128 Andrews Road, Penrith

Flora and Fauna Assessment

Prepared for
Cadence Property Group Pty Ltd

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DOCUMENT TRACKING

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Abbreviations

Abbreviations	Description
BC Act	*Biodiversity Conservation Act 2016*
CPW	Cumberland Plain Woodland
DCP	Development Control Plan
DotEE	Commonwealth Department of the Environment and Energy
DP&E	Department of Planning and Environment
ELA	Eco Logical Australia
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
GIS	Geographic Information Systems
GPS	Global Positioning System
HBT	Hollow Bearing Tree
LEP	Local Environment Plan
LGA	Local Government Area
NP&W Act	*National Parks and Wildlife Act* 1974
NRAR	Natural Resources Access Regulator
NV Act	*Native Vegetation Act 2003*
RFEF	River-flat Eucalypt Forest
TEC	Threatened Ecological Community
TSC Act	NSW *Threatened Species Conservation Act 1995*
WM Act	*Water Management Act 2000*

Executive summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Cadence Property Group Pty Ltd to prepare a Flora and Fauna Assessment for impacts associated with the construction of a new industrial warehouse, two detention basins and access road located at 128 Andrews Road, Penrith (Lot 20 in DP 1216618) and minor works on the adjacent site at 130-172 Andrews Road, Penrith (Lot 13 DP 217705). The location of the shared access driveway into the Existing O-I Sydney Production Facility is still being decided. This assessment has considered both locations and undertook the assessment as a worst case scenario.

This document reports on the ecological values within the study area and considers the impacts from the proposed industrial development in accordance with the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Note that the *Biodiversity Conservation Act 2016* (BC Act), which repeals the TSC Act, took effect on 25 August 2017. There is a savings and transitional period for development proposals under Part 4 of the *Environmental Planning and Assessment Act 1979* to be assessed under previous legislation for specific local government areas identified as an interim designated area. The local government area of Penrith is an interim designated area under the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*. It is understood that the Development Application is to be lodged before 25 November 2018, hence this Flora and Fauna Assessment has been prepared and assessed under the TSC Act.

This report will be used to support the Development Application (DA) to Penrith City Council.

ELA undertook a database review and site inspection, to determine the extent of native vegetation present and to inform an assessment of potential impacts to threatened species, their habitat and ecological communities.

Three threatened ecological communities were recorded during the site inspection:

- Cumberland Plain Woodland in the Sydney Basin Bioregion – listed as critically endangered under the TSC Act
- River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions listed as endangered under the TSC Act; and
- Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions listed as endangered under the TSC Act

Cumberland Plain Woodland identified in the study area did not meet the vegetation condition criteria for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest listed as an critically endangered ecological community under the EPBC Act. The current footprint will result in the removal/impact to approximately 0.56 ha of River-flat Eucalypt Forest and 0.04 ha of Cumberland Plain Woodland. The proposal will also result in the removal/ disturbance to 1.05 ha of Artificial wetland for the construction of a detention basin. Once the detention basin is built the basin will be planted with native sedges and rushes and will provide similar habitat to the habitat which is currently present.

One threatened fauna species *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) was recorded within the study area. No threatened flora species were identified within the study area.

Following the site inspection, habitat assessment and the consideration of impacts, it was concluded that there were a number of species of threatened fauna likely to occur, and/or may be affected by the proposed works. Thus, as there is potential for an impact on threatened ecological communities and flora and fauna listed under the TSC and EPBC Acts resulting from the proposed works assessments of significance were undertaken.

Assessments of Significance (7-part test) were applied to threatened species and ecological communities known, likely or with the potential to occur within the study area to determine if the proposed works will adversely affect these species or ecological communities. The following species and ecological communities were assessed:

Vegetation communities:

- Cumberland Plain Woodland in the Sydney Basin Bioregion
- River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions

Birds

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Hieraaetus morphnoides* (Little Eagle)

Bats

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Southern Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

The assessments concluded that the proposed works are unlikely to result in a significant impact on the threatened ecological communities and species and a Species Impact Statement (SIS) or referral under the EPBC Act is not required. Mitigation measures and recommendations have been provided to reduce impacts to threatened species and ecological communities within and adjacent to the study area (**Section 6**).

Additionally, a small component of the works will be conducted within land mapped as waterfront and triggers the requirement for a Control Activity Approval under the *Water Management Act 2000* (WM Act).

1 Introduction

Eco Logical Australia Pty Ltd (ELA) was commissioned by Cadence Property Group Pty Ltd to prepare a Flora and Fauna Assessment for impacts associated with the construction of a new warehouse, two detention basins and access road from Andrews Road located at 128 Andrews Road Penrith (Lot 20 in DP 1216618) and minor works on the adjacent site at 130-172 Andrews Road, Penrith (Lot 13 DP 217705) (**Figure 1**).

On 25 February 2018, the NSW Government amended the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*. This regulation provides for a transitional period for certain LGAs including Penrith. Under the transitional arrangements, the former planning provisions (i.e. Section 5A of the *Environmental Planning and Assessment Act 1979)* continue to apply rather than the new *Biodiversity Conservation Act 2016* (BC Act) up until 25 November 2018.

The purpose of this report is to address impacts to threatened species and habitat, ecological communities and populations listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The location of the shared access driveway into the Existing O-I Sydney Production Facility is still being decided. This assessment has considered both locations and undertook the assessment as a worst case scenario.

1.1 Site description

The study area covering an area of 27 ha and subject site covering an area of 10.9 ha is located in an industrial area in the suburb of Penrith within the Penrith Local Government Area, approximately 49 km north west of the Sydney CBD. The site is bounded by Penrith Wastewater Treatment Plant to the south, Nepean Rugby Park to the east and warehouses and industrial use area to the north and west.

The study area (survey area) is shown in **Figure 1**.

1.2 Key terms

The following terminology has been used in this report:

- *Subject site:* the area to be directly affected by the proposal.
- *Study area:* the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly.
- *Locality*: The locality is defined by a 5 kilometre radius around the study area for the purposes of conducting database searches.

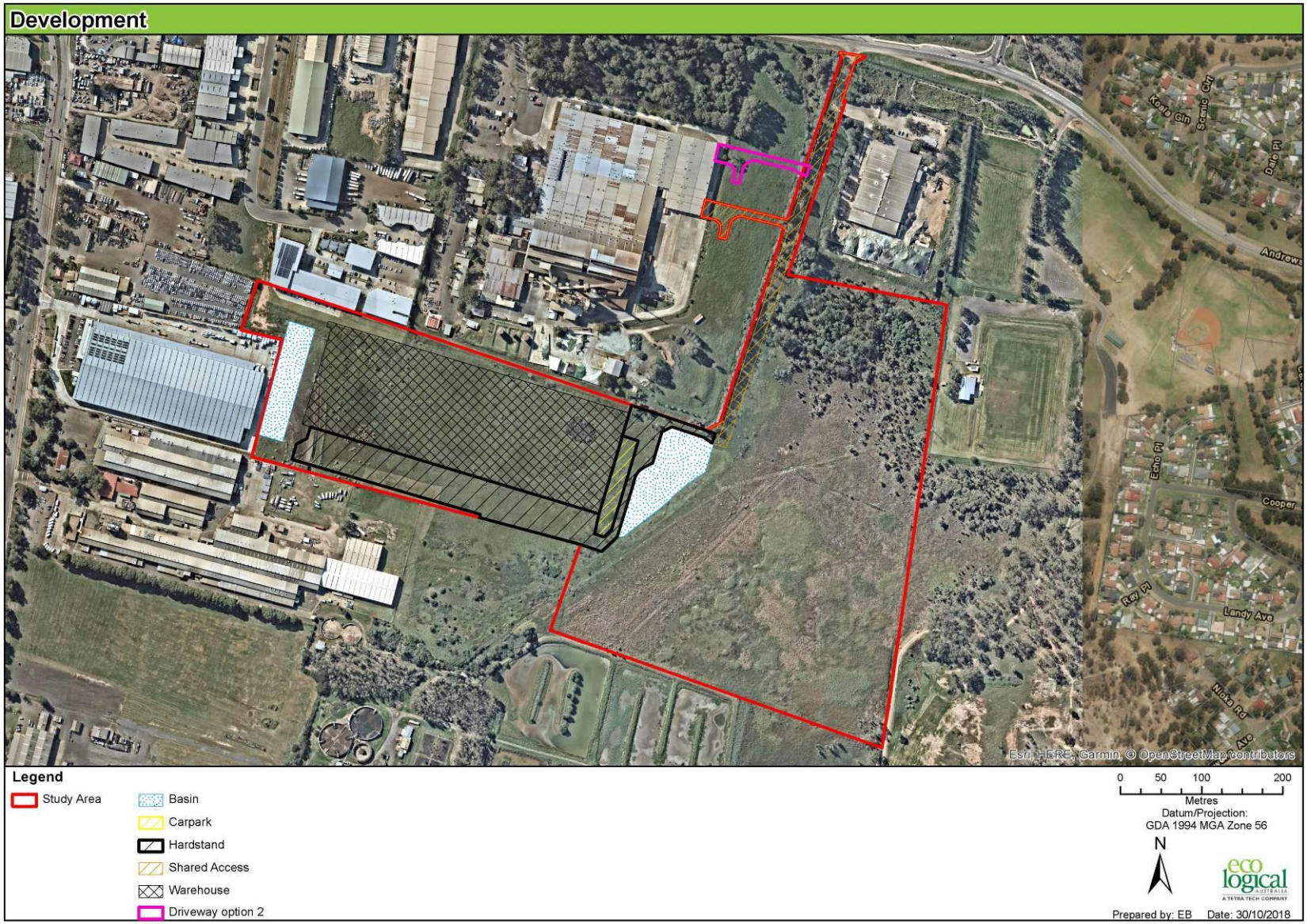

Figure 1: Study area and subject site

2 Legislative context

Name	Relevance to the project	Section in this report
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified on or near the site. This report assesses impacts to MNES and concludes that the development is not likely to have a significant impact on MNES.	Section 5.5 and Appendix G
State		
Environmental Planning and Assessment Act 1979 (EP&A Act)	The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for NSW, providing a framework for the overall environmental planning and assessment of development proposals. The EP&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 (under the BC Act– refer below).	NA
Biodiversity Conservation Act 2016	On 25 August 2017 the Biodiversity Conservation Act commenced operation. The Biodiversity Conservation (Savings and Transitional) Regulation 2017 contains provisions - see section 27 (1f) and 27 (3) that means the Biodiversity Conservation Act will apply to development under Part 4 of the EP&A Act only after 25 November 2018 in the Penrith LGA. If a development application is to be lodged after that time, the new Biodiversity Conservation Act 2016 will apply including the test for determining whether proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats under section 7.3.	NA
Biodiversity Conservation Regulation 2017	The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. The Biodiversity Offsets Scheme applies to all local developments, major projects or the clearing of native vegetation where the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 applies. Any of these will require entry into the Biodiversity Offsets Scheme if they occur on land mapped on the Biodiversity Values Map. The study area contains land identified on the Biodiversity Values Map however because this proposal will be not be assessed under the BC Act (see row above) there is no requirement to consider the BV map. .	NA
Threatened	Impacts to species, populations, or endangered communities listed under the	Section 5.4

Name	Relevance to the project	Section in this report
Species Conservation Act 1995 (TSC Act)	TSC Act must be assessed under Section 5A of the EP&A Act.	and Appendix F
Fisheries Management Act 1994 (FM Act)	The development does not involve harm to mangroves or other protected marine vegetation, dredging, reclamation or blocking of fish passage and therefore a permit under the FM Act is not required.	NA
Biosecurity Act 2015	The *Biosecurity Act 2015* and regulations provide specific legal requirements for state level priority weeds. Under the Act all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Specific legal requirements apply to State determined priorities under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022. Weeds listed as 'other weeds of regional concern' listed under the plan warrant resources for local control or management programs and are a priority to keep out of the region. Inclusion in this list may assist Local Control Authorities and/or land managers to prioritise action in certain circumstances where it can be demonstrated the weed poses a threat to the environment, human health, agriculture etc. Twelve (12) weeds were identified on site and are detailed in **Section 4.2.2**.	Section 4.2.2
Native Vegetation Act 2003 (NV Act)	The development is proposed on land that is excluded from the operation of the NV Act. No further assessment is required under the NV Act.	NA
Water Management Act 2000 (WM Act)	The WM Act's main objective is to manage NSW water in a sustainable and integrated manner that will benefit today's generations without compromising future generations' ability to meet their needs. The WM Act is administered by NSW Department of Primary Industries Water (DPI – Water) (previously NSW Office of Water) and establishes an approval regime for activities within waterfront land. Controlled activity approval is typically required for work within 40 m of the highest bank of a river, lake or estuary. Section 91E of the Act creates an offence for carrying out a controlled activity within waterfront land without approval. The Wetland located to the east of the study area is considered waterfront land as a 4th order and greater watercourse type under the Act (includes estuaries, wetlands and any parts of rivers influenced by tidal waters).The proposal will take place within the outer 50% of the 40 m buffer of the wetland.	NA Section 5.6
Planning Instruments		

