



BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

LAKESIDE ESTATE RESIDENTIAL SUBDIVISION – LAKE WYANGAN

GRIFFITH CITY COUNCIL LOCAL GOVERNMENT AREA

APRIL 2024

Report prepared by
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for LWLE Pty Ltd



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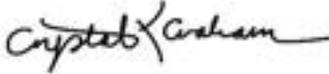
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CERTIFICATION

I certify that I have prepared this BDAR and, to the best of my knowledge, it is in accordance with the NSW *Biodiversity Conservation Act* 2016 and the Biodiversity Assessment Method 2020 (BAM 2020). The information it contains is neither false nor misleading. It addresses, to the fullest extent possible, all matters affecting or likely to affect biodiversity as a result of the proposed activity.

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Signed		
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Executive summary

LWLE Pty Ltd (the client and proponent) has engaged OzArk Environment and Heritage (OzArk) to conduct the biodiversity assessment for a proposal to develop a residential subdivision (Lakeside Estate; the proposal) at Lake Wyangan, north of Griffith, NSW.

The proposal would clear up to 5.48 ha of native vegetation on Lot 146/-/DP1214737. The proposal triggers entry into the NSW Biodiversity Offsets Scheme (BOS) as it exceeds the vegetation clearance threshold of 0.50 ha; consequently, the proponent is required to prepare a Biodiversity Development Assessment Report (BDAR) and to offset impacts to biodiversity. This report documents the assessment, which has been completed in accordance with the Biodiversity Assessment Method 2020 (BAM 2020) and details the proponent's biodiversity offset requirement (number of ecosystem and species credits).

The native vegetation present in the disturbance footprint consists of three Plant Community Types (PCTs):

- PCT 16 – Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.
- PCT 181 – Common Reed - Bushy Groundsel aquatic tall reedland grassland wetland of inland river systems.

In accordance with the BAM, PCTs were further stratified into vegetation zones based on observed condition. This process resulted in six vegetation zones being recognised: 16_Moderate, 16_Low, 16_Derived, 26_Remnant, 26_Derived, and 181_Moderate.

PCT 26 is associated with the following Threatened Ecological Communities (TECs):

- NSW *Biodiversity Conservation Act* 2016 (BC Act)-listed Endangered Ecological Community (EEC): *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions*.
- Commonwealth *Environment Protection and Biodiversity Conservation Act* 199 (EPBC Act)-listed EEC: *Weeping Myall Woodlands*.

Zone 26_Remnant was found to meet the thresholds to be considered an example of the BC Act-listed EEC but not the EPBC Act-listed equivalent. Zone 26_Derived did not meet the thresholds for either listing. In total, 0.09 ha of the BC Act-listed EEC will be impacted by this proposal.

PCT 181 is associated with the following TEC:

- BC Act-listed Critically Endangered Ecological Community (CEEC): *Artesian Springs Ecological Community in the Great Artesian Basin*.

PCT 181 does not meet the conditions to be considered an example of this CEEC as the site is not within the Great Artesian Basin and no artesian spring activity was noted.

PCT 16 is not associated with any TEC.

Impacts to native vegetation will generate an obligation to retire a total of 90 ecosystem credits.

In total, 17 species credit species were generated by the BAM Calculator (BAM-C). The habitat suitability of the subject land for these species was assessed. According to the BAM, if suitable habitat for these species occurs on the subject land, they must be the subject of targeted survey according to recommended guidelines, or else assumed present. After consideration of geographical and habitat constraints, five species could be discounted due to the absence of features necessary for breeding and 12 species credit species were retained in the assessment. Surveys were conducted for all 12 of these species, following relevant and approved BAM survey methodologies. These species were not detected on site. Consequently, the proposal will not generate a requirement to offset any species credits.

The proponent intends to satisfy their offset obligations by buying and retiring the necessary credits from the open market or, if appropriate credits are not available, by paying directly into the Biodiversity Conservation Fund.

The significance of the proposed impact to EPBC Act-listed threatened, migratory, wetland and marine species, populations and communities predicted to occur within a 10 km search area was assessed. No significant impact to any threatened entity likely to result in the extinction of a local population was identified. The residual ecological impacts of the proposal would be adequately mitigated and offset using the management actions recommended and the offset requirements detailed within this BDAR. Therefore, a referral of the proposal to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) for these matters is not required.

This assessment covers the current form of the proposal. Any change to the scope of work may require re-assessment.

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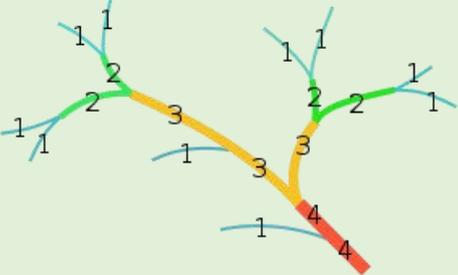
Abbreviations

Term	Description
°C	Degrees Celsius
AOBV	Areas of Outstanding Biodiversity Value
ASL	Above Sea Level
BAM	Biodiversity Assessment Method 2020
BAR	Biodiversity Assessment Report
BDAR	Biodiversity Development Assessment Report
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BOS	NSW Biodiversity Offsets Scheme
CAMBA	China-Australia Migratory Bird Agreement
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DCCEEW, Cth	Commonwealth Department of Climate Change, Energy the Environment and Water
DoE	Department of Environment
DPE	Department of Planning and Environment
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESCP	Erosion and Sediment Control Plan
FM Act	NSW <i>Fisheries Management Act 1994</i>
GDEs	Groundwater dependent ecosystems
GPS	Global Positioning System
ha	Hectare
HTE	High Threat Exotic

Term	Description
IBRA	Interim Biogeographic Regionalisation of Australia. Each region is a land area made up of a group of interacting ecosystems repeated in similar form across the landscape.
JAMBA	Japan-Australia Migratory Bird Agreement
KFH	Key Fish Habitat
KTP	Key Threatening Process
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Services
mm/cm/m/m²/km	Millimetre/centimetre/metre/square metre/kilometre
MNES	Matters of National Environmental Significance
NPW Act	NSW <i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
PMST	Protected Matters Search Tool
PRL	Protected Riparian Land
PW	Priority Weed
RAMSAR	Convention on Wetlands of International Importance
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
TECs	Threatened Ecological Communities
TSPD	Threatened Species Profile Database
VIS	Vegetation Information System
VRZ	Vegetated Riparian Zone
WoNS	Weeds of National Significance

Glossary of terms

Term	Description
Areas of outstanding biodiversity	<p>An area of outstanding biodiversity value is:</p> <ul style="list-style-type: none"> ❖ an area important at a State, national or global scale, and ❖ an area that makes a significant contribution to the persistence of at least one of the following: <ul style="list-style-type: none"> ○ multiple species or at least one threatened species or ecological community ○ irreplaceable biological distinctiveness ○ ecological processes or ecological integrity ○ outstanding ecological value for education or scientific research. <p>The declaration of an area may relate, but is not limited, to protecting threatened species or ecological communities, connectivity, climate refuges and migratory species (BC Act).</p>
Cumulative impact	<p>The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.</p>
Direct impacts	<p>Are those that directly affect the habitat of species and ecological communities and of individuals using the study area. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat (OEH 2018).</p>
Habitat	<p>The area occupied or used, including areas periodically or occasionally occupied or used, by any threatened species or ecological community and includes all the different aspects (both biotic and abiotic) used by species during the different stages of their life cycle (OEH 2018).</p>
Important population	<p>Is a population that is necessary for a species' long-term survival and recovery; this may include populations identified as such in recovery plans, and/or that are:</p> <ul style="list-style-type: none"> ❖ key source populations either for breeding or dispersal ❖ populations that are necessary for maintaining genetic diversity, and/or ❖ populations that are near the limit of the species range (DE 2013).
Indirect impact	<p>Occur when project-related activities affect species or ecological communities in a manner other than direct loss within the subject land. Indirect impacts may sterilise or reduce the habitability of adjacent or connected habitats. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, reduction in viability of adjacent habitat due to edge effects, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, noise, light spill, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas (OEH 2018).</p>
Invasive species	<p>Is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources, or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.</p>
Local occurrence (EEC)	<p>The ecological community present within the study area. However, the local occurrence may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of the ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.</p>
Local population (in regard to a threatened or migratory species)	<p>A local population of a threatened plant species comprises those individuals occurring in a defined area or a cluster of individuals extends into habitat adjoining and contiguous with the study area where the individuals could reasonably be expected to cross-pollinate.</p> <p>A local population of fauna species comprises those individuals known or likely to occur in a defined area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area.</p>

