**Report**

# Bradfield City Centre Stage 2A REF Biodiversity Addendum

FINAL

Prepared for Western Parkland City Authority

8 May 2024

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- Western Parkland City Authority: Alexander Nikolic.
- Department of Climate Change, Energy, the Environment and Water for access to the Protected Matters Search Tool of the Australian Government.
- NSW Department of Planning and Environment for access to the BioNet Atlas of NSW Wildlife.
- NSW Department of Primary Industries Fisheries for access to the predicted distribution maps for threatened species and fish communities.

Biosis staff involved in this project were:

- Astrid Mackegard (mapping).

*Biosis acknowledges the Aboriginal and Torres Strait Islander peoples as Traditional Custodians of the land on which we live and work.*

*We pay our respects to the Traditional Custodians and Elders past and present and honour their connection to Country and ongoing contribution to society.*

# Glossary

| | |
|---|---|
| **BC Act** | *Biodiversity Conservation Act 2016* (NSW) |
| **Biodiversity and Conservation SEPP** | State Environmental Planning Policy (Biodiversity and Conservation) 2021 |
| **Biosecurity Act** | *Biosecurity Act 2015* (NSW) |
| **BOS** | Biodiversity Offsets Scheme |
| **BSIA** | Biodiversity Strategy and Impact Assessment |
| **CEEC** | Critically Endangered Ecological Community |
| **DCP** | Development Control Plan |
| **Cth DCCEEW** | Commonwealth Department of Climate Change, Energy, the Environment and Water |
| **NSW DCCEEW** | NSW Department of Climate Change, Energy, the Environment and Water |
| **DPI** | NSW Department of Primary Industries |
| **EP&A Act** | *Environmental Planning and Assessment Act 1979* (NSW) |
| **EPBC Act** | *Environment Protection and Biodiversity Conservation Act 1999* (Cth) |
| **FM Act** | *Fisheries Management Act 1994* (NSW) |
| **GIS** | Geographic Information System |
| **LEP** | Local Environmental Plan |
| **LGA** | Local Government Area |
| **LLS** | Local Land Services |
| **MNES** | Matters of National Environmental Significance |
| **NSW** | New South Wales |
| **PCT** | Plant Community Type |
| **SEPP** | State Environmental Planning Policy |
| **SIC** | Significant Impact Criteria |
| **SIS** | Species Impact Statement |
| **study area** | Defined by the boundary of Lot 3101 DP1282964 |
| **subject site** | The area of impact for the proposed works |
| **TEC** | Threatened Ecological Community |
| **ToS** | Test of Significance |
| **VRZ** | Vegetated Riparian Zone |
| **Western Parkland City SEPP** | State Environmental Planning Policy (Precincts - Western Parkland City) 2021 |
| **WM Act** | *Water Management Act 2000* (NSW) |
| **WPCA** | Western Parkland City Authority |

# Summary

Biosis Pty Ltd (Biosis) was commissioned by the Western Parkland City Authority (WPCA) to prepare a Biodiversity Addendum Report to support the Stage 2A Enabling Works for the Bradfield City Centre. This addendum is required to support a Review of Environmental Factors (REF) being prepared by Urbis (on behalf of WPCA). The Stage 2A subject site is located at 215 Badgerys Creek Road, Bradfield in New South Wales (NSW) and encompasses approximately 38.0 hectares in the northern part of Lot 3101 DP1282964. The subject site is located approximately 20 kilometres south of Penrith, in the Liverpool City Council Local Government Area (LGA).

Biosis previously prepared the *Bradfield City Centre Master Plan Application Biodiversity Strategy and Impact Assessment* (Biosis 2023) (Bradfield City Centre Master Plan BSIA) to support the approval of Stage 1 of the Bradfield City Centre Master Plan. This Master Plan outlines a mixed-use development comprising industrial, commercial, open space and residential uses for the 114.9 hectare site centred on a new Sydney metro station.

The Stage 2A Enabling Works are required to allow for the development of the site in accordance with the prepared Master Plan, and consists of the following proposed activities (the project):

- Construction of new roads, and associated stormwater, earthworks, and civil works.
- Provision of wastewater, potable water, recycle water infrastructure.
- Provision of electrical services network and reticulation infrastructure.
- Provision of data and telecommunications network infrastructure.
- Streetscape landscape works.

The subject site, defined by the extent of proposed works, is surrounded by the study area which includes adjacent areas likely to be directly or indirectly affected by the proposal. This includes areas of native vegetation within the remainder of Lot 3101 DP1282964, as well as potentially receiving waterbodies in the locality including Moore Gully (a Strahler order 3 and 4 watercourse) and Thompsons Creek (a Strahler order 4 and 5 watercourse) (the study area). The study area covers approximately 114.9 hectares.

As this assessment is an addendum to the existing Bradfield City Centre Master Plan BSIA, it relies upon field investigations undertaken as part the BSIA. No additional field investigations have been undertaken in the preparation of this report.

## Ecology values and impacts

Key ecological values of the subject site include:

- 9.75 ha of native vegetation consistent with one Plant Community Type (PCT), PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion. This legacy PCT has been superseded by PCT 3320 Cumberland Shale Plains Woodland, following the release of revised east-coast PCTs in June 2022.
- 8 hollow-bearing trees supporting the following hollows:
  - 8 small hollows (<50 mm entrance diameter).
  - 6 medium hollows (50 – 149 mm entrance diameter).

The native vegetation within the subject site satisfies the listing criteria of the following Critically Endangered Ecological Communities (CEECs) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Biodiversity Conservation Act 2016* (BC Act):

- *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (CEEC, EPBC Act).
- *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act)

Seven threatened flora species and 19 threatened fauna species, listed under the EPBC Act or BC Act, were also determined to have a moderate or greater likelihood of occurrence within the broader study area.

The subject site (and broader study area) occurs within the South-West Growth Centre, as defined under Chapter 3 (Sydney region growth centres) of State Environmental Planning Policy (Precincts - Western Parkland City) 2021 (Western Parkland City SEPP). The subject site consists of land that is wholly biocertified under the action of the *Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Regional Growth Centres) 2006* (this SEPP has since been replaced in part by the Western Parkland City SEPP). The proposed works do not trigger the Biodiversity Offset Scheme (BOS) under the BC Act due to the biocertification order that exists over the subject site. As such consideration of the BOS is not warranted, and a Biodiversity Development Assessment Report (BDAR) is not required.

A single unnamed Strahler order 1 waterway, as defined under the *Water Management Act 2000* (NSW) (WM Act) occurs in the eastern half of the subject site. One named watercourse (Moore Gully) also occurs to the south of the subject site. Moore Gully is considered key fish habitat under the *Fisheries Management Act 1994* (NSW) (FM Act) and the key fish habitat buffer associated with this feature extends into the subject site.

Further information regarding the ecological values in the broader study area is provided in the Bradfield City Centre Master Plan BSIA.

## Recommendations

The primary measure for the development to minimise impacts to ecological values on the site is to limit the removal of native vegetation and habitat, provide compensatory habitat for the removal of hollow-bearing trees, and avoid impacts to aquatic systems and their associated riparian and key fish habitat buffers. The project will be required to adhere to full list of mitigation measures detailed in the Bradfield City Centre Master Plan BSIA.

In addition to the BSIA mitigation measures, as the enabling works include the development of water storage facilities (i.e., temporary stormwater basins) within the 13 km wildlife buffer zone of the Western Sydney International Airport, it is recommended that fauna exclusion netting be considered over these facilities. These basins will be decommissioned prior to the Western Sydney International Airport becoming operational and therefore do not represent a wildlife hazard to the airport operations. Consultation with the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) should also be considered for impacts within 40 metres of a Strahler order 3 section of Moore Gully.

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# 1 Introduction

## 1.1 Project background

Biosis was commissioned by the WPCA to complete a biodiversity addendum report for the Bradfield City Centre Stage 2A Enabling Works subject site and broader study area (Figure 1). The enabling works consist of the following proposed activities:

- Construction of new roads, and associated stormwater, earthworks, and civil works.
- Provision of wastewater, potable water, recycle water infrastructure.
- Provision of electrical services network and reticulation infrastructure.
- Provision of data and telecommunications network infrastructure.
- Streetscape landscape works.

In addition, the Stage 2A REF will also involve several activities which are ancillary to the construction of roads, including:

- Site clearance (including removal of native vegetation).
- Provision of service authority utilities within the road corridors.
- Street landscaping.
- Drainage and stormwater infrastructure (including temporary stormwater basins). Stockpiling of excess soil.
- Construction of temporary haul roads during construction, (together with the construction of the new roads).
- Road works.

This biodiversity addendum has been prepared to support a REF being prepared by Urbis (on behalf of the WPCA) for the project. This assessment is an addendum to the BSIA prepared to support the Stage 1 Bradfield City Centre Master Plan which outlines the ecological values present in the broader study area.

## 1.2 Scope of assessment

The objectives of this investigation are to:

- Describe vascular flora (ferns, conifers, and flowering plants) and vertebrate fauna (birds, mammals, reptiles, and frogs).
- Map native vegetation and other habitat features.
- Quantify the impacts to ecological values resulting from the proposed activities.
- Review the implications of relevant biodiversity legislation and policy.
- Identify potential implications of the proposed development and provide recommendations to assist with development design and reduction of impact to ecological values.

## 1.3 Location of the study area and subject site

The study area is located at 215 Badgerys Creek Road, Bradfield in NSW, approximately 20 kilometres south of Penrith and approximately 44 kilometres south-west of the Sydney Central Business District (Figure 1). It encompasses approximately 114.9 hectares of land and is defined by the boundary of Lot 3101 DP1282964. The study area includes land currently zoned as Enterprise (ENT), Mixed Use (MU) and Environment and Recreation (ENZ) under the Western Parkland City SEPP and related subsequent amendments (Figure 2). The study area occurs within the South-West Growth Centre as defined under Chapter 3 (Sydney Region Growth Centres) of the Western Parkland City SEPP, and includes certified and non-certified land as defined under the *Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Regional Growth Centres) 2006* (this SEPP has since been replaced in part by the Western Parkland City SEPP) (Figure 2). The study area also includes areas that have been mapped as High Biodiversity Value Area under the Western Parkland City SEPP (Figure 2).

The subject site occurs within the northern section of the study area and encompasses an area of approximately 38.0 hectares. It includes land mapped as Mixed Use (MU) under the Western Parkland City SEPP.

The study area and subject site occur within the:

- Sydney Basin Bioregion and Cumberland Subregion.
- Hawkesbury catchment boundary.
- Greater Sydney Local Land Services (LLS) region.
- Liverpool City Council LGA.


**Legend**

- Study area
- Subject site
- Lot

**Figure 1 Location of the study area and subject site**

0 50 100 150 200 250

Metres

Scale: 1:7,000 @ A3

*Coordinate System: GDA2020 MGA Zone 56*

N

*Acknowledgements: Basemap © Land and Property Information 2016, Imagery Maxar 2023*

Matter: 39953,
Date: 15 November 2023 ,
Prepared for: MEH, Prepared by: AM, Last edited by: amackegard
Layout: 39953_Stage2A_F1_StudyArea
Project: P:\39900s\39953\Mapping\
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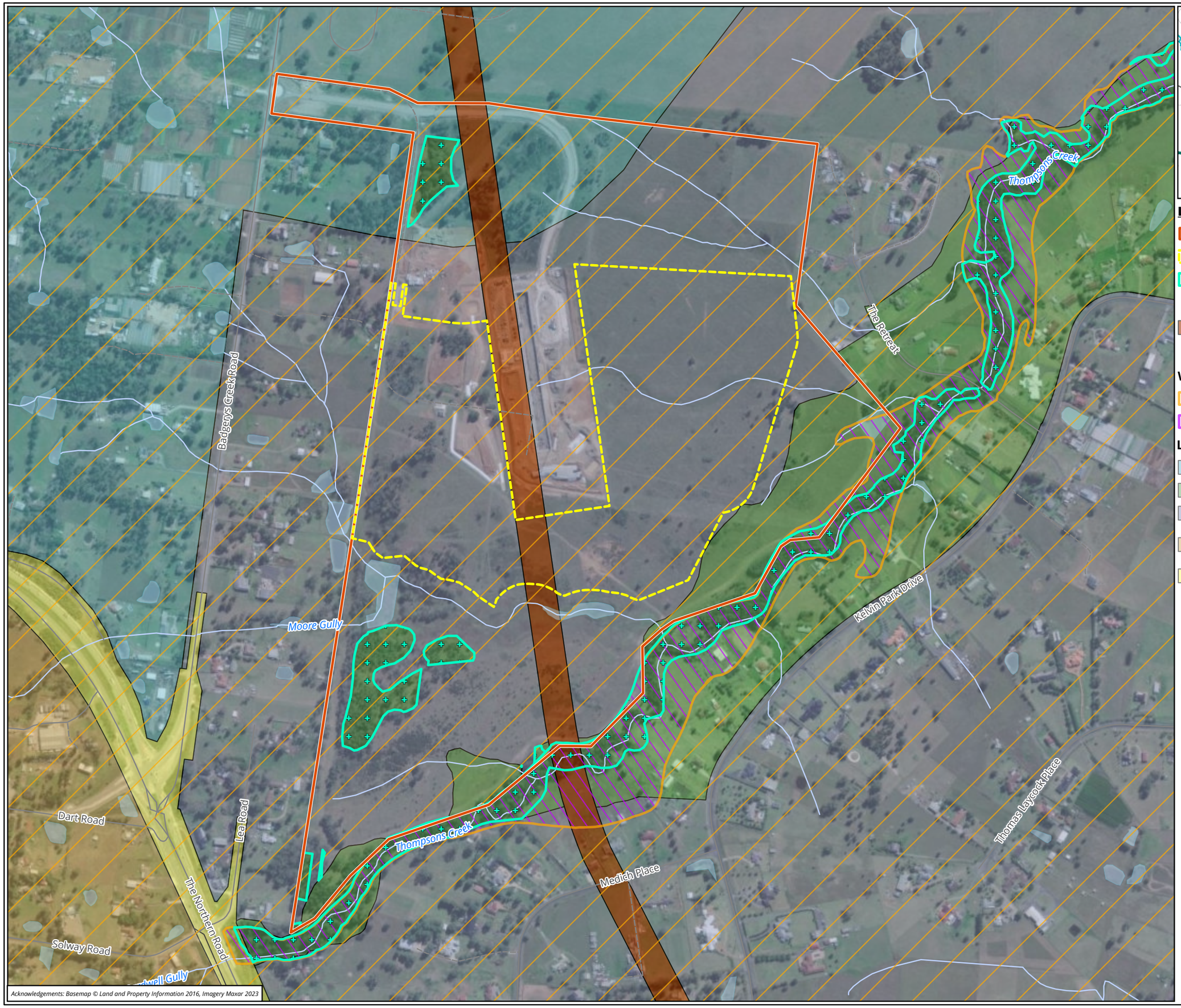
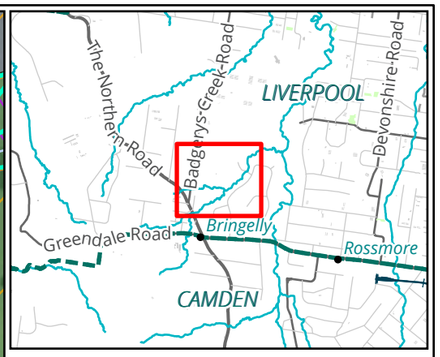



**Legend**

- Study area
- Subject site
- High Biodiversity Value Areas
- State Environmental Planning Policy (Transport and Infrastructure) 2021 - Major Infrastructure Corridor

**Western Parkland City SEPP (DPE 2023)**

- Certified area
- Non-certified area

**Land zoning**

- ENT - Enterprise
- ENZ - Environment and Recreation
- MU - Mixed Use
- RU4 - Primary Production Small Lots
- SP2 - Infrastructure

**Figure 2 Land zoning and biocertification**

0 50 100 150 200 250

Metres

Scale: 1:7,000 @ A3

*Coordinate System: GDA2020 MGA Zone 56*

N

biosis

Matter: 39953,
Date: 01 December 2023 ,
Prepared for: MEH, Prepared by: AM, Last edited by: amackegard
Layout: 39953_Stage2A_F2_LandZoning_Biocertification
Project: P:\39900s\39953\Mapping\
39953_Bradfield_REF.aprx

# 2 Methods

## 2.1 Database and literature review

To support this assessment, information provided by WPCA as well as other key information compiled as part of the Bradfield City Centre Master Plan BSIA (Biosis 2023) was reviewed, including:

- Australian Commonwealth Department of Climate Change, Energy, the Environment and Water (Cth DCCEEW) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- The NSW Department of Primary Industries (DPI) Spatial Data Portal for *Fisheries Management Act 1994* (NSW) (FM Act) listed threatened species, populations and communities.
- NSW DPI *Biosecurity Act 2015* (NSW) (Biosecurity Act) for Priority listed weeds for the Greater Sydney LLS region.
- NSW DCCEEW Vegetation Information System (VIS) mapping, including.
  - NSW State Vegetation Type Map (C1.1.M1.1).

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cth).
- *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).
- *Biodiversity Conservation Act 2016* (NSW).
- *Fisheries Management Act 1994* (NSW).
- *Water Management Act 2000* (NSW).
- *Biosecurity Act 2015* (NSW).
- State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP).
- State Environmental Planning Policy (Precincts - Western Parkland City) 2021.
- *The Cumberland Plain Conservation Plan* (CPCP).
- *Western Sydney Aerotropolis Development Control Plan 2022* (Phase 2 DCP).

## 2.2 Field investigation

This assessment relies upon the ecological data gathered as part of the field investigations undertaken for the Bradfield City Centre Master Plan BSIA (Biosis 2023). As this assessment is an addendum to the existing Bradfield City Centre Master Plan BSIA, it relies upon field investigations undertaken as part the BSIA. No additional field investigations have been undertaken in the preparation of this report.

The field investigations undertaken as part of the Bradfield City Centre Master Plan BSIA included:

- An initial flora and fauna assessment on the 8 and 9 September 2020 using a random meanders survey methodology to determine the vegetation types and broad species habitat present.
- Collection of vegetation integrity data through the completion of vegetation plots on 18 May 2021.

General classification of native vegetation in NSW used in this report is based on the classification system in Keith (2004) which uses three groupings of vegetation: vegetation formation, vegetation class and vegetation type, with vegetation type the finest grouping. The grouping referred to in this report is PCT, commonly used across NSW since 2016.

During the field investigations the vegetation types were stratified into PCTs broadly based on previous vegetation mapping, and the vegetation boundaries marked with a hand-held GPS in the field. Appropriate PCTs were selected based on species composition and structure, known geographical distribution, landscape position, underlying geology, soil type, and any other diagnostic features.

The general condition of native vegetation was observed as well as the effects of current seasonal conditions. Notes were made on specific issues such as priority weed infestations, evidence of management works, current grazing impacts and the regeneration capacity of the vegetation.

Investigation of threatened species presence and potential habitat included direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls. Significant trees providing potential habitat for fauna (i.e., hollow-bearing trees) were also recorded.

Full details regarding these surveys are included in Section 5.2 (Site investigation) of the Bradfield City Centre Master Plan BSIA (Biosis 2023).

# 3 Results

The study area occurs within the Sydney Basin IBRA bioregion and the Cumberland Plain IBRA subregion. The Sydney Basin bioregion lies on the central east coast of NSW and is one of the most species diverse in Australia. This is a result of the variety of rock types, topography and climates that are located within the bioregion (OEH 2016)

The study area consists of a gently undulating landscape that has been semi-cleared of native vegetation. The area was the previous site of the Bringelly RAAF Telecommunications Unit and includes several disused buildings associated with the previous occupancy. The surrounding lots support a mixture of residential and agricultural uses. There are pockets of native vegetation remaining on-site, scattered across the predominantly open field and along the Strahler order 5 watercourse, Thompsons Creek, which runs along the eastern edge of the site. There are also two wetlands and four farm dams onsite that are also support native vegetation.

The dominant soil type present is Ashfield Shale and Bringelly Shale of the Wianamatta Group, as described in the Blacktown Soil Landscape (Bannerman & Hazelton 1990). Soils are characteristically shallow to moderately deep, hard setting mottled podzolic soils. The site is also associated with South Creek soil landscapes and drainage depressions in conjunction with the alluvial deposits of Thompson Creek.

The study area is directly linked to a small patch of bushland in the south however The Northern Road represents a significant barrier to further movement of terrestrial fauna. The riparian corridor associated with Thompsons Creek extends northwards, connecting directly to South Creek. Both the riparian corridor and the watercourse itself provide high connectivity within the landscape for both terrestrial and aquatic biota.

## 3.1 Vegetation communities

During the development of the Bradfield City Centre Master Plan BSIA (Biosis 2023), the study area was found the support approximately 38 hectares of native vegetation consistent with six different PCTs. Section 6.3 (Vegetation communities) of the Bradfield City Centre Master Plan BSIA (Biosis 2023) describes the vegetation communities within the broader study area.

One vegetation community, PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion is present within the Stage 2A subject site. This PCT has since been amalgamated into PCT 3320 Cumberland Shale Plains Woodland, following the public release of the revised PCTs for eastern NSW in June 2022. However, in order to remain consistent with the Bradfield City Centre Master Plan BSIA (Biosis 2023), this PCT has been reported as PCT 849 within the current assessment. A description of the community, as provided in the Bradfield City Centre Master Plan BSIA (Biosis 2023), has been reproduced in Table 1 below.

**Table 1 Vegetation communities of the subject site**

| PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| **Extent within subject site** | Approximately 9.75 ha of PCT 849 was recorded in the subject site (Figure 3). |
| **Description** | High conditioned PCT 849 was observed to be structurally and floristically diverse within all stratums. The canopy was well represented by a codominance of Forest Red Gum *Eucalyptus tereticornis* and Grey Box *Eucalyptus moluccana* supported by occasional representations of Narrow-leaved Ironbark *Eucalyptus crebra*. The mid storey stratum was |

| PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| | observed to be a diverse mix of shrub species which included Hickory Wattle *Acacia implexa*, Blackthorn *Bursaria spinosa*, Gorse Bitter Pea *Daviesia ulicifolia*, *Dillwynia sieberi*, Sticky Hopbush *Dodonaea viscosa* subsp. *cuneata* and Australian Indigo *Indigofera australis*. The ground layer stratum was observed to be floristically diverse with a wide range of grasses and forbs recorded. Native species within the stratum included Weeping Grass *Microlaena stipoides* var. *stipoides*, Threeawn Speargrass *Aristida vagans*, Kangaroo Grass *Themeda triandra*, Winter Apple *Eremophila debilis* and Whiteroot *Lobelia purpurascens*. Exotic flora within the vegetation type were observed in low numbers and densities (species discussed below). This vegetation also included high quality derived native shrublands (DNS) and derived native grasslands (DNG) which occurred within areas mapped as high-quality vegetation type (Figure 3).<br><br>Moderately conditioned PCT 849 is influenced by historical clearing, with the vegetation type represented as either a native canopy with a limited native mid storey and ground layer, or isolated patches of DNS or DNG with no linkages to high quality PCT 849 areas. Native species within the condition type included Forest Red Gum and Blackthorn with a well-represented ground layer dominated by Weeping and Kangaroo grasses. Weed densities within the vegetation type were observed at moderate densities.<br><br>Low conditioned PCT 849 is present in scattered small locations across the subject site. Native species encountered are limited to stands of Blackthorn, Gorse Bitter Pea and moderate to low densities of Kangaroo Grass. High densities of exotic flora were observed within the vegetation type which affected the cover, abundance, and species richness of the conditional type.<br><br>Exotic species recorded within all conditional types included African Olive *Olea europaea* subsp. *cuspidata*, African Lovegrass *Eragrostis curvula*, Fireweed *Senecio madagascariensis*, Rhodes Grass *Chloris gayana*, Blackberry *Rubus fruticosus* species aggregate (sp. agg.) and Bridal Creeper *Asparagus asparagoides*. |
| **Condition** | The community was present in mixed condition types with 5.53 ha in high condition, 1.60 ha in moderate condition, and 2.62 ha in low condition. The patches recorded as low condition are reflective of the highly disturbed nature, reduced floristic diversity, and prevalence of weed species. |
| **Habitat features** | 8 hollow-bearing trees were located within the subject site (Figure 3). These hollow-bearing trees supported the following hollows:<br>• 8 small hollows (<50 mm entrance diameter).<br>• 6 medium hollows (50 – 149 mm entrance diameter). |
| **Associated soils, rainfall and landscape position** | The community typically occurs on clay/loam soils derived from Wianamatta Shales on the Cumberland Plain at low altitudes (mainly below 150 m) with an average rainfall between 750 and 950 mm per annum. |
| **Threatened ecological community** | **Commonwealth EPBC Act:** *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (CEEC) (in-part, condition dependant).<br><br>**NSW BC Act:** *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC) (wholly equivalent).<br><br>PCT 849 species and assemblage are consistent with the are consistent with the *Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing final determination* (NSW Scientific Committee 2009).<br><br>5.53 ha of high condition vegetation satisfies the listing criteria of the EPBC Act under the following criteria:<br>• Native tree species present with a minimum projected foliage cover of at least 10 %.<br>• The size of the vegetation patch exceeds 0.5 ha.<br>• The perennial understorey vegetative cover present is made up of at least 50 % native species. |

| PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| | This criteria is outlined under the *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest EPBC Act policy statement* (Commonwealth of Australia 2010).<br>The 1.60 ha of moderate condition and 2.62 ha of low condition PCT 849 satisfies the listing criteria of the BC Act listing only. |
| **Pictures** |  <br>**Photo 1 PCT 849 (moderate condition) within the study area**<br>  <br>**Photo 2 PCT 849 (high condition) within the study area** |

## 3.2 Aquatic habitats

Aquatic habitats within the subject site include one Strahler order 1 unnamed watercourse in the eastern half of the subject site. This watercourse is tributary of Thompsons Creek, a Strahler order 5 watercourse which occurs to the east of the study area. Moore Gully, a Strahler order 4 watercourse also occurs to the south of the subject site. The border of the subject site tracks along the riparian corridor associated with this watercourse, however does not intersect with this buffer at any point. Moore Gully is mapped as Key Fish Habitat on the DPI Fisheries Data Portal (DPI 2023). The watercourses occurring within the study area and surrounding locality are shown on Figure 4.

## 3.3 Threatened species

Background searches identified 21 threatened flora species and 45 threatened fauna species recorded (NSW DCCEEW 2024) or predicted to occur (Cth DCCEEW 2024) within 5 kilometres of the study area. An assessment of the likelihood of occurrence for these species within the study area is provided in Appendix 1 (flora) and Appendix 2 (fauna) of the Bradfield City Centre Master Plan BSIA (Biosis 2023).

Threatened species which were assessed as having a moderate of higher likelihood of occurrence within the study area are as follows:

### Flora

- Downy Wattle *Acacia pubescens* (Vulnerable, EPBC Act and BC Act).
- *Dillwynia tenuifolia* (Vulnerable, BC Act).
- Juniper-leaved Grevillea *Grevillea juniperina* subsp. *juniperina* (Vulnerable, BC Act).
- Small-flower Grevillea *Grevillea parviflora* subsp. *parviflora* (Vulnerable, EPBC Act and BC Act).
- *Marsdenia viridiflora* subsp. *viridiflora* (Endangered population, BC Act).
- Nodding Geebung *Persoonia nutans* (Endangered, EPBC Act and BC Act).
- Spiked Rice-flower *Pimelea spicata* (Endangered, EPBC Act and BC Act).

### Fauna

- Dusky Woodswallow *Artamus cyanopterus cyanopterus* (Vulnerable, BC Act).
- Australasian Bittern *Botaurus poiciloptilus* (Endangered, EPBC Act and BC Act).
- Gang-gang Cockatoo *Callocephalon fimbriatum* (Endangered, EPBC Act and Vulnerable, BC Act).
- Speckled Warbler *Chthonicola sagittata* (Vulnerable, BC Act).
- Varied Sittella *Daphoenositta chrysoptera* (Vulnerable, BC Act).
- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (Vulnerable, BC Act).
- Little Lorikeet *Glossopsitta pusilla* (Vulnerable, BC Act).
- Little Eagle *Hieraaetus morphnoides* (Vulnerable, BC Act).
- Square-tailed Kite *Lophoictinia isura* (Vulnerable, BC Act).
- Black-chinned Honeyeater (eastern subspecies) *Melithreptus gularis gularis* (Vulnerable, BC Act).
- Cumberland Plain Land Snail *Meridolum corneovirens* (Endangered, BC Act).

- Eastern Coastal Free-tailed Bat *Micronomus norfolkensis* (Vulnerable, BC Act)
- Southern Myotis *Myotis macropus* (Vulnerable, BC Act).
- Turquoise Parrot *Neophema pulchella* (Vulnerable, BC Act).
- Southern Greater Glider *Petauroides volans* (Endangered, EPBC Act and BC Act).
- Scarlet Robin *Petroica boodang* (Vulnerable, BC Act).
- Koala *Phascolarctos cinereus* (Endangered, EPBC Act and BC Act).
- Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* (Vulnerable, BC Act).
- Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act).

Note that the listings statuses of Southern Greater Glider and Koala have been updated since the Bradfield City Centre Master Plan BSIA was finalised. The list above includes the current listing statuses for these species (as of 30 November 2023).

Typically, for threatened species which have a medium or greater likelihood of occurrence, a Test of Significance (ToS) for species listed under the BC Act, or Significant Impact Criteria (SIC) Assessment for species listed under the EPBC Act would be undertaken. These tests determine if a significant impact to a threatened species is likely to occur because of the project. However, due the biocertification that exists over the subject site, further assessment of impacts in the form of these tests/assessments is not required. This is discussed further in Section 4.3.

## 3.4 Priority weeds

Nine priority weeds for The Greater Sydney LLS, which includes the Liverpool City Council LGA, have been recorded in the broader study area, and are listed in Table 2, along with their associated Biosecurity Duty in accordance with the Biosecurity Act.

The Biosecurity Act provides for the identification, classification and control of priority weeds with the purpose of determining if a biosecurity risk is likely to occur. A priority weed is any weed identified in a local strategic plan, for a region that includes that land or area, as a weed that is or should be prevented, managed, controlled or eradicated in the region.

The General Biosecurity Duty as outlined in the *Biosecurity Act* states:

> *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.*

**Table 2 Priority weeds within the study area**

| Scientific name | Common name | Relevant biosecurity duty |
|---|---|---|
| ***Asparagus aethiopicus*** | Ground Asparagus | General Biosecurity Duty |
| ***Asparagus asparagoides*** | Bridal Creeper | General Biosecurity Duty |
| ***Eichhornia crassipes*** | Water Hyacinth | General Biosecurity Duty |
| ***Lantana camara*** | Lantana | General Biosecurity Duty |
| ***Lycium ferocissimum*** | African Boxthorn | General Biosecurity Duty |

| Scientific name | Common name | Relevant biosecurity duty |
|---|---|---|
| ***Olea europaea* subsp. *cuspidata*** | African Olive | Regional Recommended Measure<br>Exclusion zone is established for all lands in Blue Mountains City Council local government area and in Penrith local government area west of the Nepean River.<br>Core area: The remainder of the region.<br>Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment.<br>Exclusion zone: The plant is eradicated from the land and the land kept free of the plant.<br>Core infestation area: Land managers prevent spread from their land where feasible. Land managers reduce impacts from the plant on priority assets. |
| ***Opuntia* sp.** | Prickly pears | General Biosecurity Duty |
| ***Rubus fruticosus* sp. agg.** | Blackberry | General Biosecurity Duty |
| ***Senecio madagascariensis*** | Fireweed | General Biosecurity Duty |

To prevent biosecurity impacts from occurring because of the presence of the above listed priority weeds within the subject site, all practical steps should be taken to control and eradicated the weeds from the subject site as per the relevant biosecurity duties outlined above, or prior to or during any future vegetation removal.


**Legend**

- Study area
- Subject site
- *Marsdenia viridiflora* subsp. *viridiflora*
- Hollow-bearing tree

**Plant Community Types**

- 725 - Castlereagh Ironbark forest, Moderate condition
- 781 - Coastal freshwater wetland, High condition
- 781 - Coastal freshwater wetland, Moderate condition
- 781 - Coastal freshwater wetland, Low condition
- 835 - Cumberland riverflat forest, High condition
- 849 - Cumberland shale plains woodland, High condition
- 849 - Cumberland shale plains woodland , Moderate condition
- 849 - Cumberland shale plains woodland, Low condition
- 1071 - Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion, Moderate conditon
- 1800 - Cumberland Swamp Oak riparian forest, High condition

**Strahler stream order**

- 1
- 2
- 3
- 4
- 5

## Figure 3 Ecological values of the study area

0 50 100 150 200 250

Metres

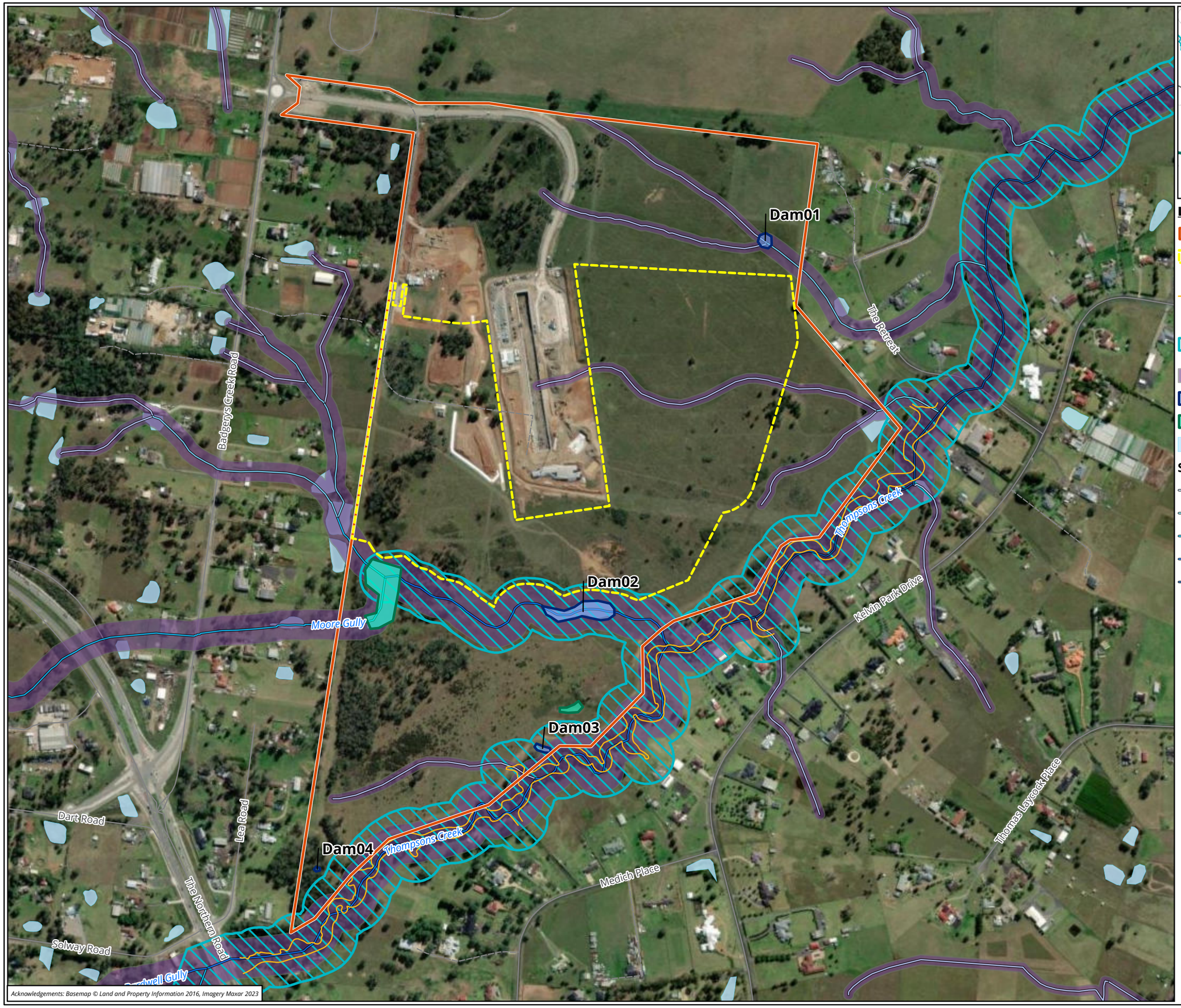
Scale: 1:7,000 @ A3

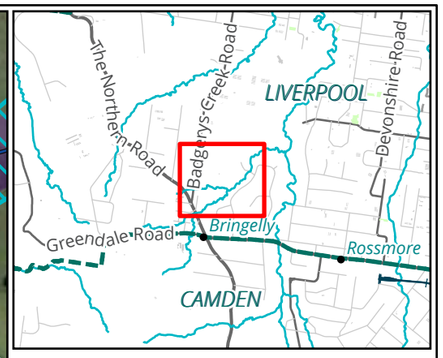
*Coordinate System: GDA2020 MGA Zone 56*

N

biosis

Matter: 39953,
Date: 15 November 2023 ,
Prepared for: MEH, Prepared by: AM, Last edited by: amackegard
Layout: 39953_Stage2A_F3_EcoFeatures
Project: P:\39900s\39953\Mapping\
39953_Bradfield_REF.aprx




**Legend**

- Study area
- Subject site
- Thompson's Creek top of bank (Western City & Aerotropolis Authority 2020)
- Key Fish Habitat riparian buffer zone
- Vegetation Riparian Zone
- Farm dam
- Wetland
- Canal-Drain (Spatial Services 2021)

**Strahler stream order**

- 1
- 2
- 3
- 4
- 5

**Figure 4 Aquatic features and riparian buffer zones**

0 50 100 150 200 250

Metres

Scale: 1:7,000 @ A3

*Coordinate System: GDA2020 MGA Zone 56*

N

biosis

Matter: 39953,
Date: 15 November 2023 ,
Prepared for: MEH, Prepared by: AM, Last edited by: amackegard
Layout: 39953_Stage2A_F4_AquaticFeatures
Project: P:\39900s\39953\Mapping\
39953_Bradfield_REF.aprx

# 4 Ecological impacts and legislation

The proposed Stage 2A enabling works involve the following impacts to ecological features within the proposed subject site:

- Removal of 9.75 ha of native vegetation consistent with PCT 849.
- The loss of 8 hollow-bearing trees supporting the following hollows:
  - 8 small hollows (<50 mm entrance diameter).
  - 6 medium hollows (50 – 149 mm entrance diameter).
- Removal of potential habitat for 7 threatened flora species and 19 threatened fauna species, listed under the EPBC Act or BC Act, which are determined to have a moderate or greater likelihood of occurrence.
- Impacts to the riparian buffer zone of one unnamed Strahler order 1 system and the key fish habitat buffer zone associated with Moore Gully.

In addition to the above, it is understood that the Stage 2A enabling works will result in the generation of road-related stormwater. It is understood that these stormwater flows will be stored within a suitably designed temporary sediment basin on site and any construction site runoff will be appropriately treated in accordance with the requirements of Phase 2 DCP, as per the *Bradfield City Centre Stage 2A Construction Environmental Management Plan* (SMEC 2023). These temporary basins will service as flood and sediment control for the enabling works until the Regional Stormwater Infrastructure (RSI) is constructed along Moore Gully. The RSI is subject to a separate REF assessment. As such there will be no indirect impacts associated with the discharge of road-related stormwater to any receiving environments within the locality of the Stage 2A enabling works.

An assessment of these impacts against relevant legislation is included in the subsections below.

## 4.1 *Environment Protection and Biodiversity Conservation Act 1999* (Cth)

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act. Under the EPBC Act, activities that have potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment and Energy for assessment.

Typically impacts to Matters of NES require further assessment, with any actions likely to cause significant impact requiring referral to the Commonwealth Minister for the Environment. However, in 2011 the Commonwealth Environment Minister endorsed the actions associated with the development of the Western Sydney Growth Centres as described in the *Sydney Growth Centres Strategic Assessment Program Report* (DECCW 2010). This approval was made under section 146B of the EPBC Act which has the same effect as an approval granted to development under Part 9 of the EPBC Act. Therefore, with this approval, any development within the prescribed certified lands will not require separate referral, assessment of approval under the EPBC Act to be taken.