Name	Relevance to the project	Section in this report
Penrith Local Environment Plan 2010	The subject site is located on land as zoned IN1 General Industrial under the Penrith LEP. The study area is located on land shown on the Scenic and Landscape Values Map of the Penrith LEP 2010. The objectives of Clause 7.5 states that Development consent must not be granted for any development on land to which this clause applies unless the consent authority is satisfied that measures will be taken, including in relation to the location and design of the development, to minimise the visual impact of the development from major roads and other public places. The proposed warehouse will be approximately 12-15 metres in height and is unlikely to create a visual impact from major roads such as Castlereagh Road and other public places such as Neapean Rugby Park due to the buffer of native vegetation between the public place and proposed development.	NA
Penrith Development Control Plan 2014	Section D4 Industrial Development 4.3. B 3. a) Vegetation and Landscape: a) of the Penrith DCP states that the siting and layout of a development should preserve all on-site trees, significant strands of vegetation, and remnant or native bushland in accordance with the requirements of the Vegetation Management and Landscape Design sections of this DCP. Where this is not practical, the development application must justify the loss of vegetation and outline what measures are to be taken to replace it (page D4 – 14). Where practical the development has been sited to utilise cleared/ previously developed land. The proposed development will result in some native vegetation loss for the construction of an access road from Andrews Road where this will be located on the edge of the wetland. The loss of vegetation and potential threatened fauna habitat this vegetation represents is unlikely to have a significant impact on the native vegetation or on the threatened fauna that may utilise this habitat. Section 5 discusses the impacts in further detail. Section C3 Water Management Section 3.3 'Watercourses, Wetlands and Riparian Corridors' applies to this proposal. The objective of this clause include: a) To protect water quality and terrestrial and aquatic life forms by identifying a riparian corridor along identified waterways and establishing specific planning controls for land within those corridors; b) To minimise disturbance and/or impacts on natural waterbodies; c) To rehabilitate existing riparian corridors and ensure that width, buffers to development, quality of landscape and diversity of vegetation to support principles of ecological sustainability are provided. Section 5.6 discusses this is in more detail.	Section 5 and Section 5.6
State Environmental Planning Policy No. 44 Koala Habitat Protection	This Policy aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline: This Policy does not apply to the Penrith LGA. Potential feed trees are present within the study area.	NA

Name	Relevance to the project	Section in this report
Sydney Regional Environmental Plan No 20 – Hawkesbury - Nepean (No 2-1997).	This policy relates to managing flora and fauna communities so that the diversity of species and genetics within the catchment is conserved and enhanced. It is noted that Clause Part 2, clause 6 (2) Environmentally sensitive areas and clause 6 (6) Flora and Fauna applies to this site. Clause 6 (2) part d relates to the Protect wetlands (including upland wetlands) from future development and from the impacts of land use within their catchments. The Freshwater Wetland in the eastern portion of the study area is recognised as Kingswood Park Wetland (No.158) as shown on Map 26 of 42. Clause 6 (6) requires certain objectives relating to biodiversity protection be considered when assessing development applications. Where practical the development has been sited to utilise cleared/ previously developed land. The proposed development will result in some native vegetation loss for the construction of an access road from Andrews Road where this will be located on the edge of the wetland. The loss of vegetation and potential threatened fauna habitat this vegetation represents is unlikely to have a significant impact on the native vegetation or on the threatened fauna that may utilise this habitat. Section 5 discusses the impacts in further detail.	Section 5

3 Methods

3.1 Literature and data review

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

- BioNet / Atlas of NSW Wildlife (OEH 2018a)
- EPBC Act Protected Matters Search Tool (DotEE 2018a)
- NSW Threatened Species Profiles (OEH 2018b)
- Commonwealth Protected Matters Search Tool for Matters of National Environmental Significance (EPBC Act).
- Aerial mapping and vegetation mapping, to assess the extent of vegetation including mapped threatened ecological communities (TECs) listed under the TSC Act.
- Vegetation Mapping
    - Remnant Vegetation of the western Cumberland subregion, 2013 update.
- Previous reports
    - Ecological Impact Assessment – Penrith Plastic Manufacturing Facility (EMM 2013).
- Local Planning documents including;
    - Penrith City Council Local Environmental Plan (LEP) 2010.
    - Penrith City Council Development Control Plan (DCP) 2014.

Aerial photography of the study area and surrounds was also used to investigate the extent of native vegetation cover and landscape features in the study area.

The BioNet / Atlas of Wildlife (5 km radius) and Protected Matters Search Tool (5 km radius) searches were performed around the co-ordinates (-33.73588,150.70027) on 4 August 2018. The results of these searches were combined to produce a list of threatened flora, fauna and ecological communities considered likely to occur or utilise the study area. The likelihood of occurrence for each species was determined using recent records, the likely presence of suitable habitat and knowledge of the species ecology. A list of species (defined as “yes”, “likely” or having “potential”) was then used to inform the need for any targeted surveys. The terms for the likelihood of occurrence are listed in **Appendix C**.

3.2 Field survey

Field survey across the study area was conducted on 23 July 2018. The field survey consisted of validating vegetation communities and their condition, opportunistic searching for threatened flora using the random meander technique, opportunistic fauna sightings and fauna and flora habitat assessments. The field survey was undertaken by Danielle Adams-Bennett of Eco Logical Australia. Approximately 4 person hours were utilised in completing the survey. Weather observations are outlined below in **Table 1**.

Table 1: Weather conditions during field survey

Date	Temperature °C (Min)	Temperature °C (Max)	Max wind Speed km/h	Rainfall (mm)
23 July 2018	0.1	19.3	26	0

Weather Observations were taken from www.bom.gov.au Penrith (station 067113)

Species were identified to the lowest taxonomic level possible, following the Flora of NSW (Harden 1992-2002) and NSW Flora online (www.plantnet.rbgsyd.nsw.gov.au).

The random meander method (Cropper 1993) was used to identify flora and fauna and their habitat and compile a list of flora species within the study area. Validation of the vegetation mapping was conducted concurrently with the random meander method. Where the boundaries of vegetation communities differed from those mapped, they were modified using hard copy maps. The presence of threatened flora and fauna species identified as having the potential to occur in the study area was determined through a habitat assessment. Where threatened species or important habitat features were observed, such as hollow-bearing trees, potential nesting, or roosting sites, their locations were marked using a hand-held GPS. However, the locations of all important habitat features (e.g. rock outcrops, significant logs and location of all winter flowering eucalypts) observed were not recorded. A qualitative assessment was conducted for each feature. Opportunistic sightings of all fauna present within the study area were recorded.

3.2.1 Hollow bearing tree assessment

The subject site was traversed on foot to identify any hollow-bearing trees (HBTs). HBTs were marked using a handheld GPS unit.

3.3 Survey limitations

The field survey was conducted in winter, which is not an optimum survey time for many flora and fauna species. Targeted surveys would need to be repeated over a number of seasons to more adequately capture the diversity of flora and fauna that could be present in the study area. Since this was not possible, habitat assessments were undertaken to predict the likely presence of species. In addition, considering the habitat available on site and the condition of the vegetation, the survey effort was deemed satisfactory for the purposes of informing the impact assessments in this report.

It should be noted that the species list (**Appendix C**) is not an exhaustive list of species present in the study area. Some species may not have been present in the aboveground flora or were difficult to detect due to lack of suitable reproductive material. This assessment focused on validating the vegetation present on site.

Except where specifically noted, the field survey was undertaken using hand-held GPS units, which were used to take GPS point locations of flora and fauna observed in the field. It is noted that these units can have errors in the accuracy of the locations taken of up to 10 m (subject to availability of satellites on the day).

A conservative approach was also taken in assuming the presence of species that could potentially occur in the study area (that is, species were assessed to have the potential to be present even if the potential for this was low).

4 Results

4.1 Literature and data review

4.1.1 Landform, Geology and Soils

Two soil landscapes have been mapped within the study area; these are Luddenham and Richmond (Bannerman and Hazelton 1990).

The majority of the study area is located on Richmond soil landscape which is characterised by quaternary terraces of the Nepean and Georges Rivers, Relatively flat and level. Splays, levees provide local relief of <3mm. Soils are poorly structured orange to red clay loams, clays and sands. Texture may increase with depth. Ironstone nodules may be present (Bannerman and Hazelton 1990).

The eastern portion of the study area is located on Luddenham soil landscape. Luddenham soil landscape is characterised by undulating to rolling low hills on Wianamatta Group shales, often associated with Minchinbury Sandstone. The soil landscape is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. Soils are shallow dark podzolic soils or massive earthy clays on crests; moderately deep red podzolic soils on upper slopes; moderately deep yellow podzolic soils and prairie soils on lower slopes and drainage lines (Bannerman and Hazelton 1990).

4.1.2 Vegetation mapping

During the desktop literature review (DotEE 2018a and OEH 2013), eight (8) threatened ecological communities (TEC) were identified as having the potential to occur within a 5 km radius of the study area. These were:

- Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion listed as vulnerable under the TSC Act and Agnes Banks Woodland in the Sydney Basin Bioregion listed as critically endangered under the TSC Act / Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (Listed as endangered under the EPBC Act)
- Cooks River / Castlereagh Ironbark Forest in the Sydney Basin Bioregion (Listed as an endangered ecological community under the TSC Act and critically endangered under the EPBC Act)
- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community (Listed as endangered under the EPBC Act).
- Cumberland Plain Woodland in the Sydney Basin Bioregion (Listed as critically endangered under the TSC Act) / Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (Listed as critically endangered under the EPBC Act)
- Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Listed as endangered under the TSC Act)
- River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Listed as an endangered ecological community under the TSC Act)
- Shale Sandstone Transition Forest in the Sydney Basin Bioregion (Listed as a critically endangered ecological community under the TSC and EPBC Act)
- Western Sydney Dry Rainforest in the Sydney Basin Bioregion (Listed as an endangered ecological community under the TSC Act) / Western Sydney Dry Rainforest and Moist Woodland on Shale (listed as critically endangered under the EPBC Act).

Vegetation mapping conducted by OEH (2013) identified one native vegetation community, Shale Plains Woodland within the study area (**Figure 2**). This community is equivalent to the BC and EPBC Act listed critically endangered ecological community (CEEC), Cumberland Plain Woodland in the Sydney Basin Bioregion.

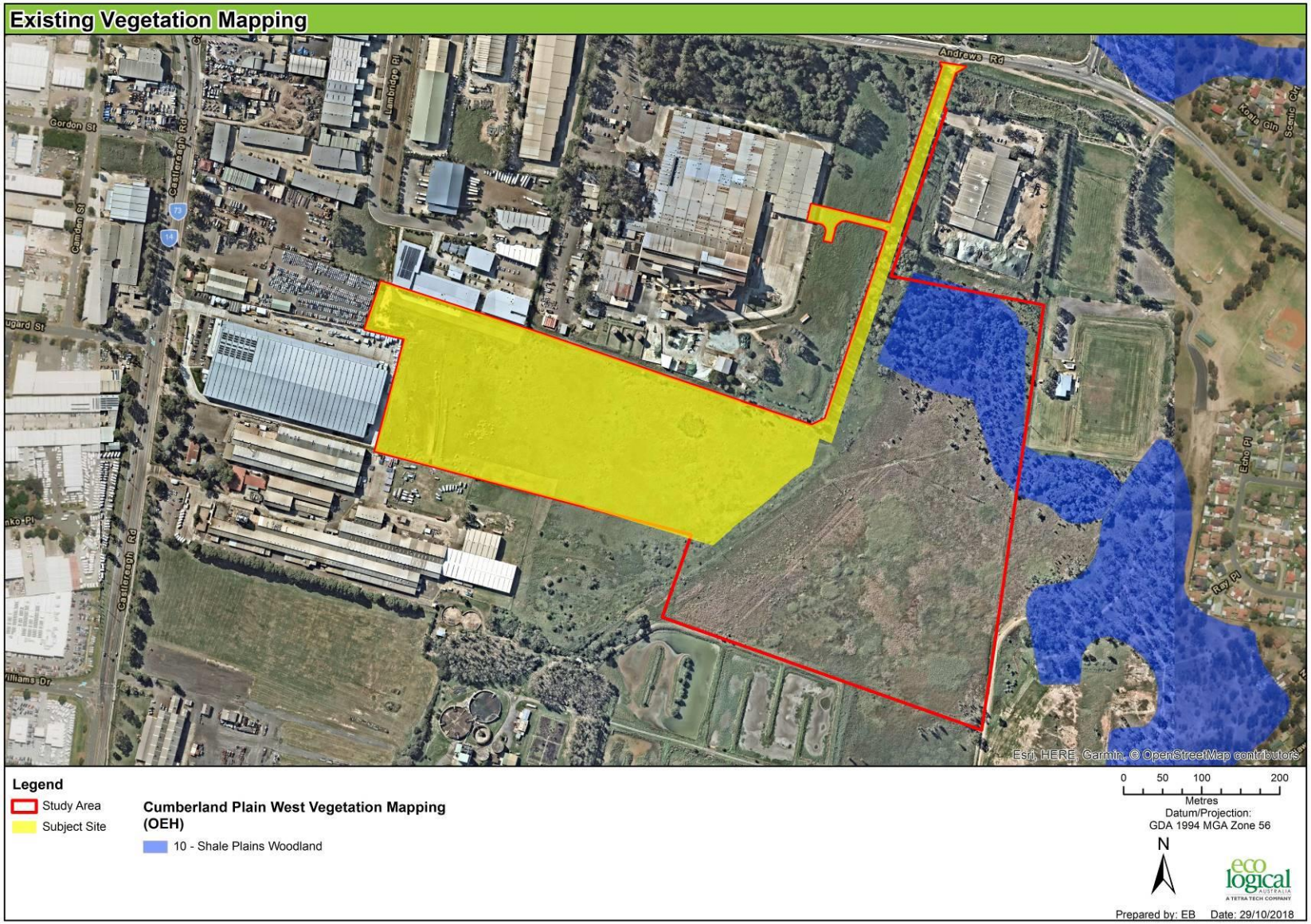

Figure 2: Vegetation communities (OEH 2013)

4.1.3 Threatened flora and fauna

A total of 23 flora species and a total of 56 fauna species comprising of 37 birds, two amphibians, 13 mammals (seven of which are bats), three fish and one invertebrate listed as threatened under the BC and/or EPBC Acts were identified as occurring or having potential to occur within a 5 km radius of the study area (OEH 2018a / DotEE 2018a). A full list of these species can be found in **Appendix D**.