Term	Description
	The local population of migratory or nomadic fauna species comprises those individuals likely to occur in the study area from time to time (DECC 2007).
Low condition (vegetation)	<p>Either:</p> <ul style="list-style-type: none"> a) woody native vegetation with native over-storey percent foliage cover less than 50% of the lower value of the over-storey percent foliage cover benchmark for that vegetation type, and where either: <ul style="list-style-type: none"> ❖ less than 50% of ground cover vegetation is indigenous species, or ❖ greater than 90% of ground cover vegetation is cleared or b) native grassland, wetland or herb field where either: <ul style="list-style-type: none"> ❖ less than 50% of ground cover vegetation is indigenous species, or ❖ more than 90% of ground cover vegetation is cleared. <p>Note: The percentages for the ground cover calculations must be made in a season when the proportion of native ground cover vegetated compared to non-native ground cover vegetation is likely to be at its maximum.</p>
Moderate to good condition (vegetation)	If native vegetation is not in low condition (above), it is in moderate to good condition.
Mitigation	Action to reduce the severity of an impact.
Mitigation measure	Any measure that prevents, reduce or controls adverse environmental effects of a project.
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (OEH 2018).
Proposal	Is considered to include 'all activities likely to be undertaken within the subject land to achieve the objective of the proposed development' (DECC 2007).
Risk of extinction	The likelihood that the local population will become extinct either in the short-term or in the long-term as a result of direct or indirect impacts on the viability of that population.
Search area	Is considered to 'include the lands that surround the subject land for a distance of 10 km' (DECC 2007). The search area has been used to search information sources to establish the landscape context of the subject land.
Significant impact	A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity.
Strahler stream order	<p>Strahler stream orders are used to define stream size based on a hierarchy of tributaries, based on the diagram below.</p> 
Study area	Means the subject land and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area should extend as far as is necessary to take all potential impacts into account (OEH 2018). In this instance, the study area extends 1,500 m from the site.

Term	Description
Subject land	Means the area directly affected by the proposal. The subject land includes the footprint of the proposal and any ancillary works, facilities, accesses or hazard reduction zones that support the construction or operation of the development or activity (OEH 2018).
Target species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.

1 Introduction

1.1 Background

LWLE Pty Ltd (LWLE; the client and proponent) proposes to develop the Lakeside Estate residential subdivision (the proposal). OzArk Environment & Heritage (OzArk) was engaged by LWLE to prepare the biodiversity assessment for the proposal. The proposal is situated on Lot 146 DP1214737 at Lake Wyangan, approximately six kilometres (km) northwest of Griffith, New South Wales (NSW; **Figure 1-1**). The proposal would occupy up to 31.31 ha of land, or 28.62 ha when exclusion zones are considered. Of this area, 5.48 ha retains native vegetation and 23.14 ha has previously been cleared or is otherwise highly degraded. The proposal takes place in the Griffith City Council Local Government Area (LGA). The regional context of the proposal is shown in **Figure 1-1** and **Figure 1-3**.

The proposal seeks approval to subdivide the subject land into sixty-seven residential lots and carry out associated civil construction works including the creation of internal roads and infrastructure (**Figure 1-2**). The proposal will also include a drainage reserve located towards the northwestern boundary of the study area (**Figure 1-2**).

The proposal triggers entry into the NSW Biodiversity Offsets Scheme (BOS) under the NSW *Biodiversity Conservation Act 2016* (BC Act) as it exceeds the clearing threshold for entry into the BOS (**Section 1.4**). Therefore, a Biodiversity Development Assessment Report (BDAR) must be prepared for this proposal. This report documents the assessment, which has been completed in accordance with the Biodiversity Assessment Method 2020 (BAM 2020) and details the proponent's biodiversity offset requirement (number of ecosystem and species credits).



Figure 1-1. Location of the subject land (red) showing nearby roads.

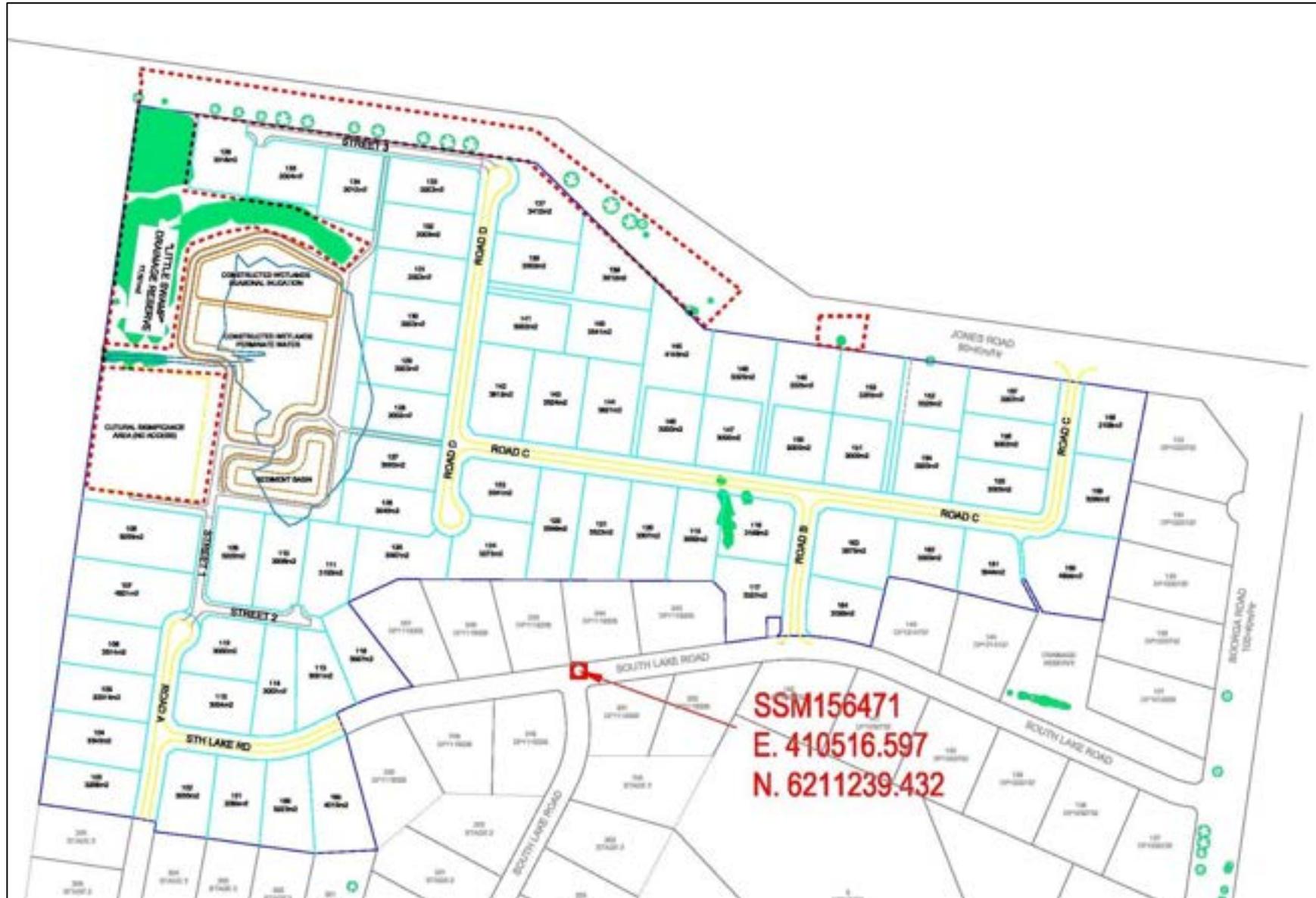


Figure 1-2. Site Plan showing lots, roads, and exclusion zones (red broken lines).