This approval had effect for the following Matters of NES under the EPBC Act:

- World Heritage properties.

- National Heritage places.
- Wetlands of international importance.
- Listed threatened species and ecological communities.
- Listed migratory species.

Impacts to Matters of NES associated with the Stage 2A enabling works are restricted to the prescribed certified lands (Figure 2), and therefore further assessment is not required. A summary of the Matters of NES relevant to the broader study area (which includes the Stage 2A subject site) are summarised in Section 6.7.1 of the Bradfield City Centre Master Plan BSIA (Biosis 2023).

## 4.2 *Environmental Planning and Assessment Act 1979* (NSW)

A total of seven threatened flora species, 19 threatened fauna species and six Threatened Ecological Communities (TECs) listed under the BC Act were identified as having a medium or greater likelihood of occurrence within the study area. Usually, further assessment of impacts would be required for these entities in the form of a ToS. However, as the subject site is restricted to areas mapped as certified under the Growth Centres Biodiversity Certification Order (Figure 2), further assessment of impacts to these entities (in the form of ToS) is not required.

## *4.3 Biodiversity Conservation Act 2016* (NSW)

An assessment of the likelihood of occurrence for threatened entities occurring within the study area is provided in Section 6.7.4 and Appendix 1 (flora) and Appendix 2 (fauna) of the Bradfield City Centre Master Plan BSIA (Biosis 2023). Biodiversity certification under the BC Act has been granted within areas mapped as "certified" under Chapter 3 (Sydney region growth centres) of the Western Parkland City SEPP. As the impacts associated with the subject site are limited to areas that have been granted biodiversity certification (Figure 2), further assessment of these entities through completion of ToS is not required.

The effect of biodiversity certification under Section 8.4 of the BC Act is as follows:

> *(1) State significant infrastructure under Part 5.1 of the Planning Act The environmental assessment requirements for the approval of State significant infrastructure under Part 5.1 of the EP&A Act do not require an assessment of the impact of the infrastructure on biodiversity to the extent that the infrastructure is carried out or proposed to be carried out on biodiversity certified land.*
>
> *(2) Development (including State significant development) under Part 4 of the Planning Act. An assessment of the likely impact on biodiversity of development on biodiversity certified land is not required for the purposes of Part 4 of the EP&A Act.*
>
> *(3) A consent authority, when determining a development application in relation to development on biodiversity certified land under Part 4 of the EP&A Act, is not required to take into consideration the likely impact on biodiversity of the development carried out on that land.*
>
> *(4) Activities under Part 5 of the Planning Act An activity to which Part 5 of the EP&A Act applies which is carried out or proposed to be carried out on biodiversity certified land is taken, for the purposes of Part 5 of that Act, to be an activity that is not likely to significantly affect any threatened species or ecological community under this Act, or its habitat, in relation to that land.*

*(5) A determining authority under Part 5 of the EP&A Act is not required under that Part to consider the effect on biodiversity of an activity to the extent that it is carried out on biodiversity certified land.*

*(6) This section prevails This section has effect despite anything to the contrary in the EP&A Act or Part 7 of this Act.*

Due the effects of biodiversity certification, further assessment of impacts to BC Act listed threatened species and communities within the certified area is not required and the BOS is not triggered. A SIS or BDAR is therefore not required.

## *4.4 Fisheries Management Act 1994* (NSW)

### 4.4.1 Key fish habitat

One of the key objectives of the FM Act is to conserve 'key fish habitats'. Key fish habitats underpin the approach applied by NSW DPI to ensure effort and resources are focused on habitats that are of a high priority to the conservation of fisheries. Key fish habitats are not defined in the FM Act, with their classification instead following the *Policy and guidelines for fish habitat conservation and management* (Fairfull 2013). As noted in Section 6.7.5 of the Bradfield City Centre Master Plan BSIA (Biosis 2023), Moore Gully satisfies the criteria for being classified as key fish habitat under the guidelines, and is also mapped as key fish habitat on the *Fisheries NSW Spatial Data Portal* (DPI 2023).

As detailed in Section 6.7.5.1 of the Bradfield City Centre Master Plan BSIA (Biosis 2023), Moore Gully requires a 50-metre buffer key fish habitat buffer zone in accordance with the *Policy and guidelines for fish habitat conservation and management* (Fairfull 2013). This buffer zone is shown on Figure 4, with a portion of this buffer occurring within the Stage 2A subject site. Note that this buffer zone is also based on mapped hydrolines whereas the buffer zone will need to apply from the top of bank for this system. Any development occurring within this buffer zone will require approval from DPI Fisheries.

### 4.4.2 Threatened species

As detailed in Section 6.7.5.2 of the Bradfield City Centre Master Plan BSIA (Biosis 2023), no threatened species listed under the FM Act were identified as likely to occur within the study area. As such a test of significant effect on threatened species, populations or ecological communities, or their habitats, as outlined in section 220ZZ of the FM Act is not required. A SIS is therefore also not required.

## *4.5 Water Management Act 2000* (NSW)

Impacts to riparian zones are also protected under the WM Act, guided by the *Controlled activities – Guidelines for riparian corridors on waterfront land* (DPIE 2022) fact sheet. Works within 40-metres of the top bank of mapped watercourses will need to be consistent with the riparian corridor matrix which requires a Vegetated Riparian Zone (VRZ) to be preserved. The VRZ buffer applies to each side of the watercourse, measured from top of bank, and is based on the watercourse Strahler order. The buffers required are as follows:

- Strahler order 1 – 10 metre buffer (each side).
- Strahler order 2 – 20 metre buffer (each side).
- Strahler order 3 – 30 metre buffer (each side).
- Strahler order 4 and greater – 40 metre buffer (each side).

One unnamed Strahler order 1 watercourse occurs in the eastern portion of the subject site (Figure 4). This watercourse has a VRZ buffer requirement of 10-metres. Moore Gully, a Strahler order 4 watercourse occurs to the south of the subject site and has a VRZ buffer requirement of 40 metres. The subject site tracks along the boundary of the Moore Gully VRZ buffer, however does not include any direct impacts to this area. Buffers for all of watercourses within the study area have been mapped in Figure 4.

Public authorities are exempt from the need to acquire a controlled activity permit from the NSW DCCEEW for work on waterfront land.

## 4.6 State Environmental Planning Policies

### 4.6.1 Biodiversity and Conservation SEPP 2021

#### Chapter 4: Koala Habitat Protection 2021

Chapter 4 Koala Habitat Protection aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

The study area is located within the Liverpool City Council LGA. Liverpool City Council is listed under Schedule 2, Chapter 4 of the Biodiversity and Conservation SEPP, and is therefore subject to the requirements laid out by the policy. Specifically, this means before a consent authority may grant consent to a development application (DA), it must satisfy itself whether or not the land is potential Koala habitat and core Koala habitat.

However, under Section 4.4 of the Biodiversity and Conservation SEPP, Chapter 4 of the SEPP does apply to land on which biodiversity certification has been conferred and is in force. As the subject site occurs on land that is biodiversity certification, further consideration of Chapter 4 is not required.

### 4.6.2 Precincts – Western Parkland City SEPP 2021

#### Chapter 3 (Sydney region growth centres)

Chapter 3 of the Western Parkland City SEPP (Sydney region growth centres) establishes the broad framework for the development of four identified growth centres in Western Sydney: the North-West Growth Centre, the South-West Growth Centre, the Wilton Growth Area, and the Greater Macarthur Growth Area. The aim of this policy was to allow for the co-ordinated release of land for residential, employment and other urban development within the growth centres, in order to ensure high-quality, sustainable and liveable developments. The study area occurs within the South-West Growth Centre and includes land designated as certified and non-certified under this SEPP.

Land mapped within a certified area does not require any further biodiversity assessment as part of the DA process. Land mapped within a 'non-certified area' may still require a biodiversity assessment prior to development. The subject site is wholly located within certified land (Figure 2) and therefore further assessment under the BC Act is not required.

#### Chapter 4 (Western Sydney Aerotropolis)

The study area is located within land on the Land Application Map of Chapter 4 (Western Sydney Aerotropolis) of the Western Parkland City SEPP and is therefore subject to the development controls and permitted developments detailed under the SEPP. The following sections directly relate to biodiversity:

- Section 4.19 – Wildlife hazards.

- Section 4.25 – Preservation of trees and vegetation in Environment and Recreation Zone and Cumberland Plain.

The implications of these development controls are detailed in the following subsections.

**Wildlife hazards**

Section 4.19 (Wildlife hazards) applies to development of land within the 13 kilometre wildlife buffer zone of the future Western Sydney International Airport. Relevant developments cannot be granted development consent within this area unless the consent authority:

a) *has consulted the relevant Commonwealth body, and*
b) *has considered a written assessment of the wildlife that is likely to be present on the land and the risk of the wildlife to the operation of the Airport provided by the applicant, which includes-*
    i. *species, size, quantity, flock behaviour and the particular times of day or year when the wildlife is likely to be present, and*
    ii. *whether any of the wildlife is a threatened species, and*
    iii. *a description of how the assessment was carried out, and*
c) *is satisfied that the development will mitigate the risk of wildlife to the operation of the Airport, including, for example, measures relating to—*
    i. *waste management, landscaping, grass, fencing, stormwater or water areas, or*
    ii. *the dispersal of wildlife from the land by the removal of food or the use of spikes, wire or nets.*

Relevant development means development for the following purposes; agricultural produce industries, aquaculture, camping grounds, eco-tourist centres, garden centres, intensive livestock agriculture, intensive plant agriculture, livestock processing industries, plant nurseries, recreation facilities (major), recreation facilities (outdoor), sewage treatment plants, water or resource management facilities that consist of outdoor processing, storage or handling of organic or putrescible waste, and water storage facilities.

As the enabling works include the development of water storage facilities, Section 4.19 of the SEPP applies. However, it is noted that these water storage facilities (i.e., stormwater basins) will be temporary in nature and only operational for a maximum of 12 months until such time as additional stormwater control measures are put in place along Moore Gully, which are subject to separate project approvals. The Western Sydney International Airport it due to be operational in 2026. By this time these temporary stormwater basins would have been decommissioned so there will be no increased wildlife hazards associated with these temporary water storage facilities.

Mitigation measures to deter wildlife such as exclusion netting should also be considered. Any installed netting will need to be suitably sized so that is does not pose a risk to wildlife (i.e., mesh size should be less than 5 millimetres).

**Preservation of trees and vegetation in Environment and Recreation Zone and Cumberland Plain**

Section 4.25 (Preservation of trees and vegetation) applies to land in the ENZ zone as well as land shown as High Biodiversity Value Area. No such lands occur within the Stage 2A subject site (Figure 2), and as such this section does not apply.

## 4.7 Cumberland Plain Conservation Plan

The CPCP will support biodiversity and growth in the Western Parkland City through the protection of the region's most important conservation values. This will be achieved through the creation of new reserves, conservation areas and green spaces for the local community. The CPCP has been designed to improve

ecological resilience and function, and to offset biodiversity impacts from new housing, employment areas and infrastructure in the Western Parkland City (DPE 2022).

The CPCP has been developed to allow for strategic biodiversity certification of four growth areas under the BC Act as well as strategic assessment under the EPBC Act. The four growth areas are:

- Greater Macarthur Growth Area
- Greater Penrith to Eastern Creek Investigation Area
- Western Sydney Aerotropolis
- Wilton Growth Area

The CPCP excludes areas of the Western Sydney Aerotropolis that overlap with the South-West Growth Centre, the Western Sydney International Airport and the eastern part of Mamre Road Precinct (DPE 2022). As the Bradfield City Centre occurs within the South-West Growth Centre, the CPCP does not apply to the subject site. As such the CPCP will not be discussed further as part of this assessment.

## 4.8 *Western Sydney Aerotropolis Development Control Plan 2022*

The Phase 2 DCP provides development controls to supplement the Western Parkland City SEPP. Its aim is to inform the preparation and assessment of DAs and Masterplans. Section 2.4 (Vegetation and Biodiversity) and Section 2.10 (Airport Safeguarding) are of relevance to the current assessment.

### Section 2.4 (Vegetation and biodiversity)

This section applies to native vegetation and biodiversity and includes the following relevant sections:

- Section 2.4.1 - Deep Soil and Tree Canopy
- Section 2.4.2 - Protection of Biodiversity
- Section 2.4.3 - Protection of Trees and Vegetation
- Section 2.4.4 - On Lot and Streetscape Landscaping and Preferred Plant Species

An assessment against the performance outcomes and benchmark solutions that comprise these four section of the Phase 2 DCP is provided in Section 6.7.9 of the Bradfield City Centre Master Plan BSIA (Biosis 2023). The enabling works will need to ensure they are consistent with the agreed actions detailed in the BSIA and ensure the mitigation measures detailed in the Phase 2 DCP are implemented.

### Section 2.10 (Airport safeguarding)

This section includes provisions related to safeguarding the operation of the airport and includes controls for wildlife hazards which are relevant to biodiversity assessments. An assessment against the performance outcomes and benchmark solutions that comprise this section of the Phase 2 DCP is provided in Section 6.7.10 of the Bradfield City Centre Master Plan BSIA (Biosis 2023). The enabling works will need to ensure they are consistent with the agreed actions detailed in the BSIA and ensure the mitigation measures detailed in the Phase 2 DCP are implemented.

# 5 Recommendations

Recommendations to aid in the avoidance and mitigation of impacts to ecological values are included in Section 7 (Recommendations) of the Bradfield City Centre Master Plan BSIA (Biosis 2023). The relevant recommendations for the Stage 2A enabling works have been repeated below in Table 3.

In addition to the BSIA mitigation measures, as the enabling works include the development of water storage facilities (i.e., stormwater basins) within the 13 kilometre wildlife buffer zone of the Western Sydney International Airport, it is recommended that fauna exclusion netting be considered over these basins. Any installed netting will need a mesh size of less than 5 millimetres and will need to be regularly inspected for wear and tear to ensure it does not post an entanglement risk to wildlife. As detailed in Section 4.6.2, the proposed stormwater basins are temporary in nature and will be decommissioned prior to the Western Sydney International Airport becoming operational.

**Table 3 Recommendations to avoid, mitigate, and offset impacts to ecological values**

| BSIA Ref # | Recommendation | Timeframe | Responsibility |
|---|---|---|---|
| **Native vegetation** | | | |
| **1** | The Master Plan has avoided impacts to 12.47 ha of native vegetation which is included under the plans Open Space Strategy detailed in Section 6.6.2 (of the BSIA). Further impacts to native vegetation and TECs within the development footprint can be managed by implementing appropriate safeguards in further planning and design stages as part of the DA process. This includes avoiding areas of native vegetation wherever possible, and, where unavoidable, targeting areas of lower condition vegetation for development/impact. | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| **2** | Identifying the locations where the TECs and native vegetation to be retained as No Go zones in a project Construction Environmental Management Plan (CEMP) or similar. | During construction | Construction contractor |
| **3** | Install appropriate exclusion fencing to the boundary of the TECs and any construction areas where there is some potential for accidental encroachment. Include appropriate signage such as No Go Zone or Environmental Protection Area. | During construction | Construction contractor |
| **4** | Any development within the study area would need to adhere to performance outcomes outlined in the Phase 2 DCP. This DCP includes several protections for biodiversity, native vegetation and plant planting that will ensure further impacts to native vegetation are | During detailed design of subsequent developments. Part of the DA | Development proponent |

| BSIA Ref # | Recommendation | Timeframe | Responsibility |
|---|---|---|---|
| | minimised or remediated. | process. | |
| **6** | Ensure appropriate sediment control measures are put in place to ensure run-off during construction does not result in indirect impacts to native plant communities, particularly TECs. | During construction | Construction contractor |
| **7** | Identify opportunities to revegetate impacted areas following development works. Revegetation works would need to follow the approved planting lists outlined in the DCPs and comply with the fauna management and mitigation measures outlined in the *Western Sydney Aerotropolis: Wildlife Management Assessment Report - Final Report Revision 3* (Avisure 2020) and Section 10.2 (Wildlife Hazards) of the Phase 2 DCP. | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| **Priority weeds** | | | |
| **10** | To prevent biosecurity impacts, in accordance with the NSW Biosecurity Act all practical steps should be taken to control and eradicate priority weeds from future development footprints prior to or during vegetation removal. A pre-clearance assessment may need to be undertaken to identify potential weed material and recommend appropriate treatment or disposal measures. | During construction | Construction contractor |
| **Hollow-bearing trees** | | | |
| **11** | Where required, removal of significant habitat trees should be preceded by a preclearance assessment, followed by a two-stage clearing process to minimise impact to native fauna.<br>**Step 1:**<br>Surrounding shrubs and canopy to be removed and the hollow-bearing tree/s to be knocked by arborist or excavator and left standing for 24-48 hours prior to hollow-bearing tree removal, to allow time for fauna to escape and relocate naturally.<br>**Step 2:**<br>Ecologist or arborist (if high in tree) to inspect hollows and/or habitat trees for the presence of fauna.<br>Excavator operator or arborist to again knock or disturb the habitat tree prior to felling, with the intent to encourage the final movement of fauna out of hollows/nests. | During construction | Construction contractor |

| BSIA Ref # | Recommendation | Timeframe | Responsibility |
|---|---|---|---|
| | During felling, the tree is felled as carefully as possible and placed on the ground, for example branch-by-branch to allow for regular checks for fauna by the Ecologist.<br>Lengths cut from trees during felling should be divided in a manner that will preserve integrity of any hollows present and placed in retained vegetation to provide habitat for ground dwelling fauna.<br>Any fauna displaced are either captured and inspected for injury prior to relocation in a pre-allocated area or allowed to self-relocate into adjacent retained habitats.<br>Injured fauna are to be taken to a local veterinarian or a WIRES representative is to be contacted as soon as possible. | | |
| **12** | Loss of hollows should be offset through the installation of compensatory habitat such as nest boxes. Nest boxes should be installed in the environmental prior to clearing and offset a minimum of 2:1 ratio (nest boxes: hollows lost) as outlined in the Phase 2 DCP. Any hollows removed should be reserved and installed in nearby environments to provide additional habitat for fauna. | During construction | Construction contractor |
| **13** | At least 60 % of replacement habitat (i.e., nest boxes) should be installed prior to the removal of a hollow-bearing trees. | During construction | Construction contractor |
| **Key fish habitat** | | | |
| **14** | Wherever possible development should be avoided within the key fish habitat buffers associated with Moore Gully and Thompsons Creek (Figure 4). | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| **15** | Impacts within the 50 m key fish habitat buffer will require approval from DPI Fisheries. | During detailed design of subsequent developments. Part of the DA process. | Development proponent or WPCA |

| BSIA Ref # | Recommendation | Timeframe | Responsibility |
|---|---|---|---|
| **Watercourses and riparian corridors** | | | |
| **18** | Works within 40 m from top of bank of any mapped watercourse will require a controlled activity permit from NRAR. Major projects that are classified as State Significant Developments and State Significant Infrastructure are exempt from this requirement. | During detailed design of subsequent developments. Part of the DA process. | Development proponent or WPCA |
| **19** | Ensure appropriate sediment control measures are put in place to ensure run-off during construction does not result in indirect impacts to the watercourse. | During construction | Construction contractor |
| **20** | Ensure No-Go zones are in place to protect any retained sections of riparian corridors. | During construction | Construction contractor |

# 6 Conclusion

This report is an assessment of the potential impact of the proposed enabling works on ecological values within the Stage 2A subject site. The proposed activities that will result in impacts to ecological values include:

- Removal of 9.75 ha of native vegetation, of which 5.53 ha in high condition satisfies the listing criteria of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (CEEC, EPBC Act), and all conditions (high, moderate and low) satisfy the criteria of *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act).
- 8 hollow-bearing trees supporting the following hollows:
  - 8 small hollows (<50 mm entrance diameter).
  - 6 medium hollows (50 – 149 mm entrance diameter).
- Removal of potential habitat for 7 threatened flora species and 19 threatened fauna species, listed under the EPBC Act or BC Act, which are determined to have a moderate or greater likelihood of occurrence within the broader study area.
- Impacts to the riparian buffer zone of one unnamed Strahler order 1 system and the key fish habitat buffer zone associated with Moore Gully.

As the subject site occurs on certified land, further assessment of impacts to EPBC Act and BC Act listed threatened species is not required and entry into the BOS is not triggered. A SIS or BDAR is therefore not required. Several safeguards to avoid, minimise and mitigate the above impacts have been included in Section 5. As the enabling works include the development of water storage facilities (i.e., temporary stormwater basins) within the 13 kilometre wildlife buffer zone of the Western Sydney International Airport, it is recommended that fauna exclusion netting be considered over these facilities. These basins will be decommissioned prior to the Western Sydney International Airport becoming operational and therefore do not represent a wildlife hazard to the airport operations. Consultation with NSW DCCEEW should also be considered for impacts within 40 metres of a Strahler order 3 section of Moore Gully.

# References

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biosis

Western Parkland City Authority

Bradfield City Centre
Master Plan Application

# Biodiversity Strategy and Impact Assessment

Prepared by Biosis

October 2023

wpca.sydney

NSW GOVERNMENT

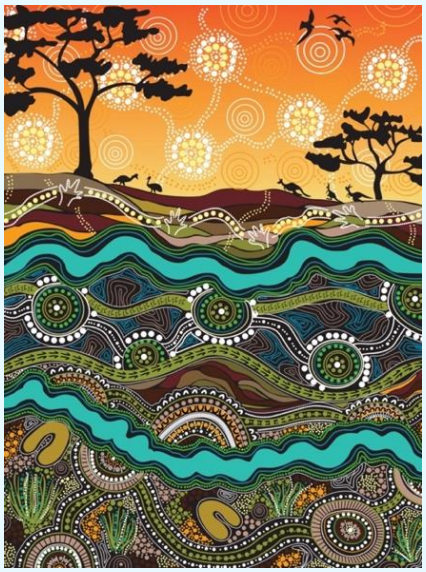
# Acknowledgement of Country

Aboriginal people have had a continuous connection with the Country encompassed by the Western Parkland City (the Parkland City) from time immemorial. They have cared for Country and lived in deep alignment with this important landscape, sharing and practicing culture while using it as a space for movement and trade.

We Acknowledge that four groups have primary custodial care obligations for the area: Dharug/Darug, Dharawal/Tharawal, Gundungurra/Gundungara and Darkinjung. We also Acknowledge others who have passed through this Country for trade and care purposes: Coastal Sydney people, Wiradjuri and Yuin.

Western Sydney is home to the highest number of Aboriginal people in any region in Australia. Diverse, strong and connected Aboriginal communities have established their families in this area over generations, even if their connection to Country exists elsewhere. This offers an important opportunity for the future of the Parkland City.

Ensuring that Aboriginal communities, their culture and obligations for Country are considered and promoted will be vital for the future of the Parkland City. A unique opportunity exists to establish a platform for two-way knowledge sharing, to elevate Country and to learn from cultural practices that will create a truly unique and vibrant place for all.



**Garungarung Murri Murri Nuru**
(Beautiful Grass Country)
Artwork created by Dalmarri artists Jason Douglas and Trevor Eastwood for the Western Parkland City Authority

| Version | Status | Date | Prepared By | Reviewer | Comments |
|---|---|---|---|---|---|
| *DFT01* | *Draft* | *18/02/2022* | *Biosis* | *Rebecca Dwyer* | *Report at 60 % completion.* |
| *DFT02* | *Draft* | *21//03/2022* | *Biosis* | *Rebecca Dwyer* | *Full draft (minus DCP tables)* |
| *DFT03* | *Draft* | *28/03/2022* | *Biosis* | *Jane Raithby-Veall* | *DCP tables only* |
| *DFT04* | *Draft* | *11/11/2022* | *Biosis* | *Matthew Hyde* | *Updated study template and issue of final Master Plan requirements* |
| *DFT05* | *Draft* | *24/11/2022* | *Biosis* | *Matthew Hyde* | *Reviewing comments from WPCA* |
| *DFT06* | *Draft* | *19/06/2023* | *Biosis* | *Jane Raithby-Veall* | *Updated report template. Final Master plan footprint and associated updates.* |
| *FNL01* | *Final* | *30/06/2023* | *Biosis* | *Matthew Hyde* | *Reviewing comments from WPCA. Updated mapping. Preparation of final version.* |
| *FNL02* | *Final* | *02/08/2023* | *Biosis* | *Jane Raithby-Veall* | *Updates to development footprint.* |
| *FNL03* | *Final* | *13/09/2023* | *WPCA* | *Jason Azucena* | *Update to Table 1* |
| *FNL04* | *Final* | *19/10/2023* | *WPCA* | *H Gilvear* | *Update Lot and DP* |

# Executive Summary

Biosis Pty Ltd was commissioned by the Western Parkland City Authority (WPCA) to undertake a biodiversity assessment to support the approval of Stage 1 of the Bradfield City Centre Master Plan. This Master Plan outlines a mixed-use development, comprising industrial, commercial, open space and residential uses for a 115-hectare site centred on a new Sydney Metro station. This site is located off 215 Badgerys Creek Road, Bringelly in New South Wales (NSW) (the study area).

The current assessment takes the form of a Biodiversity Strategy and Impact Assessment, with the assessment outlining the key ecological values likely to occur within the study area, the impacts associated with the proposed Master Plan, key biodiversity legislation applicable to the Master Plan, and recommendations to avoid, mitigate or offset the proposed development.

The assessment included a desktop review of the study area to determine the ecological values likely to be present within the Master Plan area, as well as a field assessment of the subject site to determine the existing biodiversity values of the site. A subsequent aquatic assessment of Moore Gully, a Strahler order 4 watercourse that occurs within the study area was also undertaken. Finally, an additional field assessment was undertaken to collect vegetation plot data to calculate vegetation condition in key locations across the site.

### Ecological values

The assessment identified the following key ecological values within the study area:

- 37.15 ha of native vegetation conforming with six Plant Community Types (PCTs) providing habitat for native flora and fauna.
- Seven Threatened Ecological Communities (TECs) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the NSW *Biodiversity Conservation Act 2016* (BC Act):
  - *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion* (Critically Endangered Ecological Community [CEEC], EPBC Act; and Endangered Ecological Community [EEC], BC Act).
  - Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions (EEC, BC Act).
  - River-flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria (CEEC, EPBC Act) and the equivalent River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions (EEC, BC Act).
  - Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CEEC, EPBC Act).
  - Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered, BC Act).
  - Sydney Freshwater Wetlands in the Sydney Basin Bioregion (EEC, BC Act).
  - Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South-East Queensland (EEC, EPBC Act) and the equivalent Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions (EEC, BC Act and EPBC Act).

- Seven threatened flora species and 19 threatened fauna species listed under the Commonwealth EPBC Act or NSW BC Act identified as having a medium or greater likelihood of occurrence.
- 14 hollow-bearing trees representing potential habitat for native fauna.
- One population, comprising four individuals of threatened flora species *Marsdenia viridiflora* subsp. *viridiflora* (Endangered population, BC Act), located directly adjacent to the study area.
- Creeks, wetlands and dams providing habitat for native biota:
  - Thompsons Creek, a Strahler order five watercourse occurring outside the study area along its eastern boundary. Parts of its associated riparian corridor and key fish habitat buffer partially occur within the study area.
  - Moore Gully Creek, a Strahler order four watercourse and its associated riparian corridors and key fish habitat buffers.
  - Two wetlands supporting TECs and representing potential native species habitat.
  - Four farm dams supporting native vegetation and representing potential native aquatic fauna habitat.

The study area occurs within land to which Chapter 4 (Western Sydney Aerotropolis) of *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* applies. As such the study area is subject to the controls detailed within this chapter of the SEPP. However, the study area also occurs within the South-West Growth Centre as defined under Chapter 3 (Sydney region growth centres) of *State Environmental Planning Policy (Precincts – Western Parkland City) 2021*. The majority of the study area (113.72 hectares or 99 %) is mapped as "certified" under the Draft Growth Centres Conservation Plan (Growth Centres Commission 2007) and has been granted biodiversity certification under the BC Act due to the effect of the Order to confer biodiversity certification on the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*. Biodiversity certification removes the need for further assessment of threatened species under the NSW BC Act prior to development of certified land. This biodiversity certification also applies to EPBC Act Matters of National Environmental Significance due to the endorsement of the Sydney Growth Centres Strategic Assessment Program Report (State of NSW 2010) by the Commonwealth Environment Minister.

### Impacts associated with the Master Plan

The proposed Master Plan development will result in impacts to the following ecological values:

- Removal of 24.60 ha native vegetation from the development footprint, which includes areas of potential threatened flora and fauna habitat. This native vegetation has been previously mapped as certified.
- Minor impacts within the remaining 12.47 ha of native vegetation which occurs within areas set aside for open space. These impacts are expected to be minimal as native vegetation in open spaces is expected to retain much of its existing characteristics and functionality.
- Removal of 11 hollow-bearing trees within the study area supporting a total of 21 hollows of small (<50 mm diameter) or medium (50 – 149 diameter) size classes.
- Impacts to two sections of Moore Gully and its associated Vegetated Riparian Zone (VRZ) and key fish habitat buffer, associated with future transit corridors at the eastern and western extent of the study area.
- Minor encroachment into the key fish habitat buffer associated with Thompsons Creek.
- Impacts to five unnamed Strahler order one watercourses and one unnamed Strahler order two watercourse and their associated VRZs.
- Impact to one farm dam.

All impacts to native vegetation and threatened flora and fauna are restricted to areas which have been

granted biodiversity certification. As such further assessment in the form of Tests of Significance are not required. Impacts do not trigger the Biodiversity Offset Scheme (BOS) and subsequent assessment in the form of a Biodiversity Development Assessment Report (BDAR) or Species Impact Statement (SIS) is not required. No referral for impacts to Matters of National Environmental Significance are required.

Impacts to Moore Gully and its associated key fish habitat buffer and the unnamed watercourses across the study area will require liaison with the fisheries division of the Department of Primary Industries (DPI) and the Natural Resources Access Regulator (NRAR). The VRZ of these watercourses will need to be observed and a controlled activity permit secured for any works within 40 metres of these features.

### Recommendations

Whilst additional biodiversity assessment is not required, this report makes several recommendations to avoid, mitigate and offset impacts to biodiversity. The primary measure for any future developments within the study area is to minimise removal of native vegetation and habitat and avoid disruption to existing riparian corridors. Where clearing is unavoidable, development should be designed to retain areas of high-quality vegetation wherever possible. Additional recommendations are detailed within **Section 7** and include detailed design recommendations, exclusion fencing and recommendations regarding appropriate vegetation clearing practices, staged habitat removal, supervision of habitat clearance and the installation of replacement habitat.

# Contents

# Figures



# Tables

# Glossary of Terms

| | |
|---|---|
| AAWSF | Aerotropolis Aviation Wildlife Safeguarding Framework |
| APZ | Asset Protection Zone |
| AS | Australian Standard |
| Aerotropolis | Western Sydney Aerotropolis |
| BAM | Biodiversity Assessment Method |
| BC Act | *Biodiversity Conservation Act 2016* |
| BDAR | Biodiversity Development Assessment Report |
| Biosecurity Act | *Biosecurity Act 2015* |
| BOS | Biodiversity Offset Scheme |
| CEEC | Critically Endangered Ecological Community |
| CPCP | Cumberland Plain Conservation Plan |
| DA | Development Application |
| DCCEEW | Commonwealth Department of Climate Change, Energy, the Environment and Water |
| DNG | Derived native grasslands |
| DNS | Derived native shrublands |
| DP | Deposited Plan |
| DPE | NSW Department of Planning and Environment |
| DPI | NSW Department of Primary Industries |
| EEC | Endangered Ecological Community |
| EES | Environment, Energy and Science |
| ENV | Existing Native Vegetation |
| EP&A Act | *Environmental Planning and Assessment Act 1979* |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* |
| FM Act | *Fisheries Management Act 1994* |
| GIS | Geographic Information System |

| | |
|---|---|
| Growth Centres Biodiversity Certification Order | *Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Region Growth Centres) 2006* |
| KTPs | Key threatening processes |
| LEP | Local Environmental Plan |
| LGA | Local Government Area |
| NES | National Environmental Significance |
| NRAR | Natural Resource Access Regulator |
| NSW | New South Wales |
| NSW Government | State Government for NSW |
| PCT | Plant Community Type |
| RBM | Relevant Biodiversity Measure |
| SEPP | State Environmental Planning Policy |
| SIC | Significant Impact Criteria |
| SIS | Species Impact Statement |
| Study area | The Master Plan Site (i.e., Lot 3101 DP 1282964) |
| TEC | Threatened Ecological Community |
| ToS | Test of Significance |
| TPZ | Tree Protection Zone |
| VRZ | Vegetated Riparian Zone |
| WM Act | *Water Management Act 2000* |
| Western Parkland City SEPP | *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* |
| WPCA | Western Parkland City Authority |
| WSA SEPP | *State Environment Planning Policy (Western Sydney Aerotropolis) 2020* |

# 1 Introduction

## 1.1 Purpose of this report

This report accompanies the Master Plan Application for the Bradfield City Centre submitted to the Department of Planning and Environment (DPE).

Consultation was undertaken with a range of State Authorities, service providers and members of the community during the preparation of the Master Plan Application.

Consultation with authorities has not been undertaken for biodiversity matters at this stage of the Master Planning process however it has been recommended with the fisheries division of DPI and NRAR if there are future impacts to Moore Gully, key fish habitat and riparian corridors.

All matters were considered to have been adequately addressed within the Master Plan Application or in the accompanying appendices.

## 1.2 The Western Sydney Aerotropolis

The Western Sydney Aerotropolis is an 11,200-hectare region set to become Sydney's third city (the Western Parkland City), and the gateway and economic powerhouse of Western Sydney.

The Aerotropolis comprises of the new Western Sydney (Nancy-Bird Walton) International Airport surrounded by five initial precincts which include the Aerotropolis Core, Wianamatta– South Creek, Northern Gateway, Agri-business and Badgerys Creek outlined in Figure 2 below.

The final Aerotropolis planning package, including the Precinct Plan and State Environmental Planning Policy (SEPP) Amendment, was gazetted by DPE in March 2022 and the Development Control Plan Phase 2 was finalised in November 2022. These documents have been used to inform the preparation of the Bradfield City Centre Master Plan.

The proposed Master Plan Application for the site has also been prepared using the Western Sydney Aerotropolis Master Plan Guideline and Master Plan Requirements.

# 2 Bradfield City Centre

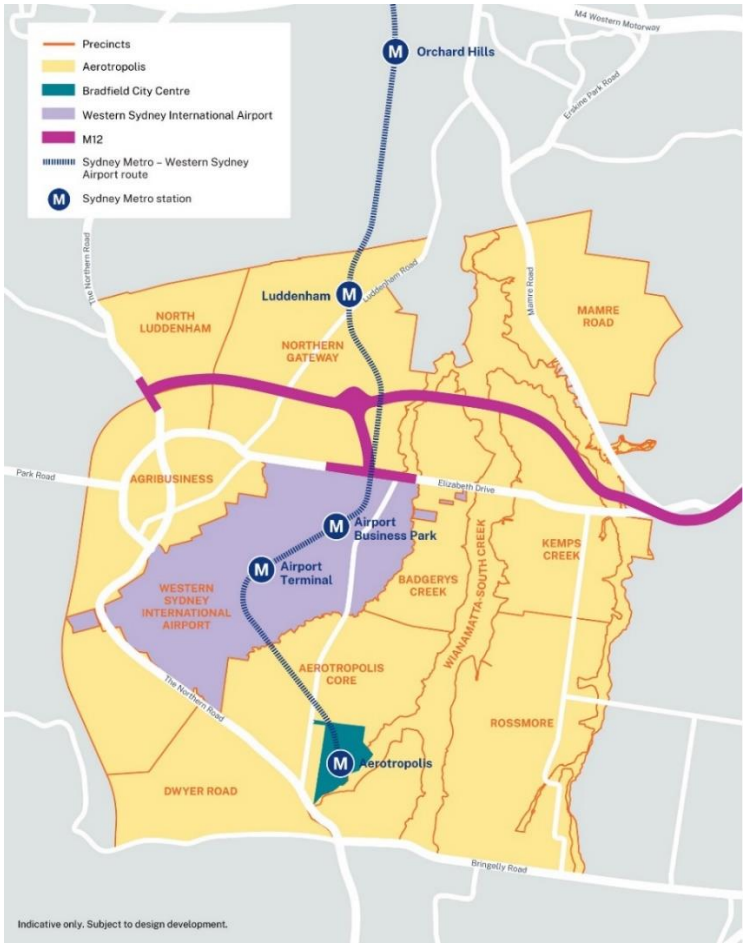
## 2.1 Strategic Context

The Bradfield City Centre is located to the south-east of the new Western Sydney International (Nancy-Bird Walton) Airport at the intersection of Badgerys Creek Road and The Northern Road (see **Figure 1** below).

The Sydney Metro Western Sydney Airport line runs through the site, providing connections from the key centre of St Marys through to stations at Orchard Hills, Luddenham, Airport Business Park, Airport Terminal and the Aerotropolis which is located within the site.

The site is surrounded by several key roads and infrastructure corridors including Bringelly Road, Badgerys Creek Road, Elizabeth Drive, M12 and The Northern Road.

**Figure 1 Strategic Context**




Set on natural waterways, Bradfield City Centre presents a rare opportunity to showcase the best urban design and to create a thriving, blue and green, connected City in which Australians will want to live, learn and work. The Bradfield City Centre will be a beautiful and sustainable 22nd Century City. It will foster the

innovation, industry and technology needed to sustain the broader Aerotropolis and fast track economic prosperity across the Western Parkland City.

## 2.2 The Master Plan Site

The street address for Bradfield City Centre is 215 Badgerys Creek Road, Bradfield (the Site) within the Liverpool Council Local Government Area (LGA). The site is legally described as Lot 3101 DP 1282964 and has an area of 114.6 hectares, with road access to Badgerys Creek Road located at the north-western corner. The site spans across the Aerotropolis Core and Wianamatta-South Creek Precinct, within Western Sydney Aerotropolis. The Site is outlined in **Figure 2** below.

The Site is predominantly zoned Mixed Use under the Western Parkland City SEPP, with a small portion of Enterprise zoned land located on the north-western corner of the site. The site also includes Environment and Recreation zoned land mostly along Thompsons Creek.