4.2 Field survey

4.2.1 Vegetation validation

A comprehensive floristic species list was compiled during the survey to assist in validating previous vegetation mapping. Descriptions of the vegetation validated in the field are discussed below and shown on **Figure 3**.

Cumberland Plain Woodland

Cumberland Plain Woodland is characterised by an upper-storey that is usually dominated by *Eucalyptus moluccana* (Grey Box) and *E. tereticornis (Forest Red Gum)*, often with *E. crebra* (Grey Ironbark), *E. eugenioides* (Narrow-leaved Stringybark), *Corymbia maculata* (Spotted Gum) or other less frequently occurring eucalypts, including *Angophora floribunda*, *A. subvelutina* (Broad-leaved Apple), *E. amplifolia* (Cabbage Gum) and *E. fibrosa* (Broad-leaved Ironbark). The community may have an open stratum of small trees that may include any of these eucalypts, as well as species such as *Acacia decurrens* (Black Wattle), *A. parramattensis* (Parramatta Wattle), *A. implexa* (Hickory Wattle) or *Exocarpos cupressiformis* (Native Cherry) (NSW Scientific Committee 2011).

The CPW identified in the study area was recorded in one small patch of the site which was characterised by scattered *Eucalyptus crebra* (Narrow-leaved Ironbark). The understorey was disturbed and dominated by exotic species such as, *Bidens pilosa* (Cobblers Pegs), *Foeniculum vulgare* (Fennel), *Eragrostis curvula* (African Lovegrass) and *Paspalum dilatatum* (Paspalum).

The CPW identified within the study area did not meet the area requirements or native perennial cover thresholds for listing requirements under the EPBC Act. A summary of the CPW condition and whether the vegetation within the study area satisfies the listing criteria under the TSC or EPBC Acts is shown in the table below.

Table 2: Summary of the vegetation condition and conservation status

Vegetation	Condition	Description	BC Act	EPBC Act
Cumberland Plain Woodland	Low	• Mature native canopy > 10% • Perennial ground cover exceeded , 50% and patch size was less than 0.5 ha • Contiguous with other native vegetation that exceeds 5 ha.	Yes	No

River-flat Eucalypt Forest

This community conforms to the endangered ecological community *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and Southeast Corner Bioregions* (River-Flat Eucalypt Forest) listed under the TSC Act. River-flat Eucalypt Forest is not listed under the EPBC Act.

The canopy consisted of *Eucalyptus tereticornis* (Forest Red Gum) and a row of *Casuarina glauca* (Swamp Oak) located along the fenceline with regeneration observed. The mid-storey was characterised by *Melaleuca linariifolia* (Flax-leaved Paperbark) and *Acacia parramattensis* (Parramatta Wattle). Exotic species influenced this community mainly around the edge of the patch and included species such as *Foeniculum vulgare* (Fennel), *Cestrum parqui* (Green Cestrum), *Sida rhombifolia* (Paddys Lucerne) *Rubus fruticosus* (Blackberry), *Bidens pilosa* (Cobblers Pegs) and *Asparagus asparagoides* (Bridal Creeper).

The understorey was dominated by *Carex appressa* (Tall sedge) and *Cynodon dactylon* (Couch) where the vegetation is influenced by the adjacent wetland and overland water that this community receives from adjacent land. Other native species included *Microlaena stipoides* (Weeping grass), *Juncus usitatus* and *Bolboschoenus fluviatilis* (Marsh Club-rush).

Native Grassland

Native grassland was located within the vicinity of the River-flat Eucalypt Forest where the groundcover was dominated by *Carex appressa* (Tall sedge) but lacked a mid-storey or native canopy.

Freshwater Wetland

This community confirms to the endangered ecological community *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (Freshwater Wetlands), which is listed under the TSC Act. This community is not listed under the EPBC Act. Freshwater Wetlands on Coastal Floodplains are associated with coastal areas subject to periodic flooding and in which standing fresh water persists for at least part of the year in most years. Typically occurs on silts, muds or humic loams in low-lying parts of floodplains, alluvial flats, depressions, drainage lines, backswamps, lagoons and lakes but may also occur in backbarrier landforms where floodplains adjoin coastal sandplains. Generally, occur below 20 m elevation on level areas.

The Freshwater Wetland in the eastern portion of the study area is recognised as Kingswood Park Wetland (No.158) under the *Sydney Regional Environmental Plan No 20 – Hawkesbury -Nepean (No 2-1997)*.

At the time of the survey no standing water was present in either of the two wetlands and the landscape was extremely dry. The only vegetation present within the artificial wetland was *Phragmites australis* (Common Reed) located in the northern half of the wetland. The wetland to the east of the study area was dominated by *Carex appressa* (Tall sedge), *Juncus usitatus*, *Bolboschoenus fluviatilis* (Marsh Club-rush) and *Typha orientalis* (Broadleaf Cumbungi).

Artificial wetland

The artificial wetland has been identified in a previous assessment (EMM 2013) as largely human induced with vegetation that did not conform to a vegetation community. It's occurrence is likely to be as a result of historical farming practices and changes to the surrounding built areas. During the site inspection the only native vegetation present within the 'wetland' was a patch of *Phragmites australis* (Common Reed) which is a colonising reed in the northern portion. Disturbance in this area is evident from the presence of exotic species such as *Cortaderia selloana* (Pampas Grass) and recent removal of vegetaion and soil. The wetland also currently receives untreated water from a stormwater pipe overflow and runoff from adjacent land as shown in Plate 1.

Exotic vegetation

The study area contained a large area of disturbed grassland that had been subjected to weed infestation and other disturbance. The groundcover was dominated by exotic grasses including *Eragrostis curvula* (African Lovegrass), *Paspalum dilatatum* (Paspalum) and *Chloris gayana* (Rhodes Grass). Other exotic species included *Verbena bonariensis* (Purpletop), *Lycium ferocissimum* (African Boxthorn) and *Cortaderia selloana* (Pampas Grass). Despite the area being dominated by exotic species some native species were present in low occurrences such as *Aristida vagans* (Threeawn Speargrass), *Rytidosperma* sp., *Cheilanthes sieberi* subsp. *sieberi* (Mulga Fern) and *Echinopogon* sp. The site also contained *Cynodon dactylon* (Common Couch) which is likely to have been seeded,

Derived native grassland is a sub-community of Cumberland Plain Woodland under the TSC Act. However, the perennial understorey did not meet the condition thresholds of 50 % or more native species to be considered as derived native grassland due to the disturbed nature of the grassland.

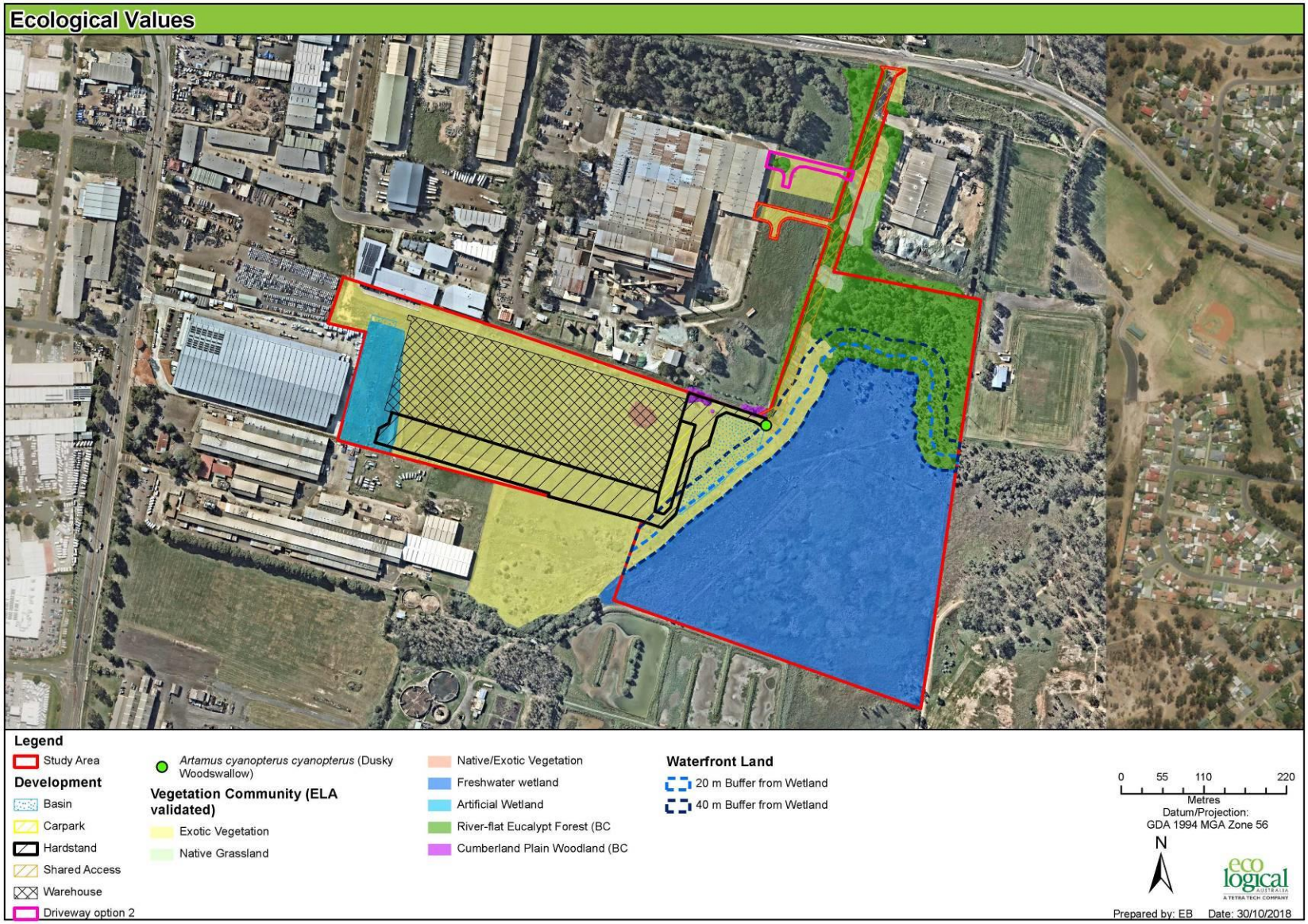

Figure 3: Ecological values (ELA 2018)

4.2.2 Flora

The field survey identified 41 flora species, comprising 19 native and 22 exotic species. A flora list for the study area is presented in **Appendix A.** No threatened flora species were recorded during the field survey.

Weeds listed under the Biosecurity Act 2015

The *Biosecurity Act 2015* and regulations provide specific legal requirements for state level priority weeds (**Table 3**). Under the Act all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Specific legal requirements apply to State determined priorities under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022. Weeds listed as 'other weeds of regional concern' under the plan warrant resources for local control or management programs and are a priority to keep out of the region. Inclusion in this list may assist Local Control Authorities and/or land managers to prioritise action in certain circumstances where it can be demonstrated the weed poses a threat to the environment, human health, agriculture etc.

Of the weeds identified during field surveys, four (4) have been listed as State level priority weeds, one as Regional priority weed and seven (7) listed as other weeds of regional concern. The weeds present, their priority listing under the Act, the associated asset / value at risk and whether they are Weeds of National Significance (WoNS), are presented in **Table 3.**

Table 3: State and Regional level priority weeds and other weeds of concern present in the study area.

Scientific Name	Common Name	WoNS	Management objective
State level priority weeds			
Asparagus asparagoides	Bridal Creeper	Yes	Asset protection
Lycium ferocissimum	African Boxthorn	Yes	Asset Protection
Rubus fruticosus agg.	Blackberry	Yes	Asset protection
Senecio madagascariensis	Fireweed	Yes	Asset protection
Regional priority weed			
Cestrum parqui	Green Cestrum	No	Asset Protection
Other weeds of regional concern			Asset / value at risk
Andropogon virginicus	Whisky Grass	No	Environment
Araujia sericifera	Moth Vine	No	Environment
Chloris gayana	Rhodes Grass	No	Environment
Eragrostis curvula	African Love Grass	No	Environment
Gleditsia triacanthos	Honey Locust	No	Environment and Agriculture
Pennisetum clandestinum	Kikuyu	No	Environment
Solanum mauritianum	Wild Tobacco Bush	No	Environment and Agriculture

Agriculture: *animal and plant industries, including agriculture, horticulture, forestry, aquaculture, recreational and commercial fishing*

Asset protection: *These Weeds are widely distributed in some areas of the State. As Weeds of National Significance, their spread must be minimised to protect priority assets.*

Environment: *biodiversity of natural, urban and peri-urban environments (terrestrial and aquatic).*

**Refer to Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022 for specific species legal requirements.*

4.2.3 Fauna species and habitat

A total of 20 fauna species identified during the field survey consisted of bird species common to peri-urban environments. A list of the fauna observed in the study area is presented in **Appendix B**. One threatened bird *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) was recorded during the field survey. No other threatened fauna species were recorded during the field survey.

Vegetation within the study area provides suitable habitat for a number of common peri-urban species and potential habitat for threatened fauna species. The habitat features relevant to each fauna group are identified in the table below.

Table 4: Habitat features and associated fauna groups (guilds) recorded in the study area.

Habitat Features	Guild	Presence of habitat features in study area
Native vegetation	Birds, microchiropteran bats (microbats), megachiropteran bats (fruit bats) and arboreal mammals	Patch of River-flat Eucalypt Forest with young and small amount of mature trees within study area
Winter flowering species	Winter migratory birds, arboreal mammals and megachiropteran bats (fruit bats)	*Eucalyptus tereticornis* were present in the River-flat Eucalypt Forest
Hollow-bearing trees	Birds, arboreal mammals and microbats	Hollow-bearing trees were identified in the RFEF (outside of the impact area)
Coarse woody debris	Terrestrial mammals, reptiles, invertebrates	Present within River-flat Eucalypt Forest
Waterbody	Amphibian and reptiles	Wetland present within the study area however dry at the time of survey
Native/ Exotic grassland	Reptiles and predator bird species	Exotic grasslands were present within the study area.