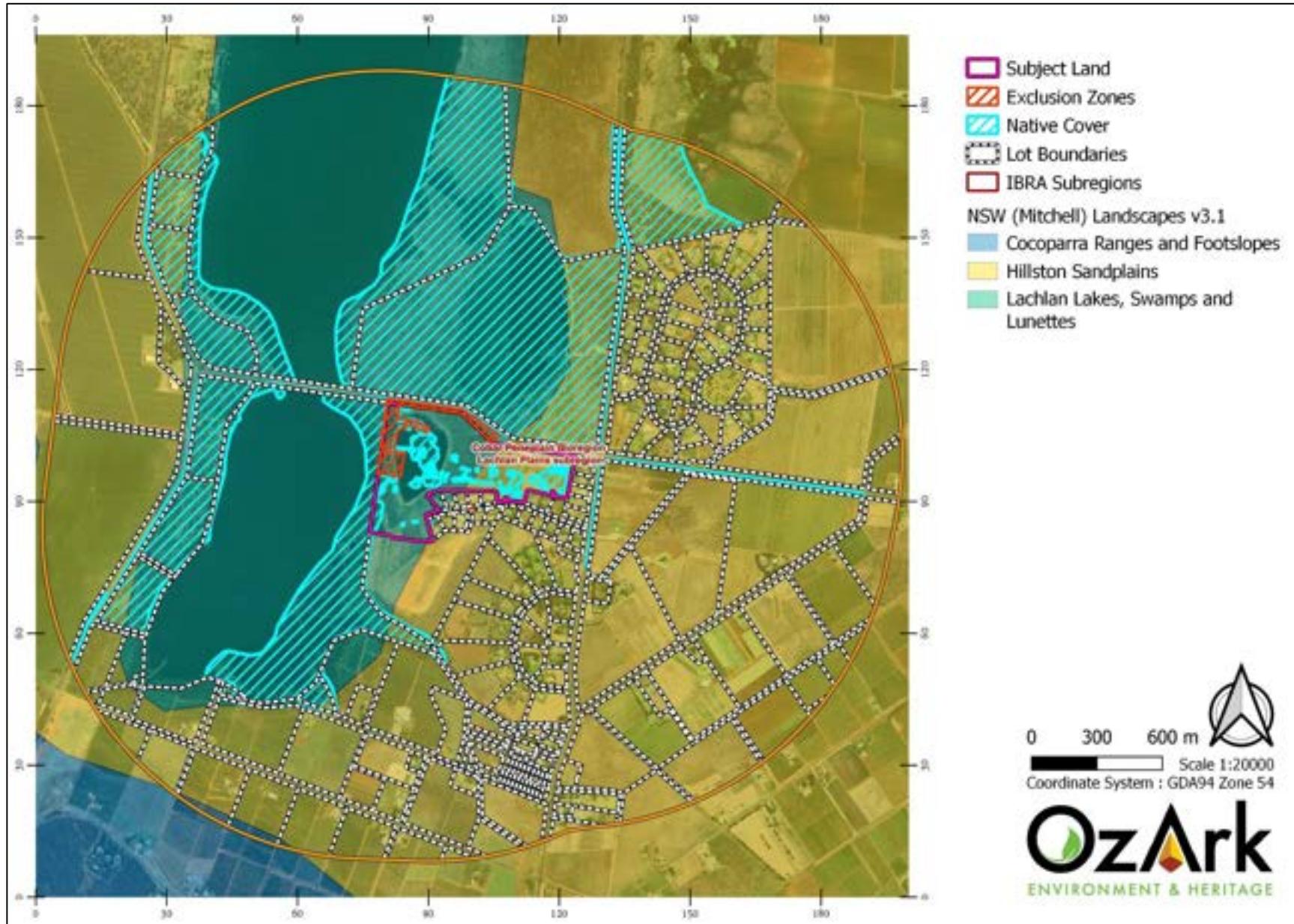


Figure 1-3. Location map showing the subject land, study area and key features required by the BAM (2020).

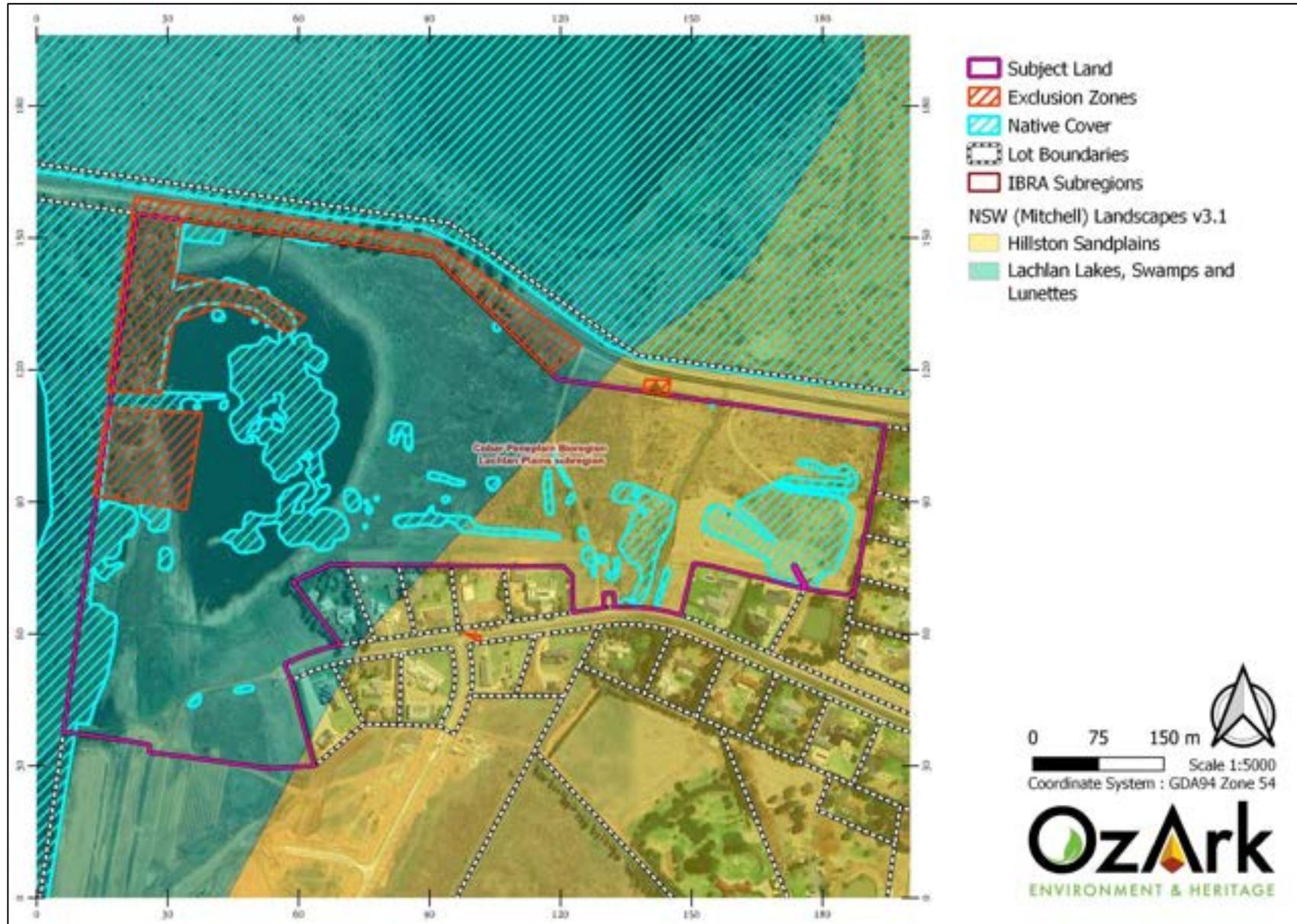


Figure 1-4. Magnified view of the subject land, study area and key features required by the BAM (2020).

1.2 Relevant Terms

The following terms and definitions are used to describe the land assessed in this study.

Subject land – In a development assessment, the land proposed for development and related activities.

Study area – Land within a 1,500 m buffer from the outside edge of the subject land. The study area is assessed for the purpose of establishing landscape context including native vegetation cover and associated threatened species.

10 km search area – The area within a 10 km radius of the subject land. This 10 km buffer has been used to search information sources, including the Protected Matters Search Tool (PMST) (Department of Climate Change, Energy, the Environment and Water, 2023) and BioNet Atlas (DPE, 2023) threatened species sightings.

1.3 Site Identification

The location of the proposal is shown on **Figure 1-1** to **Figure 1-4**.

The site is identified under the *Griffith Local Environment Plan 2014* (LEP) and on the NSW Planning Portal as follows.

- **Address:** South Lake Drive, Lake Wyangan
- **Lot/Section/Plan No:** Lot 146 DP1214737
- **Land Zoning:** R5 – Large Lot Residential
- **Minimum Lot Size:** 5 ha
- **Terrestrial Biodiversity:** Terrestrial biodiversity values under the Griffith LEP are mapped as occurring directly adjacent to the subject land (see figure in **Appendix A**).

1.4 Regulatory Context

The Proposal does not constitute a State Significant Development (SSD) and consequently entry into the BOS is not automatic. It has been determined that the BOS applies to this proposal as the clearing of 5.48 ha of native vegetation would exceed the clearing threshold (0.5 ha) for the minimum lot size associated with the development (**Table 1-1**).

The subject land was identified as occurring on bushfire prone land, according to mapping provided by the NSW Rural Fire Service, and as such, under Section 4.15 of the EP&A Act, the proponent will be required to address the relevant bushfire protection requirements of the Rural Fire Service Document *Planning for Bush Fire Protection*. It is assumed that Asset Protection Zones (APZs) are included in the impact footprint provided by LWLE Pty Ltd to OzArk and assessed in this BDAR.

Table 1-1. Clearing thresholds for entry into the NSW Biodiversity Offsets Scheme (BOS).

Minimum lot size associated with the property	Clearing threshold, beyond which the BAM applies
<1 ha	0.25 ha or more
1 ha to <40 ha	0.50 ha or more
40 ha to <1000 ha	1.00 ha or more
1000 ha or more	2.00 ha or more

1.5 Report Purpose

The purpose of the BDAR is to determine the biodiversity assets, including flora, fauna, threatened species, threatened communities and habitat values, of the subject land.

