.	reported to occur in disturbed escarpment woodland on Narrabeen sandstone.		tertiary alluvium or laterised clays)	
<i>Dillwynia tenuifolia</i> , Kemps Creek		E	-	The endangered population occurs in the area bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool Local Government Area.	The population occurs on a small outlier of the Berkshire Park Soil Landscape. The site supports a transition from Castlereagh Ironbark Forest to Castlereagh Scribbly Gum Woodland. Portions of the site contain a form of Shale Gravel Transition Forest.	92	No – outside geographic range.	No
<i>Genoplesium baueri</i>	Yellow Gnat-orchid / Bauer's Midge Orchid	E	E	Locations between Ulladulla and Port Stephens. Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	Grows in dry sclerophyll forest and moss gardens over sandstone.	0	No – no local records and no suitable habitat (forest).	No
<i>Grevillea juniperina</i> subsp. <i>juniperina</i>	Juniper-leaved Grevillea	V	-	Endemic to Western Sydney, centred on an area bounded by Blacktown, Erskine Park, Londonderry and Windsor with outlier populations at Kemps Creek and Pitt Town.	Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest, on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium.	1204	Unlikely – many records in 5km radius, but not observed in the study area and marginal habitat (small,	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
							disturbed patches of woodland).	
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	V	V	Sporadically distributed throughout the Sydney Basin with sizeable populations around Picton, Appin and Bargo (and possibly further south to the Moss Vale area) and in the Hunter at in the Cessnock - Kurri Kurri area. Also known from Putty to Wyong and Lake Macquarie on the Central Coast.	Heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.	16	Unlikely – records in 5km radius, but no suitable habitat (Heath and shrubby woodland).	No
<i>Haloragis exalata</i> subsp. <i>exalata</i>	Wingless Raspwort, Square 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.	0	No – outside geographic range.	No
<i>Isotoma fluviatilis</i> subsp. <i>fluviatilis</i>		-	X	Currently known from only two adjacent sites on a single private property at Erskine Park in the Penrith LGA. Previous sightings are all from western Sydney, at Homebush and at Agnes Banks.	Known to grow in damp places, on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland and an alluvial woodland/shale plains woodland (Cumberland Plain Woodland) ecotone.	8	No – study area outside known sightings, limited local records and presumed extinct.	No
<i>Macadamia integrifolia</i>	Macadamia Nut	-	V	Not known to occur naturally in the wild in NSW; recorded from Camden Haven but it is not	Drier subtropical rainforest.	1	No – limited records of species within 5 km, but	No



Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				known if the tree was cultivated or growing naturally.			unsuitable habitat (no rainforest).	
<i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>	<i>Marsdenia viridiflora</i> R. Br. subsp. <i>viridiflora</i> population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	E2	-	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range.	Vine thickets and open shale woodland.	38	Unlikely – records within 5km radius, but no suitable habitat (vine thickets).	No
<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas.	Heath on sandstone.	0	No – no local records and no suitable habitat (heath).	No
<i>Persicaria elatior</i>	Tall Knotweed	V	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and	Beside streams and lakes, swamp forest or disturbed areas.	0	No – no local records and no suitable habitat (riparian areas)	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				the Grafton area (Cherry Tree and Gibberagee State Forests).				
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west.	Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	0	No – no local records and no suitable habitat (open forest).	No
<i>Persoonia nutans</i>	Nodding Geebung	E	E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south.	Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.	13	No – limited local records, and no suitable habitat (incorrect woodland type).	No
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south.	Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	0	No – no local records and marginal habitat (disturbed, small patches of woodland).	No
<i>Pimelea spicata</i>	Spiked flower	Rice-	E	E	In western Sydney, <i>Pimelea spicata</i> occurs on an undulating topography of well-structured	1	Unlikely – no suitable habitat	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
				clay soils, derived from Wianamatta shale.	and grassland often in moist depressions or near creek lines. Has been located in disturbed areas that would have previously supported.		(moist depressions or near creek lines) and limited local records.	
<i>Pomaderris brunnea</i>	Rufous Pomaderris	E	V	Very 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.	Moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	0	No – outside geographic range.	No
<i>Pterostylis saxicola</i>	Sydney Greenhood	E	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south.	Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	0	No – no local records and no suitable habitat (depressions in sandstone).	No
<i>Pultenaea parviflora</i>		E	V	Endemic to the Cumberland Plain. Core distribution is from Windsor to Penrith and east to Dean Park. Outlier populations are recorded from Kemps Creek and Wilberforce.	Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	183	Unlikely – no suitable habitat no suitable habitat (forest).	No