Birds

The study area contains potential foraging, nesting, roosting and perching habitat for a range of bird species. Riparian vegetation in the study area provides a mix of ground, shrub and canopy species that would be favoured by small bird species. Common bird species were recorded during the field survey. Two threatened bird species *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) and *Hieraaetus morphnoides* (Little Eagle) which are both listed as vulnerable under the TSC Act are known and likely to utilise the study area.

Arboreal Mammals (not including bats)

There is potential that arboreal mammal species (e.g. Brushtail Possum and Sugar Gliders) may utilise the resources available within the study area. The native trees and remnant vegetation on site may provide adequate foraging habitat for these arboreal mammals. In addition it is likely that there is potential breeding habitat in the form of hollow-bearing trees present in the study area within the River-flat Eucalypt Forest (outside of the impact area).

Bats

Potential foraging habitat for a number of microchiropteran bat species (microbats), including threatened species was present within the native vegetation. Potential roosting habitat such as hollow-bearing trees is likely to be present within the study area.

Additionally, the River-flat Eucalypt Forest within the study area may attract megachiropteran (fruit bats) such as *Pteropus poliocephalus* (Grey-headed Flying-fox). No roosting habitat was recorded within the study area. This species is a highly mobile species and is unlikely to be impacted by the proposed works as only occasional canopy species may be impacted by the proposed works.

4.2.4 Hollow bearing tree assessment

No hollow-bearing trees were recorded within the subject site or observed during the field survey within the study area.

4.2.5 Threatened fauna habitat assessment

Threatened species considered to have potential to occur in the study area due to the presence of potential habitat, following desktop review and field surveys, include:

Birds

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Hieraaetus morphnoides* (Little Eagle)

Mammals (Bats)

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Myotis macropus* (Southern Myotis)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

5 Impact assessment

5.1 Introduction

The potential impact of the proposal to threatened species and communities listed under the TSC Act and EPBC Act was assessed by undertaking an assessment of likelihood of occurrence for threatened and migratory species identified from the database search (**Appendix D**).

Assessments were conducted for those species listed under the TSC Act considered likely or known to use habitat within the subject site, after considering both the desktop review and results from the field survey. Assessments of Significance (**Appendix E**) were applied to those species and communities for which the proposal has the potential to significantly impact on their breeding, movement or foraging habitat or resources.

Some species which are wide-ranging, mobile and breed in habitat not present on the study area may still occur on the study area from time to time e.g. some highly mobile birds. The proposal would not affect any habitat that is important to the survival of these species and therefore no TSC Act Assessments of Significance or EPBC Act Significant Impact Criteria were applied to these species.

5.2 Direct impacts

Both direct and indirect impacts during the construction phase and long-term impacts post construction have been considered for the impact assessment. A summary of the potential impacts based on the provided footprint has been provided in **Table 5**.

Direct impacts are those impacts that directly affect habitat and individuals. Direct impacts considered for this assessment are vegetation and habitat removal. The proposed development is likely to result in the following direct impacts:

- Direct - Removal of native vegetation.
- Direct - Loss of habitat for threatened fauna
    - Potential nesting and breeding habitat for threatened fauna
    - Potential foraging habitat for threatened fauna

5.2.1 Removal of native vegetation

The current footprint will result in the removal/impact to approximately 0.56 ha of River-flat Eucalypt Forest and 0.04 ha of Cumberland Plain Woodland. The CPW identified within the study area did not meet the area requirements or native perennial cover thresholds for listing requirements under the EPBC Act.

Similar condition Cumberland Plain Woodland was identified within the Lot 13 DP217705 to the north of the CPW identified within the study area covering an area approximately 0.1 ha, however it was not mapped as part of this assessment. Cumberland Plain Woodland was also observed east of the study area adjacent to the River-flat Eucalypt Forest south of Nepean Rugby Club covering an area approximately 10.6 ha. Both locations are likely to form the local occurrence of CPW. The local occurrence of River-flat Eucalypt Forest is primarily within the study area with a small area of disturbed River-flat Eucalypt Forest to the south of the study area. A total of 0.4 ha of CPW and 3.64 ha of RFEF was mapped within the study area. The proposed clearance represents 0.38 % of the local occurrence of CPW and 15.4 % of RFEF in a worst case scenario. It has been assumed that the clearance of the

native vegetation for the proposed works will include the removal of canopy, mid-storey and groundcover species.

The proposal will also result in the removal/ disturbance to 1.05 ha of artificial wetland for the construction of a detention basin. Once the detention basin is built the basin will be planted with native sedges and rushes and will provide similar the same habitat that is currently present.

The extent of impacts in relation to the remnant native vegetation within the study area are outlined below in the following table.

Table 5: Summary of the potential impacts on vegetation communities

Vegetation community	Local occurrence	Study area (ha)	Subject site (ha)	Removal of local occurrence (%)
Cumberland Plain Woodland (TSC Act)	10.7	0.4	0.04	0.38 %
River-flat Eucalypt Forest (TSC Act)	3.64	3.64	0.51	14 %
River-flat Eucalypt Forest (TSC Act) – **OPTION 2**			0.56	15.4 %
Freshwater Wetlands (TSC Act) – good condition	14.7	11.5	0	NA
Artificial Wetland	1.05	1.05	1.05	100%*
Native Grassland		0.15	0.07	46.7 %
Total native vegetation		16.38	1.46	NA
Urban Native / exotic		0.22	0.09	NA
Exotic		10.2	9.5	NA
Total		26.8	10.9	NA

Note: * impact relates to the removal of the disturbed wetland whilst a detention is built

5.2.2 Removal of potential habitat for threatened species

One threatened fauna species was recorded during the field survey *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) and *Hieraaetus morphnoides* (Little Eagle) has been previously observed within the site (EMM 2013). Although no other threatened fauna were recorded during the field survey potential habitat for tree dependant microbats is present within the River-flat Eucalypt Forest. For the purposes of this project an assessment of the impact to Dusky Woodswallow, Little Eagle and tree-dependant microbats has been included in this report.

Microchiropteran Bats and other Mammals

Microchiropteran bats such as Eastern Bentwing-bat, Eastern Freetail-bat, Eastern False Pipistrelle, Southern Myotis and Greater Broad-nosed Bat have been considered as having foraging and roosting habitat within the study area (**Appendix D).** A number of hollow-bearing trees within the site may provide roosting and breeding habitat for a number of these species. The combined Assessments of Significance for these species (**Appendix E**) concluded that a significant impact is not likely and that a SIS is not required.

Birds

One threatened bird species *Artamus cyanopterus cyanopterus* (Dusky Woodswallow) was recorded during the field survey. Although not recorded during the field survey a database record for the

Hieraaetus morphnoides (Little Eagle) exists from 2013 in the study area. Potential nesting and foraging habitat is present within the study area.

Mitigation measures to minimise and mitigate impacts have been identified in **Section 6**.

It is noted that some other threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, due to the highly mobile nature of these species and availability of foraging habitat in the adjacent landscape, no Assessments of Significance were considered necessary for these species.

5.3 Indirect impacts

5.3.1 Pre-construction

Potential indirect impacts from the proposed development are listed below. Management measures to prevent and minimise these impacts have been included in **Section 6**.

- Increased edge effects
- Rubbish dumping
- Possible increase in weeds in River-flat Eucalypt Forest and Freshwater Wetlands.

Indirect impacts are those impacts that do not directly affect habitat and individuals but that have the potential to interfere through indirect action. Indirect impacts considered for this assessment are site impacts (noise, light and weed invasion) and downstream or downwind impacts (sedimentation, dust, accidental spills and leaks.

During the construction, 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. Also, during the construction period there is a risk that sediment runoff may impact adjacent native vegetation and nearby drainage lines/creeks if appropriate sediment and erosion measures are not in place. This impact will be managed via an appropriate sediment and erosion control plan. The overall impact is likely to be minor.

Possible increase in weed infestation can result if weed propagules are introduced or moved around by machinery during construction. Weed control measures are recommended below to minimise this risk.

As such, indirect impacts to threatened species and native vegetation are unlikely to be significant and will be managed.

5.3.2 Post Construction

The proposal may also result in indirect impacts such as light, noise, spread of weeds and changes to stormwater runoff and nutrients once the development is completed and operational. The proposed development will be operational 24 hours which is similar to other developments nearby. The increase in light which is likely to be located in the carpark and around the warehouse is unlikely to significantly impact fauna such as microbats. The increase in light may increase the abundance of insect activity which are a key diet item so therefore feeding behaviour could increase in this area.

As a result of the encroachment into the outer 50% of the wetland buffer, it is anticipated that a condition of consent will require revegetation with riparian species to prevent the spread of weeds into the wetland and River-flat Eucalypt Forest. The proposed detention basins will collect water from the site and capture stomwater during heavy rainfall. The interface of the development to the wetland

makes up only a small portion of the boundary of the wetland and the wetland will still receive overflow of water which from surrounding land. The construction of the proposed detention basins is unlikely to excavate to a depth where they will interact with groundwater, and they will be lined/compacted to ensure water retention. The proposal will increase impervious surfaces, but will also collect and treat run-off in the the two detention basins.

Spread of exotic and introduced species

The proposed development will involve working in areas which are currently affected by twelve (12) weeds listed under the *Biosecurity Act 2015*. In addition, the study area also contains other exotic species that have the potential to spread into new habitats during and post construction. It is recommended that an on-going weed management plan or vegetation management plan is implemented prior to construction works and continued during and post-construction.

5.4 NSW TSC Act, Assessment of Significance (7-part test)

The EP&A Act states that if a species, population or ecological community is listed in Schedules 1, 1A and 2 of the TSC Act, then a review of the specified factors must be undertaken to establish if an action is likely to have a significant impact on that species, population, ecological community or habitat. Section 5A of the EP&A Act sets out seven factors that must be addressed as part of an Assessment of Significance (7-part test). This enables a decision to be made as to whether there is likely to be a significant impact on the species and, hence, if a Species Impact Statement (SIS) is required.

Assessments of Significance were conducted for the following threatened flora and fauna species and ecological communities which would be impacted by the proposed works:

Vegetation communities:

- Cumberland Plain Woodland in the Sydney Basin Bioregion
- River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions

Birds

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Hieraaetus morphnoides* (Little Eagle)

Microbats

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Southern Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

The Assessments of Significance concluded that the proposed works are not likely to result in a significant impact to the above species and that a Species Impact Statement is not required. It is noted that some other threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, due to the highly mobile nature of these species and availability of foraging habitat in the adjacent landscape, no Assessments of Significance were considered necessary for these species.

These assessments concluded that it is unlikely that the proposal would significantly impact threatened species for the following reasons:

- the area to be impacted is small
- no critical habitat will be impacted for these species
- the proposal will not fragment or isolate any fauna habitat
- large amounts of similar habitat are available within the survey area and adjacent to the study area
- the habitat is likely to be used in a transitory nature as no key breeding habitat is likely to be present within the study area.

5.4.1 Key Threatening Processes

A number of Key Threatening Processes (KTPs) listed under the TSC Act and / or EPBC Act are likely to be relevant to the proposed works. These are:

- clearing of native vegetation (TSC Act) / Land clearance (EPBC Act)
- loss of hollow-bearing trees (TSC Act)
- removal of deadwood and dead trees (TSC Act)

5.5 Significance assessment (EPBC Act)

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where 'Matters of National Environmental Significance' (NES) may be affected. Under the Act any action which "has, will have, or is likely to have a significant impact on a Matter of National Environmental Significance" is defined as a "controlled action", and requires approval from the Commonwealth Department of the Environment and Energy (DotEE) which is responsible for administering the EPBC Act.

The process includes conducting a significant impact criteria assessment for listed threatened species and ecological communities that represent a MNES and may be impacted as a result of the proposed action. Significant impact guidelines (DotE 2013) have been developed by the Commonwealth, to provide assistance in conducting the Assessment of Significance and to outline criteria to determine whether or not a referral to the Commonwealth is required.

No threatened ecological communities, flora or fauna species listed under the EPBC Act were recorded during the field surveys and based on habitat assessments none are unlikely to occur within the site or, are unlikely to be adversely impacted by the proposal (**Appendix D**). It is noted that some threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, these species are highly mobile and the amount of habitat to be impacted is negligible in comparison to the availability of similar habitat in the adjacent landscape and locality. Additionally Cumberland Plain Woodland identified in the study area did not meet the vegetation condition criteria for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest listed as an critically endangered ecological community under the EPBC Act.

Therefore, no Commonwealth significant impact assessments were considered to be required for threatened ecological communities, flora or fauna species.

5.6 Penrith Development Control Plan 2014

The following sections of the DCP apply to the subject site

- D4 Industrial Development; 4.3. B.3. a)
- C3 Water Management; 3.3.