The BDAR also identifies any constraints on the proposal according to relevant Federal and NSW environmental legislations and includes the calculation of ecosystem and/or species credits requiring offset.

1.6 Legislation

1.6.1 International legislation

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
- Ramsar Convention on Wetlands (Ramsar).

1.6.2 Commonwealth legislation

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), including EPBC Act Environmental Offsets Policy and Significant Impact Guidelines Version 1.1, 2013.

1.6.3 NSW legislation

Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act provides the legal framework for the assessment and approval of the proposed activities. Part 4 of the EP&A Act requires the proponent to examine and consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.

Biodiversity Conservation Act 2016 (BC Act)

Under the BC Act, the proponent has an obligation to consider impacts to all threatened species, populations and ecological communities listed in NSW, as well as ensuring the proposal does not exacerbate a Key Threatening Process (KTP). Entry to the BOS is triggered automatically for State Significant Developments (SSDs), as in the present case.

Biodiversity Conservation Regulation 2017 (BCR)

The BCR defines the triggers and entry thresholds for the BOS. It also provides the rules for meeting offset obligations, triggers for authorities to refuse development applications and compliance provisions.

Biosecurity Act 2015

Schedule 1 of the *Biosecurity Act 2015* contains the special provisions relating to weeds and duty to control weeds which pose a biosecurity risk. The Department of Primary Industries (DPI) maintains a list of 'Priority Weeds' (previously referred to as noxious weeds) in NSW for the State and each region which impose an obligation on landholders to prevent, eliminate or minimise, so far as is reasonably practicable, any biosecurity risk they may pose. In addition, Local Government Areas may include their own priority weeds.

Fisheries Management Act 1994 (FM Act)

The objects of the FM Act are to:

- Conserve fish stocks and key fish habitats.
- Conserve threatened species, populations and ecological communities of fish and marine vegetation.
- Promote ecologically sustainable development, including the conservation of biological diversity.

Section 201 of the FM Act states that a person other than a government authority must seek a permit from NSW Department of Primary Industries – Fisheries (DPI – Fisheries) for dredging or reclamation in a waterway. Dredging work means any work that involves excavating water land. Reclamation work means any work that involves depositing any material on water land.

water land means land submerged by water—

- (a) whether permanently or intermittently, or
- (b) whether forming an artificial or natural body of water,

and includes wetlands and any other land prescribed by the regulations as water land to which this Division applies.

As the proposal includes the reclamation of Little Swamp, a permit will be required under the FM Act. Matters relating to watercourses are discussed in detail in **Section 3.9** of this report.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (SEPPBC 2021) consolidates, transfers and repeals provisions of 11 SEPPs, the following of which are relevant to the current assessment:

- Former SEPP (Koala Habitat Protection) 2020
- Former SEPP (Koala Habitat Protection) 2021

These individual SEPPs are no longer current; however, their provisions are incorporated into the SEPPBC 2021. Through the principles contained in these amalgamated SEPPs, the SEPPBC 2021 aims to encourage the 'proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline'.

The subject site is zoned R5 - large lot residential, therefore, Chapter 4 of the SEPPBC 2021 applies to the proposal. However, as the Griffith City LGA is not listed in Schedule 2 of the SEPPBC 2021, the proposal is not subject to the requirements of the SEPP. Therefore, no further consideration is necessary under the SEPPBC 2021.

No koala records occur within the 10 km search area. Potential impacts to the Koala have been additionally assessed under the EPBC Act (**Appendices D**).

1.6.4 Griffith Local Environmental Plan (2014)

A Local Environmental Plan (LEP) is a legal document prepared by Council and approved by the State Government to regulate land use and development. LEPs guide planning decisions for local governments. The plan allows Council to regulate the ways in which all land both private and public may be used and protected through zoning and development controls.

The particular aims of this Plan relevant to the proposal are as follows:

- (1) This Plan aims to make local environmental planning provisions for land in Griffith in accordance with the relevant standard environmental planning instrument under section 3.20 of the Act.
- (2) The particular aims of this Plan are as follows—
 - (aa) to protect and promote the use and development of land for arts and cultural activity, including music and other performance arts,
 - (a) to prevent unnecessary urban sprawl by promoting business, industrial, rural and residential uses within and adjacent to existing precincts related to those uses,
 - (b) to minimise land use conflict in general by creating areas of transition between different and potentially conflicting land uses,
 - (c) to provide a variety of development options to meet the needs of the community with regard to housing, employment and services,
 - (d) to manage and protect areas of environmental significance,
 - (e) to recognise the historical development of the area and to preserve heritage items associated with it.

Terrestrial biodiversity values under the Griffith LEP are mapped as occurring directly adjacent to the subject land (see figure in **Appendix A**).

Although the Griffith LEP contains some groundwater mapping, the subject land is not included within this mapping.

2 Methods

The ecological assessment was carried out in three stages:

1. Desktop searches and review of ecological databases and information to identify threatened species, populations or ecological communities listed in the BC Act, FM Act or the EPBC Act that have the potential to occur in the study area.
2. Field survey of the subject land to conduct BAM plots, identify vegetation communities and habitat features present and target predicted threatened species and ecological communities.
3. Preparation of a BDAR that describes the impacts of the proposed activity on native vegetation and threatened species, populations and ecological communities, and provides recommendations to avoid, minimise and mitigate these impacts. The BDAR also includes a biodiversity credit summary that identifies the number of ecosystem credits and species credits required to offset the development.

2.1 Personnel

OzArk Environment & Heritage Pty Ltd (OzArk) operates under NSW Scientific Research License 101908, and NSW Department of Primary Industries (DPI) Accreditation of a corporation as an animal research establishment Ref No. AW2022/012. The role and key details of personnel involved in the project are provided in **Table 2-1**.

Table 2-1. Summary of OzArk personnel qualifications and roles in the assessment.

Name	Position	Role	CV Details
Dr David Orchard	Senior Ecologist	Initial survey, BAM plots, vegetation mapping, GIS, BAM calculations, targeted flora surveys, reporting	<ul style="list-style-type: none"> • Accredited BAM assessor – Accreditation # BAAS21028 • Doctor of Philosophy – Charles Sturt University • Graduate Diploma in Science (Botany) – University of New England • Bachelor of Arts – Australian National University • First aid training • WH&S Induction Training for Construction Work
Dr Crystal Graham	Senior Ecologist	Targeted fauna surveys, reporting, quality control, technical review	<ul style="list-style-type: none"> • Accredited BAM assessor – Accreditation # BAAS22024 • Doctor of Philosophy – Biology – University of Sydney • Honours 1 – Biology – University of Sydney • Bachelor of Advanced Science – University of Sydney • 4WD Training • WH&S Induction Training for Construction Work
Lucca Brozler	Ecologist	Reporting	<ul style="list-style-type: none"> • Masters in Conservation Biology – The University of Queensland • Bachelor of Biological Science – The University of Queensland • WH&S Induction Training for Construction Work

Existing information sources were reviewed to contextualise the study area, identify entities for targeted surveys, predict possible constraints, refine field survey methodology and assist with assessing the impacts of the proposal. Information sources consulted included:

- NSW Government Web Map Service (WMS) layers for NSW Imagery (compiled imagery, NSW Property, NSW Base Map and NSW Topographic Map) (<https://www.spatial.nsw.gov.au/>).
- EPBC Protected Matters Search Tool (<https://www.environment.gov.au/epbc/protected-matters-search-tool>)
- NSW State Vegetation Type Map C1.1.M1.1 (<https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map>)
- NSW DPI threatened fish indicative distribution maps (www.dpi.nsw.gov.au/fishing/species-protection/threatened-species-distributions-in-nsw/freshwater-threatened-species-distribution-maps)
- NSW BioNet Wildlife Atlas Vegetation classification (<https://www.environment.nsw.gov.au/research/Visclassification.htm>)
- NSW BioNet Threatened Biodiversity Data Collection (www.bionet.nsw.gov.au/)
- NSW BioNet Atlas (www.bionet.nsw.gov.au/)
- Register of Declared Areas of Outstanding Biodiversity Value (www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/about-threatened-species/critical-habitats)
- PlantNET, NSW Flora Online (www.plantnet.rbgsyd.nsw.gov.au/)
- NSW Department of Planning and Environment *Biodiversity Values Map* (<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>)
- Vulnerable Lands – Steep or Highly Erodible, Protected Riparian and Special Category land Mapping (<https://datasets.seed.nsw.gov.au/dataset/vulnerable-land-protected-riparian73a9e>)
- Acid Sulphate Soils Risk mapping (<https://datasets.seed.nsw.gov.au/dataset/acid-sulfate-soils-risk0196c>)
- Directory of Important Wetlands of Australia (DIWA) (<https://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands>)
- NSW wetlands mapping (<https://datasets.seed.nsw.gov.au/dataset/nsw-wetlands047c7>)

- Important area mapping for the Regent Honeyeater and Swift Parrot available from the Biodiversity Offsets and Agreement Management System (BOAMs).