### Figure 2 Master Plan Site

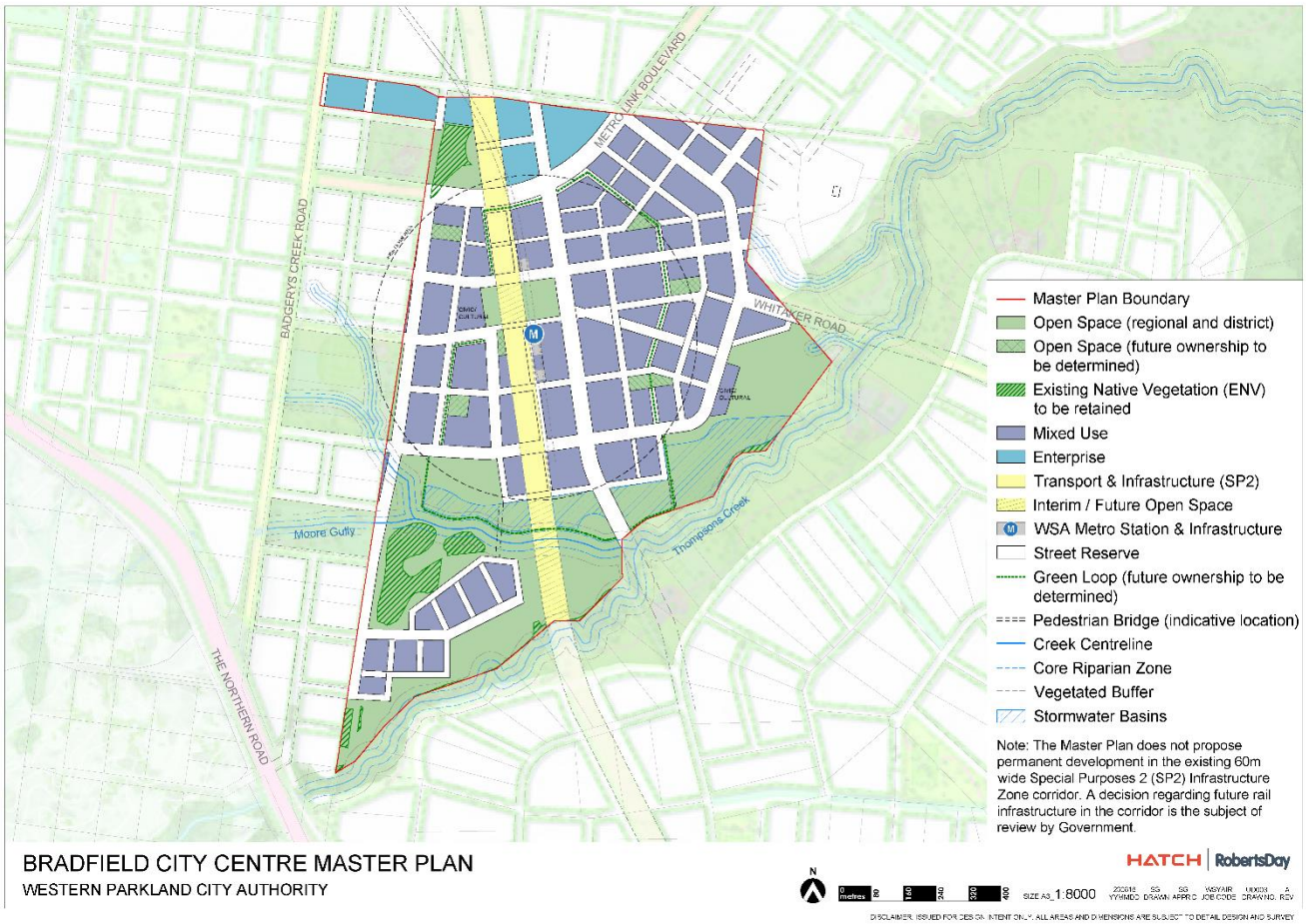
## 2.3 The Bradfield City Centre Master Plan

The Western Parkland City Authority has prepared a Master Plan (**Figure 3** below) in accordance with the DPE Master Plan Requirements.

The Master Plan sets out a framework for future development within the Bradfield City Centre which includes:

- Road network, key connectors to adjoining land and the regional road network (existing and future)
- Block structure
- Indicative open space network
- Sustainability strategy
- Social and infrastructure strategy
- Arts and culture strategy
- Infrastructure servicing strategy

### Figure 3 Master Plan



## 2.4 The Proposal

The Bradfield City Centre Master Plan is intended to facilitate the growth of the centre over time. The Master Plan has established the following three planning horizons for technical assessments (**Table 1**).

**Table 1 Planning & Development Horizons**

| Phase | Indicative Timeframe | Estimated employment | Estimated residential population | Estimated Gross Floor Area (cumulative) |
|---|---|---|---|---|
| Immediate | 2026 | 1,000 - 1,200 jobs | 0 residents | 48,500 sqm |
| Medium-term | 2036 | 8,000 - 8,300 jobs | 3,000 - 3,100 residents | 341,000 sqm |
| Long-term | 2056 | 20,000 – 24,000 jobs | 15,000 – 15,200 residents | 1,258,000 sqm + |

*Note: The table above is an estimate of the population and employment forecast used for the purposes of modelling only.*

*The master plan has the capacity to accommodate ~10,000 residential dwellings. In accordance with NSW Government policy a proportion of the residential dwellings will be affordable housing. The timing and delivery of residential dwellings will be subject to market demand and future master plan reviews that consider the impact of additional population on the scope and timing of social and physical infrastructure.*

# 3 Baseline investigations

## 3.1 Technical baseline site consideration

Biosis Pty Ltd previously prepared the *Western Sydney Aerotropolis Core Precinct Stage 1 Existing conditions – Biodiversity* report (Biosis 2020) on behalf of the Western Parkland City Authority, to support the Stage 1 Bradfield City Centre Master Plan. This assessment covered Lot 3101 DP 1282964 as well as adjoining lots along the western boundary. The assessment included a desktop review to determine the ecological values likely to be present within the site, as well as a field assessment of the site to determine the existing biodiversity values.

### Key ecological values

The assessment identified the following key ecological values within the site:

- Native vegetation providing habitat for native flora and fauna (biota).
- Seven TECs listed under the Commonwealth EPBC Act and/or NSW BC Act:
    - *Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion* (CEEC EPBC Act; EEC, BC Act).
    - *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions* (EEC, BC Act).
    - *River-flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria* (CEEC, EPBC Act) and the equivalent *River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions* (EEC, BC Act).
    - *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (CEEC, EPBC Act).
    - *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act).
    - *Sydney Freshwater Wetlands in the Sydney Basin Bioregion* (EEC, BC Act).
    - *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South-East Queensland* (EEC, EPBC Act) and the equivalent *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South-East Corner Bioregions* (EEC, EPBC Act and BC Act).
- Habitat trees providing roosting and breeding habitat for native hollow-dependent fauna.
- One threatened flora species, *Marsdenia viridiflora* subsp. *viridiflora* (Endangered population, BC Act).
- Creeks, wetlands and dams providing habitat for native biota:
    - Thompsons Creek, a Strahler order five watercourse and associated riparian corridor, including Key Fish Habitat, within Commonwealth land and adjacent lots.
    - Moore Gully Creek, a Strahler order four watercourse, including Key Fish Habitat, within Commonwealth land and adjacent lots.
    - Two wetlands, one located at the western end of Moore Gully within the study area, and the other located along the south-eastern boundary of the study area.
    - Farm dams.

### Biodiversity certification order

In addition to the key ecological values, the *Western Sydney Aerotropolis Core Precinct Stage 1 Existing conditions – Biodiversity* report (**Biosis 2020**) also outlined the site's occurrence within the south west growth centre as defined under Chapter 3 (Sydney region growth centres) of the Western Parkland City SEPP. The site includes areas mapped as both certified and non-certified land and is subject to the *Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (Growth Centres Biodiversity Certification Order). The certified and non-certified areas that occur within the study area are shown in **Figure 4**.

## 3.2 Area of Focus

The area of focus of the current assessment is the Bradfield City Centre Master Plan Site as outlined in Section 2.2 (i.e. Lot 3101 DP 1282964) and shown in **Figure 2**, which is hereafter referred to as the study area.

The objective of this assessment is to:

- Summarise the ecological values of the site and study area.
- Map the native vegetation of the study area and clearly identify any vegetation to be removed.
- Provide a flora and fauna species inventory (based on data gathered during previous assessment).
- Consider the potential for threatened species to occur, including potential habitat areas.
- Assess the Master Plan against the relevant Commonwealth and State biodiversity legislation.
- Assess the Master Plan's compliance with the framework established under the *Western Sydney Aerotropolis Wildlife Management Assessment* (**Avisure 2020**) report.
- Assess the consistency of the Master Plan with the Growth Centres Biodiversity Certification Order.
- Assess the impacts of the Master Plan on the ecological values of the riparian corridors within the study area.
- Assess the requirements for a BDAR.
- Provide recommendations and potential mitigation measure to reduce adverse ecological impacts.

# 4 Assessment Requirements and Policy Context

This section provides an overview of key biodiversity legislation and government policy considered in this assessment. This section does not describe the legislation and policy in details and guidance provided here does not constitute legal advice.

## 4.1 Master Plan Requirements

The DPE have issued Master Plan Requirements (MPRs) to the Authority for the preparation of a Master Plan for Bradfield City Centre. This report has been prepared to address the MPRs outlined in **Table 2**.

**Table 2 Master Plan Requirements**

| Reference | Master Plan Requirement | Where addressed |
|---|---|---|
| 16 | Demonstrate that the amount of existing native vegetation (ENV) protected under the draft master plan is the same as that which is currently protected under the WPC SEPP and Precinct Plan on the land to which the draft master plan applies. | Section 6.7.3<br><br>Table 9 (Item 13) |
| 16 | Identify any direct and indirect biodiversity impacts associated with the project in accordance with the *Biodiversity Conservation Act 2016* and the Biodiversity Assessment Method 2020, including the preparation of a Biodiversity Development Assessment Report (BDAR) unless a waiver is granted, or the site is on biodiversity certified land. | Section 6.7.4 |
| 16 | Describe the proposed regime for avoiding and minimising, managing and reporting any biodiversity impacts of future development. | Section 6.7.4<br><br>Section 7<br><br>Table 17 |
| 16 | Demonstrate consistency with the Relevant Biodiversity Measures (RBM) of the Growth Centres Biodiversity Certification Order (the Order) and the Commitments for matters of national environmental significance of the Strategic | Section 6.7.3<br><br>Table 9 |

| Reference | Master Plan Requirement | Where addressed |
|---|---|---|
| | Assessment, including the application of RBM 19 of the Order. | |
| 16 | Quantify the amount of ENV which will be protected in non-certified lands. | Section 6.7.3<br><br>Table 9 (Item 13) |
| 16 | Demonstrate how the ENV will be protected in the draft master plan area. | Section 6.7.3<br><br>Table 9 (Items 6 and 13) |
| 16 | Be supported by a report and maps (including shapefiles). | Biodiversity Strategy and Impact Assessment (this report)<br><br>Figure 4, Figure 5, Figure 6, and Figure 7 |

## 4.2 Commonwealth Government Plans and Policies

### 4.2.1 *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (NES) protected under the Act.

Nine (9) Matters of NES are identified under the EPBC Act:

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

Under the EPBC Act, activities that have potential to result in significant impacts on Matters of NES must be referred to the Commonwealth Minister for Environment for assessment.

Matters of NES relevant to the current project include nationally threatened species and ecological

communities, and migratory species. Threatened species and ecological communities protected by the EPBC Act are outlined in Sections 6.2 and 6.3, and summarised in Section 6.5.

Usually impacts to EPBC Act listed threatened species and ecological communities require assessment in the form of a significant impact criteria (SIC) assessment, with significant impacts potentially requiring a referral to the Commonwealth Minister for the Environment. However, the study area includes land that has been previously certified for development under section 146B of the EPBC Act and as such these SIC assessment are not required. Further details of this certification as it relates to the study area and assessment under the EPBC Act are provided in Section 6.7.1.

## 4.3 State Government Plans and Policies

### 4.3.1 *Environmental Planning and Assessment Act 1979*

The EP&A Act was enacted to encourage the proper consideration and management of impacts of proposed development or land-use changes on the environment (both natural and built) and the community. The EP&A Act is administered by the New South Wales (NSW) DPE.

The EP&A Act provides the overarching structure for planning in NSW and is supported by other statutory environmental planning instruments. Sections of the EP&A Act of primary relevance to the natural environment are outlined further below.

**Test of significance**

Section 1.7 of the EP&A Act requires proponents and consent authorities to consider if a development will have a significant effect on threatened species, populations or communities listed under the BC Act and *Fisheries Management Act 1994* (FM Act).

Section 1.7 (Section 7.3 of the BC Act and Part 7A of the FM Act) outlines factors that must be taken into account in a Test of Significance (ToS). Where any ToS determines that a development will result in a significant effect to a threatened species, population or community a SIS or preparation of a BOS application is required.

However, the study area is partially certified, including lands that have been previously certified for development under the Growth Centres Biodiversity Certification Order. As the impacts associated with the Master Plan are confined to the certified lands, with no impacts occurring within the non-certified areas, ToS are not required for BC Act listed species. Full discussion of the certification within the study area is provided in Section 4.3.2 below.

Further assessment against the EP&A Act is provided in **Section 6.7.2**.

### 4.3.2 Western Parkland City SEPP – Chapter 3 (Sydney region growth centres)

Chapter 3 of the Western Parkland City SEPP (Sydney region growth centres) establishes the broad framework for the development of four identified growth centres in Western Sydney: the North-West Growth Centre, the South-West Growth Centre, the Wilton Growth Area, and the Greater Macarthur Growth Area. The aim of this policy was to allow for the co-ordinated release of land for residential, employment and other urban development within the growth centres, in order to ensure high-quality, sustainable and liveable developments. The study area occurs within the South-West Growth Centre and includes land designated as certified and non-certified under this SEPP.

*Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Region Growth Centres) 2006*

In December 2007 the Growth Centres Biodiversity Certification Order for the North-West Growth Centre and South-West Growth Centre was made by the NSW Minister for the Environment. This biodiversity certification was granted under Schedule 7 of the now repealed NSW *Threatened Species Conservation Act 1995* (TSC Act). This certification still has effect due to the action of Part 8 Clause 43 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017. The effects of the conferred biodiversity certification are:

> *(1) Any development for which development consent is required under the provisions of a biodiversity certified EPI is, for the purposes of the Part 4 of the EP&A Act, taken to be development that is not likely to significantly affect any threatened species, population or ecological community, or its habitat.*
>
> *(2) An activity to which Part 5 of the EP&A Act applies that a biodiversity certified EPI provides can be carried out without the need for development consent is, for the purposes of that Part, taken to be an activity that is not likely to significantly affect any threatened species, population or ecological community, or its habitat.*

Maps were included as under Schedule 2 biodiversity certification order that showed areas of land that were considered as "certified areas" and "non-certified areas". Land mapped within a certified area does not require any further biodiversity assessment as part of the development application (DA) process. Land mapped within a 'non-certified area' may still require a biodiversity assessment prior to development. The certified and non-certified areas that occur within the study area are shown in **Figure 4**.

**Relevant Biodiversity Measures**

The biodiversity certification conferred upon the Growth Centres SEPP (now included as Chapter 3 of the Western Parkland City SEPP) is subject to conditions known as Relevant Biodiversity Measures (RBMs), if not complied with these conditions allow the Minister to suspend or revoke the certification. A total of 41 RBMs applying to the certification were included under Schedule 1 of the Growth Centres Biodiversity Certification Order. RBMs 6-13 are related to the conservation of 'existing native vegetation' (ENV) within the growth areas. Specifically a minimum of 2,000 hectares of ENV must be retained or protected within the Growth Centres, either within the certified areas and/or the non-certified areas (DPIE 2019).

ENV is defined under Schedule 1 of the Growth Centres Biodiversity Certification Order as follows:

*Existing native vegetation means areas of indigenous trees (including any sampling) that:*

- *had 10 % or greater over-storey canopy cover present,*
- *were equal to or greater than 0.5 ha in area, and*
- *were identified as "vegetation" on maps 4 and 5 of the draft Growth Centres Conservation Plan.*

Additional development controls for the removal of vegetation, including ENV, are detailed under Part 6 of the Growth Centres SEPP.

Further details of the biodiversity certification related to Chapter 3 (Sydney region growth centres) of the Western Parkland City SEPP, and an assessment against the RBMs as they relate to the study area are outlined include in Section 6.7.3. ENV originally mapped within the study area as part of the *Draft Growth Centres Conservation* Plan (Growth Centres Commission 2007) is shown in **Figure 4**.

## 4.3.3 *Biodiversity Conservation Act 2016*

The BC Act is the key piece of legislation providing for the protection and conservation of biodiversity in NSW through the listing of threatened species and communities and key threatening processes (KTPs). Impacts to

threatened species and communities are assessed under Section 7.3 of the BC Act.

Further, the BOS will be triggered if the biodiversity assessment under the EP&A Act and BC Act determines a project is either:

- Likely to result in a significant effect to any threatened species, or
- The clearance of native vegetation exceeds the minimum lot size, or
- The project will impact on an area(s) mapped under the Biodiversity Values Map.

Should the BOS be triggered, then either a SIS or BDAR should be prepared.

Threatened species and communities listed under the BC Act are discussed in **Section 6.5** and an assessment against the BC Act is included in **Section 6.7.4**.

### 4.3.4 *Fisheries Management Act 1994*

The FM Act provides for the protection and conservation of aquatic species and their habitat throughout NSW. Impacts to threatened species, populations and communities, and critical habitats listed under the FM Act must be assessed through the ToS process under Section 1.7 of the EP&A Act (see above). If assessment under Section 1.7 of the EP&A Act determines a project is likely to result in a significant effect to threatened species, populations or communities then a SIS should be prepared.

Threatened species, populations and communities listed under the FM Act are discussed in Section 6.4 and summarised in Section 6.5. An assessment of whether the project will result in a significant effect to these threatened species, populations and communities is summarised in Section 6.5.

Two key objectives of the FM Act are to; conserve fish stocks and key fish habitats, and conserve threatened species, populations and ecological communities of fish and marine vegetation. When reviewing applications, the DPI will assess the likelihoods of impacts to waterways in relation to their sensitivity (TYPE) and waterway class (CLASS).

An assessment of the waterways is provided in **Section 6.4**. An assessment of the project against the objectives of the FM Act is provided in **Section 6.7.5**.

### 4.3.5 *Water Management Act 2000*

The *Water Management Act 2000* (WM Act) provides for the sustainable and integrated management of the State's water for the benefit of both present and future generations based on the concept of ecologically sustainable development. Under the WM Act an approval is required to undertake controlled activities on waterfront land, unless that activity is otherwise exempt under Section 91E. Waterfront land is defined within the Act as the bed of any river, lake or estuary and any land within 40 metres of the riverbanks, lake shore or estuary mean high water mark.

A public authority does not need to obtain a controlled activity approval for any controlled activities that it carries out in, on or under waterfront land.

The WM Act is supported by a series of interpretation guidelines including *Controlled activities on waterfront land - guidelines for riparian corridors on waterfront land* (NSW Office of Water 2012). This guideline defines a riparian management envelope referred to as the vegetated riparian zone (VRZ). The width of the VRZ within a riparian corridor has been pre-determined and standardised for first, second, third and fourth order and greater watercourses according to the Strahler System of ordering watercourses and is measured from the top of the highest bank on both sides of the watercourse. This guideline also presents the riparian corridor matrix that assists applicants for controlled activity approvals to identify certain works and activities that can

occur on waterfront land and in riparian corridors. The guideline also includes overarching management measures for works on waterfront land.

An assessment of whether a Controlled Activity Approval from the NSW DPI is required under the WM Act is provided in Section 6.7.6.

### 4.3.6 *Biosecurity Act 2015*

The *Biosecurity Act 2015* (Biosecurity Act) outlines biosecurity risks and impacts, which in relation to the current assessment includes those risks and impacts associated with weeds. A biosecurity risk is defined as the risk of a biosecurity impact occurring, which for weeds includes the introduction, presence, spread or increase of a pest into or within the State or any part of the State. A pest plant that has the potential to out-compete other organisms for resources, including food, water, nutrients, habitat and sunlight and / or harm or reduce biodiversity.

Under the Biosecurity Act a priority weed is any weed identified in a local strategic plan, for a region that includes that land or area, as a weed that is or should be prevented, managed, controlled or eradicated in the region. A local strategic plan here refers to a local strategic plan approved by the Minister under Division 2 of Part 4 of the *Local Land Services Act 2013*.

The Biosecurity Act also introduces the General Biosecurity Duty, which states:

> *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.*

Priority weeds are discussed further in Section 6.7.7.

### 4.3.7 Cumberland Plain Conservation Plan

The *Cumberland Plain Conservation Plan* (CPCP) will support biodiversity and growth in the Western Parkland City through the protection of the region's most important conservation values. This will be achieved through the creation of new reserves, conservation areas and green spaces for the local community. The CPCP has been designed to improve ecological resilience and function, and to offset biodiversity impacts from new housing, employment areas and infrastructure in the Western Parkland City (State of NSW 2020).

The CPCP has been developed to allow for strategic biodiversity certification of four growth areas under the BC Act as well as strategic assessment under the EPBC Act. The four growth areas are:

- Greater Macarthur Growth Area
- Greater Penrith to Eastern Creek Investigation Area
- Western Sydney Aerotropolis
- Wilton Growth Area

The CPCP excludes areas of the Western Sydney Aerotropolis that overlap with the South West Growth Centre, the Western Sydney International Airport and the eastern part of Mamre Road Precinct (State of NSW 2021). As the Bradfield City Centre occurs within the South West Growth Centre, the CPCP does not apply to the site. As such the CPCP will not be discussed further as part of this assessment.

# 4.4 Western Sydney Aerotropolis

## 4.4.1 *Western Parkland City SEPP – Chapter 4 (Western Sydney Aerotropolis)*

The study area is located within land on the Land Application Map of Chapter 4 (Western Sydney Aerotropolis) of the Western Parkland City SEPP and is therefore subject to the development controls and permitted developments detailed under the SEPP. The following sections directly relate to biodiversity:

- 4.19 Wildlife hazards.
- 4.25 Preservation of trees and vegetation in Environment and Recreation Zone and Cumberland Plain.

An assessment of the Master Plan against these clauses is included in **Section 6.7.8**.

## 4.4.2 *Western Sydney Aerotropolis Development Control Plan 2022 Phase 2*

The *Western Sydney Aerotropolis Development Control Plan 2022 Phase 2* (Phase 2 DCP) provides development controls to supplement the WSAP, Western Parkland City SEPP, *Western Sydney Aerotropolis Precinct Plan* and the Phase 1 DCP. Its aim is to inform the preparation and assessment of master plans and DAs.

Section 2.4 (Vegetation and Biodiversity) of the Phase 2 DCP applies to native vegetation and biodiversity and is comprised of the following sections:

- 2.4.1 Deep Soil and Tree Canopy
- 2.4.2 Protection of Biodiversity
- 2.4.3 Protection of Trees and Vegetation
- 2.4.4 On Lot and Streetscape Landscaping and Preferred Plant Species

An assessment of the performance outcomes and benchmark solutions included in these sections as they relate to the Master Plan is included in **Section 6.7.9**.

Section 2.10.3 (Wildlife Hazards) of the Phase 2 DCP is also relevant to native vegetation and biodiversity, however this has been addressed separately under **Section 4.4.3**.

## 4.4.3 *Wildlife Management Assessment Report*

The *Western Sydney Aerotropolis Wildlife Management Assessment Report* (Avisure 2020) (WSA Wildlife Management Assessment Report) identifies wildlife attraction issues associated with land use planning for the Western Sydney Aerotropolis and the Western Parkland City. The report describes the legal framework and summarises a variety of support and guidance documentation to minimise the potential for wildlife strikes at the Western Sydney Airport. It includes the Aerotropolis Aviation Wildlife Safeguarding Framework (AAWSF) which outlines the wildlife attraction risk or particular land uses and outlines actions for existing or proposed developments based on proximity to the airport (with 3 km, 8 km and 13 km radius buffers included as part of the framework).

The WSA Wildlife Management Assessment Report has been incorporated into section 2.10.3 (Wildlife Hazards) of the Phase 2 DCP. An assessment of the Master Plan against this framework is included in **Section 6.7.10**.

### 4.4.4 Western Sydney Aerotropolis Plan

The *Western Sydney Aerotropolis Plan* (Western Sydney Planning Partnership 2020) (WSAP) sets out the planning framework for the Western Sydney Aerotropolis. The plan establishes the vision for the Aerotropolis, as well as a set of guiding objectives and principles. It also identifies the intended land use planning outcomes for each of the 10 identified precincts that make up the Aerotropolis.

An assessment of the planning principles that relate to biodiversity, as included in the Appendix of the WSAP, is included in Section 6.7.11.

### 4.4.5 Western Sydney Aerotropolis Precinct Plan

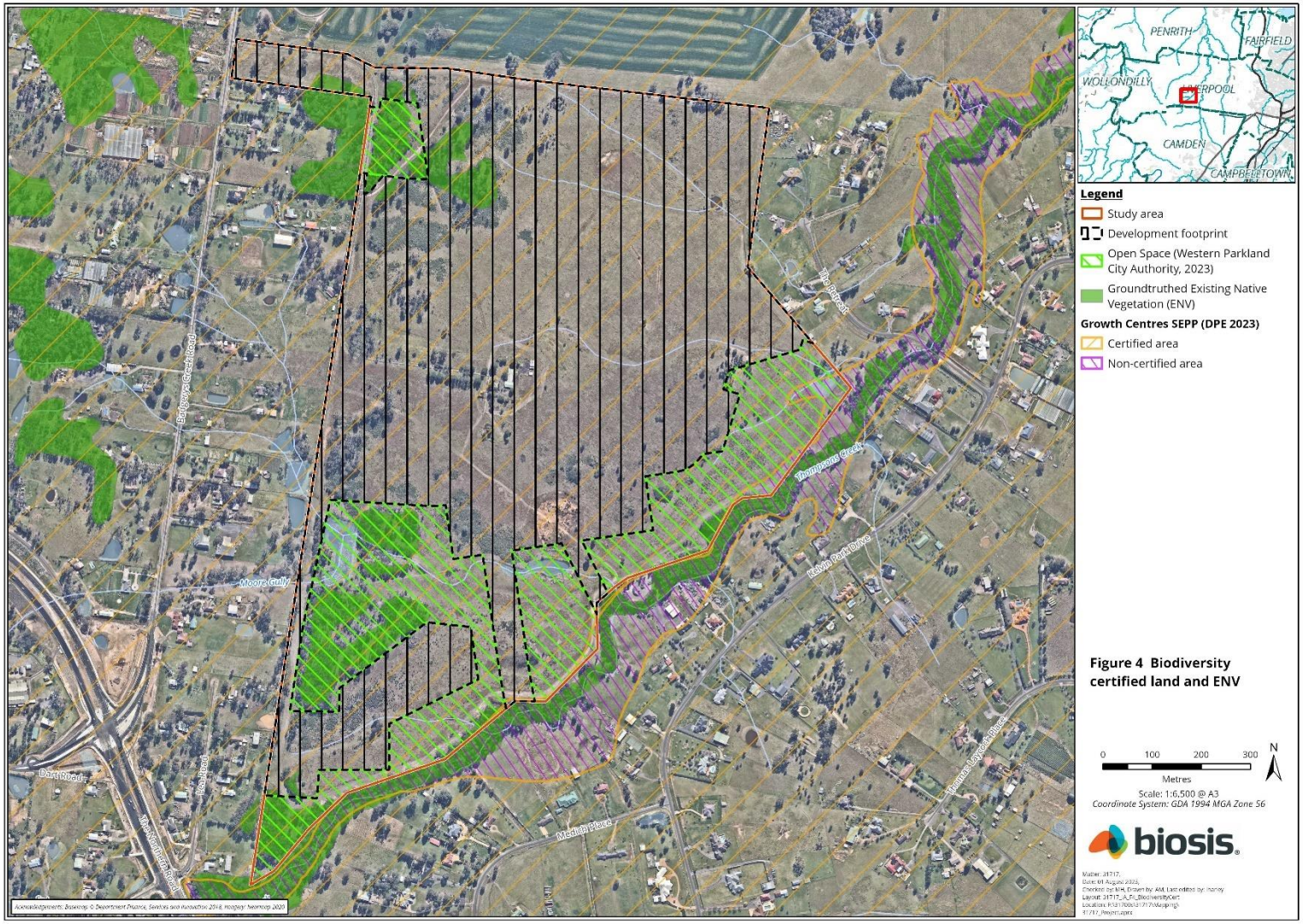
The *Western Sydney Aerotropolis Precinct Plan* (DPE 2023) has been prepared to support the Western Parkland City SEPP. The Precinct Plan provides place-based objectives and requirements to guide the development of the Aerotropolis in a consistent and sustainable manner over time. The plan sets out the fine-scale details to support land use zoning across the aerotropolis.

A brief statement regarding the precinct plan and the master plan adherence to this plan is included in Section 6.7.12.

## 4.5 Other relevant technical standards

No other relevant technical standards are applicable for biodiversity.

## Figure 4 Biodiversity certified land and ENV



# 5 Framework for technical assessment

## 5.1 Literature and database review

To provide a context for the study area, information about flora and fauna from within 5 kilometres (the locality) was obtained from relevant public databases. Records from the following databases were collated and reviewed in September 2020:

- Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool for matters protected by the EPBC Act (output provided in **Appendix 3**).
- NSW BioNet database for the Atlas of NSW Wildlife, Department of Planning and Environment (DPE) (BC Act).
- The NSW DPI Spatial Data Portal for FM Act listed threatened species, populations and communities.
- PlantNET (RBGDT 2021).

Other sources of biodiversity information included relevant vegetation mapping:

- *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands* (SCIVI) (Tozer et al. 2010).
- *Remnant vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207* (DPE 2015).

The following reports were also reviewed:

- *Background Report – Aerotropolis City Centre Master Planning* (RobertsDay Pty Ltd 2020).
- *The Draft Cumberland Plain Conservation Plan* (State of NSW 2021).
- *The Draft Growth Centres Conservation Plan* (Growth Centres Commission 2007)
- *Highlights of the Draft Cumberland Plain Conservation Plan* (State of NSW 2020).
- *Flora and fauna assessment: Bringelly RAAF Receiving Station* (Golder Associates 2011).
- *Sydney Metro – Western Sydney Airport – Technical paper 3: Biodiversity Development Assessment Report* (M2A 2020).
- *Greater Sydney Region Plan: A Metropolis of Three Cities* (State of NSW 2018).
- NSW Scientific Committee final determinations for TECs.

## 5.2 Site investigation

### 5.2.1 Flora assessment

The initial flora assessment was undertaken on the 8 and 9 September 2020 using a random meanders survey methodology to determine the vegetation types present.

General classification of native vegetation in NSW used in this report is based on the classification system in Keith (2004) which uses three groupings of vegetation: vegetation formation, vegetation class and vegetation type, with vegetation type the finest grouping. The grouping referred to in this report is Plant Community Type (PCT), commonly used across NSW since 2016.

The vegetation types were stratified into PCTs broadly based on previous vegetation mapping, and the vegetation boundaries marked with a hand-held GPS in the field. Appropriate PCTs were selected based on species composition and structure, known geographical distribution, landscape position, underlying geology, soil type, and any other diagnostic features.

The general condition of native vegetation was observed as well as the effects of current seasonal conditions. Notes were made on specific issues such as priority weed infestations, evidence of management works, current grazing impacts and the regeneration capacity of the vegetation.

A secondary field investigation was undertaken on the 18 May 2021 to collect vegetation integrity data through the completion of vegetation plots undertaken in accordance with the *Biodiversity Assessment Method* (BAM) (DPIE 2020). These plots were undertaken in targeted areas to collect data within the previously mapped ENV on site, as mapped under the Draft Growth Centres Conservation Plan (Growth Centres Commission 2007). Each vegetation plot included the following:

- One 400 square metre plot (standard 20 m × 20 m), to assess composition and structure attributes.
- One 1,000 square metre plot (standard 20 m × 50 m), to assess the function attributes (number of large trees, stem size classes, tree regeneration and length of logs).
- Five 1 square metre subplots, to assess average litter cover (and other optional ground cover components) for the plot.

A total of six plots were undertaken within the study area.

A list of flora species was compiled from each survey period. Records of threatened flora species will be submitted to EES for incorporation into the BioNet Wildlife Atlas.

### 5.2.2 Fauna assessment

The study area was investigated on 8 and 9 September 2020 to determine its values for fauna. These were determined primarily on the basis of the types and qualities of habitat features present. All species of fauna observed during the assessment were noted and active searching for fauna was undertaken. This included direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls. Particular attention was given to searching for threatened biota and their habitats. Significant trees providing potential habitat for fauna (i.e., hollow-bearing trees) were also recorded. Fauna species were recorded with a view to characterising the values of the site and the investigation was not intended to provide a comprehensive survey of all fauna that has potential to utilise the site over time.

Fauna records will be submitted to EES for incorporation into the NSW BioNet Wildlife Atlas.

### 5.2.3 Aquatic assessment

An aquatic assessment was undertaken of Moore Gully on 18 May 2021. The key aim of the assessment was to describe and characterise the condition of Moore Gully within the study area. During this assessment the length of Moore Gully within the study area was traversed. Visual assessments of the waterway were made, taking note of the flow status, geomorphic characteristics, presence and condition of aquatic vegetation and in-stream habitats for aquatic biota. The field assessment included the following:

- Collection of physiochemical water quality variables using a Horiba Multiparameter Water Quality Meter. Variable measured included pH, dissolved oxygen, temperature, turbidity and electrical conductivity.
- Sampling of aquatic macroinvertebrates and subsequent NSW AUSRIVAS rapid assessment (Turak, Johnstone, & Waddell 2004).
- Survey for native fish in suitable habitats with a total of 11 bait traps deployed over a period of 4 hours.

### 5.2.4 Permits and licences

The flora and fauna assessments were conducted under the terms of Biosis' Scientific Licence issued by the Environment, Energy and Science Group under the *National Parks and Wildlife Act 1974* (SL100758, expiry date 31 May 2022). Fauna survey was conducted under approval CSB 17/892 from the NSW Animal Care and Ethics Committee (expiry date 31 January 2023). Aquatic survey was undertaken under DPI Fisheries Permit (P05/0016-6.0, expiry date 3 July 2023).

### 5.2.5 Limitations

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are several reasons why not all species will be detected at a site during survey, such as species dormancy, seasonal conditions, ephemeral status of waterbodies, and migration and breeding behaviours of some fauna. In many cases these factors do not present a significant limitation to assessing the overall ecological values of a site.

The current biodiversity assessment was conducted in spring, which is an optimal time for survey. The survey effort is considered sufficient to assess the general values of the study area.

Database searches, and associated conclusions on the likelihood of species to occur within the study area, are reliant upon external data sources and information managed by third parties.

### 5.2.6 Mapping

Aerial photography supplied by Near Maps (NearMap Australia Pty Ltd 2023).

Mapping was conducted using hand-held (uncorrected) Tablet Personal Computer units (GDA94) and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files containing the relevant flora and fauna spatial data are available to incorporate into design concept plans. However, this mapping may not be sufficiently precise for detailed design purposes.

# 6 Technical assessment

## 6.1 Landscape context

The study area occurs within the Sydney Basin IBRA bioregion and the Cumberland Plain IBRA subregion. The Sydney Basin bioregion lies on the central east coast of NSW and is one of the most species diverse in Australia. This is a result of the variety of rock types, topography and climates that are located within the bioregion (OEH 2016).

The study area consists of a gently undulating landscape that has been semi-cleared of native vegetation. The area was the previous site of the Bringelly RAAF Telecommunications Unit and includes several disused buildings associated with the previous occupancy. The surrounding lots support a mixture of residential and agricultural uses. There are pockets of vegetation remaining on-site, scattered across the predominantly open field and along the Strahler Order five watercourse, Thompsons Creek, which runs along the eastern edge of the site. There are also two wetlands and four farm dams onsite that are also support native vegetation.

The dominant soil type present is Ashfield Shale and Bringelly Shale of the Wianamatta Group, as described in the Blacktown Soil Landscape (Bannerman & Hazelton 1990). Soils are characteristically shallow to moderately deep, hard setting mottled podzolic soils. The site is also associated with South Creek soil landscapes and drainage depressions in conjunction with the alluvial deposits of Thompsons Creek.

The study area is directly linked to a small patch of bushland in the south however The Northern Road represents a significant barrier to further movement of terrestrial fauna. The riparian corridor associated with Thompsons Creek extends northwards, connecting directly to South Creek. Both the riparian corridor and the watercourse itself provide high connectivity within the landscape for both terrestrial and aquatic biota.

## 6.2 Flora and fauna

Species recorded during the flora assessment are listed in Table A.1 of Appendix 1 (flora). Unless of particular note, these species are not discussed further. A list of threatened entities recorded or predicted to occur in the local area is also provided in those appendices (**Table A.2**), along with an assessment of the likelihood of the species occurring within the study area.

One threatened flora species, *Marsdenia viridiflora* subsp. *viridiflora*, listed as an endangered population under the BC Act, was observed during the field assessment. Four individuals were observed in a cluster along a fence line, located immediately adjacent to the north-west boundary of the study area (**Figure 5**). Individuals do not occur within the study area.

During the site investigation nine priority weeds as defined by DPI for the Liverpool LGA were recorded. These priority weeds include: Ground Asparagus *Asparagus aethiopicus*, Bridal Creeper *Asparagus asparagoides*, Water Hyacinth *Eichhornia crassipes*, Lantana *Lantana camara*, African Boxthorn *Lycium ferocissimum*, African Olive *Olea europaea* subsp. *cuspidata*, Prickly Pears *Opuntia* sp., Blackberry *Rubus fruticosus* species aggregate (sp. agg.) and Fireweed *Senecio madagascariensis*.

Species recorded during the fauna assessment are listed in Table A.3 of Appendix 2 (fauna). Unless of particular note, these species are not discussed further. A list of threatened entities recorded or predicted to occur in the local area is also provided in those appendices (Table A.4), along with an assessment of the

likelihood of the species occurring within the project area.

A list of migratory species listed under the EPBC Act that have potential to occur within the study area is also included in **Table A.5**.

## 6.3 Vegetation communities

The vegetation throughout the majority of the study area has been modified by past disturbances, which have principally included land clearing for the previous Bringelly RAAF Telecommunications Unit.

The study area supports a range of ecological values including 37.15 hectares of native vegetation consistent with six (6) different PCTs, scattered trees, waterways, dams, and wetlands. The vegetation communities present within the study area are:

- PCT 725 Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion.
- PCT 781 Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion.
- PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.
- PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion.
- PCT 1071 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion.
- PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter Valley.

These vegetation communities, and their associated ecological values, are discussed in greater detail in the tables below. They are also mapped in **Figure 5**.