The proposal is considered to be consistent with the controls given the following:

Table 6: Controls listed under the Penrith Council DCP 2014

Matters		Consideration
D4 Industrial Development Section 4.3. B 3. a) Vegetation and Landscape	the siting and layout of a development should preserve all on-site trees, significant strands of vegetation, and remnant or native bushland in accordance with the requirements of the Vegetation Management and Landscape Design sections of this DCP. Where this is not practical, the development application must justify the loss of vegetation and outline what measures are to be taken to replace it (page D4 – 14).	Where practical the development has been sited to utilise cleared/ previously developed land. The proposed development will result in some native vegetation loss including 0.56 ha of River-flat Eucalypt Forest for the construction of an access road from Andrews Road where this will be located on the edge of the wetland. The loss of vegetation and potential threatened fauna habitat this vegetation represents is unlikely to have a significant impact on the native vegetation or on the threatened fauna that may utilise this habitat. It is recommended that a Vegetation Management Plan is prepared and implemented for the River-flat Eucalypt Forest that will be retained within the study area and also for the interface between the development and the Freshwater Wetland.
C3 Water Management Section 3.3 C: Controls	1) Controlled Activity Approval under the Water Management Act 2000	The proposal will encroach within the 40m buffer of the Freshwater Wetland and a Controlled Activity Approval from the Office of Water is required.
	2) Preserving Alignment of Watercourses a) Where possible, the natural (or historic) alignment of an existing wetland or watercourse should be retained along with its natural dimensions and flow regimes.	The proposal will not result in directly impacting on the natural wetland within the study area. The artificial wetland will be removed and replaced with a vegetated detention basin.
	3) Avoiding Modifications to Natural Waterbodies a) There should be no modifications to a natural (or historic) waterbody in its dimensions, depth or bank height unless it seeks to enhance the ecological outcomes of the waterbody.	The proposal will result in the removal of the artificial wetland located to the west of the proposed warehouse. This is in order to create a bio-filtration detention basin to accommodate predicted stormwater and overflow of water from the development and surrounding development. Once completed the basin will be planted with native sedges and rushes which will improve the overall

		condition of the area and may improve the habitat for fauna including reptiles and birds. The works will also remove exotic weeds that are currently present in the existing artificial wetland/basin. Overall the proposal will cause temporary disturbance but will result in a similar if not improved detention basin with an increase in biodiversity values.
	4) Protection and Enhancement of Riparian Corridors	The riparian zone of the exsiting natural wetland does not contain a natural vegetated buffer on the western side. The proposal will encroach within the outer 50% of the 40 m buffer of the wetland and therefore will trigger the need for a Controlled Activity Approval. Non riparian corridor works and activities can be authorised within the outer riparian corridor, so long as the average width of the vegetated riparian zone can be achieved over the length of the watercourse within the development site. That is, where appropriate 50 per cent of the outer vegetated riparian zone width may be used for non-riparian uses including asset protection zones, recreational areas, roads, development lots and infrastructure. It is recommended that the inner 50 per cent of the buffer zone will be re-vegetated with native endemic riparian plant species.

6 Mitigation measures

The following measures are designed to minimise potential impacts from works associated with clearing native vegetation for proposal. The measures should be considered during the site planning phase and should form part of the development consent, where possible.

Recommended measures include:

- A Vegetation Management Plan to be prepared for the vegetation to be retained within the site to address the following matters:
  - specific measures to protect retained River-flat Eucalypt Forest and Freshwater Wetland from erosion, run-off and weed invasion
  - contractors are to be aware of threatened fauna species that may occur within the study area specifically any evidence of nesting birds .
  - best management practices for working in native vegetation communities.
  - weed management actions to protect existing ecological values and control the spread of exotic / noxious species.
  - pest management actions, where necessary.
  - all chemicals (herbicides) should be stored as far away from any waterways as possible and should be correctly stored within bunding.
  - over spraying and spray drift needs to be minimised as much as possible.
  - removal of woody weeds such as Lantana, should use the cut and paint or stem scrape methods of herbicide application and leave the stump in place if possible to avoid soil disturbance.
  - hand pulled weeds should be removed from the site and disposed of appropriately
  - recommend particular plantings, such as sedges, to be planted below the lot layout to filter nutrients before they enter the wetland or native bushland.
- Implement the following mitigation measures as part of the construction process:
  - temporary tree protection measures (such as machinery exclusion zones from tree roots or tree trunk protection) should be in place during any construction works if trees are to be retained on site and to protect adjacent native vegetation.
  - establishment of clearly defined areas, such as the works area 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 (e.g. native vegetation to the east of the site).
  - construction fencing pre-construction and during construction to ensure that related impacts are contained within the work areas.
  - soil and erosion measures such as sediment fencing, clean water diversion must be in place prior the commencement of the construction work in particular near any threatened fauna habitat.
  - soil and erosion measures should be inspected regularly (weekly at least), more often during rain periods to ensure that they are in proper working order.
  - no chemicals or rubbish should be allowed to escape the construction area.
  - all chemicals should be stored as far away from any waterways as possible and should be correctly stored within bunding.

Conclusion

Eco Logical Australia Pty Ltd (ELA) was engaged by Cadence Property Group Pty Ltd to prepare a Flora and Fauna Assessment for impacts associated with the construction of a new industrial warehouse and access road located at 128 Andrews Road and 2101 Castlereagh Road, Penrith (Lot 20 in DP 1216618 and Lot 1 in DP 787827) and minor works on the adjacent site at 130-172 Andrews Road, Penrith (Lot 13 DP 217705).

The location of the shared access driveway into the Existing O-I Sydney Production Facility is still being decided. This assessment has considered both locations and undertook the assessment as a worst case scenario.

This document reports on the ecological values within the study area and considers the impacts from the proposed industrial development in accordance with the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Note that the *Biodiversity Conservation Act 2016* (BC Act), which repeals the TSC Act, took effect on 25 August 2017. There is a savings and transitional period for developments in specific local government areas such as Penrith to be assessed under previous legislation. It is understood that the Development Application is to be lodged before 25 November 2018, hence this Flora and Fauna Assessment has been prepared and assessed under the TSC Act.

This report will be used to support the Development Application (DA) to Penrith City Council.

Three ecological communities, *Cumberland Plain Woodland in the Sydney Basin Bioregion* (Cumberland Plain Woodland), *River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* (River-flat Eucalypt Forest) and Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Freshwater Wetlands) listed under the TSC Act were validated during the site survey.

The footprint used in this assessment will result in the removal/impact to approximately 0.56 ha of River-flat Eucalypt Forest and 0.04 ha of Cumberland Plain Woodland listed under the TSC Act.

The local occurrence of two of the three native vegetation communities, Cumberland Plain Woodland and River-flat Eucalypt Forest has not been validated to identify the exact extent and condition of this vegetation outside of the study area. This is as a result of access restriction and the specific scope of work. Thus, the local occurrence has been assessed based on the vegetation mapped within the study area and therefore calculation of the local occurrence of this community is only indicative. A total of 0.4 ha of CPW, 3.64 ha of RFEF and 12.55 ha of Freshwater Wetlands was mapped within the study area. The proposed clearance represents 0.38 % of the local occurrence of CPW and 15.4 % of RFEF in a worst case scenario.

Assessments of Significance were undertaken for the threatened fauna species listed under the TSC Act addressed threatened species and ecological communities known, likely or with the potential to occur within the study area to determine if the proposed works will adversely affect these species or ecological communities. The following species and ecological communities were assessed:

<u>Vegetation communities:</u>

- Cumberland Plain Woodland in the Sydney Basin Bioregion
- River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions

Birds

- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)

1) *Hieraaetus morphnoides* (Little Eagle)

Bats

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Myotis macropus* (Southern Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

No threatened ecological communities, flora or fauna species listed under the EPBC Act were recorded during the field surveys and based on habitat assessments none are unlikely to occur within the site or, are unlikely to be adversely impacted by the proposal. It is noted that some threatened fauna species may utilise the site intermittently as marginal foraging habitat. However, these species are highly mobile and the amount of habitat to be impacted is negligible in comparison to the availability of similar habitat in the adjacent landscape and locality.

Therefore, no Commonwealth significant impact assessments were considered to be required for threatened ecological communities, flora or fauna species.

The works will be conducted within land mapped as waterfront and triggers the requirement for a Control Activity Approval under the *Water Management Act 2000* (WM Act).

Mitigation measures and recommendations have been provided to reduce impacts to threatened species and ecological communities within and adjacent to the study area (**Section 6**).

This Flora and Fauna Assessment concluded that the proposal is unlikely to result in a significant impact to any threatened ecological communities, threatened flora or fauna listed under the BC or EPBC Act. Throughout the process of designing the proposed development options for access and siting the building has been explored and has taken practical steps to reduce the ecological impact by ensuring the detention basin, hardstand areas and access road was located in the outer 50 per cent of the Vegetated Riparian Zone in accordance with the Natural Resources Access Regulator (NRAR) (formerly DPI Water) 'Guidelines for riparian corridors on waterfront land.'

Therefore, subject to implementation of the recommendations outlined in this report, it is recommended that the application be supported by Council.

References

Bannerman, S.M. and Hazelton, P.A. 1990. Soil landscapes of the Penrith 1:100 000 Sheet. Soil Conservation Service of NSW, Sydney.

Bureau of Meteorology 2018. *Penrith, New South Wales July 2018 Daily Weather Observations.* Available: http://www.bom.gov.au/climate/dwo/201807/html/IDCJDW2111.201807.shtml

Department of the Environment and Energy 2018a. *Protected matters search tool website*. [online]. Australian Government. Available: http://www.deh.gov.au/erin/ert/epbc/index.html (4 August 2018).

Department of the Environment and Energy 2018b. *Species Profile and Threats Database*. [Online] Available from: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Department of the Environment 2015. *National Flying-fox Monitoring Viewer*. Available: http://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf [Accessed 4 August 2018].

EMM 2013. Ecological Impact Assessment – Penrith Plastic Manufacturing Facility. Prepared for Iplex Pipelines Australia Pty Ltd.

NSW Scientific Committee 2009. *Final Determinations.* http://www.environment.nsw.gov.au/committee/finaldeterminations.htm

NSW Scientific Committee 2011. C*umberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing*. NSW Scientific Committee - final determination. Available: http://www.environment.nsw.gov.au/determinations/cumberlandwoodlandsFD.htm

Office of Environment and Heritage (OEH) 2013. *Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207*.

Office of Environment and Heritage (OEH) 2017. *Key threatening processes*. Available: http://www.environment.nsw.gov.au/threatenedspeciesapp/

Office of Environment and Heritage (OEH). 2018a. *Threatened Species Database* (5 km radius search). OEH Sydney, NSW. (Data viewed 2 January 2018).

Office of Environment and Heritage (OEH) 2018b. *Threatened Species Profiles*. Available: http://www.environment.nsw.gov.au/threatenedspeciesapp/

Appendix A - Flora species recorded in the study area

Scientific name	Common name	Status
Native flora species		
Acacia parramattensis	Parramatta Wattle	N
Acacia sp.		N
Aristida vagans	Threeawn Speargrass	N
Bolboschoenus fluviatilis	Marsh club-rush	N
Carex appressa	Tall Sedge	N
Casuarina glauca	Swamp Oak	N
Cheilanthes sieberi subsp. *sieberi*	Mulga Fern	N
Cynodon dactylon	Common Couch	N
Echinopogon sp.		N
Eucalyptus amplifolia	Cabbage Gum	N
Eucalyptus crebra	Narrow-leaved Ironbark	N
Eucalyptus tereticornis	Forest Red Gum	N
Juncus usitatus		N
Melaleuca armillaris	Bracelet Honey-myrtle	N
Melaleuca linariifolia	Flax-leaved Paperbark	N
Microlaena stipoides	Weeping Grass	N
Phragmites australis	Common Reed	N
Rytidosperma sp.		N
Typha orientalis	Broadleaf Cumbungi	N
Exotic (and non-indigenous) flora species		
Andropogon virginicus	Whisky Grass	E, Weed of regional concern
Araujia sericifera	Moth Vine	E, Weed of regional concern
Asparagus asparagoides	Bridal Creeper	E, State level priority weed, WoNS
Bidens pilosa	Cobblers Pegs	E
Chloris gayana	Rhodes Grass	E, Weed of regional concern
Cirsium vulgare	Spear Thistle	E
Conyza bonariensis	Fleabane	E
Cortaderia selloana	Pampas Grass	E
Eragrostis curvula	African Love Grass	E, Weed of regional concern
Foeniculum vulgare	Fennel	
Gleditsia triacanthos	Honey Locust	E, Weed of regional concern
Lycium ferocissimum	African Boxthorn	E, State level priority weed, WoNS
Paspalum dilatatum	Paspalum	E
Pennisetum clandestinum	Kikuyu	E, Weed of regional concern

Scientific name	Common name	Status
Plantago lanceolata	Plantain	E
Rubus fruticosus agg.	Blackberry	E, State level priority weed, WoNS
Senecio madagascariensis	Fireweed	E, State level priority weed, WoNS
Setaria sp.	Pigeon Grass	E
Sida rhombifolia	Paddy's Lucerne	E
Solanum mauritianum	Tobacco Weed	E, Weed of regional concern
Trifolium repens	White clover	E
Verbena bonariensis	Purpletop	E

Key: N = Native; E = Exotic; P = Planted; WoNS = Weed of National Significance

Appendix B – Fauna species recorded in the study area

Scientific Name	Common Name	Native / Exotic
Acridotheres tristis	Indian Myna	E
*Artamus cyanopterus cyanopterus**	Dusky Woodswallow	N
Cacatua galerita	Sulphur-crested Cockatoo	N
Cacatua sanguinea	Little Corella	N
Chenonetta jubata	Australian Wood Duck	N
Corvus coronoides	Australian Raven	N
Coracina novaehollandiae	Black-faced Cuckoo-shrike	N
Grallina cyanoleuca	Magpie-lark	N
Hirundo neoxena	Welcome Swallow	N
Malurus cyaneus	Superb Fairy Wren	N
Manorina melanocephala	Noisy Miner	N
Manorina melanophrys	Bell Miner	N
Neochmia temporalis	Red-browed Finch	N
Phylidonyris novaehollandiae	New Holland Honeyeater	N
Rhipidura albiscapa	Grey Fantail	N
Rhipidura leucophrys	Willie Wagtail	N
Sturnus vulgaris	Common Stirling	E
Threskiornis molucca	Australian White Ibis	N
Trichoglossus haematodus	Rainbow Lorikeet	N
Vanellus miles	Masked Lapwing	N

Appendix C - Likelihood of occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. 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 study area, and
- "no" = habitat on site and in the vicinity is unsuitable for the species.