All databases were searched in February 2023, prior to conducting the initial fieldwork, and reviewed (and updated where applicable) in March 2024 prior to completing the draft BDAR. Results of the database searches are provided in **Appendix A**.

2.2 Field Survey

2.2.1 BAM Survey Methodology

Vegetation communities are identified in accordance with the online NSW Plant Community Type Classification (DPE, 2023d), which is the current state-wide vegetation classification system for Plant Community Types (PCTs). This classification system is used for vegetation mapping, development assessment and site planning purposes. It describes over 1,500 PCTs across the state, and groups the vegetation communities into vegetation Class and Formation / Sub-formation as per Keith (2004).

In this study, PCTs were identified on the basis of the following inputs:

- NSW State Vegetation Map C1.1.M1.1 (DPE 2022b), which provides predictive mapping of PCTs in and around the subject land. This mapping is indicative only. It is not necessarily accurate at a fine scale for the purposes of the current study.
- Professional ecological knowledge about locally occurring vegetation types and landscape, soil and topographic patterns, including transitions from one community to another and potential for intergrades between plant communities.
- Field survey results to confirm the flora species present, vegetation structure, landscape position and soil type on the subject land and the extent and condition of native vegetation.
- The BioNet Vegetation Classification database, this being used to identify the candidate vegetation communities likely to be present based on the site conditions (flora species present, vegetation structure, bioregion, and landscape position and soil type) and the relevant published PCT descriptions.

If any of the PCTs were identified as having potential to be part of a Threatened Ecological Community (TEC), the relevant identification guidelines (NSW Scientific Committee listing criteria and Commonwealth identification guides) were consulted to determine the status of the vegetation community present. These guidelines provide the identification criteria used to positively identify the community as being part of the TEC. The criteria include location, species present, overstorey species, weed cover, number and type of native species including whether certain 'important' native species are present.

Plant identification followed nomenclature in the Royal Botanic Gardens PlantNET online database (Royal Botanic Gardens and Domain Trust, 2023).

Nine BAM plots (LW01-LW09) were completed during the initial survey on the 16th of February 2023 (**Figure 4-1**). As sections of the site could not be accessed during this survey due to flooding, four additional plots (LWX01-LWX04) were completed on the 21st of September 2023. The final footprint of the proposal was not known during the initial survey and plots were conducted with a view to sampling all vegetation zones that might be impacted by the proposal (see **Figure 4-1** and **Appendix B**). The plot locations were randomly selected whilst ensuring adequate survey effort within each vegetation zone (**Table 2-2**; **Figure 4-1**). According to the BAM (2020), a minimum of eight BAM plots would be required for this site (**Table 2-2**), comprising two plots each in zones 26_Derived and 181_Moderate and one each in zones 26_Remnant, 16_Low, 16_Moderate, and 16_Derived (see **Section 4.3.1** for a description of these zones). Of the thirteen plots conducted during the site surveys, nine (LW01, LW02, LW03, LW05, LW07, LW08, LW09, LWX01, and LWX02) were retained in the final analysis. Plot LW04 was omitted as it represented a vegetation zone that was excluded from the final footprint. Plots LW06, LWX03, and LWX04 were used to validate mapping of certain areas as non-native and were not required in the final BAM calculations.

Table 2-2. Minimum number of plots and transects required per zone area (DPIE, 2020b).

Vegetation zone area (ha)	Minimum number of plots/transects
<2	1 plot/transect
>2 – 5	2 plots/transects
>5 – 20	3 plots/transects
>20 – 50	4 plots/transects
>50 – 100	5 plots/transects
>100 – 250	6 plots/transects
>250 – 1000	7 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone
>1000	8 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone

Plots were surveyed according to the BAM (2020) as follows:

- The native survey plot consisted of nested 20 m × 50 m and 20 m × 20 m plots.
- Species composition and structure (species and percent cover) data collected from within 20 m × 20 plot.

- Vegetation function data (size and number of trees, presence of hollow-bearing trees and woody debris) collected from within the 20 m × 50 m plot.
- Percent of litter cover data collected within five 1 m x 1 m squares positioned at 5 m, 15 m, 25 m, 35 m and 45 m points of the 50 m plot.
- The plots were positioned within the subject land and their GPS locations were recorded (GDA 94 / MGA Zone 55).

The remainder of the subject land was traversed by foot to confirm the nature of vegetation (i.e. native or non-native) and search for habitat features such as hollow bearing trees, rock outcrops, and nests.

2.2.2 Incidental Surveys

Incidental flora and fauna sightings were recorded while undertaking the BAM plots and searching the subject land for hollow-bearing trees and other potential habitat features. Potential habitat such as rock, loose bark and coarse woody debris was recorded and examined for signs of cryptic species. Tracks and other areas of suitable substrate were searched for animal tracks. Other evidence of fauna presence on the subject land, such as scats, feathers and sloughed skins were also recorded.

2.2.3 Targeted Surveys

Targeted flora surveys were undertaken on the 20th to 21st of September 2023 and the 3rd to 4th of October, 2023. These surveys involved walking parallel transects across the subject land at 10 m spacings as per the guidelines for surveying flora species under the BAM (DPIE, 2020a; **Figure 2-1**). As parallel flora transects involve slowing walking across the subject land – which in turn flushes cryptic terrestrial birds – the Australian Bustard and the Bush Stone-curlew were simultaneously targeted during flora transects. The flora survey effort (simultaneously covering the Australian Bustard and Bush Stone-curlew) is depicted in **Figure 2-1** all detected flora species are listed in **Appendix C**.

Vegetation mapping for Plant Community Types was conducted on the 16th of February 2023; some fauna species were targeted whilst undertaking this initial fieldwork. Additional targeted fauna surveys were undertaken on the 23rd to 26th of October 2023. The targeted fauna methodology followed the Biodiversity Assessment Method Survey Guide where available (i.e., for amphibians: DPIE, 2022c; DPE 2022c) and where not available the Australian Government Guidelines were followed (i.e., for birds: DEWHA 2010). The targeted fauna survey effort is summarized in **Table 2-3** and **Figure 2-2** and all detected fauna species are listed in **Appendix C**.

Table 2-3. Summary of Targeted Fauna Survey Effort in 2023.

Species	February	September	October	TOTAL
<i>Ardeotis australis</i> Australian Bustard	<ul style="list-style-type: none"> 8.75 hours of foot traverses (1 day) 	<ul style="list-style-type: none"> 9 hours of foot traverses (2 days) 	<ul style="list-style-type: none"> 10 hours of foot traverses (2 days) 8.2 hours of dusk surveys (5 days) 	<ul style="list-style-type: none"> 27.75 hours of foot traverses (5 days) 8.2 hours of dusk surveys (5 days)
<i>Burhinus grallarius</i> Bush Stone-curlew	<ul style="list-style-type: none"> 8.75 hours of diurnal vegetation transects (1 day) 	<ul style="list-style-type: none"> 9 hours of diurnal vegetation transects (2 days) 	<ul style="list-style-type: none"> 10 hours of foot traverses (2 days) 8.2 hours of dusk surveys (5 days) 4 nights call playback 4 nights spotlighting 	<ul style="list-style-type: none"> 27.75 hours of foot traverses (5 days) 8.2 hours of dusk surveys (5 days) 4 nights call playback 4 nights spotlighting
<i>Haliaeetus leucogaster</i> White-bellied Sea Eagle		<ul style="list-style-type: none"> 0.75 hours of dusk surveys (1 day) 	<ul style="list-style-type: none"> 8.2 person hours of dusk surveys (5 calendar days) 	<ul style="list-style-type: none"> 8.75 hours of dusk surveys (6 days)
<i>Hieraaetus morphnoides</i> Little Eagle		<ul style="list-style-type: none"> 0.75 hours of dusk surveys (1 day) 	<ul style="list-style-type: none"> 8.2 person hours of dusk surveys (5 calendar days) 	<ul style="list-style-type: none"> 8.75 hours of dusk surveys (6 days)
<i>Litoria raniformis</i> Southern Bell Frog			<ul style="list-style-type: none"> 4 nights of aural-visual surveys (8.2 hours) 4 nights of call playback 	<ul style="list-style-type: none"> 4 nights of aural-visual surveys (8.2 hours) 4 nights of call playback
<i>Lophoictinia isura</i> Square-tailed Kite		<ul style="list-style-type: none"> 0.75 hours of dusk surveys (1 day) 	<ul style="list-style-type: none"> 8.2 hours of dusk surveys (5 calendar days) 	<ul style="list-style-type: none"> 8.7 hours of dusk surveys (6 days)

Green shading = approved survey month.