**Table 3 Vegetation communities of the study area**

| **PCT 725 Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion** | |
|---|---|
| **Extent within the study area** | 1.00 ha |
| **Description** | PCT 725 had been historically disturbed through land clearing resulting in weed invasion and a reduction in native floristic diversity. Canopy species recorded consisted primarily of Red Ironbark *Eucalyptus fibrosa* with occasional representations of Forest Red Gum *Eucalyptus tereticornis* and Narrow-leaved Ironbark *Eucalyptus crebra* in ecotonal areas.<br>The native mid-storey was found to be floristically poor but dominated by large stands of *Melaleuca decora* supported by occasional specimens of Blackthorn *Bursaria spinosa* subsp. *spinosa* and Prickly-leaved Paperbark *Melaleuca nodosa.* Exotic species encountered within the mid-storey included stands of Broad-leaf Privet *Ligustrum lucidum*, Lantana, Cassia *Senna pendula* var. *glabrata* and African Olive. |

| PCT 725 Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| | The ground stratum was highly disturbed with only limited number of residual native grasses and forbs being encountered with native flora species such as Weeping Grass *Microlaena stipoides* var. *stipoides* and Fishweed *Einadia trigonos* being most common. Dominant exotic flora within the stratum included Wandering Jew *Tradescantia fluminensis,* Cobblers Pegs *Bidens pilosa,* Kikuyu Grass *Cenchrus clandestinus* and Paddy's Lucerne *Sida rhombifolia.* |
| Condition | The community was present in moderate condition as a result of the highly disturbed nature of the mid and ground storey stratums. |
| Associated soils, rainfall and landscape position | The community occurs on clay-rich soils derived from predominantly Tertiary alluvium and on Wianamatta Shale derived soils found next to Tertiary alluvium (NSW NPWS 2002, Tozer 2003, NSW Scientific Committee 2011a). |
| TEC | Commonwealth EPBC Act: *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion* (CEEC).<br>NSW BC Act: *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion* (EEC).<br>Justification: Species and assemblage are consistent with both the *Cooks River/Castlereagh ironbark forest in the Sydney Basin Bioregion - endangered ecological community listing final determination* (NSW Scientific Committee 2011a) and the *Approved Conservation Advice (including listing advice) for Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion* (Department of the Environment 2015). |
| Threatened species habitat | The Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion within the study area supported the several *Marsdenia viridiflora* subsp. *viridiflora* individuals, listed as an Endangered population under the BC Act.<br>Locations of the recorded threatened flora species are provided in Figure 5. |

| PCT 725 Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| Picture |  <br>**Photo 1 PCT 725 within the study area** |

| PCT 781 Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion | |
|---|---|
| Extent within the study area | 0.52 ha |
| Description | PCT 781 was observed to be disturbed as a result of historical clearing, stock access and aquatic weed invasion. Whilst no canopy or mid storey stratums were evident, native aquatic vegetation was observed to quite diverse. Native species recorded within the PCT included Water Plantain *Alisma plantago-aquatica*, Water Primrose *Ludwigia peploides* subsp. *montevidensis*, Nardoo *Marsilea mutica*, Woolly Frogmouth *Philydrum lanuginosum*, Water Ribbons *Cycnogeton procerum*, *Potamogeton tricarinatus* and Water Couch *Paspalum distichum*. Exotic species recorded with the vegetation type included Spiny Rush *Juncus acutus* and Water Hyacinth. |
| Condition | The community was present in mixed condition types with 0.01 ha in high condition, 0.45 ha in moderate, and 0.06 ha in low condition. The patches observed in a low condition were as a result of their highly disturbed nature and reduced floristic diversity. |
| Associated soils, rainfall and landscape position | The community occurs on silts, muds or humic loams in depressions, flats, drainage lines, backswamps, lagoons and lakes associated within coastal floodplains. Generally occur below 20 m elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions (NSW Scientific Committee 2004a). |

| PCT 781 Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion | |
|---|---|
| TEC | **Commonwealth EPBC Act:** No associated listings.<br>**NSW BC Act:** *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (EEC).<br>**Justification:** Species and assemblage are consistent with the *Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions - endangered ecological community listing final determination* (NSW Scientific Committee 2004a). |
| Picture |  <br>**Photo 2 PCT 781 within the study area** |

| PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| Extent within the study area | 1.73 ha |
| Description | PCT 835 was represented by a co-dominant canopy of Red Forest Red Gum and Cabbage Gum *Eucalyptus amplifolia* subsp. *amplifolia*, supported by regular representations of Rough-barked Apple *Angophora floribunda* and Swamp Oak *Casuarina glauca*. The native mid-storey, whilst limited, was represented by stands of Blackthorn and Coffee Bush *Breynia oblongifolia*. Exotic species encountered within the stratum were primarily represented by African Olive. This species was observed to form monocultures within sections of the stratum.<br>The ground stratum was recorded to be relatively diverse despite the well represented exotic overstorey. Native grasses and forbs encountered within the stratum included Weeping Grass, Fishweed, Kidney Weed *Dichondra repens*, Hedgehog Grass *Echinopogon caespitosus* var. *caespitosus* and Stout Bamboo Grass |

| PCT 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| | *Austrostipa ramosissima*. Dominant exotic flora within the stratum included Wandering Jew, Cobblers Pegs, Kikuyu Grass and Jerusalem Cherry *Solanum pseudocapsicum*. |
| Condition | The community was in high condition as a result of the high native floristic diversity recorded within all stratums despite the moderate representation of woody weeds. |
| Associated soils, rainfall and landscape position | Situated on broad alluvial flats of the Hawkesbury and Nepean river systems and forms narrow ribbons alongside streams and creeks that drain the Cumberland Plain (NSW Scientific Committee 2011b). |
| TEC | Commonwealth EPBC Act: *River-flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria* (CEEC)<br>NSW BC Act: *River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (EEC).<br>Justification: Species and assemblage are consistent with the Commonwealth *Conservation Advice for the River-flat eucalypt forest on coastal floodplains of New South Wales and eastern Victoria* (DAWE 2020) and the NSW *River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions - Scientific Committee determination* (NSW Scientific Committee 2011b). |
| Picture |  <br>**Photo 3 PCT 835 within the study area** |

| PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| **Extent within the study area** | 33.32 ha |
| **Description** | PCT 849 occurred as three distinct conditional type's high, moderate and low, all of which provided their own distinct floristic assemblages.<br><br>High conditioned PCT 849, primarily located on the western and north-western portion of the study area, was observed to structurally and floristically diverse within all stratums. The canopy was well represented by a codominance of Forest Red Gum and Grey Box *Eucalyptus moluccana* supported by occasional representations of Narrow-leaved Ironbark. The mid storey stratum was observed to be a diverse mix of shrub species which included Hickory Wattle *Acacia implexa*, Blackthorn, Gorse Bitter Pea *Daviesia ulicifolia*, *Dillwynia sieberi*, Sticky Hopbush *Dodonaea viscosa* subsp. *cuneata* and Australian Indigo *Indigofera australis*. The ground layer stratum was observed to be floristically diverse with a wide range of grasses and forbs recorded. Native species within the stratum included Weeping Grass, Threeawn Speargrass *Aristida vagans*, Kangaroo Grass *Themeda triandra*, Winter Apple *Eremophila debilis* and Whiteroot *Lobelia purpurascens*. Exotic flora within the vegetation type were observed in low numbers and densities (species discussed below). This vegetation also included high quality derived native shrublands (DNS) and derived native grasslands (DNG) which were directly linked to the high-quality vegetation type.<br><br>Moderately conditioned PCT 849 occurred in three distinct locations within the study area. As a result of historical clearing, the vegetation type was represented as either a native canopy with a limited native mid storey and ground layer or isolated patches of DNS or DNG with no linkages to high quality PCT 849 areas. Native species within the condition type included Forest Red Gum and Blackthorn with a well-represented ground layer dominated by Weeping and Kangaroo grasses. Weed densities within the vegetation type were observed at moderate densities.<br><br>Low conditioned PCT 849 was observed as scatted locations throughout the study area (Figure 5). Native species encountered were limited to stands of Blackthorn, Gorse Bitter Pea and moderate to low densities of Kangaroo Grass. High densities of exotic flora were observed within the vegetation type which affected the cover, abundance and species richness of the conditional type.<br><br>Exotic species recorded within all conditional types included African Olive, African Lovegrass *Eragrostis curvula*, Fireweed, Rhodes Grass *Chloris gayana*, Blackberry and Bridal Creeper. |
| **Condition** | The community was present in mixed condition types with 16.76 ha in high condition, 5.92 ha in moderate condition, and 10.64 ha in low condition. The patches observed in low condition were a result of their highly disturbed nature, reduced floristic diversity, and prevalence of weed species. |
| **Associated soils, rainfall and landscape position** | Shale Plains Woodland occurs on clay/loam soils derived from Wianamatta Shales on the Cumberland Plain at low altitudes (mainly below 150 m) with an average rainfall between 750 and 950 mm per annum. |
| **TEC** | **Commonwealth EPBC Act**: *Cumberland Plain Shale Woodlands and Shale-Gravel* |

| PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| | *Transition Forest* (CEEC).<br><br>**NSW BC Act**: *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC).<br><br>**Justification**: The 16.76 ha in high condition satisfies the listing criteria of both the EPBC Act and BC Act listing as it satisfied the following criteria:<br>• Native tree species present with a minimum projected foliage cover of at least 10 %.<br>• The size of the vegetation patch exceeds 0.5 ha.<br>• The perennial understorey vegetative cover present is made up of at least 50 % native species.<br><br>This criteria is outlined under the *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest EPBC Act policy statement* (Commonwealth of Australia 2010).<br><br>The 5.92 ha of moderate condition and 10.64 ha of low condition PCT 849 satisfies the listing criteria of the BC Act listing only. Species and assemblage are consistent with the *Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing final determination* (NSW Scientific Committee 2009). |
| Pictures |  <br>**Photo 4 PCT 849 (moderate condition) within the study area** |

| PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | |
|---|---|
| |  <br>**Photo 5 PCT 849 (high condition) within the study area** |

| PCT 1071 Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion | |
|---|---|
| **Extent within the study area** | 0.22 ha |
| **Description** | PCT 1071 was represented by a monoculture of Broadleaf Cumbungi *Typha orientalis* with occasional specimens of Water Primrose. Exotic species within the vegetation type were limited to species such as Spiny Rush, Kikuyu Grass and Water Hyacinth. |
| **Condition** | The community was in moderate condition owing to the reduced species diversity and the low to moderate density of weed species observed. |
| **Associated soils, rainfall and landscape position** | The community can occur within man-made water bodies, drainage lines and depressions across a wide variety of environments. Includes modified former wetlands. Also occurs in its original form in a wide variety of situations associated with coastal plains, valleys, lagoons and other sites of poor drainage. |
| **TEC** | **Commonwealth EPBC Act**: No associated listings.<br>**NSW BC Act**: *Sydney Freshwater Wetlands in the Sydney Basin Bioregion* (EEC).<br>**Justification**: Species and assemblage are consistent with the *Sydney Freshwater Wetlands in the Sydney Basin Bioregion - endangered ecological community listing final determination* (NSW Scientific Committee 2000). |

| | |
|---|---|
| Picture |  <br>**Photo 6 PCT 1071 within the study area** |

| **PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley** | |
|---|---|
| Extent within the study area | 0.35 ha |
| Description | PCT 1800 was represented by a dominant canopy of Swamp Oak with occasional specimens of Forest Red Gum throughout. As a result of the increased incidence of Swamp Oak canopy cover, a reduced native mid and ground storey stratum was recorded. As such, encountered native flora was limited to resilient species such as Blackthorn and Prickly-leaved Paperbark in the mid stratum and Weeping Grass, Whiteroot, Fishweed and Scurvy Weed *Commelina cyanea* within the ground layer.<br>Exotic species encountered within the vegetation type included African Olive and Lantana. |
| Condition | The community was present in high condition owing to the high quality and intact canopy and densities of flora species. |
| Associated soils, rainfall and landscape position | Typically associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains (NSW Scientific Committee 2004b). The distinguishing feature is the prominent stands of Swamp Oak *Casuarina glauca* found along or near streams. |
| TEC | Commonwealth EPBC Act: *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland* (EEC).<br>NSW BC Act: *Swamp Oak Floodplain Forest of the New South Wales North Coast,* |

| PCT 1800 Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley | |
|---|---|
| | *Sydney Basin and South East Corner Bioregions* (EEC).<br><br>**Justification**: Species and assemblage are consistent with the *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions - endangered ecological community listing final determination* (NSW Scientific Committee 2004b) and the *Conservation advice (incorporating listing advice) for the Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community* (DoE 2018). |
| Picture |  <br>**Photo 7 PCT 1800 within the study area** |

# 6.4 Aquatic habitats

Aquatic habitats located within the study area include Moore Gully, a Strahler order four watercourse, as well as several unnamed tributaries of Thompsons Creek, a Strahler order five watercourse that occurs outside of the study area, along its eastern boundary. Two (2) wetlands supporting TECs are located within the study area, as well as four (4) farm dams supporting native biota. Details of these aquatic habitats are included in the following sections.

## 6.4.1 Moore Gully

Moore Gully is classed as a laterally unconfined, discontinuous channel, chain of ponds system in the NSW River Styles database (DPIE 2021), with a high level of confidence indicated for this assessment. The database also describes the system as being in moderate condition with a high recovery potential.

The field investigation supports this assessment with Moore Gully presenting as a moderate condition, chain of ponds system. These ponds are linked by preferential flow paths along a discontinuous channel that

supports aquatic and wetland vegetation. Vegetation is supported along the length of Moore Gully due to the presence of shallow water and soil moisture held within the channel zone even within discontinuous sections. The waterway is interrupted by two large man-made dams, likely constructed around existing ponds. While the channel form is discontinuous in sections, the concept of a bed and bank (forming a channel or channel zone) is still applicable. The bed and banks of Moore Gully falls within the low point of the landscape and contains a wetted area that is evidenced by the presence of shallow surface water, aquatic and wetland vegetation. The centreline of this wetted area aligns well with the hydroline mapping for the study area, with the hydroline representing the centreline of the channel zone (**Figure 6**).

Moore Gully is also considered to be key fish habitat under the FM Act as it satisfies conditions outlined in *Policy and guidelines for fish habitat conservation and management* (Fairfull 2013). The requirements of key fish habitat in relation to Moore Gully are outlined in **Section 6.7.5.1**. Riparian buffers required under the WM Act required for Moore Gully are outlined in **Section 6.7.6**.

### 6.4.2 Thompsons Creek and tributaries

Thompsons Creek occurs outside of the study area, extending along the eastern boundary. Whilst the watercourse occurs outside of the study area, the creek supports a continuous riparian corridor which partly occurs within the study area. This corridor extends northward to connect with the riparian corridor of South Creek, a Strahler order six watercourse, north of the study area.

The following watercourses within the study area are tributaries of Thompsons Creek:

- Moore Gully as detailed in **Section 6.4.1** above.
- One unnamed Strahler order two system occurring in the northern part of the study area, fed by two unnamed Strahler order one systems.
- Three unnamed Strahler order one systems distributed across the study area.

These watercourses are mapped in Figure 6 along with their associated riparian and key fish habitat buffer areas (where applicable). These areas are discussed further in **Sections 6.7.5** and **6.7.6**.

### 6.4.3 Wetlands

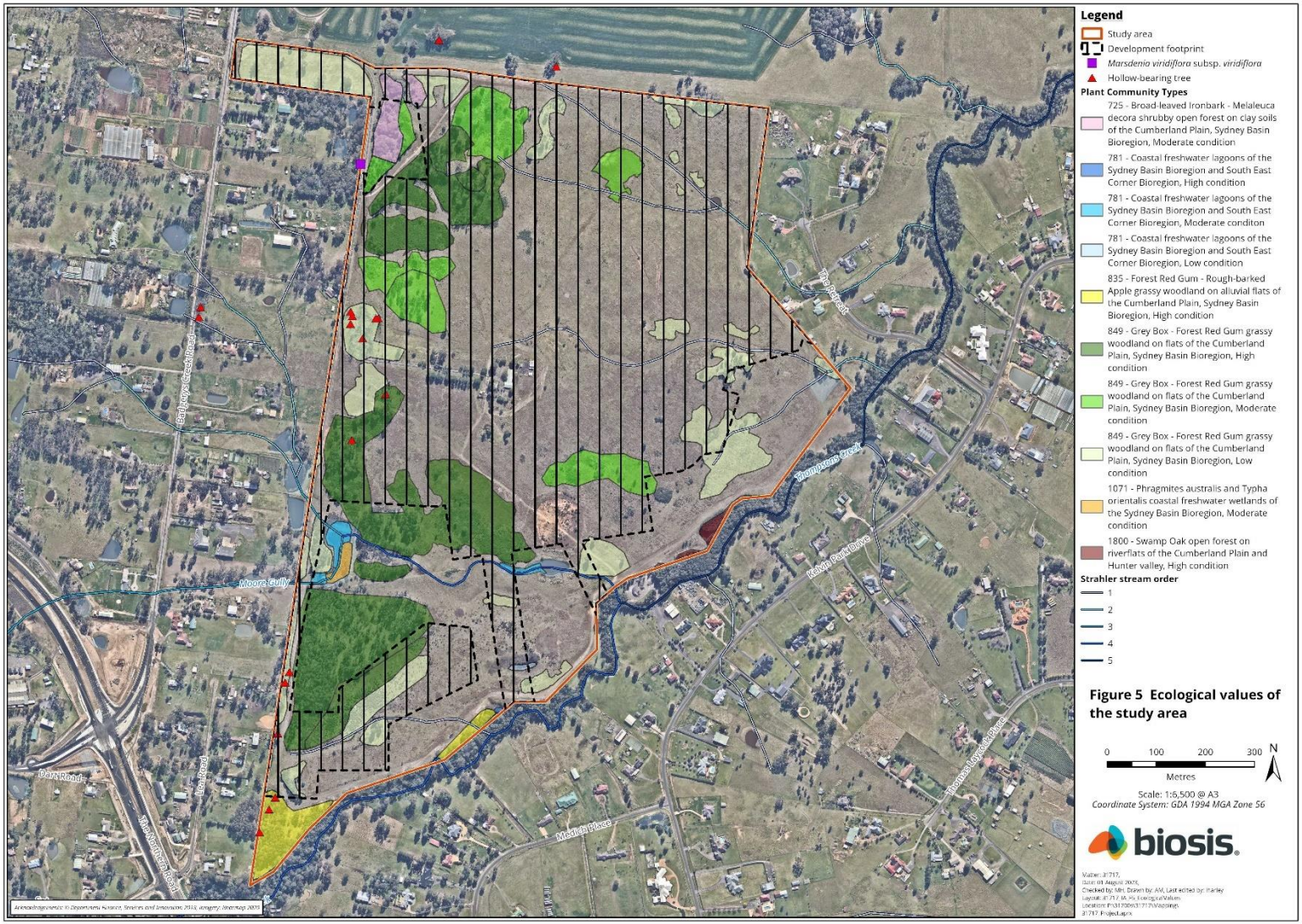
Two wetlands are located within the study area. The larger of the two is located along the western border of the study area within the channel zone of Moore Gully. This wetland measures approximately 130 metres by 50 metres and supports PCT 1071 *Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion (as described in Section 6.3 and shown in Photo 6). This PCT is consistent with the BC Act listed EEC *Sydney Freshwater Wetlands in the Sydney Basin Bioregion*. A variety of native fauna were observed utilising this wetland during the assessment including Common Eastern Froglet *Crinia signifera*, Purple Swamphen *Porphyrio porphyrio*, Dusk Moorhen *Gallinula tenebrosa*, Great Egret *Ardea alba*, Eurasian Coot *Fulica atra*, and Pacific Black Duck *Anas superciliosa*.

The second wetland is located in the south-eastern portion of the study area, close to the key fish habitat buffer associated with Thompsons Creek. This wetland measures approximately 60 metres by 30 metres and supports PCT 781 Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion (as described in Section 6.3 and shown in Photo 2). This PCT is consistent with the BC Act listed EEC *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions*. Native frog species Common Eastern Froglet was detected at this wetland.

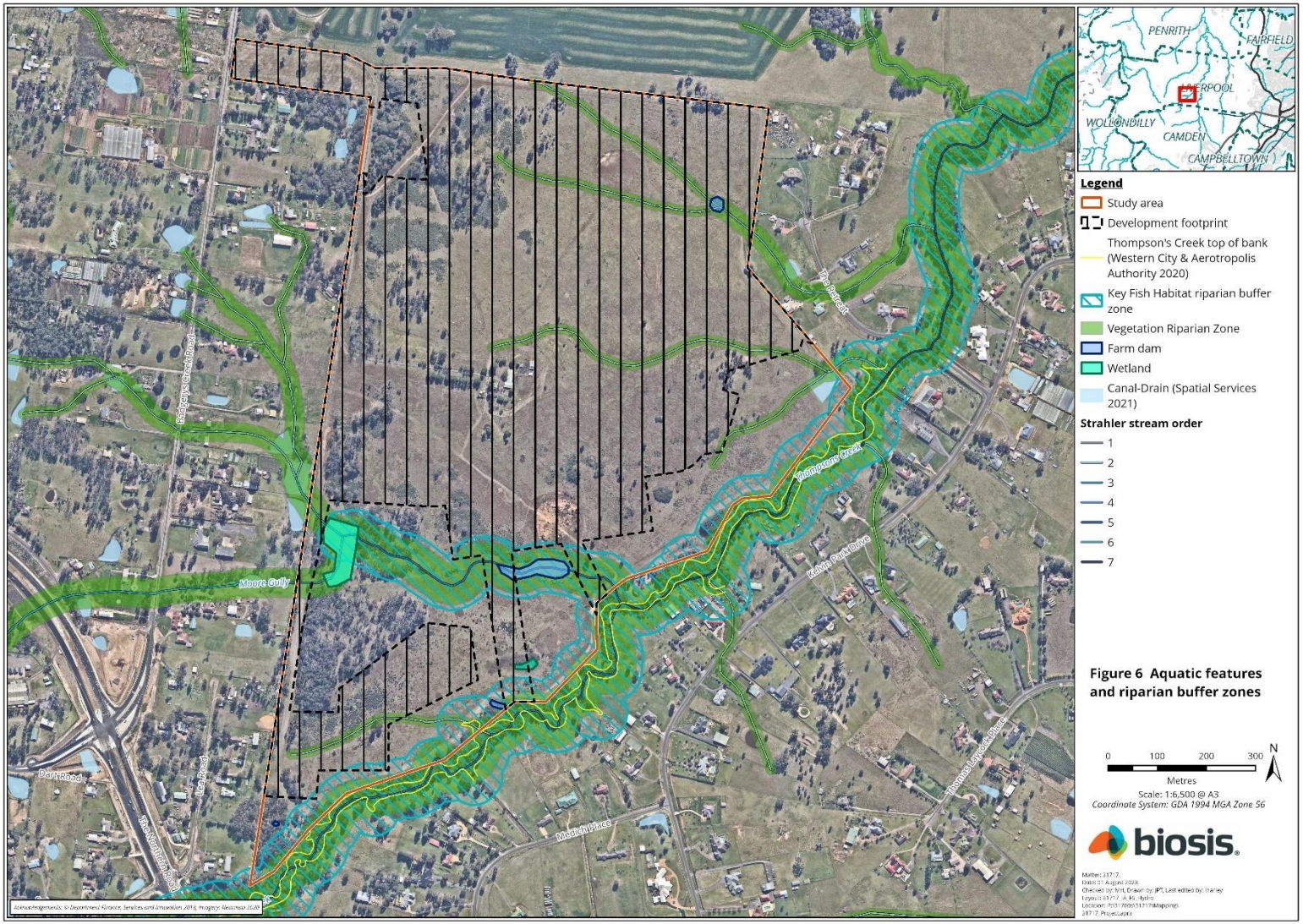
### 6.4.4 Farm dams

Four farm dams are located within the study area (Figure 6). These dams were all holding water during the field assessment (8 and 9 September 2020), appearing at least 80 % full. All dams supported fringing native aquatic flora species and aquatic macrophytes including Tall Spike Rush *Eleocharis sphacelata*, *Eleocharis acuta*, Tall Sedge *Carex appressa*, Nardoo *Marsilea mutica*, River Buttercup *Ranunculus inundatus,* Water Primrose *Ludwigia peploides* subsp. *peploides,* Water Ribbons, and *Potamogeton tricarinatus*. The dams also displayed evidence of fauna usage with frogs and waterfowl present during survey. Whilst not directly observed there is a high possibility these dams provide habitat for eels and turtles. Aquatic fauna salvage will likely be required prior to any development works. Invasive fish species Eastern Gambusia *Gambusia holbrooki* was not observed however it was detected during fish survey of Moore Gully. As such mitigation measures for this species should also be considered as part of any development works.

## Figure 5 Ecological values of the study area



## Figure 6 Aquatic features and riparian buffer zones



## 6.5 Threatened entities

Threatened entities includes all flora and fauna species, populations and ecological communities listed under the EPBC Act and BC Act. Lists of threatened entities recorded or predicted to occur within five kilometres of the study area are provided in Appendix 1 (flora) and Appendix 2 (fauna). An assessment of the likelihood of these species occurring in the study area, and an indication of the likelihood of the project resulting in a significant impact/effect, is included.

No areas of critical habitat for flora or fauna have been declared within the study area. Seven TECs listed under the Commonwealth EPBC Act or NSW BC Act have been mapped within the study area. Seven threatened flora species and 19 threatened fauna species listed under the Commonwealth EPBC Act or NSW BC Act have been identified as having a medium or greater likelihood of occurrence. No aquatic species listed under the FM Act have been identified as being likely to occur within the study area. Table 4 discusses areas of value and potential impacts for all mapped TECs and the threatened species with a medium or greater likelihood of occurrence.

Table 4 Threatened entities likely to occur in the study area

| Species name | EPBC Act status | BC Act status | Relevance to study area and potential for impact |
|---|---|---|---|
| **Ecological communities** | | | |
| *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion* | CEEC | EEC | 1.00 ha of this TEC has been mapped within the study area. Sections of this will be removed under the proposed the Master Plan. |
| *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* | - | EEC | 0.52 ha of this TEC has been mapped within the study area. Sections of this will be removed under the proposed the Master Plan. |
| *River-flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria* (EPBC Act)<br><br>*River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (BC Act) | CEEC | EEC | 1.73 ha of these TECs (both EPBC Act and BC Act listings) has been mapped within the study area. Sections of this will be removed under the proposed the Master Plan. |
| *Cumberland Plain Shale Woodlands and Shale-* | CEEC | - | 16.75 ha of this TEC has been mapped within the study area. Sections of this will be removed under |

| Species name | EPBC Act status | BC Act status | Relevance to study area and potential for impact |
|---|---|---|---|
| *Gravel Transition Forest* (EPBC Act) | | | the proposed the Master Plan. |
| *Cumberland Plain Woodland in the Sydney Basin Bioregion* (BC Act) | - | CEEC | 33.32 ha of this TEC has been mapped within the study area. Sections of this will be removed under the proposed the Master Plan. |
| *Sydney Freshwater Wetlands in the Sydney Basin Bioregion* | - | EEC | 0.22 ha of this TEC has been mapped within the study area. Sections of this will be removed under the proposed the Master Plan. |
| *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*<br><br>*Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* | EEC | EEC | 0.35 ha of this TEC has been mapped within the study area. Sections of this will be removed under the proposed the Master Plan. |
| **Flora** | | | |
| *Acacia pubescens*<br><br>Downy Wattle | Vulnerable | Vulnerable | Areas of PCTs 725 and 849 represent potential habitat for this species. |
| *Dillwynia tenuifolia* | - | Vulnerable | Areas of PCTs 725 and 849 represent potential habitat for this species. |
| *Grevillea juniperina* subsp. *juniperina*<br><br>Juniper-leaved Grevillea | - | Vulnerable | Areas of PCTs 725 and 849 represent potential habitat for this species. |
| *Grevillea parviflora* subsp. *parviflora*<br><br>Small-flower Grevillea | Vulnerable | Vulnerable | Areas of PCT 725 represent potential habitat for this species. |
| *Marsdenia viridiflora* subsp. *viridiflora* | - | Endangered population | Recorded on site during the field investigations undertaken as part of the current assessment. Areas of PCTs 725, 835, 849 and 1800 represent |

| Species name | EPBC Act status | BC Act status | Relevance to study area and potential for impact |
|---|---|---|---|
| | | | potential habitat for this species. |
| *Persoonia nutans*<br>Nodding Geebung | Endangered | Endangered | Areas of PCT 725 represent potential habitat for this species. |
| *Pimelea spicata*<br>Spiked Rice-flower | Endangered | Endangered | Areas of PCT 849 represent potential habitat for this species. |
| **Fauna** | | | |
| *Artamus cyanopterus cyanopterus*<br>Dusky Woodswallow | - | Vulnerable | Forest and woodland PCTs (725, 835, 849 and 1800) represent potential foraging and roosting habitat. |
| *Botaurus poiciloptilus*<br>Australian Bittern | Endangered | Endangered | Wetland habitats (PCTs 781 and 1071) represent potential habitat for this species. |
| *Callocephalon fimbriatum*<br>Gang-gang Cockatoo | Endangered | Vulnerable | Medium and large hollow-bearing trees represent potential breeding habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) represent potential foraging habitat for the species. |
| *Chthonicola sagittata*<br>Speckled Warbler | - | Vulnerable | Forest and woodland PCTs (725, 835, 849 and 1800) represent potential habitat for the species. |
| *Daphoenositta chrysoptera*<br>Varied Sittella | - | Vulnerable | Forest and woodland PCTs (725, 835, 849 and 1800) represent potential habitat for the species. |
| *Falsistrellus tasmaniensis*<br>Eastern False Pipistrelle | - | Vulnerable | Hollow-bearing trees represent potential roosting habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) represents potential foraging habitat. |
| *Glossopsitta pusilla*<br>Little Lorikeet | - | Vulnerable | Hollow-bearing trees represent potential roosting habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) with mature flower trees (such as *Eucalyptus* spp., *Corymbia* spp. and *Angophora* spp. represent potential foraging |

| Species name | EPBC Act status | BC Act status | Relevance to study area and potential for impact |
|---|---|---|---|
| | | | habitats. |
| *Hieraaetus morphnoides*<br><br>Little Eagle | - | Vulnerable | Grassland areas within the study area represent potential foraging resources. Forest and woodland PCTs (725, 835, 849 and 1800) may support breeding habitat however no breeding individuals were detected during field investigations (Biosis 2020). |
| *Lophoictinia isura*<br><br>Square-tailed Kite | - | Vulnerable | Grassland areas within the study area represent potential foraging resources. Forest and woodland PCTs (725, 835, 849 and 1800) may support breeding habitat however no breeding individuals were detected during field investigations (Biosis 2020). |
| *Melithreptus gularis gularis*<br><br>Black-chinned Honeyeater (eastern subspecies) | - | Vulnerable | Forest and woodland PCTs (725, 835, 849 and 1800) represent potential habitat for the species. |
| *Meridolum corneovirens*<br><br>Cumberland Plain Land Snail | - | Endangered | Areas of leaf litter within PCT 849, particularly around the base of *Eucalyptus tereticornis* and *Eucalyptus moluccana* trees, represent potential habitat for this species. Rubbish such as sheet metal is also utilised by this species as habitat. |
| *Micronomus norfolkensis*<br><br>Eastern Costal Free-tailed Bat | - | Vulnerable | Hollow-bearing trees represent potential roosting habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) represents potential foraging habitat. |
| *Myotis macropus*<br><br>Southern Myotis | - | Vulnerable | Hollow-bearing trees represent potential roosting habitat for the species, particularly those in proximity to farm dams, wetlands and watercourses. Forest and woodland PCTs (725, 835, 849 and 1800) area represent potential foraging habitat. |
| *Neophema pulchella*<br><br>Turquoise Parrot | - | Vulnerable | Hollow-bearing trees represent potential breeding habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) represent potential foraging habitat for the species. |

| Species name | EPBC Act status | BC Act status | Relevance to study area and potential for impact |
|---|---|---|---|
| *Petauroides volans*<br>Greater Glider | Vulnerable | - | Habitat trees containing medium and large hollows represent potential breeding habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) within the study area represents potential foraging habitat, particularly those containing mature *Eucalyptus* trees. |
| *Petroica boodang*<br>Scarlet Robin | - | Vulnerable | Forest and woodland PCTs (725, 835, 849 and 1800) represent potential habitat for the species. |
| *Phascolarctos cinereus*<br>Koala | Endangered | Vulnerable | Eucalyptus trees within the study area represent potential foraging resources for the species. Some additional non-eucalyptus trees within the study area may also be utilised for foraging or dispersal. These areas are associated with Forest and woodland PCTs (725, 835, 849 and 1800). |
| *Saccolaimus flaviventris*<br>Yellow-bellied Sheathtail-bat | - | Vulnerable | Hollow-bearing trees represent potential roosting habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) represents potential foraging habitat. |
| *Scoteanax rueppellii*<br>Greater Broad-nosed Bat | - | Vulnerable | Hollow-bearing trees represent potential roosting habitat for the species. Forest and woodland PCTs (725, 835, 849 and 1800) represents potential foraging habitat, particularly those that are located along riparian corridors. |

Known habitats for migratory species have been considered and those recorded in the locality are outlined detailed in **Appendix 2**. These species may use the study are on occasion for foraging, however the study area does not provide habitat for an ecologically significant proportion of migratory species.

## 6.6 Ecological impacts

This section identifies the potential impacts of the Master Plan on the ecological values of the study area.

### 6.6.1 Impacts to terrestrial and aquatic values

The principal means to reduce impacts on ecological values will be to minimise removal of native vegetation and habitat. The proposal retains the native vegetation at Ridge Park and south of Moore Gully. Under the current proposal, 24.60 hectares of native vegetation are proposed to be removed from the study area.

The majority of impacted native vegetation (24.07 hectares or 98 %) occurs as patches of PCT 849 in the western half of the study area in low, moderate and high conditions. As outlined in **Table 3**, high condition PCT

849 satisfies the key diagnostic features of the EPBC Act listed CEEC *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*. All three condition types (low, moderate and high) satisfy the diagnostic features of the BC Act listed CEEC *Cumberland Plain Woodland in the Sydney Basin Bioregion*.

The study area has a history of past disturbance, associated with its historical use as the RAAF Bringelly Telecommunications Unit, and it appears as though clearing of native vegetation and ground disturbance was undertaken as part of its prior land use. However, as outlined in the Final Determination for the BC Act listed *Cumberland Plain Woodland in the Sydney Basin Bioregion* (NSW Scientific Committee 2009), the community is known to persist following total or partial clearing. It is not uncommon for contemporary tree-dominated stands of the community to exist largely as relics or regrowth of what were originally taller forests and woodlands. Following clearing and during subsequent regrowth, the tree canopy may also remain sparse or may regrow to form dense stands of saplings and small trees, or in some cases the upper or mid storey may be absent from the community. The remaining areas of this community are also severely fragmented with half of all mapped patches being smaller than 3 hectares (NSW Scientific Committee 2009).

Whilst some the vegetation with the study area presents as fragmented patches of woodland or regrowth saplings or shrubs, this is not inconsistent with the areas of this CEEC that remain across its distribution. As highlighted in Section 6.3 (Table 3) patches of this community within the study area also included high quality DNS and DNG which were directly linked to the high-quality vegetation patches.

The development footprint of the Master Plan is shown in Figure 7. Native vegetation that will be removed as a result of the Master Plan is shown in Table 5. TECs that will be removed as a result of the Master Plan are shown in Table 6. A summary of all impacts to ecological values within the study area is detailed in Table 7.

**Table 5 Native vegetation to be removed from the development footprint**

| PCT | Condition | Proposed impact (ha) |
|---|---|---|
| 725 Broad-leaved Ironbark – Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion | Moderate | 0.41 |
| 781 Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion | Moderate | 0.08 |
| 835 Forest Red Gum – Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion | High | 0.03 |
| 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion | High | 10.33 |
| | Moderate | 5.45 |
| | Low | 8.29 |

Table 6 TECs to be removed from the development footprint

| TEC | Proposed impact (ha) |
|---|---|
| *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion* (BC Act) | 0.41 |
| *Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* (BC Act) | 0.08 |
| *River-flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria* (EPBC Act)<br><br>*River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (BC Act) | 0.03 |
| *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (EPBC Act) | 10.33 |
| *Cumberland Plain Woodland in the Sydney Basin Bioregion* (BC Act) | 24.07 |

Table 7 Ecological values and impacts

| Ecological value | Impacts |
|---|---|
| Native vegetation | 24.60 ha of native vegetation occurs within the Master Plan development footprint and is likely to be cleared. This includes vegetation that meets the listing criteria of two TECs under the EPBC Act and four TECs under the BC Act (as outlined in **Table 6**).<br><br>A further 12.47 ha of native vegetation occurs within areas identified as open space for the regional parkland and Ridge Park under the Master Plan (**Figure 3**). Most native vegetation within these areas is likely to be retained, with these areas also likely to be subject to substantial revegetation. Under Section 2.4 (Vegetation and Biodiversity) of the Phase 2 DCP a minimum tree canopy of 45 % for open space is to be achieved.<br><br>These open space areas also include 6.60 ha of ENV which has been protected through zoning as Environment and Recreation (ENZ) under State Environmental Planning Policy (Precincts—Western Parkland City) Amendment (Miscellaneous) 2022. |
| Hollow-bearing trees | 11 hollow-bearing trees have been mapped within the Master Plan development footprint. These trees support 12 small hollows (< 50 mm diameter), and 9 medium hollows (50 – 149 mm diameter).<br><br>Three hollow-bearing trees within the study area occur outside of the development footprint and are therefore avoided. These trees support 1 small hollow, 3 medium hollows, and 1 large hollow (150 – 400 mm diameter). |

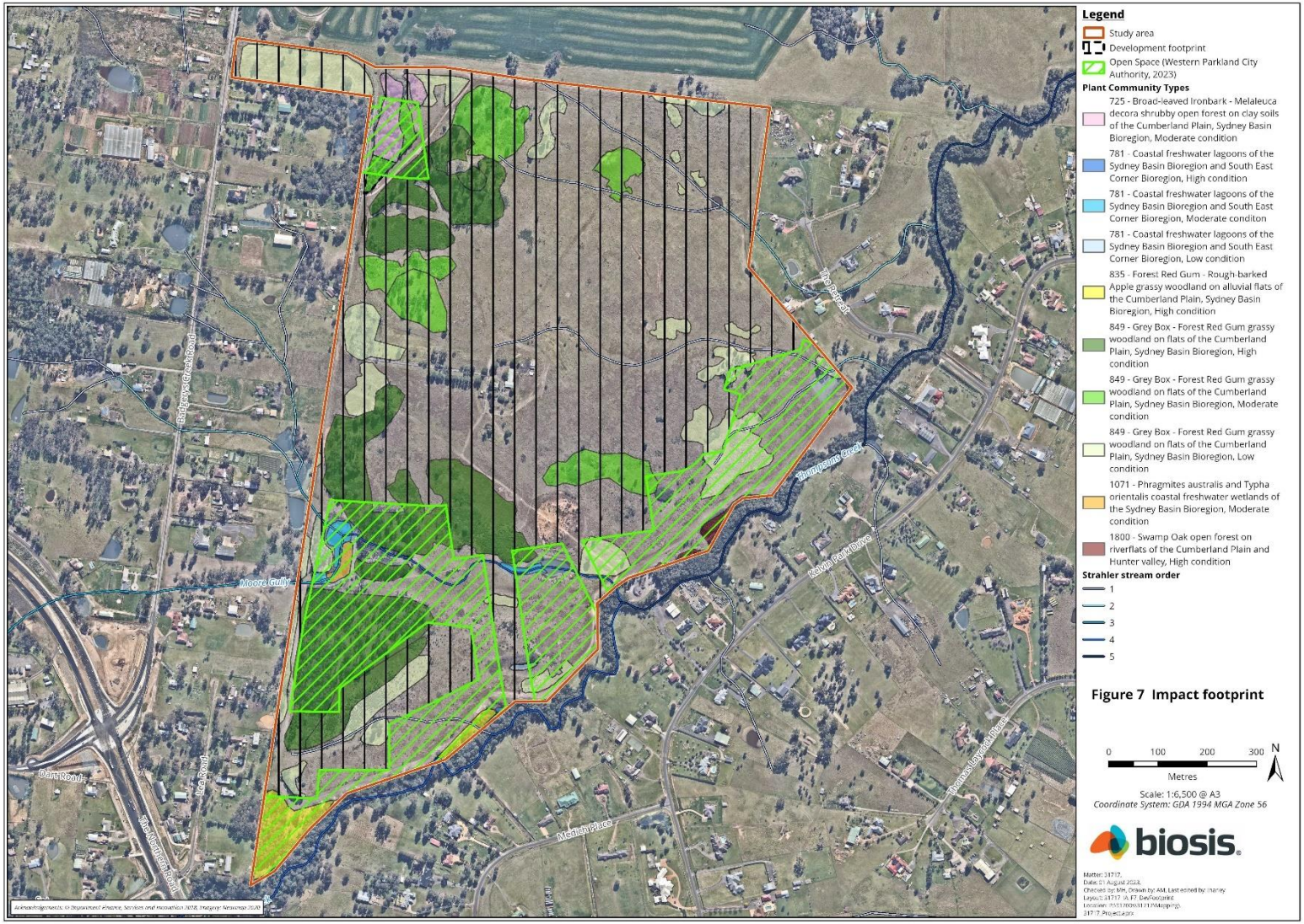
| Ecological value | Impacts |
|---|---|
| Moore Gully | Impacts to Moore Gully are mostly avoided by the proposed Master Plan, with a large portion of the mapped watercourse occurring within the Open Space area (Figure 7).The Moore Gully area includes the future infrastructure corridor as identified in *State Environmental Planning Policy (Transport and Infrastructure) 2021* and a roadway as provided in the Precinct Plan. When constructed these may have impact upon Moore Gully. The future infrastructure corridor is located at the easternmost extent of Moore Gully in the study area, near its interface with Thompsons Creek, whilst the roadway is located at its westernmost extent, west of the existing wetland (Figure 6). Details of the proposed construction of these corridors is not currently available.<br><br>Impacts to Moore Gully associated with these two transit corridors will also occur within the VRZ buffer, required under the WM Act. Further discussion of these impacts are outlined in Section 6.7.6 which includes an assessment against the WM Act.<br><br>A more detailed assessment will be provided in Stage 2 once the water basin parameters are confirmed and commitment from NSW Government in relation to the future rail corridor |
| Unnamed waterways | Five unnamed Strahler order one watercourses and one unnamed Strahler order two watercourse, and their associated riparian buffer zones will be wholly or partly impacted by the proposed Master Plan. The riparian zones associated with these watercourses have been significant modified due to past disturbance within the study area and in some cases the vegetation is completely absent. Further discussion of riparian zones and requirements for these waterways are outlined in Section 6.7.6 which includes an assessment against the WM Act. |
| Farm dams | One farm dam occurs within the development footprint, located to the north-east of the study area.<br><br>Three farm dams occur outside of the development footprint, including one large dam located along Moore Gully. It is likely that these dams, whilst outside of the development footprint, will be modified at some point as they occur within the natural areas to be enhanced as part of the open space strategy. |
| Key fish habitat | Moore Gully and Thompsons Creek are considered key fish habitat and a 50 m key fish habitat buffer is required as outlined in Section 6.7.5.1.<br><br>Impacts to the Moore Gully and Thompsons Creek key fish habitat buffers are mostly avoided by the proposed Master Plan. The exception being in the vicinity of the two transit corridors (see Moore Gully item above). Additionally, there is some minor encroachment along the northern buffer zone of Moore Gully and in the southern part of the study area with the Thompsons Creek buffer zone (Figure 6). |

The results of this impact assessment should be used to inform the further design of the development. Recommendations are outlined in Section 7 on how best to avoid, mitigate or offset these impacts. The design phase of future developments within the Master Plan area will be critical to determining specifics of how ecological values will be incorporated and managed.