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution	Habitat	Number of records within 5 km	Likelihood of Occurrence	Impact Assessment Required
<i>Rhizanthella slateri</i>	Eastern Underground Orchid	B	E	In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra.	Sclerophyll forest in shallow to deep loams.	0	No – no records of species within 5 km and outside geographic range.	No
<i>Rhodamnia rubescens</i>	Scrub Turpentine	CE	CE	Occur from coastal districts of NSW north from Batemans Bay to Bundaberg in Queensland.	Subtropical Rainforests, Warm Rainforests, Littoral Rainforests, and Wet Sclerophyll Forests. It may also occur as a pioneer in adjacent areas of dry sclerophyll and grassy woodland associations	0	No – outside geographic range.	No
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest.	Subtropical and littoral rainforest on gravels, sands, silts and clays.	0	No – outside geographic range.	No
<i>Thesium australe</i>	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands.	Grassland on coastal headlands or grassland and grassy woodland away from the coast.	0	No – no local records and no suitable threatened flora habitat (native grassland).	No
<b>Total records</b>						<b>2212</b>		



BC Act Key: V = vulnerable, E = endangered, E2 = endangered population, E4A = critically endangered  
EPBC Act Key: V = vulnerable, E = endangered, CE = critically endangered, X = extinct

## Appendix B Test of Significance (BC Act)

The 'Test of significance' (5-part test) is applied to species, populations and ecological communities listed on Schedules 1 and 2 of the BC Act. The assessment sets out 5 factors, which when considered, allow proponents to undertake a qualitative analysis of the likely impacts of an action and to determine whether a significant impact is likely. All factors must be considered, and an overall conclusion made based on all factors in combination.

### B1 Cumberland Plain Woodland

This ecological community is listed as critically endangered under the BC Act. Cumberland Plain Woodland was identified in poor condition within the study area during survey. The proposal would remove 0.17 ha of this ecological community within the development footprint. The local occurrence of this community is considered the same as the development footprint for the proposal.

**Table 12: BC Act Test of Significance for Cumberland Plain Woodland**

BC Act	Question	Response
7.3.1(a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	N/A
7.3.1(b) (i)	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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	<p>The proposal would remove of 0.17 ha of CPW.</p> <p>Due to patches of CPW to be affected consisting of small, degraded patches across an agricultural landscape, their removal would not constitute an adverse effect on the extent of the ecological community. The removal of this area of CPW would not compromise the long-term maintenance of the ecological community or the genetic diversity and long-term evolutionary development of CPW in the locality, due to the highly degraded nature of the patches present, lack of structural complexity (groundcover dominated by weeds and the midstorey is absent) and distance from any patches of the community that are intact.</p> <p>Therefore, it is considered unlikely that the proposal would adversely affect the extent of the ecological community such that it is likely to be placed at risk of extinction in the locality.</p>
7.3.1(b) (ii)	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity 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.	<p>The proposal would modify the composition of Cumberland Plain Woodland present within the study area by removing 0.17 ha of poor condition vegetation. The patches are comprised of a native canopy only. The midstorey was absent and the groundcover was dominated by exotic species. The patches to be removed do not represent structurally diverse Cumberland Plain Woodland, nor do they contain species unique to the patch or the locality. This modification is considered unlikely to be substantial and adverse such that its local geographic distribution would be placed at risk of extinction. Ecological functioning will still continue between</p>