An assessment of Significance was conducted for threatened species or ecological communities that were recorded within the study area or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the study area intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar good quality habitat remaining in the surrounding landscape. As such, an assessment of significance in reference to State or Commonwealth legislation was not considered necessary.

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
FAUNA						
Birds						
Anthochaera phrygia	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 in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).	Unlikely	No
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland	Recorded within the study area	Yes
Botaurus poiciloptilus	Australasian Bittern	E1	E	Found over most of NSW except for the far north-west. Found in permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. (bullrushes) and *Eleocharis* spp. (spikerushes).	Unlikely	No
Calyptorhynchus	Glossy Black-	V	-	In NSW, widespread along coast and inland to the southern tablelands	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
lathami	Cockatoo			and central western plains, with a small population in the Riverina. Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.		
Chthonicola sagittata	Speckled Warbler	V	-	Occupies a wide range of eucalypt dominated communities with a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding.	Unlikely	No
Circus assimilis	Spotted Harrier	V	-	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. It occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Unlikely	No
Daphoenositta chrysoptera	Varied Sittella	V	-	Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, mallee and Acacia woodland.	Unlikely	No
Glossopsitta pusilla	Little Lorikeet	V	-	In NSW, found from the coast westward as far as Dubbo and Albury. Dry, open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation.	Unlikely	No
Grantiella picta	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.	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	Unlikely	No
Hieraaetus morphnoides	Little Eagle	V	-	Throughout the Australian mainland, with the exception of the most densely-forested parts of the Dividing Range escarpment. Open eucalypt forest, woodland or open woodland, including sheoak or Acacia woodlands and riparian woodlands of interior NSW.	Potential. One database record within the study area from 2013	Yes
Lathamus discolor	Swift Parrot	E1	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.	Unlikely	No
Lophoictinia isura	Square-tailed Kite	V	-	In NSW, it is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast. Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.	Unlikely	No
Neophema pulchella	Turquoise Parrot	V	-	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Unlikely	No
Ninox strenua	Powerful Owl	V	-	Powerful Owls are associated with a wide range of wet and dry forest types with a high density of prey, such as arboreal mammals, large birds and flying foxes. Large trees with hollows at least 0.5m deep are	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				required for shelter and breeding.		
Numenius madagascariensis	Eastern Curlew	-	CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Unlikely	No
Pandion haliaetus	Eastern Osprey	V	-	Common around the northern NSW coast, and uncommon to rare from coast further south. Some records from inland areas. Rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	Unlikely	No
Petroica phoenicea	Flame Robin	V	-	Flame Robins are found in a broad coastal band around the south-east corner of the Australian mainland, from southern Queensland to just west of the South Australian border. The species is also found in Tasmania. Flame Robins prefer forests and woodlands up to about 1800 m above sea level.	Unlikely	No
Rostratula australis	Australian Painted Snipe	E1	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.	Unlikely	No
Stagonopleura guttata	Diamond Firetail	V	-	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River. It is found in grassy eucalypt woodlands, including	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland.		
Stictonetta naevosa	Freckled Duck	V	-	The Freckled Duck is found primarily 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. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. 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.	Unlikely	No
Tyto novaehollandiae	Masked Owl	V	-	The Masked Owls distribution extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. The Masked Owl lives in dry eucalypt forests and woodlands from sea level to 1100 m.	Unlikely	No
Tyto tenebricosa	Sooty Owl	V	-	The Sooty Owl occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Territories are occupied permanently. This species occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (Pseudocheirus peregrinus) or Sugar Glider (Petaurus breviceps).		
Migratory birds						
Actitis hypoleucos	Common Sandpiper	-	M	Found along all coastlines of Australia and in many areas inland. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	No	No
Apus pacificus	Fork-tailed Swift	-	M	Recorded in all regions of NSW. Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	Unlikely	No
Calidris acuminata	Sharp-tailed Sandpiper	-	C,J,K	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.	No	No
Calidris ferruginea	Curlew Sandpiper	E1	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	Unlikely	No
Calidris melanotos	Pectoral Sandpiper	-	M	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and	No	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.		
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo	-	M	Northern and eastern Australia, records mainly coastal in NSW south to Bega area. Non breeding habitat: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodland.	No	No
Gallinago hardwickii	Latham's Snipe	-	M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	Unlikely	No
Hirundapus caudacutus	White-throated Needletail	-	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.	Unlikely	No
Monarcha melanopsis	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 farther 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.	Unlikely	No
Monarcha trivirgatus	Spectacled Monarch	-	M	Wet forests, mangroves.	Unlikely	No
Motacilla flava	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.	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Myiagra cyanoleuca	Satin Flycatcher	-	M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	Unlikely	No
Rhipidura rufifrons	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.	Unlikely	No
Tringa nebularia	Common Greenshank	-	M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions. Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	No	No
Mammals						
Dasyurus maculatus	Spotted-tailed 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.	Unlikely	No
Petauroides volans	Greater Glider	-	V	Greater Glider is found in Eastern Australia, from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest). Eucalypt forests and woodlands. It is typically found in highest abundance in taller, montane, moist eucalypt forests with	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				relatively old trees and abundant hollows.		
Petaurus norfolcensis	Squirrel Glider	V	-	Associated with dry hardwood forest and woodlands. Habitats typically include gum barked and high nectar producing species, including winter flower species. The presence of hollow bearing eucalypts is a critical habitat value.	Unlikely	No
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	Unlikely	No
Phascolarctos cinereus	Koala	V	V	In NSW it mainly occurs on the central and north coasts with some 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. Eucalypt woodlands and forests.	Unlikely	No
Pseudomys novaehollandiae	New Holland Mouse	-	V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	No	No
Mammals (Bats)						
Chalinolobus dwyeri	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.	Unlikely	No
Falsistrellus tasmaniensis	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.	Potential	Yes

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	In NSW it occurs on both sides of the Great Dividing Range, from the coast inland to Moree, Dubbo and Wagga Wagga. Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.	Potential	Yes
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Found along the east coast from south Qld to southern NSW. Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Potential	Yes
Myotis macropus	Southern Myotis	V	-	In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers. Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	Potential	Yes
Pteropus poliocephalus	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.	Potential – foraging habitat	No
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Both sides of the great divide, from the Atherton Tableland in Qld to north-eastern Victoria, mainly along river systems and gullies. In NSW it is widespread on the New England Tablelands. Woodland, moist and dry eucalypt forest and rainforest.	Potential	Yes
Fish						
Maccullochella peelii	Murray Cod	-	V	Murray Cod generally prefer slow flowing, turbid water in streams and rivers, favouring deeper water around boulders, undercut banks, overhanging vegetation and logs. Small numbers are still present in the Nepean River and Yarra River.	No	No
Macquaria	Macquarie	E1	E	Murray-Darling Basin (particularly upstream reaches) of the Lachlan,	No	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
australasica	Perch			Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. River and lake habitats, especially the upper reaches of rivers and their tributaries.		
Prototroches maraena	Australian Grayling	-	V	The historic distribution of the Australian Grayling included coastal streams from the Grose River southwards through NSW, Vic. and Tas. On mainland Australia, this species has been recorded from rivers flowing east and south of the main dividing ranges. This species spends only part of its lifecycle in freshwater, mainly inhabiting clear, gravel-bottomed streams with alternating pools and riffles, and granite outcrops but has also been found in muddy-bottomed, heavily silted habitat. Grayling migrate between freshwater streams and the ocean and as such it is generally accepted to be a diadromous (migratory between fresh and salt waters) species.	No	No
Amphibians						
Heleioporus australiacus	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.	No	No
Litoria aurea	Green and Golden Bell Frog	E1	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 Typha spp. (bullrushes) or Eleocharis spp. (spikerushes). Some	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				populations occur in highly disturbed areas.		
Invertebrates						
Meridolum corneovirens	Cumberland Plain Land Snail	E1	-	Areas of the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool, west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. Primarily inhabits Cumberland Plain Woodland. Also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest.	Unlikely	No
FLORA						
Acacia bynoeana	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.	Unlikely	No
Acacia pubescens	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.	Unlikely	No
Allocasuarina glareicola		E1	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	Unlikely	No
Asterolasia elegans		E1	E	*Asterolasia elegans* is restricted to a few localities on the NSW Central Coast north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				LGAs. It is found in sheltered forests on mid- to lower slopes and valleys, in or adjacent to gullies.		
Cynanchum elegans	White-flowered Wax Plant	E1	E	Asterolasia elegans is restricted to a few localities on the NSW Central Coast north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby LGAs. It is found in sheltered forests on mid- to lower slopes and valleys, in or adjacent to gullies.	Unlikely	No
Dillwynia tenuifolia		V	-	The core distribution is the Cumberland Plain from Windsor and Penrith east to Dean Park near Colebee. Other populations in western Sydney are recorded from Voyager Point and Kemps Creek in the Liverpool LGA, Luddenham in the Penrith LGA and South Maroota in the Baulkham Hills Shire. Disjunct localities outside the Cumberland Plain include the Bulga Mountains at Yengo in the north, and Kurrajong Heights and Woodford in the Lower Blue Mountains.	Unlikely	No
Eucalyptus aggregata	Black Gum	V	V	Black Gum is found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the ACT. In NSW it occurs in the South Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands, for example in the Blayney, Crookwell, Goulburn, Braidwood and Bungendore districts.	Unlikely	No
Genoplesium baueri	Bauer's Midge Orchid	E1	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone.	Unlikely	No
Grevillea juniperina subsp. juniperina		V	-	This species is 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. It grows on reddish	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels.		
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	V	Square Raspwort occurs in 4 widely scattered localities in eastern NSW. It is disjunctly distributed in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Square Raspwort appears to require protected and shaded damp situations in riparian habitats. Flowering specimens in NSW are recorded from November to January.	Unlikely	No
Melaleuca deanei	Deane's Paperbark	V	V	Found in heath on sandstone, and also associated with woodland on broad ridge tops and slopes on sandy loam and lateritic soils.	Unlikely	No
Marsdenia viridiflora subsp. *viridiflora*	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	E2	-	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range where it is known to grow in vine thickets and open shale woodland.	Unlikely	No
Micromyrtus		E1	V	Restricted to the general area between Richmond and Penrith, western Sydney. Grows in Castlereagh Scribbly Gum Woodland, Ironbark	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
minutiflora				Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments. Sporadic flowering, June to March Response to fire and mechanical disturbance is uncertain. Regeneration may be due to resprouting or germination of soil-stored seed.		
Persoonia hirsuta		E1	E	Persoonia hirsuta has a scattered distribution around Sydney. The species is distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Persoonia hirsuta has a large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Unlikely	No
Persoonia nutans	Nodding Geebung	E1	E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. The species has a disjunct distribution, with the majority of populations (and 99% of individuals) occurring in the north of the species range in the Agnes Banks, Londonderry, Castlereagh, Berkshire Park and Windsor Downs areas. Core distribution occurs within the Penrith, and to a lesser extent Hawkesbury, local government areas, with isolated and relatively small populations also occurring in the Liverpool, Campbelltown, Bankstown and Blacktown local government areas. The southern and northern populations have distinct habitat differences. Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
				occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest.		
Pimelea curviflora var. curviflora		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.	Unlikely	No
Pimelea spicata	Spiked Rice-flower	E1	E	Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). Well-structured clay soils. Eucalyptus moluccana (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	Unlikely	No
Pterostylis gibbosa	Illawarra Greenhood	E1	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). Open forest or woodland, on flat or gently sloping land with poor drainage.	Unlikely	No
Pterostylis saxicola	Sydney Plains Greenhood	E1	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.	Unlikely	No
Pultenaea parviflora		E1	V	Endemic to the Cumberland Plain. Mainly from Windsor to Penrith and east to Dean Park, with outlier populations at 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.	Unlikely	No

Scientific Name	Common Name	TSC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of Occurrence	Impact Assessment Required
Rhizanthella slateri	Eastern Underground Orchid	V	E	Occurs from south-east Queensland to south-east NSW. 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. Habitat requirements are poorly understood and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed.	Unlikely	No
Syzygium paniculatum	Magenta Lilly Pilly	V	V	This species occupies a narrow coastal area between Bulahdelah and Conjola State Forests in NSW. On the Central Coast, it occurs on Quaternary gravels, sands, silts and clays, in riparian gallery rainforests and remnant littoral rainforest communities *S. paniculatum* is summer flowering (November-February), with the fruits maturing in May.	Unlikely	No
Thesium australe	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.	Unlikely	No

TSC Act Key: V = vulnerable, E1 = endangered, E2 = endangered population, E4A = critically endangered

EPBC Act Key: V = vulnerable, E = endangered, CE = critically endangered, M = migratory under CAMBA, JAMBA, RoKAMBA or Bonn Agreement, Mar = Marine.

Appendix D - NSW TSC Act (7-Part Test)

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

The impact assessment was undertaken for the following two threatened ecological communities and species

Species	TSC Act
Ecological communities	
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically endangered
River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	Endangered
Threatened fauna	
Artamus cyanopterus cyanopterus (Dusky Woodswallow)	Vulnerable
Hieraaetus morphnoides (Little Eagle)	Vulnerable
Hollow-roosting bats	
Falsistrellus tasmaniensis (Eastern False Pipistrelle)	Vulnerable
Mormopterus norfolkensis (Eastern Freetail-bat)	Vulnerable
Myotis macropus (Southern Myotis)	Vulnerable
Scoteanax rueppellii (Greater Broad-nosed Bat)	Vulnerable
Cave roosting bats	
Miniopterus schreibersii oceanensis (Eastern Bentwing-bat)	Vulnerable

Cumberland Plain Woodland

Cumberland Plain Woodland (CPW) is listed as a Critically Endangered Ecological Community under the TSC Act. In the NPWS vegetation mapping of the Cumberland Plain, two forms of Cumberland Plain Woodland have been identified: Shale Hills Woodland and Shale Plains Woodland. Shale Hills Woodland occurs mainly on the elevated and sloping southern half of the Cumberland Plain and is the most widely distributed form of CPW (NPWS 2002). The dominant canopy trees in CPW include *Eucalyptus moluccana* (Grey Box), *E. tereticornis* (Forest Red Gum) and *E. crebra* (Narrow-leaved Ironbark), although *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) may also occur. The community typically has a shrub layer dominated by *Bursaria spinosa* (Blackthorn), with other shrubs, such as *Acacia implexa, Indigofera australis* and *Dodonaea viscosa* subsp. *cuneata*, also present. The diverse understorey layer is similar for both forms of Cumberland Plain Woodland. It is common to find grasses, such as *Themeda australis* (Kangaroo Grass*), Microlaena stipoides* var. *stipoides* (Weeping Meadow Grass) in the community, as well as herbs, such as *Dichondra repens* (Kidney Weed), *Brunoniella australis* (Blue Trumpet) and *Desmodium varians* (NPWS 2002).