## 6.6.2 Master Plan report Open Space Strategy

The Master Plan Report which includes public domain and landscape chapters outlines how the open space areas that are being retained across the study area will function and be enhanced. Current areas of native vegetation within the study area that are expected to retain much of their existing characteristics and functionality include the Ridge Park, which occurs in the north-western section of the study area, as well as the riparian zone associated with Moore Gully. These areas have been excised from the Master Plan development footprint as the native vegetation in these areas is being primarily retained or enhanced. Whilst some clearance of native vegetation within these areas may be required to allow for the development of public parks and walkways, the revegetation and enhancement within these areas is expected to compensate for these losses. The Master Plan also preserves ENV land within the open space area consistent with the protected existing native vegetation detailed in **Figure 7** of the Western Sydney Aerotropolis Precinct Plan. The area covered by the Public Open Space is included in **Figure 7**.

## Figure 7 Development footprint



# 6.7 Assessment against key biodiversity legislation

## 6.7.1 *Environment Protection and Biodiversity Conservation Act 1999*

An assessment of the impacts of the proposed development on Matters of NES, as outlined in, Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia 2013) is detailed below. Typically impacts to Matters of NES require further assessment, with any actions likely to cause significant impact requiring referral to the Commonwealth Minister for the Environment. However, in 2011 the Commonwealth Environment Minister endorsed the actions associated with the development of the Western Sydney Growth Centres as described in the Sydney Growth Centres Strategic Assessment Program Report (DECCW 2010). This approval was made under section 146B of the EPBC Act which has the same effect as an approval granted to development under Part 9 of the EPBC Act. Therefore, with this approval, any development within the prescribed certified lands will not require separate referral, assessment of approval under the EPBC Act to be taken.

This approval had effect for the following Matters of NES under the EPBC Act:

- World Heritage properties.
- National Heritage places.
- Wetlands of international importance.
- Listed threatened species and ecological communities.
- Listed migratory species.

Impacts to Matters of NES associated with the Master Plan are restricted to these prescribed certified lands and therefore further assessment is not required. A summary of the Matters of NES relevant to the Master Plan are summarised in **Table 8.**

Table 8 Assessment of the Master Plan against the EPBC Act

| Matter of NES | Master Plan specifics | Assessment against Commonwealth of Australia (2013) |
|---|---|---|
| **Threatened species (flora and fauna)** | 18 flora species and 21 fauna species listed under the EPBC Act have been recorded or are predicted to occur in the locality. An assessment of the likelihood of these species occurring in the study area is provided in Table A.2 of Appendix 1 (flora) and Table A.4 of Appendix 2 (fauna). | 4 threatened flora and 4 threatened fauna species listed under the EPBC Act were determined to have a moderate of greater likelihood of occurrence within the study area. Assessment of these threatened species is not required as the impacts associated with the Master Plan are restricted to prescribed certified lands. These areas have been previously assessed and approval granted under the *Sydney Growth Centres Strategic Assessment Program Report* (DECCW 2010) which has been endorsed by the Commonwealth Environment Minister. |
| **Threatened ecological** | The Master Plan will result in the permanent removal of the following EPBC Act listed TECs from within the | Assessment of these TECs is not required as the impacts associated with the Master Plan are restricted to prescribed certified lands. |

| Matter of NES | Master Plan specifics | Assessment against Commonwealth of Australia (2013) |
|---|---|---|
| communities | development footprint:<br>• 0.41 ha of *Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion*.<br>• 0.03 ha of *River-flat Eucalypt Forest on Coastal Floodplains of Southern New South Wales and Eastern Victoria.*<br>• 10.33 ha of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*. | These areas have been previously assessed and approval granted under the *Sydney Growth Centres Strategic Assessment Program Report* (DECCW 2010) which has been endorsed by the Commonwealth Environment Minister. |
| Migratory species | 14 migratory species have been recorded or are predicted to occur in the locality (Table A.5 of Appendix 2). | While some of these species would be expected to use the study area on occasions, some may do so regularly, and others may be resident. The study area does not provide important habitat for an ecologically significant proportion of any of these species.<br><br>Assessment of these migratory species is not required as the impacts associated with the Master Plan are restricted to prescribed certified lands. These areas have been previously assessed and approval granted under the *Sydney Growth Centres Strategic Assessment Program Report* (DECCW 2010) which has been endorsed by the Commonwealth Environment Minister. |
| Wetlands of international importance (Ramsar sites) | There are 12 Ramsar sites in NSW, the closest one being Towra Point Nature Reserve in Kurnell, south of Sydney city. | The study area does not flow directly into a Ramsar site, and the development is not likely to result in a significant impact. Assessment is not required as the impacts associated with the Master Plan are restricted to prescribed certified lands. These areas have been previously assessed and approval granted under the *Sydney Growth Centres Strategic Assessment Program Report* (DECCW 2010) which has been endorsed by the Commonwealth Environment Minister. |

## 6.7.2 *Environment Planning and Assessment Act 1979*

A total of 7 threatened flora species, 18 threatened fauna species and 6 TECs listed under the BC Act were identified as having a medium or greater likelihood of occurrence. Usually, further assessment of impacts would be required for these entities in the form of a ToS. However, the development footprint associated with the Master Plan is restricted to areas mapped as certified under the Growth Centres Biodiversity Certification Order. As such further assessment of impacts to these entities is not required.

## 6.7.3 *Western Parkland City SEPP – Chapter 3 (Sydney Region Growth Centres)*

**Relevant Biodiversity Measures**

A total of 41 RBMs are included under Schedule 1 (Condition of Biodiversity Certification) of the Growth Centres Biodiversity Certification Order. Of these, 18 are of relevance to the proposed Master Plan. An assessment of the plan against these RBMs is provided in Table 9.

#### 6.7.3.1.1 Consideration of existing development proposals

A small portion of the mapped ENV is located within the Primary arterial road (rapid bus) corridor and the disturbance footprint of the temporary north/south access road connecting the First Building to the Sydney Metro constructed access road through to Badgerys Creek Road. This matter was assessed and resolved as part of the First Building DA. Of further note, the vegetation within the First Building footprint is not within the protected area and the vegetation to be cleared is on land certified under the 2007 Biodiversity Certification Order for State Environmental Planning Policy (Sydney Region Growth Centres) 2006.

Notwithstanding the above and to mitigate our impact we have made a commitment to DPE to minimise the disturbance and removal of trees within the ENV area. This includes identification of trees to be removed or retained prior to commencing construction and tree protection measures consistent with AS 4970 will be implemented for those trees to be retained. We are also collecting native seeds, tree hollows, tree trunks and root balls from the site to be reused in future landscaping or habitat relocation and have committed to undertake additional plantings within the broader precinct to ensure no net loss of tree canopy cover as a result of the development.

The site of the AMRF First Building is consistent with the layout of the broader Bradfield masterplan and aligns with the planned road network and public transport network under the masterplan. The 15th Avenue corridor is established under the Western Parkland City Precincts SEPP and the First Building aligns with this corridor. The north/south access road that slightly traverses through the ENV and Environment and Recreation Zone (ENZ) is utilising and widening an existing access track and is temporary in nature and not a long-term traffic solution. When appropriate and after direct east/west access from Badgerys Creek Road is secured, the temporary road will be removed. The area will then be revegetated and turned into open space which is in accordance with both the Master Plan and SEPP, being ENZ zoned/ENV protected and utilised as local open space.

Table 9 Assessment of the Master Plan against the listed RBMs

| Relevant Biodiversity Measure | Consistency with the Master Plan study area |
|---|---|
| **General** | |
| 4 Copies of all final reports, maps, reviews, plans and monitoring data referred to in the conditions of biodiversity certification must be held by the GCC and made publicly available, either on request and/or by a mechanism that is broadly publicly accessible. This does not apply to material that is commercially sensitive or contains sensitive information regarding the location of threatened species, populations or ecological communities or their habitat. | The Master Plan must be published on the NSW planning portal and takes effect on the day it is so published, as per clause 5, section 4.41 of the Western Parkland City SEPP. |
| **Native vegetation to be retained within the Growth Centres** | |
| 6 A minimum of 2,000 hectares of existing native vegetation must be retained and protected within the Growth Centres, either within the certified areas and/or the non-certified areas, subject to conditions 7 to 13 below. | The Master Plan is conserving 6.60 ha of validated ENV within the study area as part of Ridge Park and the regional parkland south of Moore Gully. |
| 7 During the precinct planning process, the GCC may determine to make areas of existing native vegetation within the non-certified areas available for development if the clearance of such vegetation is considered necessary for either the provision of essential infrastructure and/or to meet the required Development Parameters specified in the Growth Centres Development Code. | No clearing of ENV within the non-certified areas is proposed under the Master Plan. As such further consideration of this RBM is not required. |
| 8 In making a determination under condition 7, the GCC must demonstrate by way of information provided during the public exhibition of the precinct plan (where that exhibition occurs after this order takes effect) that the clearing of any existing native vegetation in the non-certified areas will be offset by: | No clearing of ENV within non-certified areas is proposed under the Master Plan. As such further consideration of this RBM is not |

| Relevant Biodiversity Measure | Consistency with the Master Plan study area |
|---|---|
| a. the protection of an equal or greater area of existing native vegetation elsewhere in the Growth Centres; and/or<br><br>b. the revegetation and/or restoration of an area of land elsewhere in the Growth Centres, subject to satisfying the following,<br><br>i. that the clearance of existing native vegetation in the non-certified areas will not affect the capacity to achieve overall improvement or maintenance of biodiversity values for threatened species, populations and ecological communities and their habitats,<br><br>ii. the revegetated and/or restored areas will be protected,<br><br>iii. the extent of revegetation and/or restoration compared to clearing of existing native vegetation must be undertaken at a ratio of at least 3:1 (to reflect the greater ecological risks relative to retaining<br><br>existing native vegetation),<br><br>iv. areas subject to revegetation and/or restoration must be of a suitable boundary configuration and design to support long-term management,<br><br>v. revegetation and/or restoration of the proposed areas would not be undertaken under another scheme or regulatory requirement already in operation at the time that the clearing is approved (this includes but is not limited to any approvals, and associated conditions of such approvals, that may be required under the *Rivers and Foreshores Improvement Act 1948* and *Water Management Act 2000*),<br><br>vi. revegetation and/or restoration will be undertaken by suitably qualified and experienced persons using indigenous plant stock, and<br><br>vii. sufficient resources will be made available to undertake the revegetation and/or restoration and any necessary follow-up maintenance and monitoring for a minimum period of 5 years following the commencement of the revegetation and/or restoration. | required |

| Relevant Biodiversity Measure | Consistency with the Master Plan study area |
|---|---|
| 9 Revegetation and/or restoration may be partly counted towards meeting the overall requirement to protect 2,000 hectares of existing vegetation required in condition 6. The amount that may be counted shall be calculated by dividing the total area of revegetation and/or restoration required under condition 8b(iii) by 3.<br><br>Note: for example, if 9 hectares of revegetation is undertaken then 3 hectares may be counted. | Not applicable. |
| 10 In the non-certified areas, proposals to clear existing native vegetation shall be subject to the relevant development controls in the SEPP and *Sydney Regional Environmental Plan No. 31 – Regional Parklands*, and the requirements of the *Environmental Planning and Assessment Act 1979*. | No development is proposed within non-certified areas under the Master Plan. |
| 11 Where there are essential infrastructure proposals, including but not limited to proposals under Part 3A of the *Environmental Planning and Assessment Act 1979*, that involve clearing of existing native vegetation in the non-certified areas and that do not require development consent under the SEPP, such clearing must be offset by applying the same requirements specified in condition 8 above.<br><br>In this case the offsets may be located outside of the Growth Centres (but within the Cumberland Plain of Western Sydney, as defined in condition 32) if the GCC is satisfied that there are no practicable offset options within the Growth Centres and all other requirements of condition 8 will be met. However, any offsets outside the Growth Centres cannot be counted towards meeting the requirements of condition 6. | No development is proposed within non-certified areas under the Master Plan. |
| 12 Notwithstanding any other conditions of biodiversity certification, in the lands marked by a red hatching on the biodiversity certification maps existing native vegetation must not be cleared unless it is in accordance with a plan of management or unless such clearance has been agreed to by the DECC. | No clearing is proposed within lands marked by red hatching on the biodiversity certification maps under the proposed Master Plan. |
| 13 If new information becomes available after the biodiversity certification order took effect that demonstrates that the vegetation within an area does not otherwise meet the definition of existing native vegetation, then for the purposes of conditions 7 to 8 and condition 11 to 12 only the area of confirmed existing native vegetation shall be considered. | Biosis undertook field investigation of the study area and confirmed of the 10.89 ha of ENV originally mapped across the study area, 8.76 ha still existed, |

| Relevant Biodiversity Measure | Consistency with the Master Plan study area |
|---|---|
| | of which 6.60 ha will be retained in open space areas. These areas will be protected through the Environment and Recreation (ENZ) zoning that has been applied to these areas under the State Environmental Planning Policy (Precincts—Western Parkland City) Amendment (Miscellaneous) 2022.<br><br>No clearing of ENV within areas mapped as non-certified will occur as a result of the proposed Master Plan. |
| **Additional conservation actions within Growth Centres – native vegetation** | |
| 14 During or before the preparation of the relevant precinct plan(s) under the Growth Centres Development Code, a further detailed assessment must be undertaken of the areas adjoining or proximate to the Shanes Park Air Services Australia site marked in blue hatching on the biodiversity certification maps. | Not applicable. The study area does not include the Shanes Park Air Services Australia site. |
| 15 The assessment referred to in condition 14 must examine whether the areas meet the criteria specified in Schedule 3. | Not applicable. The study area does not include the Shanes Park Air Services Australia site. |
| 16 Based on the outcomes of the assessment the DECC shall provide advice to the Minister on whether the areas should be included within the certified areas or the non-certified areas shown on the biodiversity certification maps. | Not applicable. The study area does not include the Shanes Park Air Services Australia site. |

| Relevant Biodiversity Measure | Consistency with the Master Plan study area |
|---|---|
| **Additional conservation actions within Growth Centres - plants** | |
| 17 During or before the preparation of the relevant precinct plan(s) under the Growth Centres Development Code relating to the areas referred to in the table below, the following actions must be undertaken: | Not applicable. The study area does not include any of these locations. Populations of these species were not detected during field investigations however targeted searches were not undertaken. |

| Species | Required action |
|---|---|
| *Acacia pubescens* | Potential populations at Cross Street, Kemps Creek and Thirtysecond Avenue, Austral – as shown in black hatching on the biodiversity certification maps:<br>▪ survey to confirm the presence of the species, and<br>▪ if the species is present, provide for the protection of the area of suitable habitat for the species to the satisfaction of the DECC. |
| *Pimelea spicata* | Potential populations at Denham Court Road - as shown in black hatching on the biodiversity certification maps:<br>▪ survey to confirm the presence of species, and<br>▪ if the species is present, provide for the protection of the area of suitable habitat |
| *Persoonia hirsuta* | Potential populations at North Kellvville – as shown in black hatching on the biodiversity certification maps:<br>▪ survey to confirm the presence of the species, and<br>▪ if the species is present, provide for the protection of the area of suitable habitat for the species to the satisfaction of the DECC. |
| *Leucopogon fletcheri* | Known population at North Kellyville - as shown in black hatching on the biodiversity certification maps:<br>▪ survey to confirm the extent of the population, and<br>▪ provide for the protection of the population to the satisfaction of the DECC. |
| *Darwinia biflora*<br>*Hibbertia superans*<br>*Epacris purpurascens* var *purpurascens* | Known populations at North Kellyville - as shown in black hatching on the biodiversity certification maps:<br>▪ survey to confirm the extent of the populations, and<br>▪ provide for the protection of the populations to the satisfaction of the DECC. |

| Relevant Biodiversity Measure | | Consistency with the Master Plan study area |
|---|---|---|
| *Eucalyptus* sp "Cattai" | | |
| **Additional conservation actions within the Growth Centres - animals** | | |
| 18. During or before the preparation of the relevant precinct plan(s) under the Growth Centres Development Code relating to the area referred to in the table below, the following actions must be undertaken: | | Not applicable. The study area does not include this location. |
| Species | Required action | |
| Green and Golden Bell Frog | Potential population at Riverstone - as shown in black hatching on the biodiversity certification maps:<br>Option 1<br>▪ survey to confirm the presence of the species, and<br>▪ if the species is present, provide protection of the area of suitable habitat for the species to the satisfaction of the DECC.<br>Option 2<br>▪ • if the species is present at Riverstone but cannot be adequately protected to the satisfaction of the DECC, then:<br>(a) undertake targeted survey to confirm the presence of the species elsewhere in the Growth Centres, and<br>(b) if the species is present elsewhere in the Growth Centres, provide for the protection of an area(s) of suitable habitat for the species to the satisfaction of the DECC. | |
| **Additional conservation actions within the Growth Centres – development sites** | | |
| 19 Within twelve months of the biodiversity certification order taking effect, the GCC (in consultation with the DECC) must put in place procedures so that all future precinct plans (excluding any plans that were publicly exhibited before the biodiversity certification order took effect), where practicable, provide for the appropriate re-use of:<br>a. native plants (including but not limited to seed collection) and the relocation of native animals from | | Provisions for the protection of native vegetation and biodiversity, including preferred plant species lists and relocation of native animals are detailed in section 5.3.2 of the Aerotropolis |

| Relevant Biodiversity Measure | Consistency with the Master Plan study area |
|---|---|
| development sites, prior to development commencing; and<br><br>b. top soil from development sites that contain known or potential native seed bank.<br><br>For the purposes of condition 19a and 19b appropriate uses may include, but are not limited to, application in re-vegetation or restoration works and landscaping in the Growth Centres. | Phase 2 DCP. |
| **Future precinct plans** | |
| 35 During the preparation of future precinct plans (excluding any precinct plans already publicly exhibited before this order took effect) the GCC must undertake and make publicly available an assessment of the consistency of the proposed precinct plan with the conditions of biodiversity certification. This may occur during or before any public exhibition of future draft precinct plans. | This assessment reviews the RBMs that are relevant to the proposed development outlined in the Master Plan. |
| **Future threatened species listings or discoveries** | |
| 36 Where a preliminary determination is made under the Act to list a species, population or ecological community, and that species, population or ecological community may or is known to occur within the Growth Centres, then the GCC must (as soon as practicable) provide advice to the DECC on whether:<br><br>a. the species, population or ecological community is known or likely to be present in the Growth Centres;<br><br>b. it was considered during the preparation of the draft Growth Centres Conservation Plan by the GCC; and<br><br>c. whether the SEPP, and related measures, provides adequate protection for the species, population or ecological community. | Not applicable. |
| 37 Based on the information provided in accordance with condition 36, and any other relevant matters, the DECC shall advise the Minister on whether to formally review, maintain, modify, suspend or revoke the biodiversity certification of the SEPP if the species, population or ecological community is listed under the Act. | Not applicable. |

## 6.7.4 *Biodiversity Conservation Act 2016*

An assessment of the likelihood of threatened entities occurring within the study area is provided in Appendix 1 (flora) and Appendix 2 (fauna). As the impacts associated with the proposed Master Plan are restricted to areas that have been granted biodiversity certification, further assessment of these threatened entities through completion of ToS are not required. The effect of biodiversity certification under Section 8.4 of the BC Act is as follows:

> (1) **State significant infrastructure under Part 5.1 of the Planning Act** The environmental assessment requirements for the approval of State significant infrastructure under Part 5.1 of the EP&A Act do not require an assessment of the impact of the infrastructure on biodiversity to the extent that the infrastructure is carried out or proposed to be carried out on biodiversity certified land.
>
> (2) **Development (including State significant development) under Part 4 of the Planning Act** An assessment of the likely impact on biodiversity of development on biodiversity certified land is not required for the purposes of Part 4 of the EP&A Act.
>
> (3) A consent authority, when determining a development application in relation to development on biodiversity certified land under Part 4 of the EP&A Act, is not required to take into consideration the likely impact on biodiversity of the development carried out on that land.
>
> (4) **Activities under Part 5 of the Planning Act** An activity to which Part 5 of the EP&A Act applies which is carried out or proposed to be carried out on biodiversity certified land is taken, for the purposes of Part 5 of that Act, to be an activity that is not likely to significantly affect any threatened species or ecological community under this Act, or its habitat, in relation to that land.
>
> (5) A determining authority under Part 5 of the EP&A Act is not required under that Part to consider the effect on biodiversity of an activity to the extent that it is carried out on biodiversity certified land.
>
> (6) **This section prevails** This section has effect despite anything to the contrary in the EP&A Act or Part 7 of this Act.

However, as outlined above, biodiversity certification under the BC Act has been granted within areas mapped as "certified" under Chapter 3 (Sydney region growth centres) of the Western Parkland City SEPP. As such further assessment of impacts to these BC Act listed threatened species and communities within the certified area is not required and the BOS is not triggered. A SIS or BDAR is therefore not required.

## 6.7.5 *Fisheries Management Act 1994*

One of the key objectives of the FM Act is to conserve 'key fish habitats'. Key fish habitats underpin the approach applied by NSW DPI to ensure effort and resources are focused on habitats that are of a high priority to the conservation of fisheries. Key fish habitats are not defined in the FM Act, with their classification instead following the *Policy and guidelines for fish habitat conservation and* management (Fairfull 2013), which involves the visual assessment of waterways based on the TYPE (sensitivity of key fish habitat present) and CLASS (classification of the waterway for fish passage).

The extent of Moore Gully within the study area conforms to TYPE 1 - highly sensitive key fish habitat on the basis of the following characteristics:

- The chain of ponds waterway form that covers the extent of Moore Gully within the study area, excluding the constructed dams, support the native aquatic plant species River Buttercup and Water Couch *Paspalum distichum* throughout the channel zone.
- Both on-line dams also contain native aquatic vegetation.

- Several other plant species representative of wetland conditions occur throughout the channel zone in areas that are clearly inundated or contain surface water for significant periods.
- Large woody debris greater than 300 mm in width is present in limited amounts and areas.

The extent of Moore Gully with the study area conforms to CLASS 2 – moderate key fish habitat based on the following characteristics:

- Moore Gully is an intermittently flowing named waterway.
- Semi-permanent to permanent water is present in pools or in connected wetland areas along the extent of Moore Gully.
- Species of freshwater aquatic vegetation are present along the waterway.
- TYPE 1 habitats are present.
- Defined bed and banks for this waterway form are present. In discontinuous section this is evidenced by the channel zone occupying the low points of the landscape and the presence of wetland or aquatic vegetation affirming the permanence of water in these areas.

These findings are supported by the Fisheries NSW Spatial Data Portal (DPI 2021) which maps Moore Gully as key fish habitat. Thompsons Creek has also been mapped as key fish habitat and, whilst a full aquatic assessment of this watercourse is beyond the scope of this assessment, it is likely to conform to a TYPE 1, CLASS 2 classification under Fairfull (2013).

#### 6.7.5.1.1 Key Fish Habitat riparian buffer zones

In order to protect key fish habitat, Fairfull (2013) states that a riparian buffer zone should be measured from the top of the bank/drainage depression along CLASS 1 to 3 waterways, with the width of the riparian corridor based on the habitat TYPE and waterway CLASS. For TYPE 1, CLASS 2 waterways (which includes Thompsons Creek and Moore Gully), a 50-metre buffer zone is recommended. Any development within this buffer zone will require liaison with DPI Fisheries and has potential for additional aquatic assessment requirements. This buffer zone may be able to be reduced through liaison with DPI.

The 50-metre buffer zone has been mapped along Thompsons Creek and Moore Gully in Figure 6. Note that top of bank mapping is only available along Thompsons Creek (and not in its entirety), outside of this area the buffer is based on the mapped hydroline only.

Under Fairfull (2013), Strahler order one and two watercourses are not considered key fish habitat. Similarly farm dams on Strahler order one or two streams, or unmapped gullies are also not considered key fish habitat.

A more detailed assessment will be provided in Stage 2 once the water basin parameters are confirmed.

#### 6.7.5.1.2 Threatened species

As outlined in Section 6.5, no species listed under the FM Act were identified as likely to occur within the study area. As such a test of significant effect on threatened species, populations or ecological communities, or their habitats, as outlined in section 220ZZ of the FM Act is not required. A SIS is therefore not required.

### 6.7.6 *Water Management Act 2000*

Impacts to riparian zones are also protected under the WM Act, guided by the Guidelines for controlled activity on waterfront land – Riparian corridors (NSW Office of Water 2012). Works within 40-metres of the top bank of mapped watercourses will need to be consistent with the riparian corridor matrix which requires a VRZ be preserved. The VRZ buffer applies to each side of the watercourse, measured from top of bank, and is based on the watercourse Strahler order. The buffers required are as follows:

- Strahler order one – 10-metre buffer (each side).

- Strahler order two – 20-metre buffer (each side).
- Strahler order three – 30-metre buffer (each side).
- Strahler order four and greater – 40-metre buffer (each side).

Five unnamed Strahler order one watercourses and one unnamed Strahler order two watercourse occur within the development footprint (Figure 6). These watercourses have riparian buffers of 10-metres and 20-metres respectively. Moore Gully (Strahler order 4) and Thompsons Creek (Strahler order 5) both have riparian buffers of 40 metres. The development footprint includes sections of the Moore Gully riparian zone where the transit corridors cross at the eastern and western most extents of the watercourse within the study area. Whilst parts of the Thompsons Creek riparian buffer occur within the study area, impacts under the proposed Master Plan are currently avoided. Buffers for all of these watercourses have been mapped in Figure 6.

Liaison with DPI should be undertaken regarding potential impacts to these riparian corridors. In some instances, due to the degraded nature of the riparian corridor, this may reduce the width of riparian corridor buffer required. Any development within 40-metres of a watercourse will also require a controlled activity permit from the NRAR. An exemption for controlled activity approval does apply for major projects which are state significant development or state significant infrastructure.

A more detailed assessment will be provided in Stage 2 once the water basin parameters are confirmed.

### 6.7.7 *Biosecurity Act 2015*

Nine priority weeds for the Greater Sydney Local Land Services region, which includes the Liverpool Council LGA, have been recorded in the study area, and are listed in Table 10, along with their associated Biosecurity Duty in accordance with the Biosecurity Act.

The Biosecurity Act provides for the identification, classification and control of priority weeds with the purpose of determining if a biosecurity risk is likely to occur. A priority weed is any weed identified in a local strategic plan, for a region that includes that land or area, as a weed that is or should be prevented, managed, controlled or eradicated in the region.

The General Biosecurity Duty as outlined in the Biosecurity Act states:

> *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.*

**Table 10 Priority weeds within the study area**

| Scientific name | Common name | Relevant biosecurity duty |
|---|---|---|
| *Asparagus aethiopicus* | Ground Asparagus | General Biosecurity Duty |
| *Asparagus asparagoides* | Bridal Creeper | General Biosecurity Duty |
| *Eichhornia crassipes* | Water Hyacinth | General Biosecurity Duty |
| *Lantana camara* | Lantana | General Biosecurity Duty |

| Scientific name | Common name | Relevant biosecurity duty |
|---|---|---|
| *Lycium ferocissimum* | African Boxthorn | General Biosecurity Duty |
| *Olea europaea* subsp. *cuspidata* | African Olive | **Regional Recommended Measure**<br><br>Exclusion zone is established for all lands in Blue Mountains City Council local government area and in Penrith local government area west of the Nepean River.<br><br>Core area: The remainder of the region.<br><br>Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment.<br><br>Exclusion zone: The plant is eradicated from the land and the land kept free of the plant.<br><br>Core infestation area: Land managers prevent spread from their land where feasible. Land managers reduce impacts from the plant on priority assets |
| *Opuntia* sp. | Prickly pears | General Biosecurity Duty |
| *Rubus fruticosus* sp. agg. | Blackberry | General Biosecurity Duty |
| *Senecio madagascariensis* | Fireweed | General Biosecurity Duty |

To prevent biosecurity impacts from occurring as a result of the presence of the above listed priority weeds within the study area, all practical steps should be taken to control and eradicated the weeds from the study area as per the relevant biosecurity duties outlined above, or prior to or during any future vegetation removal.

## 6.7.8 *Western Parkland City SEPP – Chapter 4 (Western Sydney Aerotropolis)*

### Wildlife hazards

Section 4.19 (Wildlife hazards) of Chapter 4 (Western Sydney Aerotropolis) of the Western Parkland City SEPP applies to development of land within the 13 kilometre wildlife buffer zone. Relevant developments cannot be granted development consent within this area unless consultation has occurred with the relevant Commonwealth body responsible for Airport operation, and the DA is supported by a written assessment of the wildlife likely to be present on the land and the risk of the wildlife to the operation of the Airport. Relevant development means development for the following purposes; agricultural produce industries, aquaculture, camping grounds, eco-tourist centres, garden centres, intensive livestock agriculture, intensive plant agriculture, livestock processing industries, plant nurseries, recreation facilities (major), recreation facilities (outdoor), sewage treatment plants, water or resource management facilities that consist of outdoor processing, storage or handling of organic or putrescible waste, and water storage facilities. Any such relevant developments within the Master Plan area will be required to undertake these requirements prior to development consent. However, such assessments are currently beyond the scope of this current report.

**Preservation of trees and vegetation**

Section 4.25 (Preservation of trees and vegetation) applies to land in the Environment and Recreation Zone as well as land shown as "high biodiversity value" on the High Biodiversity Value Areas Map. No such lands occur within the development footprint of the Master Plan, and as such this section does not apply.

## 6.7.9 *Western Sydney Aerotropolis Development Control Plan 2022 Phase 2*

The following tables provide an assessment of the Master Plan against the performance outcomes and benchmark solutions detailed in the Phase 2 DCP for the following environmental values:

- Deep soil and tree canopy (**Table 11**)
- Protection of biodiversity (**Table 12**)
- Protection of trees and vegetation (**Table 13**)
- On lot and streetscape landscaping and preferred plant species (**Table 14**)

**Table 11 Deep soil and tree canopy performance outcomes included under the Phase 2 DCP**

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| PO1 | Consolidate areas of deep soil and tree canopy and provide minimum dimensions which allow for sufficient tree planting. | 1. Tree canopy and deep soil is provided in accordance with Table 2 (of the DCP). Applicants must also have regard for the site coverage and relevant pervious surface targets outlined in this DCP.<br><br>2. Deep soil areas are to be a minimum 3m by 3m in dimension.<br><br>3. Consolidate deep soil areas by establishing these areas right up to abutting boundary walls and fence lines.<br><br>4. Consolidate deep soil in setback areas and locate with adjoining deep soil areas in adjoining properties.<br><br>5. Other than Urban Parks available under the Aerotropolis Precinct Plan, a minimum tree canopy of 45 % for open space is to be achieved. Where open spaces include sports courts or fields, the 45 % tree canopy shall be provided outside the spaces identified for the court or field area.<br><br>6. Deep soil planting areas are to be de-compacted before planting with no | The Master Plan allows for areas of deep soil with adequate dimensions sufficient for tree planting. The minimum soil areas and widths for tree planting included are:<br><br>• Large Trees – 10 m x 10 m or equivalent<br>• Medium Trees – 6 m x 6 m or equivalent<br>• Small trees – 3.5 m x 3.5m or equivalent<br><br>Where planter areas abut boundary walls and fence lines a minimum of 6 m width is required. |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | services to be installed within these zones. | |

Table 12 Protection of biodiversity performance outcomes included under the Phase 2 DCP

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| PO2 | Populations of targeted threatened species are retained, and the condition of suitable habitat improves within areas of the Cumberland subregion most likely to support long-term viability. | 1. Mitigation to be undertaken in accordance with the following best practice guidelines for threatened ecological communities (TEC):<br><br>a. *Best Practice Guidelines: Cooks River/Castlereagh Ironbark Forest* (NSW Department of Environment and Climate Change, 2008) within and adjacent to the TEC; and<br><br>b. *Recovering Bushland on the Cumberland Plain: Best Practice Guidelines for the Management and Restoration of Bushland* (NSW Department of Environment and Climate Change, 2005).<br><br>2. Fencing is to be constructed where required to protect threatened species habitat. Site design allows public access to fencing for ongoing maintenance.<br><br>3. Temporary protective fencing to be erected around areas identified for conservation on or immediately adjoining the site prior to construction commencing.<br><br>4. Allow public access to temporary fencing to ensure ongoing maintenance throughout construction.<br><br>5. Protect integrity of temporary fencing during construction.<br><br>6. Implement open structure design for roads adjacent to known populations of Cumberland Plain Land Snail in accordance with actions under the Save | Mitigation measures will be undertaken in accordance with the best practice guidelines for TECs.<br><br>The site design has been considered to allow public access to fencing for ongoing maintenance.<br><br>The remaining mitigation measures will be implemented during construction works. |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | our Species Program (EES, 2020).<br><br>7. Locate Asset Protection Zones (APZs) for bushfire protection wholly within certified land. The appropriate APZ distance is determined by Planning for Bush Fire Protection 2019 and Rural Fire Service Standards for Asset Protection based on vegetation type, slope and development type.<br><br>8. Contain domestic cats and dogs within certified-urban capable land, consistent with relevant council guidelines as permitted and appropriate.<br><br>9. Provide for the reuse of native plants (including but not limited to seed collection) and<br><br>topsoil from development sites that contain known or potential native seed bank. | |
| PO3 | Development facilitates the connected movement of native animals through the landscape. | 1. Avoid impacts to habitat features which provide essential habitat for native fauna including ground cover and shrub layers, emerging trees, mature trees, dead trees capable of providing habitat, natural drainage lines and rock outcrops and avoid impacts to soil within the Tree Protection Zone (TPZ) of the retained trees and the subject and neighbouring sites.<br><br>2. Movement of fauna is facilitated within and through wildlife corridors by:<br><br>a. Ensuring that development, services and landscaping associated activities do not create barriers to the movement of fauna along and within wildlife corridors; and<br><br>b. Protect fauna from potential hazards during pre-construction and construction.<br><br>c. Prepare a pre-clearance native fauna survey immediately prior to clearing of native vegetation to ensure that arboreal | Detailed assessment to be provided at DA stage. |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | mammals, roosting and hollow-using birds, bats and reptiles are stopped from accessing any vegetation to be cleared and are translocated prior to clearing. Translocation may require a licence from NSW Environment, Energy and Science under the Translocation<br><br>Operational Policy<br><br>d. Adopt and implement open structure design for roads adjacent to known populations of the Cumberland Plain Land Snail in accordance with actions under the NSW Government's *Saving Our Species* program. | |
| PO4 | Within land subject to the *Cumberland Plain Conservation Plan* only, development adjoining conservation areas provides ecological setbacks to threatened species. | 1. The following threatened species require setbacks:<br><br>Grey-headed Flying-fox:<br><br>i. Grey-headed Flying-fox camp requires 100 m setback to any buildings and development;<br><br>ii. The setback area should be maintained free of flying fox roosting habitat; and<br><br>iii. A Flying-fox management plan should be provided to demonstrate management and mitigation measures.<br><br>Raptors:<br><br>i. Raptor nests require a 500m circular setback from where nests are in extensive undisturbed bushland; and<br><br>ii. Where nests are located closer to existing developments, a minimum circular setback distance of 250 m should be maintained along with an undisturbed corridor at least 100m wide extending from the nest to the nearest foraging grounds. | No Grey-headed Flying-fox camps or raptor nests were detected within the study area during the field assessments. As such these setbacks are not relevant to the Master Plan. Should these features become established within the Master Plan area then they will need to be considered at the DA stage. |
| PO5 | Noise and light adjacent, and near, | 1. High intensity lighting including industrial or commercial lighting, sports field lighting, lighting within carparking | There is a risk that needs to be balanced in achieving this control in the future, greening Bradfield City |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | conservation areas does not result in any disturbance to wildlife. | areas and associated with any industrial or commercial-scale retail development shall be designed to avoid light spill into adjoining parks and biodiversity areas (AS 4282 Control of the Obtrusive Effects Of Outdoor Lighting, or updates to that standard, are to be considered as a minimum).<br><br>2. Install warm coloured LED street lighting where a development footprint contains or is within 100 m of known microbat colonies or habitat likely to support microbat colonies to deter insects.<br><br>3. Manage light spill and noise producing activities where wildlife impacts are likely to arise from the proposed development and where development is adjacent to avoided land. Measures shall include appropriate noise treatment barriers along major roads and other light and noise attenuation mitigation measures.<br><br>4. Ensure that any residual noise impacts on wildlife arising from development are appropriately mitigated. | Centre whilst also designing a safe area with adequate lighting, sightlines and passive surveillance.<br><br>This control needs to be reviewed in association with Design for Safe Places PO4 when being implemented, particularly in relation to the mixed-use and residential area located in the south-west of Bradfield City Centre which currently requires pedestrians to cross through an open space with few direct connections over Thompsons Creek to Rapid Bus and Metro services. |
| PO6 | Bushfire risk is minimised. | 1. Ensure appropriate fire management regimes and hazard reduction techniques for native vegetation areas, waterways, and riparian zones. | Fire management regimes and hazard reduction will be implemented as per the Bushfire Strategy and Impact Assessment which has been included as part of the Master Plan Application. |
| PO7 | Retain and protect koala populations and their habitats through mitigating indirect and ongoing impacts from development. | 2. For all certified-urban capable land adjacent to koala habitat, the following controls apply:<br><br>a. Design subdivision layout, including perimeter roads and asset protection zones to reduce impacts to, and protect areas of, adjacent koala habitat.<br><br>b. Signpost areas adjoining koala habitat to identify koalas in the area and associated penalties for non-compliance. | If required, the Master Plan will address certified-urban capable land requirements where relevant. |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | c. Exclude planting tree species in open space, recreation areas and urban streets that are koala feed tree species set out below by Schedule 2 – Central and Southern Tablelands and Central Coast Koala Use Tree Species of the State Environmental Planning Policy (Koala Habitat Protection) 2021.<br><br>d. An ecologist shall be present through the duration of any pre-clearance koala surveys and vegetation clearing works to maintain oversight and responsibility of the activities and koala translocation.<br><br>3. Where a koala exclusion fence is not installed between koala habitat and certified-urban capable land, the following development controls apply:<br><br>a. Prepare a pre-clearance koala survey immediately prior to the removal of native vegetation to ensure minimal disturbance to koala habitat. Implement a translocation plan if koalas are found. Translocation may require a licence<br><br>from NSW Environment, Energy and Science (EES) under the Translocation Operational Policy.<br><br>b. Implement a tree-felling protocol to avoid impacts to koalas in trees to be cleared.<br><br>c. Enforce vehicle wash-down points for machinery, equipment and tyres prior to entering and leaving the construction site to control the spread of vegetation pathogens known to affect koala feed trees.<br><br>**Pre-construction Temporary Fencing**<br><br>d. Erect temporary protective fencing designed for koala protection to protect adjacent koala habitat on or immediately adjoining the site prior to construction to ensure koala | |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | protection.<br><br>Dog Containment Fencing<br><br>e. Design and construct public dog recreation areas with secure containment fencing.<br><br>f. Design residential lots with dog containment fencing in accordance with Council requirements.<br><br>**Development Operation**<br><br>g. Manage roadside vegetation to increase the visibility of koalas.<br><br>**Vehicle Strike**<br><br>h. Implement traffic calming measures for all development<br><br>i. Implement 40km/hr speed limit restrictions on local roads adjacent to koala habitat.<br><br>ii. Install koala information signposts on perimeter roads and roads adjacent to wildlife habitat areas in accordance with Austroads, Roads and Maritime Services (RMS) technical guidelines, Council Guidelines and relevant Australian Standards.<br><br>iii. Install traffic calming devices such as speed humps and audible surfacing along perimeter roads adjacent to koala habitat.<br><br>iv. Install koala-friendly road design structures, such as underpasses, fauna bridges and overpasses as required. Reference to the RMS Biodiversity Guidelines is to be made. | |