BC Act	Question	Response
		patches of CPW within the locality, despite the removal of CPW from the proposal.
7.3.1(c) (i)	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposal would remove 0.17 ha of vegetation identified as Cumberland Plain Woodland.
7.3.1(c) (ii)	In relation to the habitat of a threatened species or ecological community:  Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposal is predominantly focused on areas which are already cleared or dominated by exotic vegetation. The 0.17 ha of native vegetation to be removed exists as a number of small, disturbed patches of CPW within the study area. The proposal would result in a minor increase in fragmentation and isolation of CPW in the local occurrence, as a number of small patches would be removed. However, the patches to be affected exist as isolated and disturbed patches amongst mostly cleared land. The reduction of this patch by 0.17 ha would not significantly increase the distance to the next patch.
7.3.1(c) (iii)	In relation to the habitat of a threatened species or ecological community: 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 0.17 ha of vegetation identified as poor condition CPW. The extent of ecological community to be removed/modified is not considered to be critically important to its long-term survival in the locality given that similar patches of the same threatened ecological community would be retained within the broader locality. In addition, the affected vegetation is of poor condition, lacking species diversity and structure, highly fragmented and weed infested.
7.3.1(d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The proposal would not impact any declared Areas of Outstanding Biodiversity Value.
7.3.1(e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	<p>The proposal is associated with the KTPs:</p> <ul style="list-style-type: none"> <li>• <i>Clearing of native vegetation</i></li> <li>• <i>Invasion of native plant communities by exotic perennial grasses</i></li> <li>• <i>Loss of hollow-bearing trees</i></li> </ul> <p>The proposal would contribute to these KTPs through the removal of 0.17 ha of native vegetation and removal of one HBT. A number of priority weeds are within the study area therefore do not pose a significant additional threat to the community. The CPW to be cleared consists of small, degraded patches, which would constitute a minor clearing of native vegetation, considering similar vegetation in the broader locality.</p>
<b>Conclusion</b>	<b>Is there likely to be a significant impact?</b>	<p>No. The proposal is unlikely to have a significant impact on CPW for the following reasons:</p> <ul style="list-style-type: none"> <li>• The extent of vegetation to be removed (0.17 ha) is in a degraded condition</li> </ul>

BC Act	Question	Response
		<ul style="list-style-type: none"> <li>• A greater amount of similar quality CPW will be retained within the broader locality adjacent to the development footprint.</li> <li>• No fragmentation or isolation of habitat will occur.</li> <li>• The area to be removed is not considered critically important to its long-term survival considering the poor existing condition and surrounding exotic/cleared land.</li> </ul>



## B2 Varied Sittella

The proposal would remove 0.17 ha of foraging habitat for this species.

**Table 13: BC Act Test of Significance for Varied Sittella**

BC Act	Question	Response
7.3.1(a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	<p>The proposal would impact 0.17 ha of native vegetation containing marginal foraging habitat for Varied Sittella. The patch of habitat is small, has poor structural complexity and would be utilised as part of a wider range of foraging resources in the broader landscape for this highly mobile species.</p> <p>This highly mobile species would also be able to access suitable habitat available within the riparian corridor of Cosgroves Creek. Therefore, it is considered unlikely that the proposal would place a viable population of Varied Sittella at risk of extinction.</p>
7.3.1(b) (i)	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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	N/A
7.3.1(b) (ii)	<p>In the case of an endangered ecological community or critically endangered ecological community:</p> <p>Whether the proposed development or activity 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.</p>	N/A
7.3.1(c) (i)	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposal would remove 0.17 ha of foraging habitat. However, this is not considered significant as there is better condition habitat available in the riparian corridor of Cosgroves Creek and the Varied Sittella is highly mobile and would be able to access this vegetation.
7.3.1(c) (ii)	<p>In relation to the habitat of a threatened species or ecological community:</p> <p>Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity</p>	The proposal would remove 0.17 ha of potential foraging habitat. This species is highly mobile and is able to disperse between habitat patches. There is similar habitat patches within the locality, and the proposal would not fragment or isolate habitat patches for this species.
7.3.1(c) (iii)	In relation to the habitat of a threatened species or ecological community: The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species,	The proposal would impact 0.17 ha of potential foraging habitat for this species. The area of habitat to be affected is not considered vital to the long-term survival of this species within the locality as it is degraded, has low structural complexity and is fragmented. There is similar