Before European settlement, CPW was extensive across western Sydney, covering 125,000 hectares. In 2002 there was only 9% of the original extent, with a further 14% remaining as scattered trees across the landscape (NPWS 2002). CPW occurs in the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly Local Government Areas (DECC, 2010).

Clearing for agriculture and urban development is the greatest threat to CPW. Given it exists now only in fragments, CPW is vulnerable to disturbances, such as weed invasion, increased soil nutrients, rubbish dumping and frequent fire. Weeds, such as *Eragrostis curvula (*African Lovegrass), *Olea europaea* subsp. *cuspidata* (African Olive) and *Chloris gayana* (Rhodes Grass), are major threats to the community (DECC, 2010).

Similar condition Cumberland Plain Woodland was identified within the Lot 13 DP217705 to the north of the CPW identified within the study area covering an area approximately 0.1 ha and was also observed east of the study area adjacent the River-flat Eucalypt Forest south of Nepean Rugby Club covering an area approximately 10.6 ha and both locations are likely to form the local occurrence of CPW. The proposed clearance represents 0.38 % of the local occurrence of CPW.

a. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

CPW is a critically endangered ecological community and therefore this question is not applicable.

b. in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

c. in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

The CPW identified within the study area is characterised by scattered regrowth trees with a disturbed/ exotic understorey that exists along the fenceline between the study area and the lot to the north.

Additional CPW is located south east of the study area within Hickeys Lane Reserve. The proposed works will result in the removal of approximately 0.04 ha of CPW. This is approximately 0.38 % of the local occurrence of CPW.

The CPW that occurs within the site that will be directly and/or indirectly impacted is in poor condition with a disturbed understorey. Given the small amount (0.04 ha) will be removed of an already fragmented local occurrence, it is unlikely that the proposal would place the local occurrence of CPW at risk of extinction.

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

The proposal will result in the removal of 0.04 ha of CPW in the study area which represents 0.38 % of the local occurrence of CPW. The vegetation proposed to be cleared in this area is in poor condition and is only comprised of scattered trees with an exotic/disturbed understorey. Additional areas of similar condition CPW are identified in the lot to the north of the site and also within Hickeys Lane Reserve. Therefore the proposal is unlikely to be substantially and adversely modified that the local occurrence of CPW would be placed at risk of extinction.

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

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

The proposed action will result in the removal of 0.04 ha of CPW within the study area. This proposed action represents a reduction of 0.38 % of its local occurrence. The majority of the local occurrence of CPW exists outside of the study area and will continue to persist.

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

The CPW within the study area is part of a largely fragmented local occurrence. The vegetation proposed to be cleared in the study area consists of single young trees with an exotic/ disturbed understorey. The scale of vegetation clearance and proposal is unlikely to impede on the movement of genetic material between scattered occurrence of CPW in the study area and similar condition CPW located north of the site. Therefore the CPW on site will not be further fragmented or isolated from adjacent patches of CPW and will not further increase the fragmentation of the local occurrence.

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

The CPW in the locality has undergone significant past disturbance with historical clearing and urban development. The CPW within the study is in poor condition and similar condition CPW exists north of the study area with better condition CPW present within Hickeys Lane Reserve. The presence of exotic weeds in the understorey also threatens the integrity of this ecological community.

Given the condition of the CPW to be removed and the small amount of clearance in comparison to the local occurrence, it is unlikely that the removal of CPW would represent an area of habitat that is important to the long-term survival of this community within the locality.

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

No critical habitat has been identified within the study on the Register of Critical Habitat.

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

Vegetation clearance is listed as a key threatening process. The maximum area of potential habitat to be cleared is 0.04 ha which represents 0.38 % of the local occurrence of CPW. Additional areas of the community would remain east of the study area within Hickeys Lane Reserve. Therefore, it is unlikely that the proposal would exacerbate any key threatening processes to such an extent that they would place any local occurrences of CPW at risk of extinction.

g. whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process (KTP) is defined under the TSC Act as "*a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities*".

KTPs that are relevant to the proposal and CPW include:

- clearance of native vegetation
- invasion of native plant communities by exotic perennial grasses.

Although some removal of native vegetation mapped as CPW will be removed or disturbed for the proposal. Given the small amount of clearing, the proposed works are unlikely to contribute towards a KTP. Appropriate mitigation measures should be implemented to reduce the compaction of soils, increase flow of sediments or the spread of weed propagules during and post-construction.

The invasion of exotic species including woody weeds, vines and perennial grasses are considered KTP. Implementing post-action restoration and amelioration works will assist in the indirect impacts to the adjacent CPW.

Conclusion

The proposal would result in the removal of approximately 0.04 ha of CPW. The proposed vegetation removal is unlikely to be considered significant for the following reasons:

- Clearance area is a maximum of 0.04 ha, which is considered a small amount in relation to CPW within in the locality.
- The CPW proposed for removal consists of single regrowth trees with a disturbed / exotic dominated understorey and similar vegetation is present within the lot to the north and the removal will not adversely affect the composition of the community.
- Indirect impacts from the proposal will be managed by the mitigation measures.

On the basis of the above considerations, it is unlikely that the proposed development will result in a significant impact on the CPW within the locality. As such, a Species Impact Statement (SIS) is not required.

River-flat Eucalypt Forest

River Flat Eucalypt Forest (RFEF) occurs on the river flats of the coastal floodplains of the NSW North Coast, the Sydney Basin, and the South East Corner Bioregions. It has a tall open tree layer of eucalypts, which may exceed 40 m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. While the composition of the tree stratum varies considerably, the most widespread and abundant dominant trees include *Eucalyptus tereticornis* (Forest red gum), *E. amplifolia* (Cabbage gum), *Angophora floribunda* (Rough-barked Apple), and *A. subvelutina* (Broad-leaved Apple). *Eucalyptus baueriana* (Blue Box), *E. botryoides* (Bangalay), and *E. elata* (River Peppermint) may be common south from Sydney, *E. ovata* (Swamp Gum) occurs on the far south coast, *E. saligna* (Sydney Blue Gum) and *E. grandis* (Flooded Gum) may occur north of Sydney, while *E. benthamii* is restricted to the Hawkesbury floodplain. A layer of small trees may be present, including *Melaleuca decora, M. styphelioides* (Prickly-leaved Teatree), *Backhousia myrtifolia* (Grey Myrtle), *Melia azedarach* (White Cedar), *Casuarina cunninghamiana* (River Oak), *and C. glauca* (Swamp Oak). Scattered shrubs include *Bursaria spinosa, Solanum prinophyllum, Rubus parvifolius, Breynia oblongifolia, Ozothamnus diosmifolius, Hymenanthera dentata, Acacia floribunda*, and *Phyllanthus gunnii*. The groundcover is composed of abundant forbs, scramblers and grasses, including *Microlaena stipoides, Dichondra repens, Glycine clandestina, Oplismenus aemulus, Desmodium gunnii, Pratia purpurascens, Entolasia marginata, Oxalis perennans*, and *Veronica plebeia*. The composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity, and other disturbance, and may have a substantial component of exotic shrubs, grasses, vines and forbs (OEH 2018).

RFEF within the study area is located within the north east portion of the study area and extends outside of the study area. Vegetation varies in condition and species composition due to presence of exotic species. Mitigation measures have been included in this report to reduce potential impacts during construction.

The study area contains 3.64 ha of RFEF and makes up the local occurrence. This community was also observed to extend outside of the study area however the vegetation was not validated as part of this assessment.

The proposed footprint will result in the removal of approximately 0.56 ha which represents approximately 15.4 % of the local occurrence.

a. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

River-flat Eucalypt Forest is not a threatened species and therefore this question does not apply.

b. in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

River-flat Eucalypt Forest is not an endangered population and therefore this question does not apply.

c. in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

Factors likely to have an adverse effect on the extent of RFEF include substantial loss of habitat through removal or modification and increase in sediments.

Vegetation within the study area is contiguous with RFEF outside the study area forming a "patch", which also correlates to the local occurrence. The local occurrence of RFEF identified within the study area is approximately 3.64 ha.

Under the proposed works as a wort case scenario approximately 0.56 ha of RFEF will be removed or disturbed for the works. Indirect impacts within the adjoining RFEF may occur as a result of soil disturbance and change in nutrients.

While 0.56 ha of RFEF will be directly or indirectly impacted by the works, the impacted area represents only 15.4 % of the local occurrence. Given the current condition of the vegetation, the small amount clearing of vegetation to be cleared and the amount of RFEF retained within the study area the proposal is unlikely to result in an adverse impact on the extent or significant modify RFEF.

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

As discussed, the proposal will remove approximately 15.4 % of the local occurrence of RFEF within the study area would be retained that exists in a similar condition and diversity (in some areas greater diversity) would also remain undisturbed by the proposal within the study area. The proposal would not impede the flow of genetic material between the vegetation within the study area and the vegetation within the locality as pollination is still expected to occur.

Potential indirect impacts to the remainder of the RFEF within the study area from weed invasion would be mitigated through active management of development edge effects.

Therefore, given that the majority of the mapped local occurrence (3.08 ha) will remain and that the potential indirect impacts are managed. The proposal is unlikely to substantially or adversely modify the composition of RFEF in a way that would place a local occurrence of this community at risk of extinction.

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

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

The proposed action will result in direct and indirect impacts of approximately 0.56 ha of vegetation mapped as RFEF which represents 15.4 % of the mapped local occurrence.

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

The proposed works would result in the removal of up to 0.56 ha of RFEF; however, the proposal would not isolate or fragment remaining areas of RFEF within the study area as it will remain contiguous with RFEF not to be impacted by the proposal. Areas of habitat connectivity would still exist with vegetation adjacent to the study area and in the local occurrence.

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

The 0.56 ha RFEF at the study area which will be impacted represents 15.4 % of the local occurrence is located on the edge of the RFEF located within the study area and is subject to weeds. The vegetation contains native species in all structure layers but also includes some exotic species and noxious weeds. Given the retention of RFEF within the study area with similar species diversity (or greater diversity) it is unlikely that the small area, 0.56 ha of RFEF proposed for removal would represent an area of habitat that is important to the long-term survival of this community in the locality.

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

No critical habitat has been identified within the study on the Register of Critical Habitat.

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

There is no recovery plan or threat abatement plan for this community. OEH is currently developing a targeted approach for managing Ecological Communities. In the interim, a number of management actions have been identified by OEH for this community. The proposal would be inconsistent with a number of these actions, however the study area contains a relatively small patch of RFEF and is unlikely to be a strategic location for conservation of this EEC.

g. whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process (KTP) is defined under the TSC Act as "*a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities*".

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

- clearance of native vegetation
- invasion of native plant communities by exotic perennial grasses

Although some removal of native vegetation mapped as RFEF will be removed or disturbed for the proposal. Given the small amount of clearing, the proposed works are unlikely to contribute towards a KTP. Appropriate mitigation measures should be implemented to reduce the compaction of soils, increase flow of sediments or the spread of weed propagules during and post-construction.

The invasion of exotic species including woody weeds, vines and perennial grasses are considered KTP. Implementing post-action restoration and amelioration works will assist in the indirect impacts to the adjacent RFEF.

Conclusion

The proposal is unlikely to have a significant impact on RFEF for the following reasons:

- Clearing of vegetation for the works is minimal (15.4 %) of the local occurrence of RFEF.
- Retained RFEF is contiguous with other RFEF located adjacent to the site located south of Nepean Rugby Club.

- Indirect impacts can be mitigated through the Construction Environmental Management Plan.

On the basis of the above considerations, it is unlikely that the proposed development will result in a significant effect on RFEF. As such, a Species Impact Statement (SIS) is not required.

***Artamus cyanopterus cyanopterus* (Dusky Woodswallow)**

The Dusky Woodswallow is listed as a vulnerable species under Schedule 2 of the TSC Act. It is widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range.

The Dusky Woodlswallow primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.

This species primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Also frequently hovers, sallies and pounces under the canopy, primarily over leaf litter and dead timber. Also occasionally take nectar, fruit and seed.

Depending on location and local climatic conditions (primarily temperature and rainfall), the dusky woodswallow can be resident year round or migratory. In NSW, after breeding, birds migrate to the north of the state and to southeastern Queensland, while Tasmanian birds migrate to southeastern NSW after breeding. Migrants generally depart between March and May, heading south to breed again in spring. There is some evidence of site fidelity for breeding. Although dusky woodswallows generally breed as solitary pairs or occasionally in small flocks, large flocks may form around abundant food sources in winter. Large flocks may also form before migration, which is often undertaken with other species.

Nest is an open, cup-shape, made of twigs, grass, fibrous rootlets and occasionally casuarina needles, and may be lined with grass, rootlets or infrequently horsehair, occasionally unlined. Nest sites vary greatly, but generally occur in shrubs or low trees, living or dead, horizontal or upright forks in branches, spouts, hollow stumps or logs, behind loose bark or in a hollow in the top of a wooden fence post. Nest sites may be exposed or well concealed by foliage.