Table 13 Protection of trees and vegetation performance outcomes included under the Phase 2 DCP

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| PO1 | Existing trees and vegetation are retained, protected, enhanced, and incorporated into the development, wherever possible. | 1. Development is designed to minimise impacts on trees, except for invasive species and/or noxious weeds.<br><br>Note: Applications involving the removal of trees must refer to the Liverpool Council Tree Management Policy or the Penrith Council Guidance for Tree Removal and pruning available on the respective Council's website | The Master Plan aims to retain the majority of existing trees where appropriate within planned public open space. Retention of trees will be confirmed during the detailed DA design. |
| PO2 | Minimise threats to the long-term survival of existing trees through tree preservation zones and pruning techniques. | 1. Works and construction activities are excluded within the Tree Protection Zone (TPZ) of trees unless a qualified arborist has assessed the tree and provided guidelines as to how the work can be carried out with minimal risk to the long-term survival of the tree and this has been included in an approved Tree Protection Plan (Drawing and Specification).<br><br>2. Any pruning or tree removal works that may impact threatened ecological communities are to adhere to the following best practice guidelines:<br><br>a. Best Practice Guidelines: Cooks River/Castlereagh Ironbark Forest (Department of Environment and Climate Change NSW, 2008) within and adjacent to the threatened ecological community; and<br><br>b. Recovering Bushland on the Cumberland Plain: Best Practice Guidelines for the Management and Restoration of Bushland (Department of Environment and Climate Change NSW, 2005).<br><br>3. Development is designed to avoid impacts on trees, except for priority weeds in accordance with the Council's weed policy. | It is assumed TPZ and mitigation measures including pre-clearance will be undertaken prior to clearance and development. These would be included as conditions of consent following lodgement of a DA. |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | 4. Existing trees have appropriate soil volumes and setbacks from buildings, footpath, road/kerb and gutter and services to provide sufficient space for root and canopy development to ensure the tree reaches its identified mature height and spread. | |
| PO3 | Where hollow-bearing trees cannot be retained and are removed, they shall be replaced with nesting boxes, as close as possible to where the removed tree was located. | 1. The removal of the hollow bearing trees shall be offset by the installation of nesting boxes. The size of the nest box is to reflect the size and dimensions of the hollow removed. Alternatively, the tree hollow could be appropriately mounted on one of the retained trees in a manner where it will not pose a risk to life or property.<br><br>2. All nesting boxes and hollows shall be mounted at least 5 m above the ground.<br><br>3. Requirement for 60% of nest boxes (replacement habitat) to be in place prior to clearing of hollow-bearing trees. | To be considered and addressed at detailed DA design. |

Table 14 Preferred plant species performance outcomes detailed in the Phase 2 DCP

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| PO1 | Plant species are provided in accordance with the preferred species identified for the Aerotropolis | 1. Landscaping in development is to incorporate a diverse range plant species, as per the Aerotropolis DCP preferred Species List provided at Appendix B of this DCP.<br><br>Prioritise use of Cumberland species, followed by other species that are suitable for the purpose and the microclimatic conditions of the site. | Plant species selected within the landscape guideline and masterplan will be generally selected from Appendix B of the Phase 2 DCP.<br><br>Plant species that are not part of DCP will require an ecologist to sign off to ensure that the non-DCP plant species conform to the Phase 2 DCP's species selection principles. To be confirmed as part of detailed DA design. |
| PO2 | Landscape design reflects the cultural landscape | 1. Landscaping is to highlight architectural features, define entry points, indicate direction, and frame | A holistic approach has been undertaken to ensure the most effective landscape design solution |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | and is integrated with the design intent of the architecture and built form. | and filter views into the site along sight lines.<br><br>5. Size and scale of landscaping is responsive to the bulk and scale of the development. | has been achieved.<br><br>Additional details to be confirmed as part of detailed DA design. |
| PO3 | Landscaping complements the views to and from the public domain, as well as to and from public and private open spaces within the site. | 1. Use appropriate species to screen side (where sufficient width permits) and rear boundaries and enhance visually obtrusive land uses or building elements (e.g., waste enclosures). | To be confirmed as part of detailed DA design. |
| PO4 | Trees are planted in locations and distances apart to support their ongoing growth without causing conflict, including with the Obstacle Limitation Surface and utility services. | 1. Trees are planted in unobstructed spaces where they have a minimum of three mature trunk diameter space to grow, and to limit upheaval of pavements and infrastructure.<br><br>2. Trees are not to penetrate operational airspace and tree heights should encourage wildlife movements below the OLS, where practical.<br><br>3. Demonstrate species have been selected to ensure that at maturity, heights and root systems will achieve adequate clearance from streetlights and underground services such as stormwater pits.<br><br>4. If required, trees can be planted in underground engineered tree pits to provide sufficient underground space to sustain the tree to maturity and beyond.<br><br>5. Trees are planted and spaced to ensure the locations are spacings permit the trees to establish and reach maturity with their canopy and trunk being unimpeded. | 1. Where trees are located close to paving or in limited areas of soft landscaping, stratacell or equivalent is required to ensure successful root growth can be achieved and to reduce damage to hardscape elements.<br><br>2. Landscaping should be planned, so to not to attract wildlife that could create a safety hazard to the operations of the Western Sydney International Airport. Refer to Appendix B of the Phase 2 DCP for a list of suitable landscape species. In areas within the 3 km wildlife buffer but outside of the priority/ parkland, a report prepared by a suitability qualified and experienced ecologist is to be submitted with any application when the landscaping plan:<br><br>a. Incorporates alternative landscape species not listed within Appendix B.<br><br>b. Incorporates landscape species denoted within the landscape species list.<br><br>c. Will result in more than 5 trees being planted in 1 group (group refers to touching mature canopies). |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | | d. Provides a spacing between a group of 5 or more.<br><br>3, 4 and 5. To be confirmed as part of a detailed DA design. |
| PO5 | Landscaping design promotes safety and surveillance. | 1. Within high use areas (e.g. car parking areas, children's play areas and walkways), trees at maturity have clean trunks to a height of 1.8 m around facilities.<br><br>2. Medium height shrubs (0.6 m – 1.8 m) are avoided along paths and close to windows and doors to maintain sight lines and allow for passive surveillance.<br><br>3. Landscaping in the vicinity of a driveway entrance does not obstruct visibility for the safe ingress and egress of vehicles and pedestrians. | Landscaping design as part of Master Plan agrees with these principles. |
| PO6 | Landscaping is integrated with vehicular access and car parking areas on development lots to soften their visual impact, provide protection from glare, and reduce heat island effect. | 1. Provide 1 medium tree for every 5 at grade car spaces, and maximise shading (as listed and shown in the image below) by:<br><br>a. Orienting the tree parallel to the parking space.<br><br>b. Staggering the configuration rather than linear.<br><br>c. Selecting a tree with a Leaf Area Index of >4.<br><br>d. Using structurally engineered pits or vaults and WSUD design principles to provide appropriate space for tree root development.<br><br>2. Landscaping shall not restrict driver sightlines to pedestrians, cyclists, and other vehicles on the frontage road.<br><br>3. Where basement car parking extends beyond the building envelope, a minimum soil depth of 1.5m is provided above the basement, | Landscaping design as part of Master Plan agrees with these principles. |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | measured from the top of the slab, and including the required drainage. This will not be calculated as part of the deep soil zone nor included as part of the urban typology (site coverage) for the site | |

## 6.7.10 Wildlife Management Assessment Report

**Table 15** outlines the performance outcomes and benchmark solutions that have been included in the Phase 2 DCP for Wildlife Hazards and provides an assessment against the Master Plan. As detailed in **Section 4.4.3**, these performance outcomes have been developed in accordance with the wildlife buffers outlined in the WSA Wildlife Management Assessment Report.

**Table 15 Wildlife hazard performance outcomes detailed in the Phase 2 DCP**

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| PO1 | Development does not attract wildlife which would create a safety hazard to the operations of the Airport. | 1. All waste bins are designed and installed with fixed lids.<br><br>2. Any bulk waste receptacle or communal waste storage area is contained within enclosures that cannot be accessed by birds or flying foxes.<br><br>3. Any stormwater detention within the 3 km and 8 km wildlife buffer is designed to fully drain within 48 hours after a rainfall event.<br><br>4. Buildings and structures are designed to minimise the opportunity for roosting areas. | The benchmark solutions identified for PO1 will need to be addressed during the DA process. These are too detailed for the current level of design included under the Master Plan. |
| PO2 | Landscaping does not attract wildlife that could create a safety hazard to the operations of the Airport. | 1. Refer to Appendix B for a list of suitable landscape species.<br><br>2. In areas within the 3 km wildlife buffer but outside of the priority/parkland areas shown in Figure 15, a report prepared by a suitability qualified and experienced ecologist is to be submitted with any application when the landscaping | Figure 9 (Western Parkland City Vision – Government Commitment Areas map) of the Phase 2 DCP provides an overview of proposed Parkland Priority Areas which includes the following priority areas:<br><br>• Environment and Recreation Zone.<br>• National Parks and Reserves. |

| ID | Performance outcome | Benchmark solution | Master Plan |
|---|---|---|---|
| | | plan:<br><br>a. Incorporates alternative landscape species not listed within Appendix B;<br><br>b. Incorporates landscape species denoted within the landscape species list;<br><br>c. Will result in more than five trees being planted in 1 group (group refers to touching mature canopies); and/or<br><br>d. Provides a spacing between a group of 5 or more trees that is less than 100 m.<br><br>3. The ecologist report is to consider building, site, and water body design outcomes and/or landscape maintenance measures that will mitigate bird and flying fox attraction and roosting areas. | • Aerotropolis Core and Northern Gateway Mixed Use Zones.<br><br>• Luddenham Village.<br><br>As a large majority of the study area is mapped as Mixed Use under the Western Parkland City SEPP, it is included within this priority area. In accordance with the Phase 2 DCP, areas of the Master Plan within this priority area do not require an ecologist report when utilising any of the species listed in Appendix B (Western Sydney Aerotropolis Landscape Species List) of the Phase 2 DCP, including those that have the additional requirements of "*only within 3 km wildlife buffer, where supported by ecologist report, confirming landscape design minimises wildlife attraction*".<br><br>A small area to the north-west of the study area is zoned as Enterprise under the Western Parkland City SEPP and therefore is not included within the Parkland Priority Area. As this area is within the 3 km wildlife buffer zone, some species will require an ecologist report before they can be planted in this area. It is understood that the Master Plan is only utilising the approved species from Appendix B (Western Sydney Aerotropolis Landscape Species List) of the Phase 2 DCP within this area, and none of the included species have the additional requirement of an ecological report when planted within the 3 km buffer zone. |

## 6.7.11Western Sydney Aerotropolis Plan

**Table 16** outlines the planning principles relevant to biodiversity that are included in the Western Sydney Aerotropolis Plan (i.e., Sustainability Objective 4) along with a summary of how the Master Plan is addressing these planning principles.

Table 16 Sustainability (objective 4) planning principles included in the Western Sydney Aerotropolis Plan

| ID | Planning principle | Master Plan |
|---|---|---|
| SU1 | Retain and enhance natural features such as waterways, vegetation, landform and culturally significant landscapes. | The Master Plan retains natural features such as the Moore Gully and Thompsons Creek watercourses which will be enhanced as part of the proposed plan. Areas of ENV have also been retained through the proposed open space network which includes Ridge Park in the north of the Master Plan site, and a large regional parkland in the southern portion of the Master Plan site. These two parklands cover 30.27 ha (26.33 % of the entire Master Plan site) and will undergo significant rehabilitation in accordance with the Master Plan Open Space Strategy, as detailed in Section 6.6.2. |
| SU2 | Integrate Blue Green Infrastructure links with public open spaces and the Green Grid, maximising opportunities for connections, an urban tree canopy and active use of the floodplain. | The Master Plan preserves the Moore Gully and Thompsons Creek watercourses which will contribute significantly to the blue grid across the Master Plan site. The Master Plan also preserves 30.27 ha of open space through Ridge Park and the large regional parkland to the south of the Master Plan area. In addition to these areas, small pockets of district and local open spaces are provided throughout the main section of the development footprint, ensuring green spaces are available throughout the Bradfield City Centre. |
| SU3 | Retain water in the landscape by maximising appropriate permeable surfaces, reusing water and developing appropriate urban typologies. | The Master Plan incorporates key water management requirements through the rehabilitation of riparian corridors along Moore Gully and Thompsons Creek, as well as through an integrated design approach which incorporates water quality, water reuse and flood detention requirements across the site. A key site for the delivery of these outcomes is the Moore Gully watercourse which will include riparian zones, wetland zones with on-site detention, bioretention treatment, and open water storage (WPCA 2023). |
| SU4 | Orient urban development towards creeks and integrate into the landscape through quality open space, a high degree of solar access and tree canopy. | The interface between the Master Plan development footprint and the Moore Gully precinct has been designed to incorporate promenades which will aid in the transition between developable space and the blue-green grid represented by Moore Gully and the surrounding regional parkland (WPCA 2023). Open space areas including regional parkland, the Ridge Park, Central Park and local open spaces throughout the developable areas ensure quality open space is available through the Master Plan site. As per Section 2.4 (Vegetation and Biodiversity) of the |

| ID | Planning principle | Master Plan |
|---|---|---|
| | | Phase 2 DCP, areas set aside for urban parks will require a minimum tree canopy of 40 % to be achieved. |
| SU5 | Develop a connected parkland network linking with the Wianamatta–South Creek corridor that shapes the Aerotropolis and provides amenity and ecological value and create a high quality ridgeline and linear parks adjacent to, and integrated with, riparian corridors that retain water. | Moore Gully and its surrounding regional parkland connect directly with Thompsons Creek which forms part of the Wianamatta – South Creek corridor, allowing for retention of water across the site. This regional parkland will be subject to significant rehabilitation which will increase its ecological value, particularly along its existing degraded riparian corridor. The Ridge Park at the northern end of the Master Plan site will also ensure green open space is available along ridgelines within the Master Plan site. |
| SU6 | Retain and increase the urban tree canopy and green cover across the Aerotropolis consistent with the Region Plan target of 40% and the Premier's Priority for Greening our city. | Open space areas cover 30.27 ha (26.33 %) of the Master Plan site. As per Section 2.4 (Vegetation and Biodiversity) of the Phase 2 DCP, areas set aside for urban parks will require a minimum tree canopy of 40 % to be achieved. |
| SU7 | Retain, enhance and co-locate vegetation on ridgelines with active open space and use it to guide building heights. | ENV located within the northern section of the Master Plan site will be protected and retained through the co-location of the Ridge Park open space in this area. This will ensure native vegetation is retained at the key ridge site as part of the Master Plan. |
| SU8 | Identify and protect scenic and cultural landscapes and develop a street grid based on landforms, with long north–south blocks in urban areas to attain good solar performance, and east–west streets to capture long views to the Blue Mountains. | The Master Plan consists of a grid-based lot arrangement, accommodating long north-south blocks where possible. North-south corridors through the Master plan site are represented by the central major road transit corridor (which will be lined with canopy trees) as well as several other vegetative corridors between lots, the most significant of these being the City Walk West leading south from Central Park and the proposed Metro station.<br><br>Three arterial east-west streets cross the Master Plan site which will ensure long views are maintained. These streets will also be lined with canopy trees ensuring green corridors are available throughout the city centre. Finally, the City Walk East will connect Central Park and the Metro station with the proposed major events space within the regional parkland to the south-east of the Master Plan site. |

| ID | Planning principle | Master Plan |
|---|---|---|
| SU9 | Meet the requirements of the biodiversity conservation program in the Cumberland Plain Conservation Plan and approved strategic biodiversity certification and strategic assessment protecting land with biodiversity value and provide a sensitive urban interface that supports and enhances corridors and reserves. | The Master Plan site occurs within the South West Growth Centre and includes land designated as certified and non-certified under Chapter 3 (Sydney region growth centres) of the Western Parkland City SEPP. The Master Plan conforms with the requirements of this SEPP and its associated bio-certification order, as detailed within Section 6.7.3.<br><br>The Bradfield City Centre Master Plan site occurs outside of the nominated Western Sydney Aerotropolis area under the Cumberland Plain Conservation Plan. |
| SU10 | Avoid, minimise and mitigate impacts on threatened species and endangered ecological communities, habitat corridors, and riparian and aquatic habitats to prioritise length, connectivity and representativeness to maintain ecological function.<br><br>Protect the integrity and continuity of wildlife by:<br><br>• protecting priority habitat corridors to support migrating species, birds and arboreal mammals<br>• using public land for biodiversity conservation with an appropriate management regime.<br>• expanding vegetation corridors if impacted by utility installations. | The Master Plan allows for 30.27 ha of open space as either regional parkland or the Ridge Park. This represents 26.33 % of the total Master Plan area and includes patches of ENV and other areas of native vegetation which include TECs and habitat for threatened species. These areas will be rehabilitated in accordance with the Open Space Strategy detailed in Section 6.6.2, as well as through the requirement of the Phase 2 DCP, which states that these areas will require a minimum tree canopy of 40 % to be achieved. This rehabilitation will ensure the ecological values across the Master Plan site are preserved and enhanced. |
| SU11 | Retain and protect wetland environments to support plant animal communities and to mitigate wildlife attraction or wildlife strike. | Wetland environments will be retained and rehabilitated along the Moore Gully watercourse as part of the proposed Master Plan. These areas will be supported through the preservation of the 40-metre core riparian zone along Moore Gully and Thompsons Creek. |
| SU12 | Provide open space buffers and asset protection zones to conservation areas wholly within urban capable footprints. | Asset Protection Zones (APZs) will be wholly located within the Master Plan development footprint. No encroachment of APZs is proposed into the areas mapped as Open Space as part of the proposed Master Plan. |
| SU13 | Plan stormwater and wastewater in the Wianamatta–South Creek Catchment to minimise potential hydrologic and hydraulic | The Master Plan incorporates key water management requirements through the rehabilitation of riparian corridors along Moore Gully |

| ID | Planning principle | Master Plan |
|---|---|---|
| | impacts on ecology, creek structure, infrastructure, water quality and the natural water cycle. Integrate water sensitive urban design and use stormwater or recycled water to irrigate streets and public open space to support public amenity and urban cooling. Co-locate industrial water users, where appropriate. | and Thompsons Creek, as well as through an integrated design approach which incorporates water quality, water reuse and flood detention requirements across the site. A key site for the delivery of these outcomes is the Moore Gully watercourse which will include riparian zones, wetland zones with on-site detention, bioretention treatment, and open water storage (WPCA 2023). |

### 6.7.12 *Western Sydney Aerotropolis Precinct Plan*

The Master Plan is consistent with the requirements for riparian corridors (Section 4.5.2) and biodiversity and vegetation corridors (Section 4.5.4) detailed in the *Western Sydney Aerotropolis Precinct Plan*. Further assessment against the requirements of the Precinct Plan is provided in the Bradfield City Centre Master Plan Report (WPCA 2023).

# 7 Recommendations

Recommendations to aid in the avoidance and mitigation of impacts to ecological values as a result of the proposed Master Plan are detailed in Table 17. Also included are offsetting options for unavoidable impacts. These recommendations have been developed based on best practice and apply during future development design phases as well as during future construction works. Further requirements to avoid and minimise impacts to ecological values are likely to be included as part of the development application process for future development within the Master Plan area. Such developments would also need to be undertaken in accordance with the requirements of the Phase 2 DCP.

Table 17 Recommendations to avoid, mitigate, and offset impacts to ecological values

| Ref | Recommendation | Timeframe | Responsible |
|---|---|---|---|
| **Native vegetation** | | | |
| 1 | The Master Plan has avoided impact to 12.47 ha of native vegetation which is included under the plans Open Space Strategy detailed in Section 6.6.2. Further impacts to native vegetation and TECs within the development footprint can be managed by implementing appropriate safeguards in further planning and design stages as part of the DA process. This includes avoiding areas of native vegetation wherever possible, and, where unavoidable, targeting areas of lower condition vegetation for development/impact. | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| 2 | Identifying the locations where the TECs and native vegetation to be retained as No Go zones in a project CEMP or similar. | During construction | Construction contractor |
| 3 | Install appropriate exclusion fencing to the boundary of the TECs and any construction areas where there is some potential for accidental encroachment. Include appropriate signage such as No Go Zone or Environmental Protection Area. | During construction | Construction contractor |
| 4 | Any development within the study area would need to adhere to performance outcomes outlined in the Phase 2 DCPs. These DCPs include several protections for biodiversity, native vegetation and plant planting that will ensure further impacts to native vegetation are minimised or remediated. | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| 5 | Ensure any modification to the Master Plan during further concept planning or during construction that has | During lifetime of | WPCA |

| Ref | Recommendation | Timeframe | Responsible |
|---|---|---|---|
| | some potential to impact on the TECs is assessed. This may include tests of significance according to Section 1.7 of the EP&A Act. | Master Plan | |
| 6 | Ensure appropriate sediment control measures are put in place to ensure run-off during construction does not result in indirect impacts to native plant communities, particularly TECs. | During construction | Construction contractor |
| 7 | Identify opportunities to revegetate impacted areas following development works. Revegetation works would need to follow the approved planting lists outlined in the DCPs and comply with the fauna management and mitigation measures outlined in the Western Sydney Aerotropolis: *Wildlife Management Assessment Report - Final Report Revision 3* (Avisure 2020) and Section 10.2 (Wildlife Hazards) of the Phase 2 DCP. | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| 8 | Impacts to native vegetation in non-certified areas has been avoided under the Master Plan. Should removal of vegetation within these areas be required the removal a biodiversity assessment will be required. As this vegetation is mapped on the Biodiversity Values map, the removal will trigger the BOS and a BDAR will need to be prepared in accordance with the BAM. | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| **Threatened species** | | | |
| 9 | A population of *Marsdenia viridiflora* subsp. *viridiflora*, listed as an endangered population under the BC Act, occurs in the north-directly adjacent to the north-west portion of the study area (Figure 4). Currently the surrounding area is included as part of the Open Space area and will not be impacted. If future works in this area are required then these individuals should be protected through No-Go zones, or options for their relocation should be investigated. | During detailed design of subsequent developments. Part of the DA process. | Development proponent or WPCA |
| **Priority weeds** | | | |
| 10 | To prevent biosecurity impacts, in accordance with the NSW Biosecurity Act all practical steps should be taken to control and eradicate priority weeds from future development footprints prior to or during vegetation removal. A pre-clearance assessment may need to be undertaken to identify potential weed material and recommend appropriate treatment or disposal measures. | During construction | Construction contractor |

| Ref | Recommendation | Timeframe | Responsible |
|---|---|---|---|
| **Hollow-bearing trees** | | | |
| 11 | Where required, removal of significant habitat trees should be preceded by a preclearance assessment, followed by a two-stage clearing process to minimise impact to native fauna.<br><br>**Step 1:**<br><br>Surrounding shrubs and canopy to be removed and the hollow-bearing tree/s to be knocked by arborist or excavator and left standing for 24-48 hours prior to hollow-bearing tree removal, to allow time for fauna to escape and relocate naturally.<br><br>**Step 2:**<br><br>Ecologist or arborist (if high in tree) to inspect hollows and/or habitat trees for the presence of fauna.<br><br>Excavator operator or arborist to again knock or disturb the habitat tree prior to felling, with the intent to encourage the final movement of fauna out of hollows/nests.<br><br>During felling, the tree is felled as carefully as possible and placed on the ground, for example branch-by-branch to allow for regular checks for fauna by the Ecologist.<br><br>Lengths cut from trees during felling should be divided in a manner that will preserve integrity of any hollows present and placed in retained vegetation to provide habitat for ground dwelling fauna.<br><br>Any fauna displaced are either captured and inspected for injury prior to relocation in a pre-allocated area or allowed to self-relocate into adjacent retained habitats.<br><br>Injured fauna are to be taken to a local veterinarian or a WIRES representative is to be contacted as soon as possible. | During construction | Construction contractor |
| 12 | Loss of hollows should be offset through the installation of compensatory habitat such as nest boxes. Nest boxes should be installed in the environmental prior to clearing and offset a minimum of 2:1 ratio (nest boxes: hollows lost) as outlined in the Phase 2 DCP. Any hollows removed should be reserved and installed in nearby environments to provide additional habitat for fauna. | During construction | Construction contractor |

| Ref | Recommendation | Timeframe | Responsible |
|---|---|---|---|
| 13 | At least 60 % of replacement habitat (i.e., nest boxes) should be installed prior to the removal of a hollow-bearing trees. | During construction | Construction contractor |
| **Key fish habitat** | | | |
| 14 | Wherever possible development should be avoided within the key fish habitat buffers associated with Moore Gully and Thompsons Creek (Figure 6). | During detailed design of subsequent developments. Part of the DA process. | Development proponent |
| 15 | Impacts within the 50 m key fish habitat buffer will require liaison with DPI. This may lead to a reduction in buffer width in some instances (in the case of the identified minor encroachments). | During detailed design of subsequent developments. Part of the DA process. | Development proponent or WPCA |
| 16 | Impacts to the key fish habitat associated with the transit corridors are likely to require aquatic assessment to support approval (and associated permitting) from DPI under Part 7 of the FM Act. The impacts may require offsets by environmental compensation in accordance with the “no net loss of key fish habitat” policy outlines in Section 3.1 of Fairfull (2013). | During detailed design of subsequent developments. Part of the DA process. | Development proponent or WPCA |
| 17 | Offset with compensatory works will only be considered if it can be demonstrated that avoidance is impossible. Section 3.1 of Fairfull (2013) sets out eight principles that should be considered in order to achieve this. | During detailed design of subsequent developments. Part of the DA process. | Development proponent or WPCA |
| **Watercourses and riparian corridors** | | | |
| 18 | Works within 40 m from top of bank of any mapped watercourse will require a controlled activity permit from NRAR. Major projects that are classified as State Significant Developments and State Significant Infrastructure are exempt from this requirement. | During detailed design of subsequent developments. Part of the DA process. | Development proponent or WPCA |
| 19 | Ensure appropriate sediment control measures are put in place to ensure run-off during construction does not | During construction | Construction contractor |

| Ref | Recommendation | Timeframe | Responsible |
|---|---|---|---|
| | result in indirect impacts to the watercourse. | | |
| 20 | Ensure No-Go zones are in place to protect any retained sections of riparian corridors. | During construction | Construction contractor |
| **Farm dams** | | | |
| 21 | An aquatic pre-clearance assessment should be undertaken prior to the decommissioning of the four identified farm dams. This assessment should determine presence of native aquatic fauna (fish, turtles and eels) and develop a plan for their relocation during dam decommissioning. The assessment should also identify presence of exotic fish species such as Eastern Gambusia that may need to be managed during dam decommissioning to prevent the species from entering nearby waterways. | During construction | Construction contractor |
| 22 | If dams are suspected of containing native aquatic fauna (fish, turtles and ells) a two-stage dam dewatering process should be adopted.<br><br>**Step 1:**<br><br>The dam is partially dewatered to target depth and left overnight to allow mobile aquatic fauna such as turtles and eels to self-relocate. Typically, the target depth is a wadeable depth that allows for a safe undertaking of step 2. The target depth should be determined during the dam pre-clearance assessment.<br><br>**Step 2:**<br><br>Ecological supervision is required during the final stages of dam dewatering where the remaining water is removed from the dam. Ecologists to undertake fauna salvage and relocation of any remaining fauna individuals as necessary. | During construction | Construction contractor |
| 23 | Any modification to farm dams along existing hydro lines is likely to require liaison with DPI Fisheries and/or a controlled activity permit for carrying out activities on waterfront land, as defined under the WM Act. | During detailed design of subsequent developments. Part of the DA process. | Development proponent |

# 8 Conclusion

This report is an assessment of the potential impacts of the proposed Master Plan on ecological values within the Bradfield City Centre. The Plan has been assessed in accordance with the EP&A Act, FM Act, BC Act and EPBC Act, as well as relevant SEPPs and DCPs relating to the Western Sydney Aerotropolis.

The proposed Master Plan development will result in impacts to the following ecological values:

- Removal or 24.60 ha native vegetation which includes areas of potential threatened flora and fauna habitat.
- Removal of 11 hollow-bearing trees within the study area supporting a total of 21 hollows of small (<50 mm diameter) or medium (50 – 149 diameter) size classes.
- Impacts to two sections of Moore Gully and its associated VRZ and key fish habitat buffer, associated with future transit corridors at the eastern and western extent of the study area.
- Minor encroachment into the key fish habitat buffer associated with Thompsons Creek.
- Impacts to five unnamed Strahler order one watercourses, and one unnamed Strahler order two watercourse and their associated VRZs.
- Impact to one farm dam.

All six of the vegetation communities mapped by Biosis within the study area are consistent with TECs listed under the EPBC Act or the BC Act. The majority of vegetation impacts (24.07 hectares or 98 % of all impacts) occurs to PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, 10.33 hectares of which satisfies the key diagnostic criteria of the EPBC Act listed CEEC *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* and all 24.07 hectares satisfies the key diagnostic criteria for the BC Act listed CEEC *Cumberland Plain Woodland in the Sydney Basin Bioregion*.

Following the field investigation, seven threatened flora species and 19 threatened fauna species listed under the EPBC Act or BC Act were identified as having a medium or greater likelihood of occurrence in the study area. One endangered flora population, *Marsdenia viridiflora* subsp. *viridiflora*, listed under the BC Act was also recorded during the field surveys as four individuals, directly adjacent to the study area. This population is not impacted under the proposed Master Plan.

The study area occurs within the South West Growth Centre and direct impact to native vegetation are restricted to areas that have been classified as “certified” under Chapter 3 (Sydney region growth centres) of the Western Sydney Parkland SEPP. Due to the effect of the Growth Centres Biodiversity Certification Order, these areas have previously been granted biodiversity certification under the BC Act and as such no further assessments in the form of tests of significance under the EP&A Act or triggering of the BOS and subsequent assessment under the BAM is required. A BDAR or SIS is not required. In addition, due to the *Sydney Growth Centres Strategic Assessment Program Report* (DECCW 2010) and subsequent endorsement by the Commonwealth Minster for the Environment, certified areas within the South West Growth Centre are also considered to have biodiversity approval under Part 9 of the EPBC Act. As such no referral for impacts to Matters of NES for the proposed Master Plan is required.

Impacts to watercourses, VRZs and key fish habitat buffers will require liaison with DPI Fisheries and NRAR, with future developments impacting of aquatic features likely to require controlled activity permits.

Recommendations to avoid, mitigate and offset the above impacts have been included in Section 7 of this report. These include detailed design recommendations, exclusion fencing and recommendations regarding appropriate vegetation clearing practices, staged habitat removal, supervision of habitat clearance and the installation of replacement habitat (refer to **Table 17** for full details regarding the proposed safeguards).

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# Appendix 1 – Flora

Flora species recorded from the study area

### Notes to tables

| | |
|---|---|
| **Status – EPBC Act:**<br>CE – Critically Endangered<br>EN – Endangered<br>VU – Vulnerable | **Status – BC Act:**<br>E1 – endangered species (Part 1, Schedule 1)<br>E2 – endangered population (Part 2, Schedule 1)<br>E4 – presumed extinct (Part 4, Schedule 1)<br>E4A – critically endangered<br>V – vulnerable (Part 1, Schedule 2) |
| **Status – Exotic**<br># – Native species outside natural range<br>* – priority weed species declared under the Biosecurity Act | |

### Table A.1 Flora species recorded from the study area

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| Native species | | | |
| *Acacia decurrens* | Black Wattle | | |
| *Acacia implexa* | Hickory Wattle | | |
| *Alisma plantago-aquatica* | Water Plantain | | |
| *Alternanthera denticulata* | Lesser Joyweed | | |
| *Amyema miquelii* | Box Mistletoe | | |
| *Angophora floribunda* | Rough-barked Apple | | |
| *Aristida ramosa* | Purple Wiregrass | | |
| *Aristida vagans* | Threeawn Speargrass | | |
| *Arthropodium milleflorum* | Pale Vanilla-lily | | |
| *Arthropodium minus* | | | |
| *Asperula conferta* | Common Woodruff | | |
| *Austrostipa ramosissima* | Stout Bamboo Grass | | |
| *Azolla pinnata* | Azolla | | |
| *Bothriochloa decipiens* | Redleg Grass | | |
| *Breynia oblongifolia* | Coffee Bush | | |
| *Brunoniella australis* | Blue Trumpet | | |

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| *Bursaria spinosa* subsp. *spinosa* | Native Blackthorn | | |
| *Carex appressa* | Tall Sedge | | |
| *Carex inversa* | Knob Sedge | | |
| *Casuarina glauca* | Swamp Oak | | |
| *Cayratia clematidea* | Native Grape | | |
| *Centella asiatica* | Indian Pennywort | | |
| *Cheilanthes sieberi* | Poison Rock Fern | | |
| *Cheilanthes sieberi* subsp. *sieberi* | Rock Fern | | |
| *Chloris ventricosa* | Tall Chloris | | |
| *Chorizema parviflorum* | Eastern Flame Pea | | |
| *Chrysocephalum apiculatum* | Common Everlasting | | |
| *Clematis aristata* | Old Man's Beard | | |
| *Clematis glycinoides* | Headache Vine | | |
| *Commelina cyanea* | Native Wandering Jew | | |
| *Cycnogeton procerum* | Water Ribbons | | |
| *Cymbonotus lawsonianus* | Bear's Ear | | |
| *Cymbopogon refractus* | Barbed Wire Grass | | |
| *Cynodon dactylon* | Common Couch | | |
| *Cyperus gracilis* | Slender Flat-sedge | | |
| *Daviesia ulicifolia* | Gorse Bitter Pea | | |
| *Desmodium gunnii* | Slender Tick-trefoil | | |
| *Desmodium rhytidophyllum* | | | |
| *Desmodium varians* | Slender Tick-trefoil | | |
| *Dianella longifolia* | Blue Flax-Lily | | |
| *Dichelachne micrantha* | Shorthair Plumegrass | | |
| *Dichondra repens* | Kidney Weed | | |
| *Digitaria parviflora* | Small-flowered Finger Grass | | |
| *Dillwynia sieberi* | | | |
| *Dodonaea viscosa* subsp. *cuneata* | Sticky Hopbush | | |
| *Echinopogon caespitosus* var. *caespitosus* | Hedgehog Grass | | |
| *Echinopogon ovatus* | Forest Hedgehog Grass | | |
| *Einadia hastata* | Berry Saltbush | | |
| *Einadia nutans* subsp. *linifolia* | Climbing Saltbush | | |
| *Einadia trigonos* | Fishweed | | |

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| *Eleocharis acuta* | | | |
| *Eleocharis plana* | Flat Spike-sedge | | |
| *Eleocharis sphacelata* | Tall Spike Rush | | |
| *Eleocharis* spp. | Spike-rush, Spike-sedge | | |
| *Entolasia stricta* | Wiry Panic | | |
| *Eragrostis brownii* | Brown's Lovegrass | | |
| *Eremophila debilis* | Amulla | | |
| *Eucalyptus amplifolia* | Cabbage Gum | | |
| *Eucalyptus amplifolia* subsp. *amplifolia* | Cabbage Gum | | |
| *Eucalyptus crebra* | Narrow-leaved Ironbark | | |
| *Eucalyptus eugenioides* | Thin-leaved Stringybark | | |
| *Eucalyptus fibrosa* | Red Ironbark | | |
| *Eucalyptus moluccana* | Grey Box | | |
| *Eucalyptus tereticornis* | Forest Red Gum | | |
| *Euchiton involucratus* | Star Cudweed | | |
| *Euchiton japonicus* | | | |
| *Fimbristylis dichotoma* | Common Fringe-sedge | | |
| *Geranium solanderi* | Native Geranium | | |
| *Glycine clandestina* | Twining glycine | | |
| *Glycine microphylla* | Small-leaf Glycine | | |
| *Glycine tabacina* | Variable Glycine | | |
| *Goodenia hederacea* | Ivy Goodenia | | |
| *Grevillea robusta* | Silky Oak | | |
| *Grevillea robusta* (planted) | Silky Oak | | |
| *Hakea dactyloides* (planted) | Broad-leaved Hakea | | |
| *Indigofera australis* | Australian Indigo | | |
| *Juncus usitatus* | | | |
| *Kunzea ambigua* | Tick Bush | | |
| *Lepidosperma laterale* | | | |
| *Lobelia purpurascens* | Whiteroot | | |
| *Lomandra filiformis* subsp. *filiformis* | | | |
| *Lomandra multiflora* subsp. *multiflora* | Many-flowered Mat-rush | | |
| *Ludwigia peploides subsp. montevidensis* | Water Primrose | | |

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| *Marsdenia viridiflora* subsp. *viridiflora* | Native Pear | | E2 |
| *Marsilea mutica* | Nardoo | | |
| *Marsilea* spp. | A Nardoo | | |
| *Melaleuca decora* | | | |
| *Melaleuca nodosa* | Prickly-leaved Paperbark | | |
| *Mentha diemenica* | Slender Mint | | |
| *Microlaena stipoides* var. *stipoides* | Weeping Grass | | |
| *Opercularia diphylla* | Stinkweed | | |
| *Ottelia ovalifolia* | Swamp Lily | | |
| *Oxalis perennans* | | | |
| *Ozothamnus diosmifolius* | White Dogwood | | |
| *Paspalidium distans* | | | |
| *Paspalum distichum* | Water Couch | | |
| *Persicaria decipiens* | Slender Knotweed | | |
| *Philydrum lanuginosum* | Woolly Frogmouth | | |
| *Plantago debilis* | Shade Plantain | | |
| *Plantago gaudichaudii* | Narrow Plantain | | |
| *Plectranthus parviflorus* | Cockspur flower | | |
| *Poa labillardierei* var. *labillardierei* | Tussock | | |
| *Potamogeton* spp. | | | |
| *Potamogeton tricarinatus* | | | |
| *Ranunculus inundatus* | River Buttercup | | |
| *Rytidosperma tenuius* | A Wallaby Grass | | |
| *Senecio quadridentatus* | Cotton Fireweed | | |
| *Solanum americanum* | Glossy Nightshade | | |
| *Solanum prinophyllum* | Forest Nightshade | | |
| *Sporobolus creber* | Slender Rat's Tail Grass | | |
| *Sporobolus elongatus* | Slender Rat's Tail Grass | | |
| *Stackhousia monogyna* | Creamy Candles | | |
| *Themeda triandra* | | | |
| *Tricoryne simplex* | | | |
| *Triglochin procera* | Water Ribbons | | |
| *Typha orientalis* | Cumbungi | | |

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| *Vernonia cinerea* | | | |
| *Veronica plebeia* | Trailing Speedwell | | |
| *Wahlenbergia communis* | Tufted Bluebell | | |
| *Wahlenbergia stricta* | Tall Bluebell | | |
| *Wurmbea dioica* | Early Nancy | | |
| **Exotic species** | | | |
| *Araujia sericifera* | Moth Vine | | |
| *Asparagus aethiopicus* | Ground Asparagus | | * |
| *Asparagus asparagoides* | Bridal Creeper | | * |
| *Bidens pilosa* | Cobbler's Pegs | | |
| *Bidens subalternans* | Greater Beggar's Ticks | | |
| *Brassica* spp. | Brassica | | |
| *Cenchrus clandestinus* | Kikuyu Grass | | |
| *Chloris gayana* | Rhodes Grass | | |
| *Cirsium vulgare* | Spear Thistle | | |
| *Conyza bonariensis* | Flaxleaf Fleabane | | |
| *Cotoneaster glaucophyllus* | Large-Leaf Cotoneaster | | |
| *Cyperus eragrostis* | Umbrella Sedge | | |
| *Ehrharta erecta* | Panic Veldtgrass | | |
| *Eichhornia crassipes* | Water Hyacinth | | * |
| *Eragrostis curvula* | African Lovegrass | | |
| *Gamochaeta* spp. | | | |
| *Gomphocarpus fruticosus* | Narrow-leaved Cotton Bush | | |
| *Hypochaeris radicata* | Catsear | | |
| *Juncus acutus* | Spiny Rush | | |
| *Lantana camara* | Lantana | | * |
| *Ligustrum lucidum* | Broad-Leaf Privet | | |
| *Ligustrum sinense* | Narrow-Leaf Privet | | |
| *Lycium ferocissimum* | African Boxthorn | | * |
| *Modiola caroliniana* | Red-flowered Mallow | | |
| *Ochna serrulata* | Mickey Mouse Plant | | |
| *Olea europaea* subsp. *cuspidata* | African Olive | | * |
| *Opuntia ficus-indica* | Indian Fig | | |
| *Opuntia stricta* | Common Prickly Pear | | * |

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| *Oxalis corniculata* | Creeping Oxalis | | |
| *Paspalum dilatatum* | Paspalum | | |
| *Phytolacca octandra* | Inkweed | | |
| *Pinus radiata* | Radiata Pine | | |
| *Plantago lanceolata* | Lamb's Tongues | | |
| *Richardia stellaris* | | | |
| *Rubus fruticosus* | Blackberry | | * |
| *Rumex crispus* | Curly Dock | | |
| *Senecio madagascariensis* | Fireweed | | * |
| *Senecio pterophorus* | | | |
| *Senna pendula* var. *glabrata* | Cassia | | |
| *Setaria pumila* | Pale Pigeon Grass | | |
| *Sida rhombifolia* | Paddy's Lucerne | | |
| *Solanum linnaeanum* | Apple of Sodom | | |
| *Solanum nigrum* | Black-berry Nightshade | | |
| *Solanum pseudocapsicum* | Madeira Winter Cherry | | |
| *Solanum seaforthianum* | Climbing Nightshade | | |
| *Solanum sisymbriifolium* | | | |
| *Soliva sessilis* | Bindyi | | |
| *Sonchus oleraceus* | Common Sowthistle | | |
| *Tradescantia fluminensis* | Wandering Jew | | |
| *Verbena bonariensis* | Purpletop | | |
| *Verbena officinalis* | Common Verbena | | |

Flora species recorded from the study area

### Notes to tables

| Status – EPBC Act: | Status – BC Act: |
|---|---|
| CE – Critically Endangered<br>EN – Endangered<br>VU – Vulnerable | E1 – endangered species (Part 1, Schedule 1)<br>E2 – endangered population (Part 2, Schedule 1)<br>E4 – presumed extinct (Part 4, Schedule 1)<br>E4A – critically endangered<br>V – vulnerable (Part 1, Schedule 2) |

**Most recent record**

# - species predicted to occur by the PMST (not recorded on other databases).

## - species predicted to occur based on natural distributional range and suitable habitat despite lack of records in the databases searched.
2017 - recorded during current survey.