BC Act	Question	Response
	population or ecological community in the locality.	foraging habitat available directly adjacent to the development footprint and in the surrounding landscape.
7.3.1(d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The proposal will not impact any declared Area of Outstanding Biodiversity Value.
7.3.1(e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	<p>The proposal are associated with the KTPs:</p> <ul style="list-style-type: none"> <li>• <i>Loss of hollow-bearing trees</i></li> <li>• <i>Clearing of native vegetation</i></li> <li>• <i>Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners <i>Manorina melanocephala</i>.</i></li> </ul> <p>Impacts are considered minimal as only 0.17 ha of CPW including one hollow-bearing tree would be cleared as a result of the proposal.</p> <p>In relation to clearing of native vegetation, a small amount of degraded CPW will be removed as part of the proposal. Similar foraging habitat is available to the south of the study area at Cosgrove's Creek.</p> <p>Noisy miners cause exclusion of woodland and forest birds where urbanisation occurs and there is a decrease in patch size of native vegetation. Impacts include a reduction in available foraging resources. This KTP does not represent significant additional risk to these woodland bird species as the landscape is already highly altered, the vegetation is in a poor condition and better condition foraging habitat is available south of the study area along the Cosgroves Creek riparian corridor.</p>
<b>Conclusion</b>	<b>Is there likely to be a significant impact?</b>	<p>No. The proposal is unlikely to have a significant impact on the Varied Sitella for the following reasons:</p> <ul style="list-style-type: none"> <li>• The area of vegetation to be affected is in poor condition. Similar habitat for this highly mobile species still exists in the locality, as well as good condition vegetation in the nearby riparian corridor of Cosgroves Creek.</li> <li>• The proposal will not further fragment habitat for this species as it is highly mobile and can use similar habitat within the broader landscape.</li> </ul>

### B3 Microbats

The proposal would remove 0.17 ha of potential foraging and/or roosting habitat (including one hollow bearing tree) for the following vulnerable microbat species:

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).

**Table 14: BC Act Test of Significance for vulnerable microbat species**

BC Act	Question	Response
7.3.1(a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	<p>The proposal would impact 0.17 ha of marginal foraging habitat for Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat, Southern Myotis, Yellow-bellied Sheath-tail-bat and Greater Broad-nosed Bat. The patches of habitat are small, have poor structural complexity and would be utilised as part of a wider range of foraging resources in the broader landscape for these highly mobile species.</p> <p>These highly mobile species would be able to access similar habitat available within the riparian corridor of Cosgroves Creek. In addition, previous investigations by ELA in the vicinity of this project, have identified hollow-bearing trees outside, and nearby the study area. Therefore, the bat species could utilise this roosting habitat. Therefore, it is considered that the local population will still be viable and not placed at risk of extinction.</p>
7.3.1(b) (i)	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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	N/A
7.3.1(b) (ii)	<p>In the case of an endangered ecological community or critically endangered ecological community:</p> <p>Whether the proposed development or activity 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.</p>	N/A
7.3.1(c) (i)	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	The proposal would remove 0.17 ha of potential foraging habitat. One hollow-bearing tree within the study area will be removed which may offer potential roosting habitat. However, other hollows exist nearby and outside of the study area. There is similar foraging habitat available along

BC Act	Question	Response
		Cosgroves Creek south of the development footprint and these species are highly mobile.
7.3.1(c) (ii)	In relation to the habitat of a threatened species or ecological community:  Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity	The proposal is concentrated in areas which are already cleared or dominated by exotic vegetation. The 0.17 ha of native vegetation to be removed is located on the edge of a larger patch. However, the proposal would not result in further fragmenting or isolating potential habitat, because these highly mobile species will still be able to access similar vegetation located directly adjacent to the study area and in the broader locality.
7.3.1(c) (iii)	In relation to the habitat of a threatened species or ecological community: 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 impact 0.17 ha of potential foraging habitat for these microbat species. One hollow bearing tree would be removed which offers potential roosting habitat for these species. However, additional hollow bearing trees exist nearby providing alternative habitat for these species. The area of habitat to be affected is not considered vital to the long-term survival of any of these species within the locality considering similar foraging and roosting habitat nearby.
7.3.1(d)	Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).	The proposal will not impact any declared Area of Outstanding Biodiversity Value.
7.3.1(e)	Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.	<p>The proposal are associated with the KTPs:</p> <ul style="list-style-type: none"> <li>• <i>Clearing of native vegetation</i></li> <li>• <i>Loss of hollow-bearing trees</i></li> </ul> <p>Impacts are considered minimal as only 0.17 ha of poor condition CPW including one hollow-bearing tree, which may offer marginal roosting habitat, would be cleared as a result of the proposal. Hollow bearing trees exist and will be retained nearby the study area. Further foraging resources for these highly mobile species are available within the study area in the riparian corridor of Cosgroves Creek, and across the broader landscape.</p>
<b>Conclusion</b>	<b>Is there likely to be a significant impact?</b>	<p>No. The proposal is unlikely to have a significant impact on these species for the following reasons:</p> <ul style="list-style-type: none"> <li>• The area of vegetation to be affected is in poor condition. Similar habitat for these highly mobile species is available directly adjacent to the development footprint.</li> <li>• The species are unlikely to be fragmented as they are highly mobile and are able to access vegetation within the broader landscape.</li> <li>• hollow-bearing trees will be retained nearby the study area.</li> <li>• Better condition potential habitat is available east of study area in the riparian corridor of Cosgroves Creek.</li> </ul>



BC Act	Question	Response
		The species are unlikely to be fragmented as they are highly mobile and can use similar vegetation in the broader landscape.