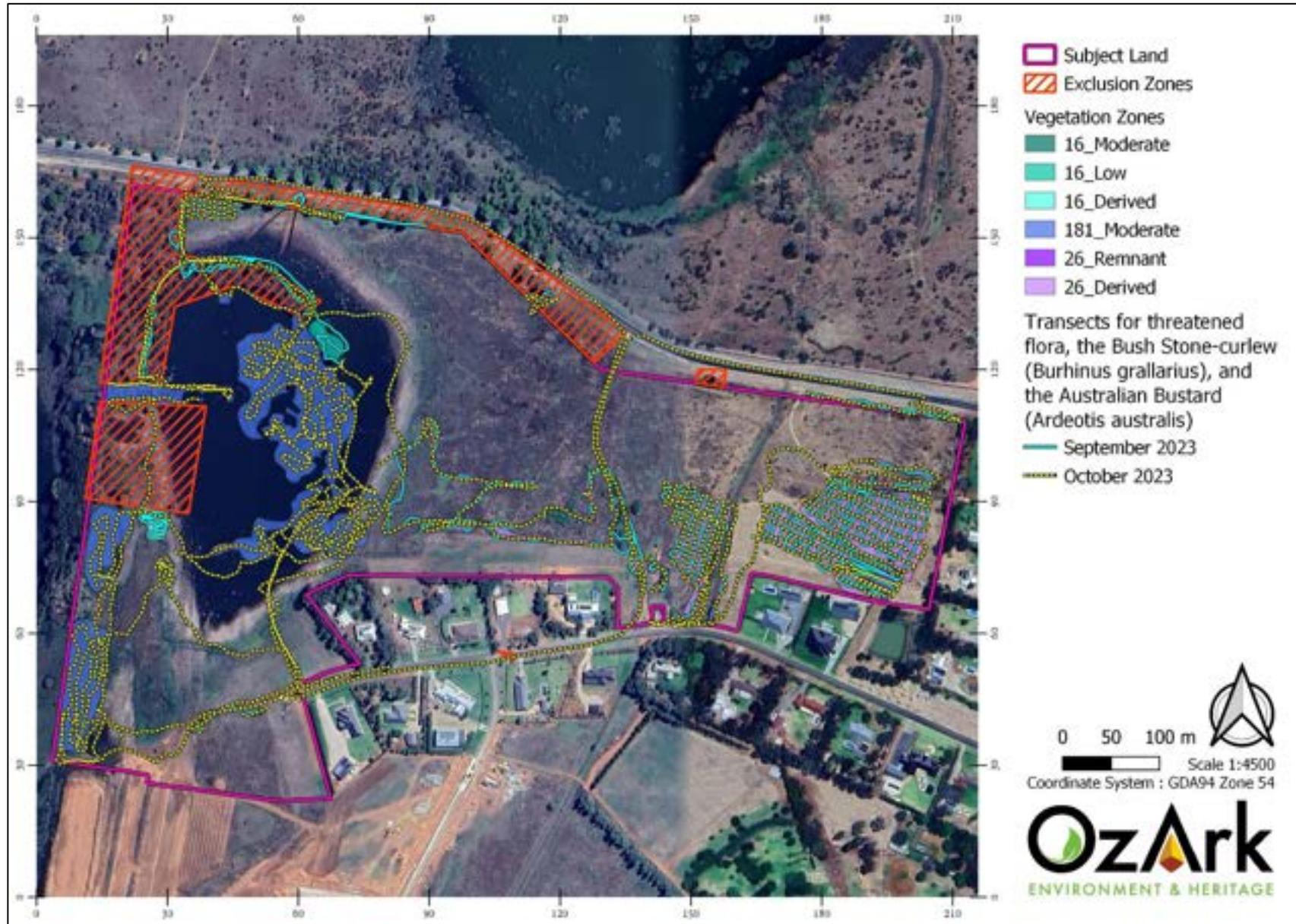


Figure 2-1. Targeted flora and fauna surveys: transects for flora, the Australian Bustard and the Bush Stone-curlew.

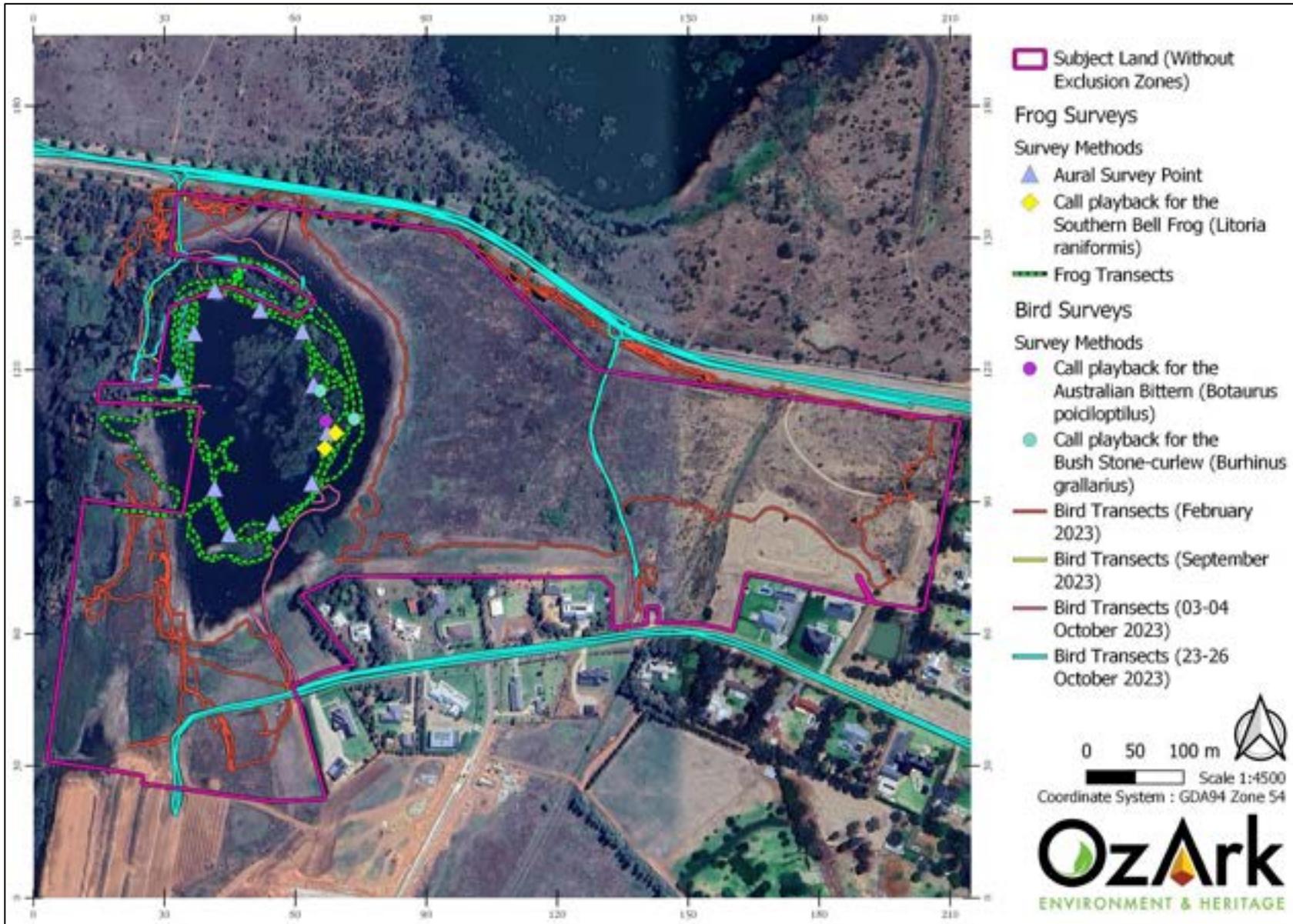


Figure 2-2. Targeted fauna surveys: diurnal bird transects, nocturnal frog transects, aural-visual frog surveys and call playback locations.

2.3 Habitat Suitability

The suitability of the subject land as habitat for all species credit species generated by the BAM-C was assessed (**Section 5.2** and **5.3**).

The presence / absence of threatened species was categorised as follows:

- Assumed present – the species was predicted to occur by the BAM-C, suitable habitat features occur on the subject land for that species and no targeted survey or expert report was commissioned.
- Absent (constraint) – None of the habitat constraints or geographic limitations are present, the habitat is degraded or the species is a vagrant.
- Absent (surveyed) – Targeted surveys undertaken during the time period specified for the species in the Threatened Biodiversity Data Collection (TBDC) and following DPIE threatened species survey guidelines for threatened flora (DPIE, 2020a).

EPBC-listed fauna that were predicted to occur within 10 km of the subject land were also assessed for their presence or absence on site (**Appendix D**).

2.4 Limitations

This study is based upon the species data available at the time of the study, and the environmental conditions, season, and time constraints imposed by the project for the field survey. Specific limitations on this study include the following:

- The initial BAM plots were completed in late summer, which is not an ideal time for surveying vegetation.
- Portions of the subject land were consistently underwater, which impeded access for BAM plots and targeted flora surveys.