Examples of criteria for determining the likelihood of occurrence for threatened entities as a guide for writing the rationale for likelihood have been listed below.

| Likelihood of occurrence | Potential criteria for likely occurrence in study area |
|---|---|
| Recorded | • Recorded in the study area during current assessment.<br>• Records in study area, as indicated by background research. |
| High | • Species/ecological communities recorded in study area during current or previous assessment/s.<br>• Aquatic species recorded from connected waterbodies in close proximity to the study area during current or previous assessment/s.<br>• Sufficient good quality habitat is present in study area or in connected waterbodies in close proximity to the study area (aquatic species).<br>• Study area is within species natural distributional range (if known).<br>• Species has been recorded within five kilometres or from the relevant catchment/basin. |
| Medium | • Records of terrestrial entities within five kilometres of the study area or of aquatic species in the relevant basin/neighbouring basin.<br>• Habitat limited in its capacity to support the species due to extent, quality, or isolation. |
| Low | • No records within five kilometres of the study area or for aquatic species, the relevant basin/neighbouring basin.<br>• Marginal habitat present (low quality and extent).<br>• Substantial loss of habitat since any previous record(s). |
| Negligible | • Habitat not present in study area.<br>• Habitat for aquatic species not present in connected waterbodies in close proximity to the study area.<br>• Habitat present but sufficient targeted survey has been conducted at an optimal time of year and species wasn't recorded. |

Table A.2 Threatened flora species recorded / predicted to occur within 5 kilometres of the study area

| Scientific name | Common name | Conservation status | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| | | EPBC | BC | | | | |
| *Acacia bynoeana* | Bynoe's Wattle | VU | EN | # | Low | No records for the species within 5 km of the study area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Semi prostrate shrub that grows in a variety of communities including; Southern Tableland Dry Sclerophyll Forests, Sydney Hinterland Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands and Sydney Coastal Heaths. Prefers open, slightly disturbed sites on sandy soils. |
| *Acacia pubescens* | Downy Wattle | VU | VU | 1999# | Moderate | Species previously recorded approximately 4 km from the study area however no recent records exist. PCTs within the study area match the habitat requirements for the species. | A spreading shrub that grows in Cooks/River Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland, usually within roadside and bushland remnants. Grows on shale, sandstone, alluvium and gravely soils, often including ironstone. |
| *Allocasuarina glareicola* | | EN | EN | # | Low | No records for the species within 5 km of the study area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Small, depauperate shrub that grows in Castlereagh Woodlands, Cumberland Dry Sclerophyll Forest, Sydney Hinterland Dry Sclerophyll Forest, Sydney Sand Flats Dry Sclerophyll Forests. Grows in lateritic soil. |

| Scientific name | Common name | Conservation status EPBC | Conservation status BC | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| *Cynanchum elegans* | White-flowered Wax Plant | EN | EN | # | Low | No records for the species within 5 km of the study area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Climbing vine that grows in rainforest gully scrub and scree slope on the edge of dry rainforests in a variety of communities including Coastal Floodplain Wetlands, Maritime Grasslands, Coastal Valley Grassy Woodlands and Northern Hinterland Wet Sclerophyll Forests. |
| *Dillwynia tenuifolia* | | | VU | 2019 | Moderate | Species previously recorded approximately 4 km from the study area. PCTs within the study area match the habitat requirements for the species. | Low, spreading shrub that grows in scrubby or heathy areas within a variety of communities including Castlereagh Ironbark Forest, Shale Gravel Transition Forest, Castlereagh Scribbly Gum Woodland and Sydney Hinterland Dry Sclerophyll Forests. Grows on tertiary alluvium, laterised clays and in shale-sandstone transitions. |
| *Genoplesium baueri* | Bauer's Midge Orchid | EN | EN | # | Negligible | No species records within 5 km of the study area. PCTs present within the study area are not associated with the species (DPIE 2022). | Terrestrial orchid with 13 populations totalling 200 plants. Grows on moss gardens in a variety of communities including Sydney Coastal Dry sclerophyll Forests, Sydney Coastal Heaths, Sydney Montane Heaths, Southern Lowland Wet Sclerophyll Forests and Sydney Hinterland Dry Sclerophyll Forests. Grows on sandstone substrates |
| *Grevillea juniperina* | Juniper-leaved | | VU | 2020 | Moderate | Closest record is approximately 6 km north- | Spreading to erect medium sized shrub that grows at elevations <50 m in Cumberland |

| Scientific name | Common name | Conservation status EPBC | Conservation status BC | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| subsp. *juniperina* | Grevillea | | | | | east of the study area. PCTs within the study area match the habitat requirements for the species. | Plain Woodland, Castlereagh Ironbark Forest, Castlereagh Scribbly Gum Woodland, Shale/Gravel Transition Forest, Sydney Sand Flats Dry Sclerophyll Forests and Coastal Valley Grassy Woodlands. Grows in sandy to clay loam soils and red pseudolateritic gravels derived from Wianamatta Shale and Tertiary Alluvium. |
| *Grevillea parviflora* subsp. *parviflora* | Small-flower Grevillea | VU | VU | 2018# | Moderate | Closest record is approximately 6 km north-east of the study area. PCTs within the study area match the habitat requirements for the species. | Low spreading to erect shrub that grows in Shale Sandstone Transition Forest, Kurri Sand Swamp Woodland, Corymbia maculata - Angophora costata Open Forest in the Dooralong Area, Sydney Sandstone Ridgetop Woodland at Wedderburn and Cooks River/Castlereagh Ironbark Forest at Kemps Creek. Grows in sandy or light clay soils including tertiary alluviums over thin shales and lateritic ironstone gravels. |
| *Haloragis exalata* subsp. *exalata* | Square Raspwort | VU | VU | # | Low | No records for the species within 5 km of the study area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Small to medium sized shrub that grows in damp, protected and shaded areas in riparian zones in a variety of communities including South East Dry Sclerophyll Forests, Coastal Floodplain Wetlands, Montane Bogs and Fens and Northern Warm Temperate Rainforests. |

| Scientific name | Common name | Conservation status EPBC | Conservation status BC | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| *Macadamia integrifolia* | Macadamia Nut | VU | | 2018 | Negligible | Species is not known to occur naturally in the wild in NSW. Records in the locality are likely to be related to planted individuals or garden escapees. | Medium sized tree that occurs in the Northern Rivers region of NSW in remnant rainforest, mixed notophyll forest and rainforest margins. |
| *Marsdenia viridiflora* subsp. *viridiflora* | Native Pear | | E2 | 2019 | Recorded | Species detected in study area during survey (Biosis 2020, 2021a). | Slender climber with twining stems that grows in vine thickets and open shale woodland in a variety of communities including Cumberland Dry Sclerophyll Forests, Coastal Floodplains Wetlands, Coastal Valley Grassy Woodlands and Dry Rainforests. |
| *Persicaria elatior* | Tall Knotweed | VU | VU | # | Low | No records for the species within 5 km of the study area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Erect herb that grows in damp places usually on the margins of waterbodies and in swamp forests in a variety of communities including Coastal Floodplain Wetlands, Coastal Swamp Forests, Eastern Riverine Forests, Coastal Freshwater Lagoons and Coastal Heath Swamps. |
| *Persoonia hirsuta* | Hairy Geebung | EN | EN | # | Low | No records for the species within 5 km of the study area. Species was not detected during field | Spreading, hairy shrub that grows at elevations between 350 - 600 metres in a variety of communities including Southern Tableland Dry Sclerophyll Forests, Sydney |

| Scientific name | Common name | Conservation status EPBC | BC | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| | | | | | | investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Hinterland Dry Sclerophyll Forests, Western Slopes Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands, Sydney Coastal Heaths and Southern Escarpment Wet Sclerophyll Forests. Grows in sandy soils on sandstone substrates. |
| *Persoonia nutans* | Nodding Geebung | EN | EN | 2018# | Moderate | Closest record is approximately 5 km north-east of the study area. PCTs within the study area match the habitat requirements for the species. | Erect or spreading shrub that grows in Cumberland Dry Sclerophyll Forests including Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland, Cooks River/Castlereagh Ironbark Forest and Shale-Sandstone Transition Forest as well as Sydney Sand Flats Dry Sclerophyll Forests and Coastal Valley Grassy Woodlands. Grows in sandy soils derived from aeolian or alluvial sediments as well as in tertiary alluviums to the south of its range. |
| *Pimelea spicata* | Spiked Rice-flower | EN | EN | 2017# | Moderate | Closest record is approximately 4 km north-west of the study area within the footprint Western Sydney International Airport. PCTs within the study area match the habitat requirements for the species. | Small erect or spreading shrub that grows in Maritime Grasslands and Coastal Valley Grassy Woodlands including Cumberland Plain Woodlands and Moist Shale Woodlands within the Cumberland Basin and in Coast Banksia Open Woodland Coastal Grasslands in the Illawarra region. Grows on well-structured clay soils. |

| Scientific name | Common name | Conservation status EPBC | BC | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| *Pomaderris brunnea* | Brown Pomaderris | VU | EN | # | Low | No records for the species within 5 km of the study area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Medium sized shrub that grows on floodplains and creeklines in a variety of communities including Sydney Hinterland Dry Sclerophyll Forests, Central Gorge Dry Sclerophyll Forests, Coastal Floodplain Wetlands, Coastal Valley Grasslands and North Coast Wet Sclerophyll Forests. Grows in clay and alluvial soils. |
| *Pterostylis saxicola* | Sydney Plains Greenhood | EN | EN | # | Low | No records for the species within 5 km of the study area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Deciduous terrestrial orchid that grows near streams in depression on sandstone rock shelves above cliff lines faces, moist, sheltered ridges and creek banks on mossy rocks in Temperate Montane Grasslands, Northern Warm Temperate Rainforests, Southern Warm Temperate Rainforests and Southern Tableland Wet Sclerophyll Forests. Grows in small pockets of shallow shale or shale/sandstone transition soils over sandstone substrates. |
| *Pultenaea parviflora* | | VU | EN | 1999# | Low | Closest record occurs 4 km to the north-east of the study area and was recorded in 1999. Several closer records exist approximately 3.5 km to the north-west (recorded in 1996 and 1999). These occur within the footprint | Small erect, branching shrub found growing in Cumberland Dry Sclerophyll Forests including Castlereagh Ironbark Forest, Shale Gravel Transition Forest and Castlereagh Scribbly Gum Woodland, Sydney Coastal Dry Sclerophyll Forests, Sydney Sand Flats Dry Sclerophyll Forests, Coastal Valley Grassy Woodlands and Southern Lowland Wet Sclerophyll Forests. Grows in soils derived |

| Scientific name | Common name | Conservation status EPBC | BC | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| | | | | | | of the Western Sydney International Airport and are likely no longer present following significant earthworks in this area. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | from Wianamatta shale, laterite or alluvium. |
| *Syzygium paniculatum* | Magenta Lilly Pilly | VU | EN | 1977# | Negligible | No recent records for the species within 5 km. PCTs present within the study area are not associated with the species (DPIE 2022). Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Small to medium sized rainforest tree found growing on stabilized dunes near the sea in South Coast Sands Dry Sclerophyll Forests, Coastal Swamp Forests, Coastal Headland Heaths, Littoral Rainforests, Northern Hinterland Wet Sclerophyll Forests and Southern Lowland Wet Sclerophyll Forests. Grows on grey sandy, gravelly, silty or clay soils over sandstone substrates. |
| *Thelymitra kangaloonica* | Kangaloon Sun Orchid | CR | CR | # | Negligible | No records for the species within 5 km. PCTs present within the study area are not associated with the species (DPIE 2022). Species was not detected | Terrestrial orchid found growing in swamps and sedgelands at elevations between 550 and 700 metres in Temperate Highland Peat Swamps on Sandstone, Coastal Heath Swamps and Montane Bogs and Fens. A cryptic species which is most visible when |

| Scientific name | Common name | Conservation status EPBC | BC | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|
| | | | | | | during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | flowering between late October and early November. Grows in grey silty or grey loam soils. |
| *Thesium australe* | Austral Toadflax | VU | VU | # | Low | No records for the species within 5 km. Species was not detected during field investigations however targeted survey was not undertaken (Biosis 2020, 2021a). | Small, straggling herb. A root parasite found growing on damp sites in grassland, grassy woodlands and coastal headlands often in association with Kangaroo Grass Themeda triandra in a variety of communities including New England Dry Sclerophyll Forests, Western Slopes Grasslands, Northern Tableland Wet Sclerophyll Forests, Brigalow Clay Plain Woodlands, Subalpine Woodlands and Maritime Grasslands. |

# Appendix 2 – Fauna

Flora species recorded from the study area

### Notes to tables

| | |
|---|---|
| **Status – EPBC Act:**<br>CE – Critically Endangered<br>EN – Endangered<br>VU – Vulnerable | **Status – BC Act:**<br>E1 – endangered species (Part 1, Schedule 1)<br>E2 – endangered population (Part 2, Schedule 1)<br>E4 – presumed extinct (Part 4, Schedule 1)<br>E4A – critically endangered<br>V – vulnerable (Part 1, Schedule 2) |
| **Status – FM Act:**<br>C1 – critically endangered<br>E1 – endangered<br>E2 – endangered<br>E4 – presumed extinct<br>V1 – vulnerable | **Status – Non-indigenous species**<br>* pest species not native to the area |

Table A.3 Vertebrate fauna species recorded from the study area (current assessment)

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| **Birds** | | | |
| *Cracticus tibicen* | Australian Magpie | | |
| *Corvus coronoides* | Australian Raven | | |
| *Threskiornis moluccus* | Australian White Ibis | | |
| *Chenonetta jubata* | Australian Wood Duck | | |
| *Coracina novaehollandiae* | Black-faced Cuckoo-shrike | | |
| *Anas castanea* | Chestnut Teal | | |
| *Acridotheres tristis* | Common Myna | | |
| *Sturnus vulgaris* | Common Starling | | |
| *Ocyphaps lophotes* | Crested Pigeon | | |
| *Gallinula tenebrosa* | Dusky Moorhen | | |
| *Platycercus eximius* | Eastern Rosella | | |
| *Turdus merula* | Eurasian Blackbird | | |
| *Fulica atra* | Eurasian Coot | | |
| *Eolophus roseicapilla* | Galah | | |
| *Great Egret* | Great Egret | | |
| *Rhipidura albiscapa* | Grey Fantail | | |

| Scientific name | Common name | Commonwealth status | NSW status |
|---|---|---|---|
| *Dacelo novaeguineae* | Laughing Kookaburra | | |
| *Grallina cyanoleuca* | Magpie-lark | | |
| *Vanellus miles* | Masked Lapwing | | |
| *Falco cenchroides* | Nankeen Kestrel | | |
| *Manorina melanocephala* | Noisy Miner | | |
| *Anas superciliosa* | Pacific Black Duck | | |
| *Porphyrio porphyrio* | Purple Swamphen | | |
| *Anthochaera carunculata* | Red Wattlebird | | |
| *Neochmia temporalis* | Red-browed Finch | | |
| *Psephotus haematonotus* | Red-rumped Parrot | | |
| *Myzomela sanguinolenta* | Scarlet Honeyeater | | |
| *Malurus cyaneus* | Superb Fairy-wren | | |
| *Egretta novaehollandiae* | White-faced Heron | | |
| *Rhipidura leucophrys* | Willie Wagtail | | |
| **Mammals** | | | |
| *Macropus giganteus* | Eastern Grey Kangaroo | | |
| *Oryctolagus cuniculus* | Rabbit | * | * |
| *Trichosurus vulpecula* | Common Brushtail Possum | | |
| *Vulpes vulpes* | Fox | * | * |
| *Wallabia bicolor* | Swamp Wallaby | | |
| **Frogs** | | | |
| *Crinia signifera* | Common Eastern Froglet | | |
| *Limnodynastes tasmaniensis* | Spotted Grass Frog | | |

Fauna species recorded from the study area

## Notes to tables

| Status – EPBC Act: | Status – BC Act: |
|---|---|
| CE – Critically Endangered<br>EN – Endangered<br>VU – Vulnerable | E1 – endangered species (Part 1, Schedule 1)<br>E2 – endangered population (Part 2, Schedule 1)<br>E4 – presumed extinct (Part 4, Schedule 1)<br>E4A – critically endangered<br>V – vulnerable (Part 1, Schedule 2) |

**Most recent record**

# - species predicted to occur by the PMST (not recorded on other databases).

## - species predicted to occur based on natural distributional range and suitable habitat despite lack of records in the databases searched.
2017 - recorded during current survey.

Examples of criteria for determining the likelihood of occurrence for threatened entities as a guide for writing the rationale for likelihood have been listed below.

| Likelihood of occurrence | Potential criteria for likely occurrence in study area |
|---|---|
| Recorded | • Recorded in the study area during current assessment.<br>• Records in study area, as indicated by background research. |
| High | • Species/ecological communities recorded in study area during current or previous assessment/s.<br>• Aquatic species recorded from connected waterbodies in close proximity to the study area during current or previous assessment/s.<br>• Sufficient good quality habitat is present in study area or in connected waterbodies in close proximity to the study area (aquatic species).<br>• Study area is within species natural distributional range (if known).<br>• Species has been recorded within five kilometres or from the relevant catchment/basin. |
| Medium | • Records of terrestrial entities within five kilometres of the study area or of aquatic species in the relevant basin/neighbouring basin.<br>• Habitat limited in its capacity to support the species due to extent, quality, or isolation. |
| Low | • No records within five kilometres of the study area or for aquatic species, the relevant basin/neighbouring basin.<br>• Marginal habitat present (low quality and extent).<br>• Substantial loss of habitat since any previous record(s). |
| Negligible | • Habitat not present in study area.<br>• Habitat for aquatic species not present in connected waterbodies in close proximity to the study area.<br>• Habitat present but sufficient targeted survey has been conducted at an optimal time of year and species wasn't recorded. |

Table A.4 Threatened fauna species recorded, or predicted to occur, within 5 kilometres of the study area

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| **Mammals** | | | | | | | | |
| *Chalinolobus dwyeri* | Large-eared Pied Bat | VU | VU | - | 2008# | Transient / nomadic | No breeding habitat (caves, karsts, mining shafts, etc.) or known roosting sites occur within the study are or immediate surrounds. Species may forage in the study area but is highly mobile and not considered resident. | Primarily found in dry sclerophyll forests and woodlands, but also found in rainforest fringes and subalpine woodlands. Forages on small, flying insects below the forest canopy. Roosts in colonies of between three and 80 in caves, Fairy Martin nests and mines, and beneath rock overhangs, but usually less than 10 individuals. Likely that it hibernates during the cooler months. The only known existing maternity roost is in a sandstone cave near Coonabarabran. |
| *Dasyurus maculatus maculatus* (SE mainland population) | Spotted-tail Quoll | EN | | - | # | Low | No records within 5 km. Study area occurs in a peri-urban environment, already fragmented by major roads. The species require large, relatively intact home ranges which is unlikely to be provided by the study area. | Uses a range of habitats including sclerophyll forests and woodlands, coastal heathlands and rainforests. Occasional sightings have been made in open country, grazing lands, rocky outcrops and other treeless areas. Habitat requirements include suitable den sites, including hollow logs, rock crevices and caves, an abundance of food and an area of intact vegetation in which to forage. Seventy per cent of the diet is medium-sized mammals, and also feeds on invertebrates, reptiles and birds. Individuals require large areas of relatively intact vegetation through |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | which to forage. The home range of a female is between 180 and 1000 ha, while males have larger home ranges of between 2000 and 5000 ha. Breeding occurs from May to August. |
| *Falsistrellus tasmaniensis* | Eastern False Pipistrelle | | VU | - | 2010 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may also utilise the study area for foraging. | Prefers wet high-altitude sclerophyll and coastal mallee habitat, preferring wet forests with a dense understorey but being found in open forests at lower altitudes. Apparently hibernates in winter. Roosts in tree hollows and sometimes in buildings in colonies of between 3 and 80 individuals. Often change roosts every night. Forages for beetles, bugs and moths below or near the canopy in forests with an open structure, or along trails. Has a large foraging range, up to 136 ha. Records show movements of up to 12 km between roosting and foraging sites. |
| *Micronomus norfolkensis* | Eastern Coastal Free-tailed Bat | | VU | - | 2019 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may also utilise the study area for foraging. | Most records are from dry eucalypt forests and woodland. Individuals tend to forage in natural and artificial openings in forests, although it has also been caught foraging low over a rocky river within rainforest and wet sclerophyll forest habitats. The species generally roosts in hollow spouts of large mature eucalypts (including paddock trees), although individuals have been recorded roosting in the roof of a hut, in wall cavities, |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
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| | | EPBC | BC | FM | | | | |
| | | | | | | | | and under metal caps of telegraph poles. Foraging generally occurs within a few kilometres of roosting sites. |
| *Miniopterus australis* | Little Bent-winged Bat | | VU | - | 2017 | Transient / nomadic | No breeding habitat (caves, karsts, mining shafts, etc.) or known roosting sites occur within the study are or immediate surrounds. Species may forage in the study area but is highly mobile and not considered resident. | Roost sites encompass a range of structures including caves, tunnels and stormwater drains. Young are raised by the females in large maternity colonies in caves in summer. Shows a preference for well-timbered areas including rainforest, wet and dry sclerophyll forests, Melaleuca swamps and coastal forests. The Little Bent-wing bat forages for small insects (such as moths, wasps and ants) beneath the canopy of densely vegetated habitats. |
| *Miniopterus orianae oceanensis* | Large Bent-winged Bat | | VU | - | 2017 | Transient / nomadic | No breeding habitat (caves, karsts, mining shafts, etc.) or known roosting sites occur within the study are or immediate surrounds. Species may forage in the study area but is highly mobile and not considered resident. | Forms large maternity roosts (up to 100,000 individuals) in caves and mines in spring and summer. Individuals may fly several hundred kilometres to their wintering sites, where they roost in caves, culverts, buildings, and bridges. They occur in a broad range of habitats including rainforest, wet and dry sclerophyll forest, paperbark forest and open grasslands. Has a fast, direct flight and forages for flying insects (particularly moths) above the tree canopy and along waterways. |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| *Myotis macropus* | Southern Myotis | | VU | - | 2019 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may also utilise the study area for foraging. | Roosts in caves, mines or tunnels, under bridges, in buildings, tree hollows, and even in dense foliage. Colonies occur close to water bodies, ranging from rainforest streams to large lakes and reservoirs. They catch aquatic insects and small fish with their large hind claws, and also catch flying insects. |
| *Petauroides volans* | Greater Glider | VU | | - | 2018# | Medium | Species has been recorded within 5 km of the study area. Eucalyptus feed trees within the study area may be utilised as foraging resources. Hollow-bearing trees represent potential breeding habitat. Poor connectivity with other remnant vegetation patches across the landscape limits usage for the species. | Greater Gliders inhabit a variety of eucalypt forests and woodlands. Presence and density of Greater Gliders is related to soil fertility, eucalypt tree species, disturbance history and density of suitable tree hollows. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. |
| *Petrogale penicillata* | Brush-tailed Rock-wallaby | VU | EN | - | # | Negligible | Areas with ledges, caves and crevices preferred by the | Habitats range from rainforest to open woodland. It is found in areas with numerous ledges, caves and crevices particularly with |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | species are absent from the study area. | northern aspects. The species forages on grasses and forbs. |
| *Phascolarctos cinereus* | Koala | EN | VU | - | 2018# | Medium | Species has been recorded within 5 km of the study area. Eucalyptus feed trees within the study area may be utilised as foraging resources. Poor connectivity with other remnant vegetation patches across the landscape limits usage for the species. | Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. 65 feed tree species are identified for the Central Coast Koala Management Area which includes the study area. Numerous species are considered primary feed trees *include Eucalyptus robusta*, *E. tereticornis, E. punctata, E. haemastoma* and *E. signata*. Koalas are solitary with varying home ranges. |
| *Pseudomys novaehollandiae* | New Holland Mouse | VU | | - | # | Negligible | Species has not been recorded within the study area or surrounding locality. Closest record is approximately 20 km to the east in a substantial patch of native vegetation surrounding the Holsworthy (Military) Airport. No records of the species occur within any | Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes. The home range of the New Holland Mouse can range from 0.44 ha to 1.4 ha. The New Holland Mouse is a social animal, living predominantly in burrows shared with other individuals. The species is nocturnal and omnivorous, feeding on seeds, insects, leaves, flowers and fungi, and is therefore likely to play an important role in seed dispersal and fungal spore dispersal. It is |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
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| | | EPBC | BC | FM | | | | |
| | | | | | | | urbanised areas of the Cumberland Plain. | likely that the species spends considerable time foraging above-ground for food, predisposing it to predation by native predators and introduced species. Breeding typically occurs between August and January, but can extend into autumn. |
| *Pteropus poliocephalus* | Grey-headed Flying-fox | VU | VU | - | 2019# | Transient / nomadic | No camps for the species occur within the study area or immediate locality. The closest known camp is located approximately 13 kilometres to the south-east at Macquarie Fields. Species may utilise the study area for foraging habitat but is not considered resident. | This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Roosts in large colonies, commonly in dense riparian vegetation. |
| *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat | | VU | - | 2017 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may also utilise the study | Habitats include wet and dry sclerophyll forest, open woodland, acacia shrubland, mallee, grasslands and desert. They roost in tree hollows in colonies and have also been observed roosting in animal burrows, abandoned Sugar Glider nests, cracks in dry clay, hanging from buildings and under slabs of rock. Forages for insects above the canopy |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | area for foraging. | in forests. |
| *Scoteanax rueppellii* | Greater Broad-nosed Bat | | VU | - | 2017 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may also utilise the study area for foraging. | Occurs in woodland and rainforest, preferring open habitats or openings in wetter forests. Often hunts along creeks or river corridors. Preys upon beetles and other large, flying insects, other bats and spiders. Roosts in hollow tree trunks and branches. |
| **Birds** | | | | | | | | |
| *Anthochaera phrygia* | Regent Honeyeater | CR | CR | - | # | Transient / nomadic | No records for the species occur within the study area or surrounding locality. Habitat critical to the survival of the species is included in the species' national recovery plan (Commonwealth of Australia 2016). These areas are also included in the BAM – Important Area Maps. The closest important area for the | Regent Honeyeaters are semi-nomadic, occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Nectar and fruit from mistletoes are also eaten. This species usually nest in tall mature eucalypts and sheoaks. |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | species is approximately 39 km to the south-west, associated with the Nattai and Yerranderie conservation areas. There is a low probability that the species will utilise the study area for foraging, however it is not considered resident. | |
| *Artamus cyanopterus cyanopterus* | Dusky Woodswallow | | VU | - | 2019 | Medium | Species has been recorded within 5 km of the study area. Habitats within the study area represent potential foraging and roosting habitat. | Primarily inhabits 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. |
| *Botaurus poiciloptilus* | Australasian Bittern | EN | EN | - | 2010# | Medium | Species has been recorded within 5 km of the study area. Wetland vegetation within the study area represents | Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including *Typha* spp. and *Eleoacharis* spp.. Typically, this bird forages at night on frogs, fish and invertebrates, and remains |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| | | | | | | | potential habitat. | inconspicuous during the day. The breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds. |
| *Calidris ferruginea* | Curlew Sandpiper | CR | EN | - | # | Negligible | Species has not been recorded within the locality. Species is associated with intertidal areas as well as swamps, lagoons and lakes. Habitat for the species does not occur within the study area. | Inhabits sheltered intertidal mudflats. Also non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland. |
| *Callocephalon fimbriatum* | Gang-gang Cockatoo | EN | VU | - | 2018 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may also utilise the study area for foraging. | In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine Snow Gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed. |
| *Chthonicola* | Speckled | | VU | - | 2013 | Medium | Species has been recorded within 5 km of | Found in eucalypt and cypress woodlands with a grassy understorey, often on ridges or |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| *sagittata* | Warbler | | | | | | the study area. Habitats within the study area represent potential foraging and roosting habitat. | gullies. The species nests on the ground in grass tussocks, dense litter and fallen branches. They forage on the ground for arthropods and seeds. |
| *Circus assimilis* | Spotted Harrier | | VU | - | 2017 | Transient / nomadic | Species has been recorded within 5 km of the study area. Habitats within the study area represent marginal foraging habitat. Species typically inhabits drier inland areas. | The Spotted Harrier is found throughout Australia but rarely in densely forested and wooded habitat of the escarpment and coast. Preferred habitat consists of open and wooded country with grassland nearby for hunting. Habitat types include open grasslands, acacia and mallee remnants, spinifex, open shrublands, saltbush, very open woodlands, crops and similar low vegetation. The Spotted Harrier is more common in drier inland areas, nomadic part migratory and dispersive, with movements linked to the abundance of prey species. Nesting occurs in open or remnant woodland and unlike other harriers, the Spotted Harrier nests in trees. |
| *Daphoenositta chrysoptera* | Varied Sittella | | VU | - | 2015 | Medium | Species has been recorded within 5 km of the study area. Habitats within the study area represent potential foraging and | The Varied Sittella is a sedentary species which inhabits a wide variety of dry eucalypt forests and woodlands, usually with either shrubby understorey or grassy ground cover or both, in all climatic zones of Australia. Usually inhabit areas with rough-barked trees, such as stringybarks or ironbarks, but |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| | | | | | | | roosting habitat. | also in mallee and acacia woodlands, paperbarks or mature Eucalypts. The Varied Sittella feeds on arthropods gleaned from bark, small branches and twigs. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. |
| *Glossopsitta pusilla* | Little Lorikeet | | VU | - | 2017 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may also utilise the study area for foraging. | Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes. |
| *Grantiella picta* | Painted Honeyeater | VU | VU | - | # | Transient / nomadic | Species has not been recorded in the locality. Almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland (DPIE 2022). Species may utilise the study area for foraging but is | Found mainly in dry open woodlands and forests, where it is strongly associated with mistletoe. Often found on plains with scattered eucalypts and remnant trees on farmlands. |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | highly mobile and not considered resident. | |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | | VU | - | 2019 | Transient / nomadic | Species has been recorded within 5 km of the study area. Species builds large stick nests for breeding and is highly selective in its nesting locations. No large stick nests that would indicate presence of a breeding pair of the species were found within the study area. Species may utilise the study area for foraging but is highly mobile not considered resident. | A migratory species that is generally sedentary in Australia, although immature individuals and some adults are dispersive. Found in terrestrial and coastal wetlands; favouring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes. It hunts over open terrestrial habitats. Feeds on birds, reptiles, fish, mammals, crustaceans and carrion. Roosts and makes nest in trees. |
| *Hieraaetus morphnoides* | Little Eagle | | VU | - | 2019 | Moderate | Species has been recorded within 5 km of the study area. Species builds large stick nests for breeding and is highly selective in its nesting locations. No large stick nests that would indicate | The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests. |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | presence of a breeding pair of the species were found within the study area. Species may utilise the study area for foraging. | |
| *Hirundapus caudacutus* | White-throated Needletail | VU | | - | 2010# | Transient/ nomadic | Species has been recorded within 5 km of the study area. Species breeds overseas. Species may utilise the study area for foraging habitat but is highly mobile and not considered resident. | An aerial species found in feeding concentrations over cities, hilltops and timbered ranges. Breeds in Asia. |
| *Ixobrychus flavicollis* | Black Bittern | | VU | - | 2000 | Low | No recent species records within the locality. Wetland within the study area may provide foraging habitat for the species but is not considered optimal habitat. Species is considered primarily a vagrant to NSW (DPIE 2022). | It inhabits terrestrial and estuarine wetlands such as flooded grasslands, forests, woodlands, rainforests and mangroves with permanent water and dense waterside vegetation. The Black Bittern typically roosts on the ground or in trees during the day and forages at night on frogs, reptiles, fish and invertebrates. The breeding season extends from December to March. Nests are constructed of reeds and sticks in branches overhanging the water. |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| *Lathamus discolor* | Swift Parrot | CR | EN | - | 2019# | Transient / nomadic | Species has been recorded within 5 km of the study area. BAM Important Area Maps for the species identify an area of critical habitat approximately 3 km south-west of the study area however no such areas occur within the study area. The species may utilise the study area for foraging however these habitats are not considered to be preferred by the species. | The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability. |
| *Lophoictinia isura* | Square-tailed Kite | | VU | - | 2019 | Moderate | Species has been recorded within 5 km of the study area. Species builds large stick nests for breeding and is highly selective in its nesting locations. No large stick nests that would indicate presence of a breeding pair of the species were found within the study | Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by *Eucalyptus longifolia*, *Corymbia maculata*, *E. elata*, or *E. smithii*. Individuals appear to occupy large hunting ranges of more than 100 km2. They require large living trees for breeding, particularly near water with surrounding woodland /forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| | | | | | | | area. Species may utilise the study area for foraging. | fork or on large horizontal limbs. |
| *Melanodryas cucullata cucullata* | Hooded Robin (south-eastern form) | | VU | - | 1990 | Low | No recent records for the species within the locality. Whilst species has a wide distribution it is seldom found in coastal areas (DPIE 2022). Species is unlikely to occur within the study area. | This species lives in a wide range of temperate woodland habitats, and a range of woodlands and shrublands in semi-arid areas. |
| *Melithreptus gularis gularis* | Black-chinned Honeyeater (eastern subspecies) | | VU | - | 2013 | Medium | Species has been recorded within 5 km of the study area. Habitats within the study area represent potential foraging and roosting habitat. | Found mostly in open forests and woodlands dominated by box and ironbark eucalypts. |
| *Neophema pulchella* | Turquoise Parrot | | VU | - | 2010 | Medium | Species has been recorded within 5 km of the study area. Hollow-bearing trees in the study area may provide roosting habitat for the species. Species may | Occurs in open woodlands and eucalypt forests with a ground cover of grasses and understorey of low shrubs. Generally found in the foothills of the Great Divide, including steep rocky ridges and gullies. Nest in hollow-bearing trees, either dead or alive; also in hollows in tree stumps. Prefer to |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | also utilise the study area for foraging. | breed in open grassy forests and woodlands, and gullies that are moist. |
| *Numenius madagascariensis* | Eastern Curlew | CR | | - | # | Negligible | Species has not been recorded within the locality. Species is typically found in intertidal habitats and estuaries. Habitat for the species is not present within the study area. | Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass. |
| *Pandion cristatus* | Eastern Osprey | | VU | - | # | Negligible | Species has not been recorded within the locality. Species is typically found in intertidal habitats and estuaries. The species builds distinctive nests which were not detected within the study area. Habitat for the species is not present within the study area. | Found in coastal waters, inlets, estuaries and offshore islands. Occasionally found 100 km inland along larger rivers. It is water-dependent, hunting for fish in clear, open water. The Osprey occurs in terrestrial wetlands, coastal lands and offshore islands. It is a predominantly coastal species, generally using marine cliffs as nesting and roosting sites. Nests can also be made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. |
| *Petroica boodang* | Scarlet Robin | | VU | - | 2012 | Medium | Species has been recorded within 5 km of | The Scarlet Robin inhabits dry eucalypt forests and woodlands. The understorey is |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | the study area. The species preferred habitat of dry eucalypt forests and woodlands with open and grassy understorey is present within the study area. | usually open and grassy with few scattered shrubs. During autumn and winter it moves to more open and cleared areas. The Scarlet Robin forages amongst logs and woody debris for insects. The nest is an open cup of plant fibres and cobwebs, sited in the fork of a tree. |
| *Petroica phoenicea* | Flame Robin | | VU | - | 2004 | Transient / nomadic | Species has been recorded within 5 km of the study area, however record is over 15 years old. Breeding habitat for the species is typically in tall moist eucalypt forests and woodlands, located on ridges and slopes which are not present within the study area. May utilise the study area as foraging habitat but the highly mobile species is not considered resident. | Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The preferred habitat in summer includes moist eucalyptus forests and open woodlands, in winter prefers open woodlands and farmlands. It is considered migratory. Diet consists mainly of invertebrates. |
| *Rostratula australis* | Australian Painted Snipe | EN | EN | - | # | Low | No records for the species within 5 km of the study area. Wetland and farm dam habitats | Usually found in shallow inland wetlands including farm dams, lakes, rice crops, swamps and waterlogged grassland. They prefer freshwater wetlands but have been |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | present within the study area are considered to be marginal habitat for the species. | recorded in brackish waters. Forages on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter. |
| *Stictonetta naevosa* | Freckled Duck | | VU | - | 2018 | Low | Species has been recorded within the locality, however the wetland and farm dam habitats present within the study area are considered to be marginal habitat only. Permanent fresh swamps or open lakes preferred by the species are not present. | The Freckled Duck breeds in permanent fresh swamps that are heavily vegetated. Found in fresh or salty permanent open lakes, especially during drought. Often seen in groups on fallen trees and sand spits. |
| **Frogs** | | | | | | | | |
| *Heleioporus australiacus* | Giant Burrowing Frog | VU | VU | - | # | Low | Species has not been recorded in the locality. Preferred habitat of hanging swamp on sandstone shelves are no present in the study area. Sandy creek | Prefers hanging swamps on sandstone shelves adjacent to perennial non-flooding creeks. Can also occur within shale outcrops within sandstone formations. Known from wet and dry forests and montane woodland in the southern part range. Individuals can be found around sandy creek banks or foraging along |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| | | | | | | | banks and ridge-tops are also absent. | ridge-tops during or directly after heavy rain. Males often call from burrows located in sandy banks next to water. Spends the majority of its time in non-breeding habitat 20-250m from breeding sites. |
| *Litoria aurea* | Green and Golden Bell Frog | VU | EN | - | # | Low | No records within 5 km of the study area. Closest record is located approximately 7 km north-west of the study area in Luddenham. Significant barriers to dispersal exist between the nearest record and the study area due to the peri-urban nature of the landscape. | Most existing locations for the species occur as small, coastal, or near coastal populations. The species is found in marshes, dams and stream sides, particularly those containing bullrushes or spikerushes. Preferred habitat contains water bodies that are unshaded, are free of predatory fish, have a grassy area nearby and have diurnal sheltering sites nearby such as vegetation or rocks, although the species has also been recorded from highly disturbed areas including disused industrial sites, brick pits, landfill areas and cleared land. Breeding usually occurs in summer. Tadpoles, which take approximately 10-12 weeks to develop, feed on algae and other vegetative matter. Adults eat insects as well as other frogs, including juveniles of their own species. |
| **Fish** | | | | | | | | |
| *Macquaria* | Macquarie | EN | | EN | # | Negligible | No records for the species occur within | Macquarie perch are found in both river and lake habitats, especially the upper reaches of |

| Scientific name | Common name | Conservation status EPBC | BC | FM | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| *australasica* | Perch | | | | | | the locality. Riverine and lake habitats required by the species do not occur within the study area. Mapped habitat for the species on the Fisheries NSW Spatial Data Portal (DPI 2023) do not occur in the study area. Species was not detected during fish surveys conducted along Moore Gully within the study area (Biosis 2021b). | rivers and their tributaries |
| *Prototroctes maraena* | Australian Grayling | VU | | EN | # | Negligible | No records for the species occur within the locality. Mapped habitat for the species on the Fisheries NSW Spatial Data Portal (DPI 2023) do not occur in the study area. Species was not detected during fish surveys conducted along Moore Gully within the study area (Biosis 2021b). | Grayling is a diadromous species; migrating between freshwater streams and the ocean. This species has been found in clear, gravel-bottomed streams with alternating pools and riffles, and granite outcrops, and also in muddy-bottomed, heavily silted habitats. |

| Scientific name | Common name | Conservation status | | | Most recent record | Likely occurrence in study area | Rationale | Habitat description |
|---|---|---|---|---|---|---|---|---|
| | | EPBC | BC | FM | | | | |
| **Gastropods** | | | | | | | | |
| *Meridolum corneovirens* | Cumberland Plain Land Snail | | EN | - | 2021 | High | Species has been previously recorded within the locality (Eco Logical Australia 2020).. | Most likely restricted to Cumberland Plain, Castlereagh Woodlands and boundaries between River-flat Forest and Cumberland Plain Woodland. It is normally found beneath logs, debris and amongst accumulated leaf and bark particularly at the base of trees. May also use soil cracks for refuge. |
| **Insects** | | | | | | | | |
| *Synemon plana* | Golden Sun Moth | CR | EN | - | # | Negligible | No records for the species occur within the locality. Habitat does not occur on site. Outside of species distribution. | Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands, with ground layer dominated by wallaby grasses of the genus Austrodanthonia. |

* - habitat descriptions have been adapted by qualified ecologists from the DEE Species Profile and Threats (SPRAT) Database, OEH Threatened Species online profiles and the NSW Scientific Committee final determinations for listed species, references within the above table are provided within the report reference list.