## B4 Grey-headed Flying-fox

The Grey-headed Flying-fox (GHFF) is listed as vulnerable under the BC Act and has previously been recorded within 5 km of the study area (DPE, 2023b). The proposal include the removal of 0.17 ha of potential foraging and habitat for this species (Cumberland Plain Woodland).

No known GHFF camps are present within the study area. GHFF present in camps within a 20 km radius of the study area may use the foraging resources available within the development footprint. The potential foraging habitat within the development footprint is marginal (*Eucalyptus* species within CPW) and would not be relied upon as a sole foraging resource for this species. The nearest camp within 20 km radius is approximately 13 km north at Emu Plains (nationally important), which had 500 - 2,500 individuals as of May 2023.

Table 15: BC Act Test of Significance for GHFF

BC Act	Question	Response
7.3.1(a)	In the case of a threatened species: whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	<p>There are no known flying fox camps within the study area (DCCEEW, 2022b). The nearest camp is located at Emu Plains approximately 13 km north of the study area.</p> <p>The proposal would result in removal of 0.17 ha of potential foraging habitat (comprised of <i>Eucalyptus</i> species within CPW) for GHFF. The works will not result in impacts to breeding habitat in the form of camps.</p> <p>It is considered unlikely that the proposal would place a viable population of the species at risk of extinction given that the area of potential habitat is small in extent and would only be used occasionally, as part of a mosaic of foraging resources.</p>
7.3.1(b) (i)	In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: 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	N/A
7.3.1(b) (ii)	In the case of an endangered ecological community or critically endangered ecological community: Whether the proposed development or activity 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.	N/A
7.3.1(c) (i)	In relation to the habitat of a threatened species or ecological community: The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity	Impacts to potential foraging habitat for this species would be minimal. Approximately 0.17 ha of CPW will be removed as a result of the proposal. No camps would be affected.

BC Act	Question	Response
7.3.1(c) (ii)	<p>In relation to the habitat of a threatened species or ecological community:</p> <p>Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity</p>	<p>The proposal will involve removal of approximately 0.17 ha of foraging habitat. Additional CPW is available in the general landscape, surrounding the development footprint. This highly mobile species could also access this area of similar vegetation, however, would likely only rely on this as marginal foraging habitat as part of a network of resources across the wider landscape. GHFF forages up to 20 km per night and is unlikely to rely on this patch of habitat. The removal of this habitat will not cause fragmentation or isolation, as this highly mobile species is still able to disperse between habitat in the locality. As such, the removal of 0.17 ha of marginal foraging habitat will not significantly impact the connectivity of GHFF habitat or separate a camp from their nearest foraging habitat.</p>
7.3.1(c) (iii)	<p>In relation to the habitat of a threatened species or ecological community: 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.</p>	<p>The proposal would result in removal of 0.17 ha of marginal potential foraging habitat for GHFF.</p> <p>This small area of habitat to be affected is not considered vital to the long-term survival of this species within the locality because the species is highly mobile and would be able to continue foraging in similar or better quality vegetation, with foraging opportunities existing within the riparian corridor of Cosgroves Creek. The condition of the vegetation to be removed is poor and is unlikely to represent important foraging resources for GHFF.</p>
7.3.1(d)	<p>Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).</p>	<p>The proposal would not impact any declared Areas of Outstanding Biodiversity Value.</p>
7.3.1(e)	<p>Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.</p>	<p>The proposal are associated with the KTPs:</p> <ul style="list-style-type: none"> <li><i>Clearing of native vegetation</i></li> <li><i>Invasion of native plant communities by exotic perennial grasses</i></li> </ul> <p>Impacts are considered minimal as only 0.17 ha of poor condition marginal foraging habitat would be removed as a result of the proposal. A number of priority weeds and other exotic flora exist within the study area, and therefore do not pose a significant additional threat to the condition of the foraging resources for GHFF. Similar foraging habitat is available to the east of the study area along Cosgroves Creek. The clearing of 0.17 ha of poor condition native vegetation is unlikely to exacerbate this key threat.</p>
<b>Conclusion</b>	<b>Is there likely to be a significant impact?</b>	<p>The proposal are unlikely to have a significant impact on GHFF for the following reasons:</p> <ul style="list-style-type: none"> <li>The extent of removal of foraging habitat in the context of the study area and broader landscape is minimal (0.17 ha).</li> <li>GHFF is unlikely to rely on these patches of habitat, and would only occasionally use it as part of a</li> </ul>