To overcome some of these limitations, a 'precautionary approach' for species presence has been adopted where required. For example, if suitable habitat for a particular threatened species is present on the site and conditions were not suitable for detecting the species at the time of the targeted survey, then the species is assumed to be present.

The above-mentioned constraints were also considered when preparing the recommendations of avoiding, minimising and mitigating potential impacts.

3 Landscape Features

3.1 Overview

A series of background searches were performed to comply with legal standards (**Table 3-1**).

Table 3-1. Environmental protection areas within the study area.

Environmental Protection Areas	Presence in the Study Area
Land identified on the Biodiversity Values Map under the NSW <i>BC Act</i> 2016	Yes (Appendix A).
Area of Outstanding Biodiversity Value (AOBV) under the NSW <i>BC Act</i> 2016	No.
Watercourse mapped as Key Fish Habitat (KFH) and/or within the extent of an aquatic Endangered Ecological Community, listed under the <i>Fisheries Management Act</i> 1994.	Yes. Section 3.10
An area reserved or dedicated under the <i>National Parks and Wildlife Act</i> 1974 or <i>Wilderness Act</i> 1987.	No.
Is the proposal located within land reserved or dedicated within the meaning of the <i>Crown Lands Act</i> 1989 for preservation of other environmental protection purposes?	No.
A World Heritage Area.	No.
Environmental Protection Zones in environmental planning instruments.	Yes (E2 and E4).
Lands protected under <i>NSW State Environmental Planning Policy (Biodiversity and Conservation)</i> 2021	No. Section 1.6.3
Aquatic reserves dedicated under the <i>Fisheries Management Act</i> 1994.	No.
Wetland areas dedicated under the Ramsar Wetlands Convention.	No.
Land subject to a conservation agreement under the <i>National Parks and Wildlife Act</i> 1974.	No.
Land identified as State Forest under the <i>Forestry Act</i> 1916.	No.
Acid sulfate area.	No.

3.2 Bioregion

The subject land falls within the Lachlan Plains subregion of the Cobar Peneplain Bioregion (**Figure 1-3; Figure 1-4**) as per the Interim Biogeographic Regionalisation of Australia (IBRA; Thackway & Cresswell, 1995). The subregion is characterised by geology, landforms, soil types and vegetation as described in **Table 3-2**.

Table 3-2. Description of the Lachlan Plains subregion (NSW NPWS 2003).

Bioregion	Cobar Peneplain
Subregion	Lachlan Plains
Geology	Devonian quartz sandstone and conglomerate, small areas of granite, and Quaternary colluvial slope mantles and alluvium.
Landforms	Strike ridges of resistant rocks often following fold patterns. Low rounded hills of granite with sparse outcrop. Wide short valleys connecting to Lachlan floodplains.
Soils	Shallow stony or gritty red earths on crests and slopes, thickening downslope as rubbly mantles often with a texture contrast. Deep sandy alluvial soils in valleys with small areas of grey clay in swamps.
Vegetation	Dense currawang, Dwyer's mallee gum and white cypress pine on rocky crests. Same with red ironbark, mallee broombush, hill tea-tree and poplar box on slopes. Poplar box, white cypress pine, mallee, kurrajong, yarran and wilga in valleys. Poplar box and black box in minor swamps.

3.3 NSW (Mitchell) Landscapes

Landscapes with relatively homogenous geomorphology, soils and broad vegetation types in NSW have been classified and mapped at a 1:250,000 scale. These landscapes are referred to as NSW (or Mitchell) Landscapes (Mitchell, 2002).

The subject land falls within the **Lachlan Lakes, Swamps, and Lunettes** and the **Hillston Sandplains** landscapes (**Figure 1-3; Figure 1-4**). The characteristics of these landscapes is described below.

Lachlan Lakes, Swamps, and Lunettes

Lachlan Lakes, Swamps and Lunettes landscape includes parts of nine land systems: Cargelligo, Gulthul, Gunnaramby, Lowbidgee, Mungo, Murrumbidgee, Riverland, Yanga and Youhl. Quaternary alluvium in lakebeds, swamps, salinas, shorelines, lunettes, feeder channels and terraces of the river wetlands. Associated extensive sandplains and dunes. Relief to 7m. Includes large relict lakes upstream of the Mungo system partially overlain by sandplains and unstable dunes, flanked by high unstable lunettes, relief to 30m. Grey cracking clays with gilgai on active lake beds and channels. Calcareous red earths on shorelines and shallow sandy calcareous soils, or deep brownish sands and solonized brown soils on lunettes. Redbrown or grey, often saline clays on relic lakebeds. Sandplains of loamy to clay loam calcareous earths with limestone nodules frequently exposed, dunes of deep red, yellow or white sands. Prior streams and relic lunettes of loamy red texture-contrast soils and calcareous earths. Lake beds often flooded and treeless, with fringing black box (*Eucalyptus largiflorens*), lignum (*Muehlenbeckia cunninghamii*), nitre goosefoot (*Chenopodium nitrariaceum*), yanga bush (*Maireana brevifolia*), and old man saltbush (*Atriplex nummularia*). Lake margins, lunettes and terraces with scattered bimple box (*Eucalyptus populnea*), black box, white cypress pine (*Callitris glaucophylla*), river cooba (*Acacia stenophylla*), dense areas of yanga bush and abundant grasses. Floodplains and channels with river red gum (*Eucalyptus camaldulensis*), scattered bladder saltbush

(*Atriplex vesicaria*), cottonbush (*Maireana aphylla*), canegrass (*Eragrostis australasica*) and abundant grasses. Sandplains and dunes of dense mallee (*Eucalyptus* sp.) scattered to clumped belah (*Casuarina cristata*), rosewood (*Alectryon oleifolius*), needlewood (*Hakea leucoptera*), porcupine grass (*Triodia irritans*), saltbushes (*Atriplex* sp.), bluebush (*Maireana* sp.) and grasses. Relic lunettes carry dense stands of black bluebush (*Maireana pyramidata*), pearl bluebush (*Maireana sedifolia*), and isolated white cypress pine or mallee.

Over-clearing status: Not over-cleared. In total, 26% of this landscape is estimated to have been cleared.

Hillston Sandplains

Hillston Sandplains ecosystem includes parts of three land systems: Lysmoyle, Karwarn and Nombinnie. Level to undulating sandplain of Quaternary aeolian sands and limited alluvium, relief 2 to 4m. Calcareous red earth and solonized brown soils with deep siliceous sands on hummocks. Bokara Hills ecosystem includes parts of three land systems: Booroondarra, Coonavitra and Mulga Downs.

Over-clearing status: Not over-cleared. In total, 52% of this landscape is estimated to have been cleared.

3.4 Geology, Cave, Karst and Soil Features

The underlying geology and soil typical of the subject land and wider study area has been described in **Table 3-2** and above. No outcropping rock, caves or karst formations were detected on the subject land.

3.5 Climate and Weather Data

The nearest weather station is located at the Griffith Airport AWS (station 075041), which is approximately 3.7 km from the subject land. Temperature records commenced at this station in 1970 and rainfall records commenced in 1958.

The area experiences hot summers, with the highest average maximum temperature of 33.3°C experienced in January (**Figure 3-1**). Temperatures in winter are cool to mild with the coldest temperatures being recorded in July, having an average minimum of 3.4°C and an average maximum of 14.8°C.

The average annual rainfall at this station is 410.6 mm. There are no major peaks in monthly rainfall year-round. The highest monthly rainfall occurs in October (40.4 mm), followed by January (36.8 mm) and November (36.4 mm). The lowest monthly rainfall occurs in February (28.0 mm), followed by April (29.2 mm) and July (32.6 mm).