The Dusky Woodswallow was detected during field surveys and is known from 4 database records within 5 km of the study area. There is potential for the species to utilise the study area and impacts are possible due to the clearing of foraging habitat.

a. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

The study area provides potential foraging and nesting habitat for this species.

The proposed works would result in the removal of 10.9 ha that represents potential foraging habitat of which 9.5 ha is made up of exotic vegetation. However larger areas of better quality habitat would remain in the study area. It is therefore unlikely that the removal of a small area of potential foraging habitat would result in a significant change to feeding behaviour. Given the Dusky Woodswallow are highly mobile, the relatively limited amount of habitat proposed for removal, no known nesting habitat will be directly impacted and the fact that study area is connected to large areas of quality vegetation directly adjacent to the site, it is considered unlikely that impacts will occur on this species such that it would place a local population at risk of extinction.

b. in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

c. in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

Not applicable.

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

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

The proposal would remove up to 10.9 ha that represents potential foraging habitat of which 9.5 ha is made up of exotic vegetation that represents potential foraging and nesting habitat for the Dusky Woodswallow. Large amounts of similar vegetation are available within the study area and immediately adjacent to the study area. Furthermore, the removal of vegetation will predominantly occur in previously disturbed areas. Therefore, it is unlikely that the habitat to be removed would be considered important for this highly mobile species within the locality.

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

The proposed works would not fragment a patch of foraging habitat into two or more patches. The potential habitat to be removed would not result in the isolation of other foraging or breeding habitat for the Dusky Woodswallow.

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

The proposal would remove 10.9 ha of potential foraging habitat for the Dusky Woodswallow. The habitat being cleared for these species only represents potential foraging habitat and does not constitute any identified breeding/ nesting habitat. Therefore, the proposed works are unlikely to affect breeding or feeding behaviours, and the habitat to be removed is unlikely to be important for this species. In addition, relatively large amounts of potential foraging, and breeding habitat is available immediately adjacent to the study area.

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

No critical habitat has been identified within the study on the Register of Critical Habitat.

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

There is no recovery plan or threat abatement plan for this species.

g. whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process (KTP) is defined under the TSC Act as "*a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities*".

KTPs that are relevant to the current proposal and this species:

- Clearing of native vegetation.

Given this species is highly mobile, the small amount of native vegetation proposed for removal and the availability of foraging and nesting habitat throughout the study area and surrounds, it is considered unlikely that the proposal would significantly exacerbate this KTP.

Conclusion

The proposal is unlikely to have a significant impact on the Dusky Woodswallow given that:

- Clearance area is small compared to potential habitat available in the locality (up to 9.5 ha).
- The proposal would not isolate habitat for these species.
- A large amount of potential habitat for these species would remain adjacent to the study area and is present throughout the locality.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Dusky Woodswallow. As such, a Species Impact Statement (SIS) is not required.

***Hieraaetus morphnoides* (Little Eagle)**

The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. It occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. The Little Eagle nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.

The Little Eagle was not detected during field surveys although it has previously been recorded within the study area in 2013. There is potential for the species to utilise the study area and impacts are possible due to the clearing of foraging habitat.

a. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Whilst this species was not recorded during the field survey it has been recorded previously and potential habitat is available within the study area.

The proposed works would result in the removal of 10.9 ha that represents potential foraging habitat of which 9.5 ha is made up of exotic vegetation that represents potential foraging habitat. However large areas of similar habitat would remain in the study area and locality. It is therefore unlikely that the removal of potential foraging habitat would result in a significant change to feeding behaviour. Given the Little Eagle are highly mobile, the relatively limited amount of habitat proposed for removal, no known nests will be directly impacted and similar vegetation will remain in the study area and is connected to large areas of quality vegetation directly adjacent to the site, it is considered unlikely that impacts will occur on this species such that it would place a local population at risk of extinction.

b. in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

c. in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

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

Not applicable.

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

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

The proposal would remove up to 10.9 ha that represents potential foraging habitat of which 9.5 ha is made up of exotic vegetation that represents potential foraging habitat for the Little Eagle. Large amounts of similar vegetation are available within the study area and immediately adjacent to the study area. Furthermore, the removal of vegetation will predominantly occur in previously disturbed areas.

Therefore, it is unlikely that the habitat to be removed would be considered important for this highly mobile species within the locality.

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

The proposed works would not fragment a patch of foraging habitat into two or more patches. The potential habitat to be removed would not result in the isolation of other foraging or breeding habitat for the Little Eagle.

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

The proposal would remove 10.9 ha that represents potential foraging habitat of which 9.5 ha is made up of exotic vegetation for the Little Eagle. The habitat being cleared for these species only represents potential foraging habitat and does not constitute any identified breeding habitat. Therefore, the proposed works are unlikely to affect breeding or feeding behaviours, and the habitat to be removed is unlikely to be important for this species. In addition, relatively large amounts of potential foraging, and breeding habitat is available immediately adjacent to the study area.

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

No critical habitat has been identified within the study on the Register of Critical Habitat.

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

There is no recovery plan or threat abatement plan for this species.

g. whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process (KTP) is defined under the TSC Act as "*a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities*".

KTPs that are relevant to the current proposal and this species:

- Clearing of native vegetation.

Given this species is highly mobile, the small amount of vegetation proposed for removal and the availability of foraging and nesting habitat throughout the study area and surrounds, it is considered unlikely that the proposal would significantly exacerbate this KTP.

Conclusion

The proposal is unlikely to have a significant impact on the Little Eagle given that:

- Clearance area is small compared to the amount of potential habitat in the locality (up to 10.9 ha).
- The proposal would not isolate habitat for this species.

- Large amount of potential habitat for this species would remain within and adjacent to the study area and is present throughout the locality.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of the Little Eagle. As such, a Species Impact Statement (SIS) is not required.

Hollow-roosting microbats

Due to similar habitat requirements and associated impacts, a single 7-part test has been undertaken for the following microchiropteran bats;

1. *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
2. *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
3. *Mormopterus norfolkensis* (Eastern Freetail-bat)
4. *Myotis macropus* (Southern Myotis)
5. *Scoteanax rueppellii* (Greater Broad-nosed Bat)

The **Eastern False Pipistrelle** is wide-ranging, occurring along the southeast coast of Australia with records from South East Queensland, New South Wales, Victoria and Tasmania. The species occurs in sclerophyll forests from the Great Dividing Range to the coast, and generally prefers wet habitats where trees are more than 20 m high. Roosting occurs in hollow trunks of eucalypt trees, usually in single sex colonies, but the species has been recorded roosting in caves under loose bark and occasionally in old wooden buildings (Churchill 1998). Their flight pattern is high and fast and they forage within or just below the tree canopy. They feed on a variety of prey including moths, rove beetles, weevils, plant bugs, flies and ants. The Eastern False Pipistrelle was not recorded during the survey however, there are 5 records within a 5 km radius of the study area. Potential habitat exists within the study area.

The **Eastern Bent-wing Bat** is listed as a vulnerable species under Schedule 1 of the TSC Act. This species occupies a range of forested environments (including wet and dry sclerophyll forests), along the coastal portion of eastern Australia, and through the Northern Territory and Kimberley area (subject to subdivision of this species).

This species has a fast, level flight exhibiting swift shallow dives. It forages from just above the tree canopy, to many times the canopy height in forested areas, and will utilise open areas where it is known to forage at lower levels. Moths appear to be the main dietary component. This highly mobile species is capable of large regional movements in relation to seasonal differences in reproductive behaviour and winter hibernation. Though individuals often use numerous roosts, it congregates in large numbers at a small number of nursery caves to breed and hibernate. Although roosting primarily occurs in caves, it has also been recorded in mines, culverts, stormwater channels, buildings, and occasionally tree-hollows. This species occupies a number of roosts within specific territorial ranges usually within 300 km of the maternity cave and may travel large distances between roost sites. The Eastern Bentwing-bat was not recorded during the field survey but has previously been recorded from 24 database records within a 5 km radius of the study area.

The **Eastern Freetail-bat** is found along the east coast from south Queensland to southern NSW and occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. The Eastern Freetail-bat roost mainly in tree hollows but will also roost under bark or in man-made structures. They are usually solitary but also recorded roosting communally, probably insectivorous (OEH 2014). The Eastern Freetail-bat was not recorded during the survey however there are 13 records within a 5 km radius of the study area. Potential habitat exists within the study area and immediately adjacent to the study area.

The **Southern Myotis** is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Southern Myotis 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. Southern Myotis

forage over streams and pools catching insects and small fish by raking their feet across the water surface.

The Southern Myotis was not recorded during the field survey, but has previously been recorded from 12 database records within a 5 km radius of the study area

The **Greater Broad-nosed Bat** is a large bat that feeds on moths and other large insects along edges of forest, cleared paddocks and tree-lined water courses. This species uses mostly tree hollows for roosting and they have been recorded in a variety of vegetation types from woodland to rainforest. There are 6 records of Greater Broad-nosed Bat within a 5 km radius of the study area.

a. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Whilst these species were not recorded in the study area, there is potential foraging habitat available within the study area.

The proposed works would result in the removal of 0.56 ha that represents potential foraging habitat. The proposal would not result in the loss of any hollow-bearing trees that represent potential breeding/ roosting habitat. In additional the proposed vegetation clearance is located on the edge of larger tracts of bushland which remain in the study area and locality. It is therefore unlikely that the removal of a small area of potential foraging habitat would result in a significant change to feeding behaviour.

Given these species are highly mobile, the relatively limited amount of habitat proposed for removal, potential roosting habitat will not be directly impacted and the fact that vegetation is connected to a larger area of similar (if not better quality) vegetation directly adjacent to the proposed works area, it is considered unlikely that impacts will occur on this species such that it would place a local population at risk of extinction.

b. In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable. These species are not an endangered population.

c. in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

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

Not applicable. These species are not an endangered ecological community.

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

Not applicable. These species are not an endangered ecological community.

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

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

The proposal would remove up to 0.56 ha of vegetation that represents potential foraging habitat for these species. The study area (although not observed during the field survey) is likely to contain hollow-bearing trees that could provide potential roosting and/or breeding habitat for these species. No man-made structures such as bridges or culverts were observed in the study area and therefore will not be impacted by the works. The amount of vegetation that will be impacted by the works is considered small in comparison to the amount of vegetation that will remain within the study area and available in the locality. Therefore, it is unlikely that the habitat to be removed would be considered important for these highly mobile species within the locality.

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

The proposal will not fragment or isolate habitat from other areas of habitat for these highly mobile species. The removal of vegetation from the subject site will not fragment potential extensive microbat habitat into two or more new patches. Native vegetation will be retained adjacent to the site within the study area. The proposed works would not fragment a patch of foraging habitat into two or more patches. The potential habitat to be removed would not result in the isolation of other foraging or breeding habitat for this species.

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

The proposal would remove 0.56 ha of potential foraging habitat for this species and would not result in the loss of hollow-bearing trees that would represent potential breeding and/or roosting habitat. Therefore, the proposed works are unlikely to affect breeding or feeding behaviours, and the habitat to be removed is unlikely to be important for this species. In addition, relatively large amounts of potential foraging, and roosting habitat is available within and adjacent to the study area.

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

No critical habitat has been declared by OEH for these species.

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

No recovery plan or threat abatement plan has been prepared for these species.

The Eastern False Pipistrelle, Eastern Bentwing-bat, Eastern Freetail-bat and Greater Broad-nosed bat have been allocated to the 'Landscape species' management stream under the Saving Our Species program as they are distributed across relatively large areas and are subject to threatening processes that generally act at the landscape scale (e.g. habitat loss or degradation) rather than at distinct, definable locations. The following relevant management actions have been identified for these species:

- Prepare Environmental Impact Assessment (EIA) guidelines which address the retention of hollow-bearing trees, maintaining diversity of age groups, species diversity, and structural diversity, with priority given to the largest hollow-bearing trees.
- Identify areas of private land that contain high densities of large hollow-bearing trees as areas of high conservation value (HCV) planning instruments and land management negotiations e.g.

Local Environment Plans (LEPs), Conservation Action Plans (CAPs) Property Vegetation Plans (PVPs).

- Promote the conservation of these HCV private land areas using measures such as incentive funding to landholders, off-setting and Biobanking, acquisition for reserve establishment or other means.

No hollow-bearing trees will be directly impacted. Therefore, the proposal is considered to be consistent with the above objectives as no hollow-bearing trees will be impacted and it is likely that hollow-bearing trees are located within the native vegetation retained within or adjacent to the study area.

g. The action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

A key threatening process (KTP) is defined under the TSC Act as "*a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities*". KTPs that are relevant to the proposal and these species include:

- Clearing of native vegetation.

Given this species is highly mobile, the small amount of native vegetation proposed for removal and the availability of foraging and roosting habitat throughout the study area and surrounds, it is considered unlikely that the proposal would significantly exacerbate these KTPs.

Conclusion

The proposal is unlikely to have a significant impact on the Microchiropteran species given that:

- Clearance area is very small (up to 0.56 ha) in respect to the amount of potential habitat available in the locality and wider landscape.
- The proposal would not isolate habitat for these species.
- Hollow-bearing trees providing roosting habitat is likely to be present and remain outside the subject site.
- A large amount of potential habitat for these species would remain adjacent to the study area and is present throughout the locality.

On the basis of the above considerations, it is unlikely that the proposal would result in a significant impact on the survival of these species. As such, a Species Impact Statement (SIS) is not required

Appendix E - Photos


Plate 1: Disturbed Wetland


Plate 2: Freshwater Wetland

Plate 3: Native Grassland

Plate 4: Exotic Grassland

Plate 5: Cumberland Plain Woodland

Plate 6: River-flat Eucalypt Forest

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