BC Act	Question	Response
		<p>broader network of foraging resources across the landscape</p> <ul style="list-style-type: none"> <li>• additional foraging habitat is available within the study area, in the riparian corridor of Cosgroves Creek.</li> <li>• The proposal would not result in fragmentation of foraging habitat for the species.</li> <li>• No breeding habitat (camps) would be affected by the proposal.</li> </ul>

## Appendix C Assessment of Significance (EPBC Act)

### C1 Grey-headed Flying-fox

The Grey-headed Flying-fox is listed as vulnerable under the EPBC Act and has been previously recorded within a 5 km radius of the study area (DPE 2022b). The proposal includes the removal of 0.17 ha of potential foraging habitat for this species (*Eucalypt* species within CPW). Considering that GHFF is present in camps within 20 km of the study area, and may forage on the Eucalypts within the study area on an occasional basis, a significance assessment has been undertaken in accordance with Significant impact guidelines 1.1 under the EPBC Act (DotE, 2009) (Table 8).

**Table 16: EPBC Act Assessment for *Pteropus poliocephalus* (Grey-headed Flying-fox)**

Criterion	Assessment
<b>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</b>	
1. lead to a long-term decrease in the size of an important population of a species	<p>The <i>Matters of National Environmental Significance Impact Guidelines 1.1</i> (DAWE 2009) defines an important population as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:</p> <ul style="list-style-type: none"> <li>• Key source populations either for breeding or dispersal</li> <li>• Populations that are necessary for maintaining genetic diversity, and/or</li> <li>• Populations that are near the limit of the species range</li> </ul> <p>GHFF is considered one population due to the constant exchange of genetic material between individuals and its movement between camps throughout its entire geographic range (DCCEEW, 2023a). Maternity or other roosting habitat is considered important habitat for this species. According to the National Flying-fox Monitoring Program, no GHFF camps currently occur or have ever been recorded within the study area (DCCEEW, 2023b). The nearest active GHFF camp occurs at Emu Plains approximately 13 km north of the study area and is considered a nationally important camp.</p> <p>The proposed action will remove 0.17 ha of potential foraging habitat for the GHFF in the form of CPW.</p> <p>GHFF is recorded as travelling long distances (up to 20 km) on feeding forays. Given the proximity of other suitable habitat outside the action area. The removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of GHFF.</p>
2. reduce the area of occupancy of an important population	<p>The proposed action will reduce the extent of available foraging habitat for the GHFF. About 0.17 ha of potential foraging habitat will be removed from the study area. The action area does not contain known breeding or sheltering habitat in the form of bat camps. GHFF is known to fly long distances (up to 20 km per night) and move between bat camps. As such this species is likely to utilise a large extent of habitat around the Emu Plains camp which may include some habitat within the development footprint and a large amount of habitat in adjacent lands. Due to the extent of habitat within a 20 km radius of the known bat camp at Emu Plains, the removal of a small amount of CPW is unlikely to significantly reduce the area of occupancy for this species.</p>
3. fragment an existing important population into two or more populations	<p>The proposed action will remove 0.17 ha of CPW suitable as foraging habitat for GHFF. No camps will be affected, and other areas of foraging habitat are present in the study area. The species is highly mobile, and the proposed action will not fragment an existing important population into two or more populations. Whilst</p>