### Migratory species (EPBC Act listed)

The following table includes a list of migratory species that have potential to occur within the study area. The list is based on database searches outlined in Section 5.1.

**Notes to tables:**

Most recent record
# species predicted to occur by the PMST (not recorded on other databases).

**Table A.5 Migratory fauna species recorded or predicted to occur within 5 kilometres of the study area**

| Scientific name | Common name | Most recent record |
|---|---|---|
| *Actitis hypoleucos* | Common Sandpiper | # |
| *Apus pacificus* | Fork-tailed Swift | # |
| *Ardea ibis* | Cattle Egret | 2010 |
| *Calidris acuminata* | Sharp-tailed Sandpiper | # |
| *Calidris ferruginea* | Curlew Sandpiper | # |
| *Calidris melanotos* | Pectoral Sandpiper | # |
| *Gallinago hardwickii* | Latham's Snipe | 2017# |
| *Haliaeetus leucogaster* | White-bellied Sea-Eagle | 2018 |
| *Hirundapus caudacutus* | White-throated Needletail | 2010# |
| *Merops ornatus* | Rainbow Bee-eater | 2008 |
| *Motacilla flava* | Yellow Wagtail | # |
| *Numenius madagascariensis* | Eastern Curlew | # |
| *Plegadis falcinellus* | Glossy Ibis | 2010 |
| *Tringa nebularia* | Common Greenshank | # |

# Appendix 3 – Protected Matters Search Tool Output

# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 19-May-2023

# Summary

## Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance (Ramsar | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 8 |
| Listed Threatened Species: | 51 |
| Listed Migratory Species: | 16 |

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

| | |
|---|---|
| Commonwealth Lands: | 39 |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 22 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |
| Habitat Critical to the Survival of Marine Turtles: | None |

## Extra Information

This part of the report provides information that may also be relevant to the area you have

| | |
|---|---|
| State and Territory Reserves: | 1 |
| Regional Forest Agreements: | None |
| Nationally Important Wetlands: | None |
| EPBC Act Referrals: | 16 |
| Key Ecological Features (Marine): | None |
| Biologically Important Areas: | None |
| Bioregional Assessments: | 1 |
| Geological and Bioregional Assessments: | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

| Community Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion | Endangered | Community likely to occur within area | In feature area |
| Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community | Endangered | Community may occur within area | In buffer area only |
| Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion | Critically Endangered | Community likely to occur within area | In feature area |
| Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest | Critically Endangered | Community likely to occur within area | In feature area |
| Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion | Critically Endangered | Community may occur within area | In buffer area only |
| River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria | Critically Endangered | Community likely to occur within area | In feature area |
| Shale Sandstone Transition Forest of the Sydney Basin Bioregion | Critically Endangered | Community may occur within area | In buffer area only |
| Western Sydney Dry Rainforest and Moist Woodland on Shale | Critically Endangered | Community likely to occur within area | In feature area |

### Listed Threatened Species [ Resource Information ]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| BIRD | | | |
| Anthochaera phrygia | | | |
| Regent Honeyeater [82338] | Critically Endangered | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Aphelocephala leucopsis](#)<br>Southern Whiteface [529] | Vulnerable | Species or species habitat may occur within area | In feature area |
| [Botaurus poiciloptilus](#)<br>Australasian Bittern [1001] | Endangered | Species or species habitat likely to occur within area | In feature area |
| [Calidris ferruginea](#)<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| [Callocephalon fimbriatum](#)<br>Gang-gang Cockatoo [768] | Endangered | Species or species habitat likely to occur within area | In feature area |
| [Calyptorhynchus lathami lathami](#)<br>South-eastern Glossy Black-Cockatoo [67036] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Climacteris picumnus victoriae](#)<br>Brown Treecreeper (south-eastern) [67062] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Erythrotriorchis radiatus](#)<br>Red Goshawk [942] | Endangered | Species or species habitat may occur within area | In feature area |
| [Falco hypoleucos](#)<br>Grey Falcon [929] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Grantiella picta](#)<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| [Hirundapus caudacutus](#)<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| [Lathamus discolor](#)<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Melanodryas cucullata cucullata | | | |
| South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Neophema chrysostoma | | | |
| Blue-winged Parrot [726] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Numenius madagascariensis | | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| Pycnoptilus floccosus | | | |
| Pilotbird [525] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Rostratula australis | | | |
| Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Stagonopleura guttata | | | |
| Diamond Firetail [59398] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| FISH | | | |
| Macquaria australasica | | | |
| Macquarie Perch [66632] | Endangered | Species or species habitat may occur within area | In feature area |
| Prototroctes maraena | | | |
| Australian Grayling [26179] | Vulnerable | Species or species habitat may occur within area | In feature area |
| FROG | | | |
| Heleioporus australiacus | | | |
| Giant Burrowing Frog [1973] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Litoria aurea | | | |
| Green and Golden Bell Frog [1870] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| MAMMAL | | | |
| Chalinolobus dwyeri | | | |
| Large-eared Pied Bat, Large Pied Bat [183] | Vulnerable | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Dasyurus maculatus maculatus (SE mainland population) | | | |
| Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Petauroides volans | | | |
| Greater Glider (southern and central) [254] | Endangered | Species or species habitat may occur within area | In feature area |
| Petaurus australis australis | | | |
| Yellow-bellied Glider (south-eastern) [87600] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Petrogale penicillata | | | |
| Brush-tailed Rock-wallaby [225] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) | | | |
| Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Endangered | Species or species habitat known to occur within area | In feature area |
| Pseudomys novaehollandiae | | | |
| New Holland Mouse, Pookila [96] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Pteropus poliocephalus | | | |
| Grey-headed Flying-fox [186] | Vulnerable | Foraging, feeding or related behaviour known to occur within area | In feature area |
| PLANT | | | |
| Acacia bynoeana | | | |
| Bynoe's Wattle, Tiny Wattle [8575] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Acacia pubescens | | | |
| Downy Wattle, Hairy Stemmed Wattle [18800] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Allocasuarina glareicola | | | |
| [21932] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Cynanchum elegans | | | |
| White-flowered Wax Plant [12533] | Endangered | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Genoplesium baueri<br>Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528] | Endangered | Species or species habitat may occur within area | In feature area |
| Grevillea parviflora subsp. parviflora<br>Small-flower Grevillea [64910] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Haloragis exalata subsp. exalata<br>Wingless Raspwort, Square Raspwort [24636] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Melaleuca deanei<br>Deane's Melaleuca [5818] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Persicaria elatior<br>Knotweed, Tall Knotweed [5831] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Persoonia nutans<br>Nodding Geebung [18119] | Endangered | Species or species habitat known to occur within area | In feature area |
| Pimelea curviflora var. curviflora<br>[4182] | Vulnerable | Species or species habitat may occur within area | In buffer area only |
| Pimelea spicata<br>Spiked Rice-flower [20834] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Pomaderris brunnea<br>Rufous Pomaderris, Brown Pomaderris [16845] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| Pterostylis saxicola<br>Sydney Plains Greenhood [64537] | Endangered | Species or species habitat likely to occur within area | In feature area |
| Pultenaea parviflora<br>[19380] | Vulnerable | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Rhizanthella slateri | | | |
| Eastern Underground Orchid [11768] | Endangered | Species or species habitat may occur within area | In feature area |
| Rhodamnia rubescens | | | |
| Scrub Turpentine, Brown Malletwood [15763] | Critically Endangered | Species or species habitat may occur within area | In buffer area only |
| Syzygium paniculatum | | | |
| Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307] | Vulnerable | Species or species habitat may occur within area | In feature area |
| Thelymitra kangaloonica | | | |
| Kangaloon Sun Orchid [81861] | Critically Endangered | Species or species habitat may occur within area | In buffer area only |
| Thesium australe | | | |
| Austral Toadflax, Toadflax [15202] | Vulnerable | Species or species habitat likely to occur within area | In feature area |
| REPTILE | | | |
| Delma impar | | | |
| Striped Legless Lizard, Striped Snake-lizard [1649] | Vulnerable | Species or species habitat may occur within area | In feature area |

| Listed Migratory Species | | | [ Resource Information ] |
|---|---|---|---|
| Scientific Name | Threatened Category | Presence Text | Buffer Status |
| Migratory Marine Birds | | | |
| Apus pacificus | | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area | In feature area |
| Migratory Terrestrial Species | | | |
| Cuculus optatus | | | |
| Oriental Cuckoo, Horsfield's Cuckoo [86651] | | Species or species habitat may occur within area | In feature area |
| Hirundapus caudacutus | | | |
| White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area | In feature area |
| Monarcha melanopsis | | | |
| Black-faced Monarch [609] | | Species or species habitat known to occur within area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Motacilla flava](#)<br>Yellow Wagtail [644] | | Species or species habitat may occur within area | In feature area |
| [Myiagra cyanoleuca](#)<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area | In feature area |
| [Rhipidura rufifrons](#)<br>Rufous Fantail [592] | | Species or species habitat known to occur within area | In feature area |
| [Symposiachrus trivirgatus as Monarcha trivirgatus](#)<br>Spectacled Monarch [83946] | | Species or species habitat known to occur within area | In buffer area only |
| **Migratory Wetlands Species** | | | |
| [Actitis hypoleucos](#)<br>Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| [Calidris acuminata](#)<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area | In feature area |
| [Calidris ferruginea](#)<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| [Calidris melanotos](#)<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area | In feature area |
| [Gallinago hardwickii](#)<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat known to occur within area | In feature area |
| [Numenius madagascariensis](#)<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| [Pandion haliaetus](#)<br>Osprey [952] | | Species or species habitat likely to occur within area | In buffer area only |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Tringa nebularia | | | |
| Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area | In feature area |

## Other Matters Protected by the EPBC Act

### Commonwealth Lands [ Resource Information ]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

| Commonwealth Land Name | State | Buffer Status |
|---|---|---|
| Communications, Information Technology and the Arts - Telstra Corporation Limited | | |
| Commonwealth Land - Australian Telecommunications Commission [12486] | NSW | In feature area |
| Commonwealth Land - Overseas Telecommunications Commission (Australia) [13339] | NSW | In feature area |
| Defence | | |
| Defence - BRINGELLY RADIO RECEIVING STATION [10187] | NSW | In buffer area only |
| Defence - BRINGELLY RADIO RECEIVING STATION [10186] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10185] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10184] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10183] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10182] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10189] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10181] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10180] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10188] | NSW | In buffer area only |
| Defence - BRINGELLY RADIO RECEIVING STATION [10179] | NSW | In feature area |
| Defence - BRINGELLY RADIO RECEIVING STATION [10190] | NSW | In feature area |
| Unknown | | |
| Commonwealth Land - [15419] | NSW | In buffer area only |

| Commonwealth Land Name | State | Buffer Status |
|---|---|---|
| Commonwealth Land - [15661] | NSW | In buffer area only |
| Commonwealth Land - [15662] | NSW | In buffer area only |
| Commonwealth Land - [12480] | NSW | In buffer area only |
| Commonwealth Land - [12481] | NSW | In buffer area only |
| Commonwealth Land - [12482] | NSW | In buffer area only |
| Commonwealth Land - [12483] | NSW | In buffer area only |
| Commonwealth Land - [12484] | NSW | In buffer area only |
| Commonwealth Land - [12485] | NSW | In buffer area only |
| Commonwealth Land - [13336] | NSW | In buffer area only |
| Commonwealth Land - [15653] | NSW | In buffer area only |
| Commonwealth Land - [13335] | NSW | In buffer area only |
| Commonwealth Land - [12479] | NSW | In buffer area only |
| Commonwealth Land - [13337] | NSW | In buffer area only |
| Commonwealth Land - [13334] | NSW | In buffer area only |
| Commonwealth Land - [15909] | NSW | In buffer area only |
| Commonwealth Land - [13338] | NSW | In buffer area only |
| Commonwealth Land - [13103] | NSW | In buffer area only |
| Commonwealth Land - [13102] | NSW | In buffer area only |
| Commonwealth Land - [14104] | NSW | In buffer area only |
| Commonwealth Land - [14105] | NSW | In buffer area only |
| Commonwealth Land - [14100] | NSW | In buffer area only |
| Commonwealth Land - [14101] | NSW | In buffer area only |
| Commonwealth Land - [14102] | NSW | In buffer area only |
| Commonwealth Land - [14103] | NSW | In buffer area only |

## Listed Marine Species

[ Resource Information ]

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Bird | | | |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area | In feature area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Bubulcus ibis as Ardea ibis<br>Cattle Egret [66521] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area | In feature area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area overfly marine area | In feature area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area overfly marine area | In feature area |
| Chalcites osculans as Chrysococcyx osculans<br>Black-eared Cuckoo [83425] | | Species or species habitat likely to occur within area overfly marine area | In feature area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat known to occur within area | In feature area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | Vulnerable | Species or species habitat known to occur within area overfly marine area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| [Lathamus discolor](#)<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area overfly marine area | In feature area |
| [Merops ornatus](#)<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area overfly marine area | In feature area |
| [Monarcha melanopsis](#)<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| [Motacilla flava](#)<br>Yellow Wagtail [644] | | Species or species habitat may occur within area overfly marine area | In feature area |
| [Myiagra cyanoleuca](#)<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| [Neophema chrysostoma](#)<br>Blue-winged Parrot [726] | Vulnerable | Species or species habitat may occur within area overfly marine area | In feature area |
| [Numenius madagascariensis](#)<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area | In feature area |
| [Pandion haliaetus](#)<br>Osprey [952] | | Species or species habitat likely to occur within area | In buffer area only |
| [Rhipidura rufifrons](#)<br>Rufous Fantail [592] | | Species or species habitat known to occur within area overfly marine area | In feature area |
| [Rostratula australis as Rostratula benghalensis (sensu lato)](#)<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area overfly marine area | In feature area |

| Scientific Name | Threatened Category | Presence Text | Buffer Status |
|---|---|---|---|
| Symposiachrus trivirgatus as Monarcha trivirgatus | | | |
| Spectacled Monarch [83946] | | Species or species habitat known to occur within area overfly marine area | In buffer area only |
| Tringa nebularia | | | |
| Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area overfly marine area | In feature area |

## Extra Information

| State and Territory Reserves | | | [ Resource Information ] |
|---|---|---|---|
| Protected Area Name | Reserve Type | State | Buffer Status |
| Kemps Creek | Nature Reserve | NSW | In buffer area only |

| EPBC Act Referrals | | | | [ Resource Information ] |
|---|---|---|---|---|
| Title of referral | Reference | Referral Outcome | Assessment Status | Buffer Status |
| Controlled action | | | | |
| Construction and Operation of Western Sydney Airport, Badgerys Creek, NSW | 2014/7391 | Controlled Action | Post-Approval | In buffer area only |
| Lyn Parade Extension | 2004/1392 | Controlled Action | Post-Approval | In buffer area only |
| M12 Motorway Project, Luddenham, NSW | 2018/8286 | Controlled Action | Post-Approval | In buffer area only |
| Sydney Metro, Western Sydney Airport - St Marys to Elizabeth Drive | 2020/8687 | Controlled Action | Post-Approval | In buffer area only |
| The Northern Road upgrade - Mersey Rd, Bringelly to Glenmore Parkway, Glenmore Park, NSW | 2016/7696 | Controlled Action | Post-Approval | In buffer area only |
| Warragamba Dam Raising Project | 2017/7940 | Controlled Action | Assessment Approach | In buffer area only |
| Not controlled action | | | | |
| Clearance of 6.3ha of Cumberland Plain Woodland for industrial subdivision cnr of Old Walgrove and W | 2004/1445 | Not Controlled Action | Completed | In buffer area only |
| Electricty Substation at Old Wallgrove Road | 2005/2220 | Not Controlled Action | Completed | In buffer area only |
| gas main installation from Eastern Creek to Erskine Park | 2005/2235 | Not Controlled Action | Completed | In buffer area only |

| Title of referral | Reference | Referral Outcome | Assessment Status | Buffer Status |
|---|---|---|---|---|
| Not controlled action | | | | |
| Greenway Park Stage 3 residential subdivision | 2004/1622 | Not Controlled Action | Completed | In feature area |
| Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia | 2015/7522 | Not Controlled Action | Completed | In feature area |
| INDIGO Central Submarine Telecommunications Cable | 2017/8127 | Not Controlled Action | Completed | In feature area |
| Shale quarry and materials recovery facility | 2008/4661 | Not Controlled Action | Completed | In buffer area only |
| Wonderland Business Park Precinct, Stage 1, Lot D1 | 2004/1626 | Not Controlled Action | Completed | In buffer area only |
| Not controlled action (particular manner) | | | | |
| INDIGO Marine Cable Route Survey (INDIGO) | 2017/7996 | Not Controlled Action (Particular Manner) | Post-Approval | In feature area |
| Replacement of flows with recycled water | 2006/3050 | Not Controlled Action (Particular Manner) | Post-Approval | In buffer area only |

| Bioregional Assessments | | | |
|---|---|---|---|
| SubRegion | BioRegion | Website | Buffer Status |
| Sydney | Sydney Basin | BA website | In feature area |

# Caveat

## 1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

## 2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

## 3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

## 4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.


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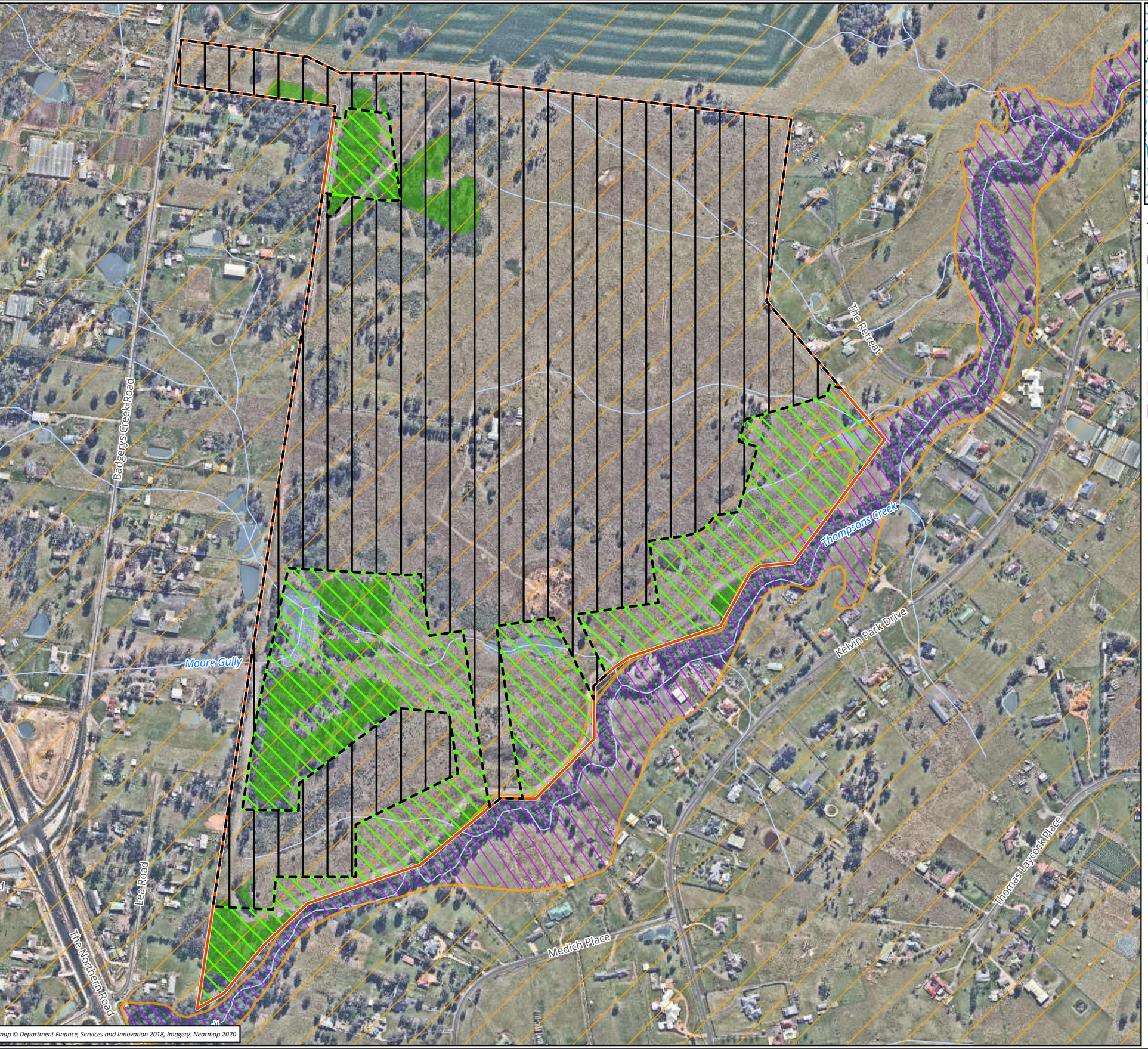
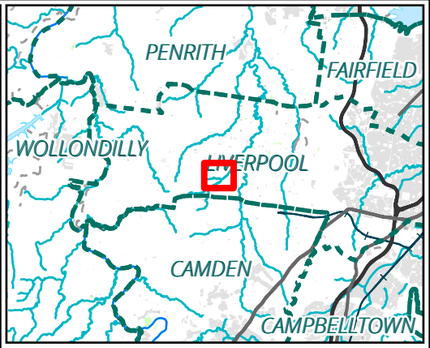
# Appendix 4 – Figures




**Legend**

- Study area
- Development footprint
- Open Space (Western Parkland City Authority, 2023)
- Groundtruthed Existing Native Vegetation (ENV)

**Growth Centres SEPP (DPE 2023)**

- Certified area
- Non-certified area

## Figure 4 Biodiversity certified land and ENV

0 100 200 300

Metres

N

Scale: 1:6,500 @ A3

*Coordinate System: GDA 1994 MGA Zone 56*

biosis

Matter: 31717,
Date: 01 August 2023,
Checked by: MH, Drawn by: AM, Last edited by: lharley
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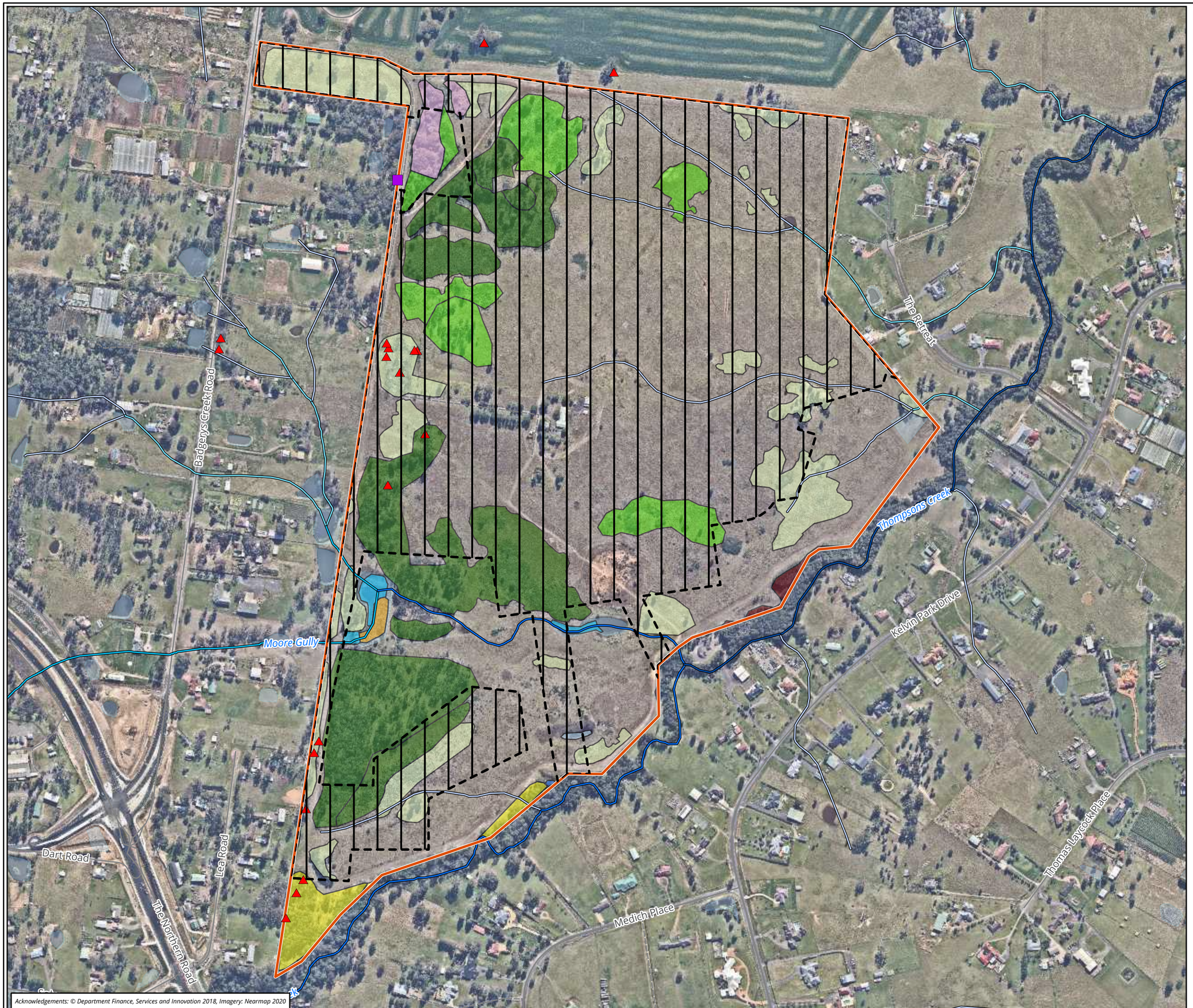


## Legend

- Study area
- Development footprint
- *Marsdenia viridiflora* subsp. *viridiflora*
- Hollow-bearing tree

**Plant Community Types**

- 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion, Moderate condition
- 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion, High condition
- 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion, Moderate conditon
- 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion, Low condition
- 835 - Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, High condition
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, High condition
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, Moderate condition
- 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, Low condition
- 1071 - Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion, Moderate condition
- 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley, High condition

**Strahler stream order**

- 1
- 2
- 3
- 4
- 5

# Figure 5 Ecological values of the study area

0 100 200 300 Metres

N

Scale: 1:6,500 @ A3

*Coordinate System: GDA 1994 MGA Zone 56*

biosis

Matter: 31717,
Date: 01 August 2023,
Checked by: MH, Drawn by: AM, Last edited by: lharley
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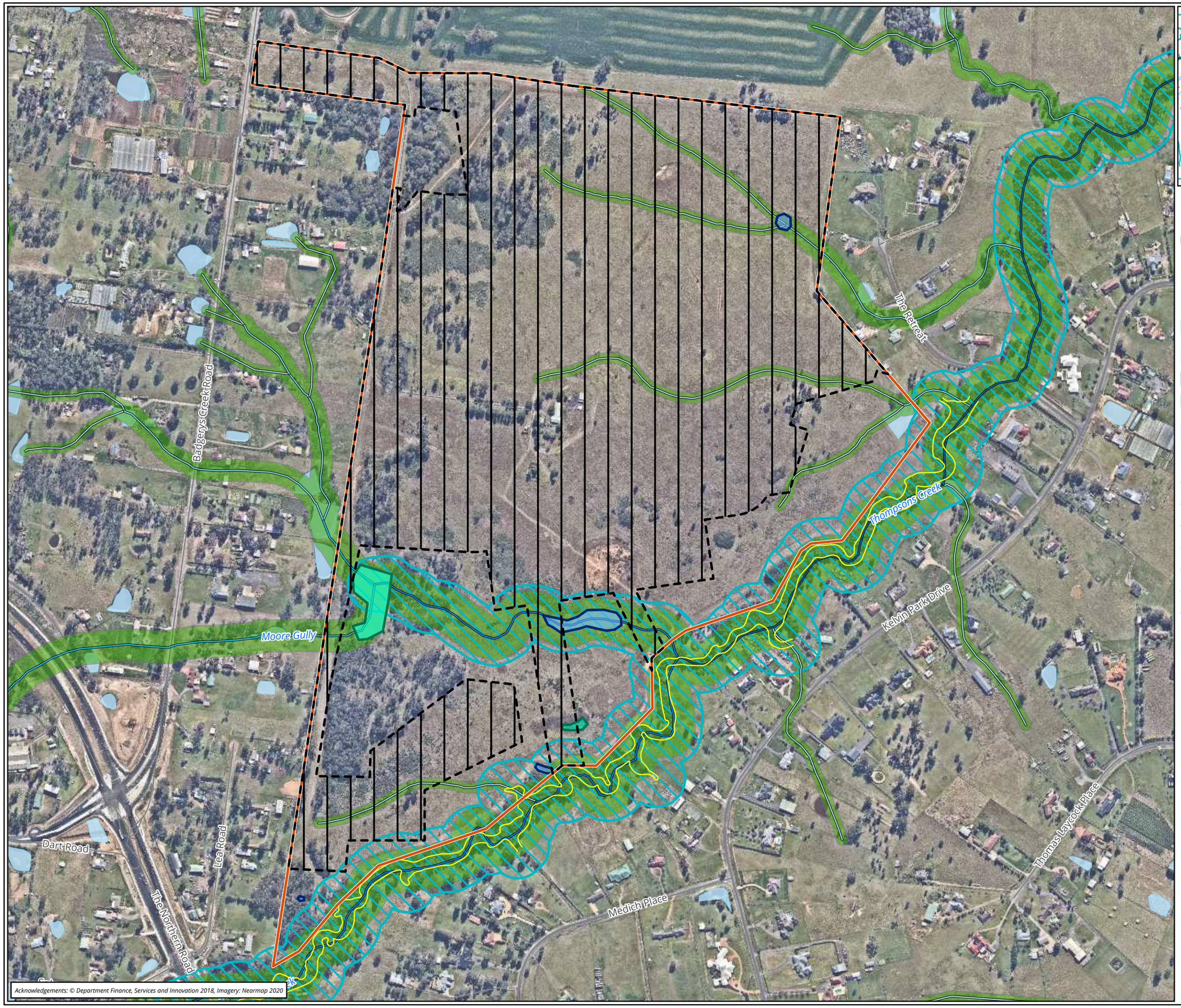


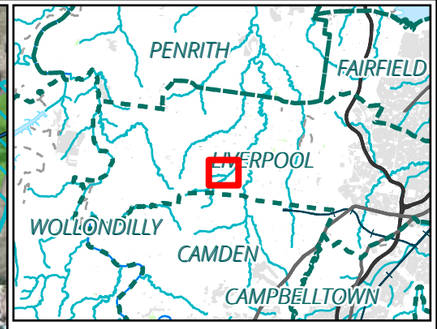


**Legend**

- Study area
- Development footprint
- Thompson's Creek top of bank (Western City & Aerotropolis Authority 2020)
- Key Fish Habitat riparian buffer zone
- Vegetation Riparian Zone
- Farm dam
- Wetland
- Canal-Drain (Spatial Services 2021)

**Strahler stream order**

- 1
- 2
- 3
- 4
- 5
- 6
- 7

**Figure 6 Aquatic features and riparian buffer zones**

0 100 200 300 N

Metres

Scale: 1:6,500 @ A3

*Coordinate System: GDA 1994 MGA Zone 56*

biosis

Matter: 31717,
Date: 01 August 2023,
Checked by: MH, Drawn by: JPT, Last edited by: lharley
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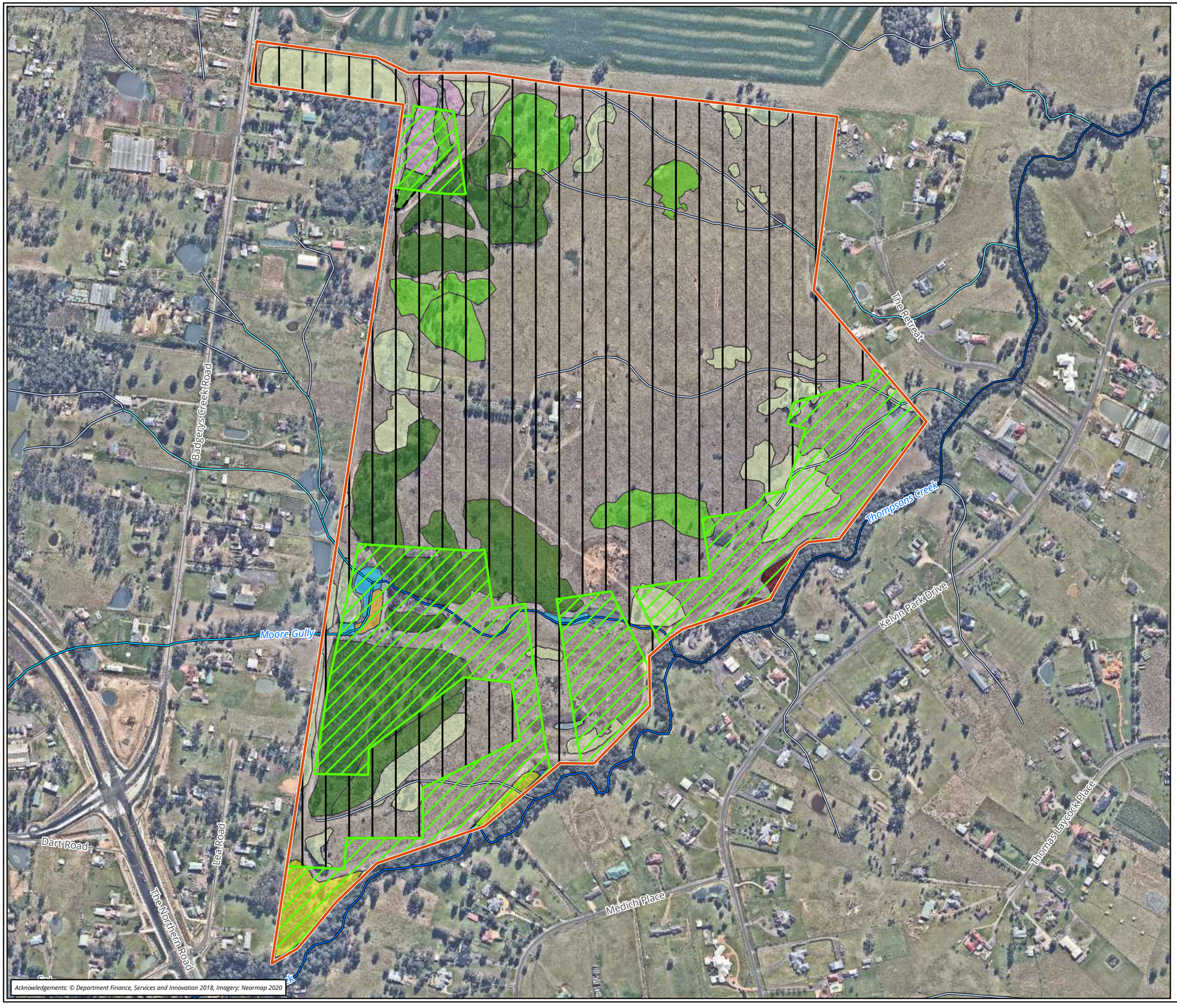


## Legend

- Study area
- Development footprint
- Open Space (Western Parkland City Authority, 2023)

**Plant Community Types**

- 725 - Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion, Moderate condition
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- 1800 - Swamp Oak open forest on riverflats of the Cumberland Plain and Hunter valley, High condition

**Strahler stream order**

- 1
- 2
- 3
- 4
- 5

**Figure 7 Impact footprint**

0 100 200 300 Metres

N

Scale: 1:6,500 @ A3

*Coordinate System: GDA 1994 MGA Zone 56*

biosis

Matter: 31717,
Date: 01 August 2023,
Checked by: MH, Drawn by: AM, Last edited by: lharley
Layout: 31717_IA_F7_DevFootprint
Location: P:\31700s\31717\Mapping\
31717_Project.aprx

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NSW GOVERNMENT