Criterion	Assessment
	the potential foraging habitat may contribute as a 'stepping stone' for this highly mobile species to other more substantial foraging habitat sites, this function is unlikely to be significantly inhibited by the proposed action, given the species foraging range and presence of other foraging habitat nearby. Habitat within the riparian corridor of Cosgroves Creek to the east of the study area will provide foraging habitat for this species. This species is likely to continue to forage adjacent to the study area and across the broader landscape. Therefore, the proposed action is unlikely to fragment an existing important population into two or more populations.
4. adversely affect habitat critical to the survival of a species	<p>The National Recovery Plan for the Grey-headed Flying-fox 2021 identifies myrtaceous plants, including important winter and spring vegetation communities are those that contain:</p> <p><i>Eucalyptus tereticornis</i>, <i>E. albens</i>, <i>E. crebra</i>, <i>E. fibrosa</i>, <i>E. melliodora</i>, <i>E. paniculata</i>, <i>E. pilularis</i>, <i>E. robusta</i>, <i>E. seeana</i>, <i>E. sideroxylon</i>, <i>E. siderophloia</i>, <i>Banksia integrifolia</i>, <i>Castanospermum australe</i>, <i>Corymbia citriodora</i>, <i>C. eximia</i>, <i>C. maculata</i>, <i>Grevillea robusta</i>, <i>Melaleuca quinquenervia</i> or <i>Syncarpia glomulifera</i></p> <p>These species are considered important foraging resources for GHFF. The plan also identifies habitat which contains native species used for foraging and occur within 20 km of a nationally important camp and native or exotic species used for roosting at the study area of a nationally important GHFF camp as critical habitat important to the survival of the species. The study area contains native Eucalypt species used for foraging and is within 20 km of a nationally important camp. The action area is therefore considered critical habitat under the National Recovery Plan. However, due to the small number of trees of <i>Eucalyptus tereticornis</i> and <i>E. fibrosa</i> to be impacted (10-20), it is unlikely that their removal would adversely affect habitat critical to the survival of this species.</p> <p>No camps will be directly affected by the proposed action.</p> <p>Additionally, given that this species is highly mobile (traveling up to 20 km to forage) and similar habitat resources available within the vicinity of the study area and broader locality, it is considered unlikely that the action will adversely affect habitat critical to the survival of this species.</p>
5. disrupt the breeding cycle of an important population	The proposed action will remove 0.17 ha of native vegetation identified as suitable foraging habitat for the GHFF. The proposed action will not disrupt the breeding cycle of GHFF given that no camps will be affected by the proposed action and suitable foraging habitat is available outside of the study area.
6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action will remove 0.17 ha of potential foraging habitat for GHFF. Given the small amount of foraging habitat to be removed, that habitat is likely to be available outside of the development footprint and that this species is highly mobile, it is unlikely that the habitat to be removed would cause the species to decline. Further, according to the National Flying-fox Monitoring Program, no GHFF camps currently occur or have ever been recorded within the study area (DCCEEW, 2022b). The nearest active GHFF camp occurs approximately 13 km to the north at Emu Plains. Therefore, no known GHFF roosting camps for this species will be affected by the proposed action.
7. Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action is unlikely to result in the establishment of an invasive species that is harmful to GHFF.

Criterion	Assessment
8. Introduce disease that may cause the species to decline	GHFF are reservoirs for the Australian bat lyssavirus which can cause clinical disease and mortality in Grey-headed Flying-fox. The species also carries and Hendra virus, although it does not cause evident clinical disease in flying-foxes. Lyssavirus infection is higher when individuals are under stress. The proposed action would not increase the incidence of Lyssavirus, as no camps would be directly affected, and there is other foraging habitat surrounding each nearby camp as well as nearby the study area.
9. Interfere substantially with the recovery of the species	Considering the above factors, the proposed action will not interfere substantially with the recovery of the species.
10. Conclusion	<p>In consideration of the above, the proposed action is considered unlikely to have a significant impact on GHFF because:</p> <ul style="list-style-type: none"> <li>• No camp or habitat important to the lifecycle of this species will be affected.</li> <li>• A minor amount of critical habitat will be affected.</li> <li>• The proposed action will not result in fragmentation of habitats.</li> <li>• Similar foraging resources as well as better condition vegetation is available for GHFF to use nearby the study area.</li> </ul>

## C2 Latham's Snipe

*Gallinago hardwickii* (Latham's Snipe) is listed as migratory under the EPBC Act. An assessment of significance has been undertaken for this species in Table 17 below.

**Table 17: EPBC Act Assessment for Latham's Snipe**

11. Criterion	12. Assessment
An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:	
2. substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	<p>The proposed action will not result in the removal of preferred habitat (wetlands) however is in proximity to marginal habitat (artificial dam with nearby canopy cover, pasture, drainage ditches and close to roads).</p> <p>The species does not breed in Australia. Latham's Snipe prefers bodies of fresh water that contain low, dense vegetation which provides shelter for roosting purposes. This habitat was not identified within the study area. The structure and composition of the fringing vegetation is a high determinant in the suitability of the habitat for foraging and roosting purposes. The dams and drainage ditches nearby the study area were found to contain minimal to no fringing vegetation, which will not be affected or removed as a result of the proposed action. Thus, the study area is only considered marginal habitat for this species.</p> <p>Given the marginal extent of potential habitat within the study area, Latham's Snipe is unlikely to have a high fidelity rate with the foraging and roosting resources in the study area between seasons. The extent of the habitat to be removed is not considered important habitat for this species.</p>
3. result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	<p>Predation by the European Red Fox is considered a threat to Latham's Snipe. This species has widely colonised mainland Australia. The potential Latham's Snipe habitat identified in the development footprint is considered marginal, due to the limited extent of canopy cover near the dam. This species would utilise the study area only on an occasional basis for roosting and foraging. Given it is a non-breeding migrant to Australia, it would be expected to use different sites between seasons. The proposed action is unlikely to result in the introduction of invasive species.</p>
4. seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	<p>The global population of Latham's Snipe is estimated to be between 25,000 and 100,000 individuals. The species' extent of occurrence is estimated at 300,000 km<sup>2</sup> and the area of occupancy at 3000 km<sup>2</sup>. An area of habitat is considered important if it supports &gt; 1% of the current population. Given its context, the study area is not considered important habitat or to support a significant proportion of the population. There is similar habitat available in the local landscape.</p>
<b>Conclusion</b>	<p>In consideration of the above, the proposed action is considered unlikely to have a significant impact on Latham's Snipe because:</p> <p>Limited and marginal habitat (canopy cover near open water, roads) will be affected by the proposed action (0.17 ha of CPW).</p> <p>The proposed action will not result in fragmentation of habitat.</p> <p>This species is highly mobile and is only likely to the utilise the study area for occasional foraging habitat.</p> <p>The extent of marginal habitat is not considered important habitat for this species.</p>



## Appendix D Flora and Fauna list

Exotic *	Scientific Name	Common Name
<b>Flora</b>		
*	<i>Araujia sericifera</i>	Moth Vine
*	<i>Aster subulatus</i>	Wild Aster
*	<i>Brassica rapa</i>	Field Mustard
	<i>Callistemon viminalis</i>	Weeping Bottlebrush
*	<i>Chloris gayana</i>	Rhodes Grass
*	<i>Cynodon dactylon</i>	Couch Grass
*	<i>Cyperus eragrostis</i>	Tall Flatsedge
*	<i>Erigeron bonariensis</i>	Fleabane
	<i>Eucalyptus fibrosa</i>	Red Ironbark
	<i>Eucalyptus moluccana</i>	Grey Box
	<i>Eucalyptus tereticornis</i>	Forest Red Gum
*	<i>Hypochaeris radicata</i>	Catsear
	<i>Juncus usitatus</i>	Common Rush
	<i>Lagunaria patersonia</i>	Norfolk Island Hibiscus
*	<i>Lycium ferocissimum</i>	African Boxthorn
*	<i>Malus</i> sp.	Apple
*	<i>Paspalum dilatatum</i>	Caterpillar Grass
*	<i>Plantago lanceolata</i>	Ribwort Plantain
*	<i>Pyrus calleryana</i>	Callery Pear
*	<i>Rubus fruticosus</i> species aggregate	Blackberry
*	<i>Rumex crispus</i>	Curly Dock
*	<i>Senecio madagascariensis</i>	Fireweed
*	<i>Setaria</i> sp.	Pigeon Grass
*	<i>Sida rhombifolia</i>	Paddy's Lucerne
*	<i>Solanum pseudocapsicum</i>	Jerusalem Cherry
*	<i>Solanum sisymbriifolium</i>	Sticky Nightshade
*	<i>Verbena bonariensis</i>	Purpletop Vervain
<b>Fauna</b>		
	<i>Manorina melanocephala</i>	Noisy Miner
*	<i>Acridotheres tristis</i>	Common Myna



Exotic *	Scientific Name	Common Name
	<i>Corvus coronoides</i>	Australian Raven