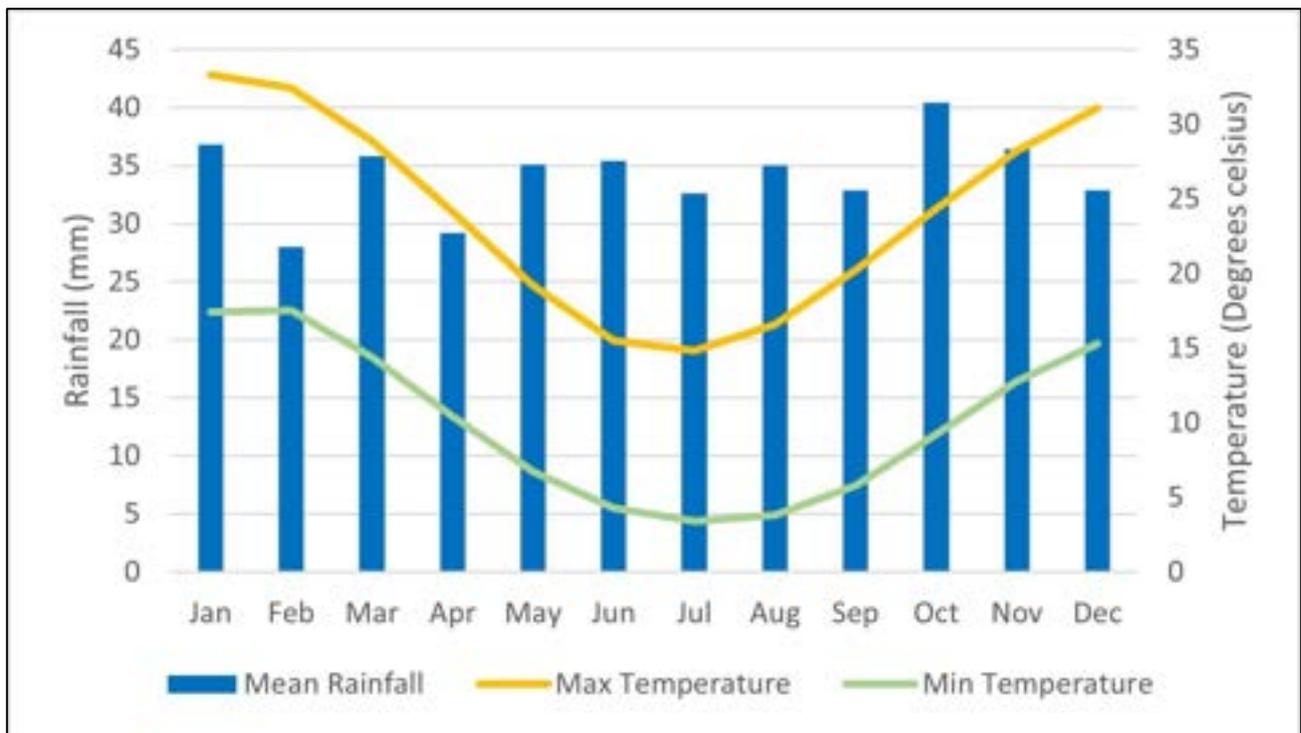


Figure 3-1. Climate statistics for Griffith Airport AWS (ID 075041) showing mean minimum and maximum temperatures, and mean rainfall (Bureau of Meteorology, 2024).

3.6 Biodiversity Values Map

The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. The subject land does not contain land identified on the BV Map (**Appendix A**).

3.7 Areas of Outstanding Biodiversity Value

The site does not contain any listed Areas of Outstanding Biodiversity Value.

3.8 Native Vegetation Cover

Native vegetation cover, assessed as the proportion of the study area retaining native vegetation, was assessed by consulting aerial imagery of the surrounding landscape and ground-truthing this where possible to determine whether native vegetation persists. Native vegetation is defined to include woody vegetation and non-woody vegetation, including regrowth and plantations, comprised of plants native to New South Wales. Native cover is mapped in **Figure 1-3**, **Figure 1-4** and **Figure 3-2**. Areas excluded from the estimate of cover include built infrastructure (chiefly roads and residences), planted non-native vegetation, and intensively farmed land. A summary of the vegetation cover estimate is provided in **Table 3-3**. For the purposes of the BAM, the native vegetation cover class has been determined as 10-30%.

Table 3-3. Native vegetation cover estimates in the study area.

Vegetation Cover Type	Description	Cover Within Study Area (ha)	Total Area of Study Area (ha)	Native Cover within Study Area (%)
Native vegetation	Remnant woodland and associated derived grassland.	251.71	1138.17	22.12

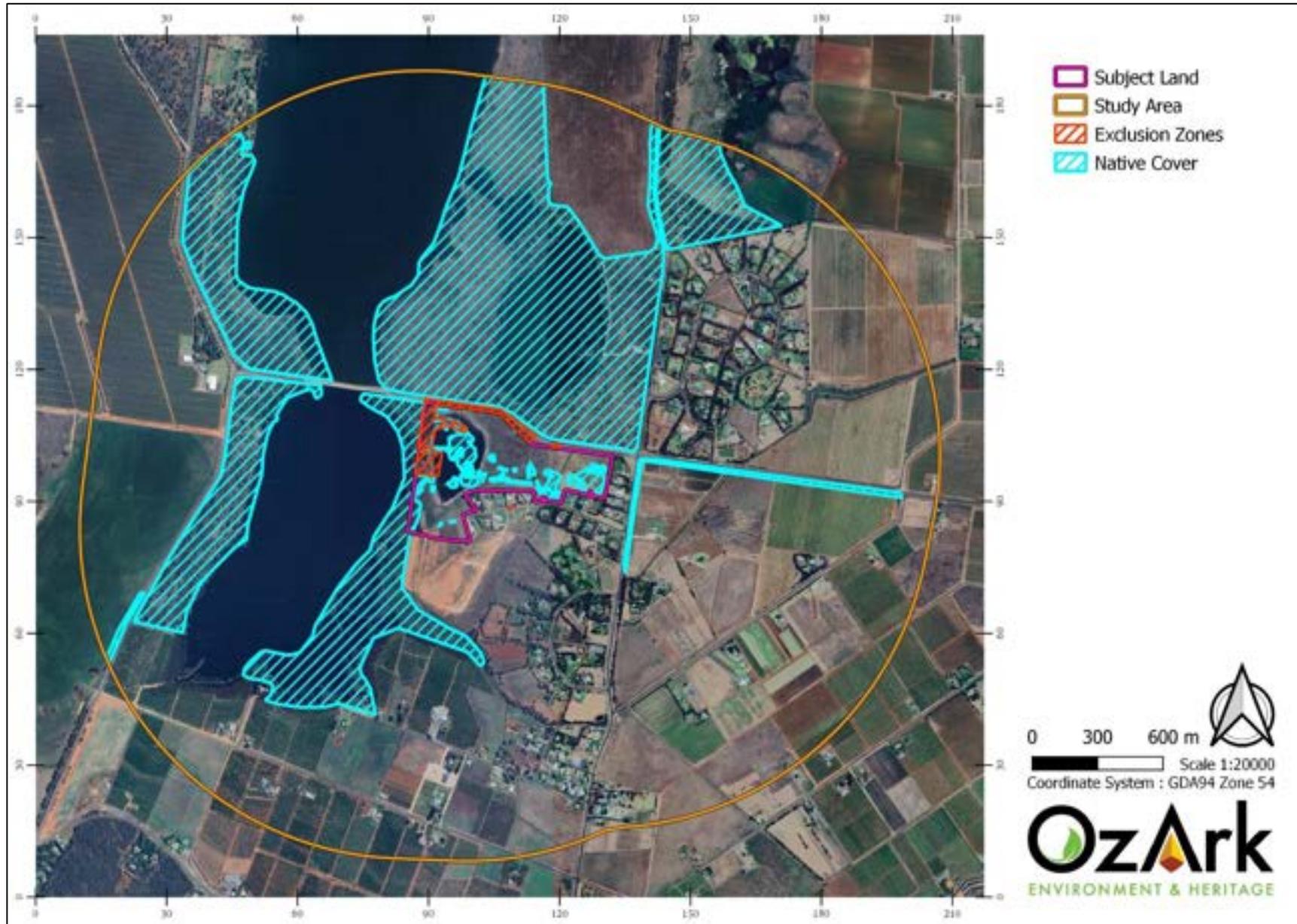


Figure 3-2. Native vegetation cover within the study area.

3.9 Rivers, Streams, Wetlands and Key Fish Habitat

According to geological studies, Lake Wyangan was historically an intermittent wetland with salts accumulating in the bed of the basin over time, leaving gypsum deposits. These gypsum deposits were mined until the 1950's when Lake Wyangan became permanently flooded (McCaffery 2003). The Lake Wyangan Catchment comprises six distinct wetlands:

- North and South Lake Wyangan (collectively known as Lake Wyangan),
- Little Swamp,
- Nericon Swamp,
- Campbell's Wetland,
- and Tharbogang Swamp.

Little Swamp occurs within the subject land (**Figure 3-3**) and South Lake Wyangan occurs immediately to the west (**Figure 3-4**). Furthermore, one unnamed, Strahler 1st order, minor non-perennial watercourses and several manmade canal lines occur within the wider study area (**Figure 3-4**):

Lake Wyangan is a closed basin, meaning that it receives and retains water from upstream and the surrounding catchment but has no natural outflow to natural watercourses. Lake Wyangan contains Key Fish Habitat (KFH), as recognised by the Department of Primary Industries – Fisheries (DPI). However, no areas of Protected Riparian Land (PRL), as recognised by the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), occur within the study area (**Figure 3-4**).

Lake Wyangan has ongoing problems with poor water quality, with frequent blue green algae (cyanobacterial) blooms and ongoing issues with salinity, turbidity, nitrogen and pesticides. In May 2020 a large fish kill occurred in Lake Wyangan, with large numbers of Bony Bream dying, along with some Murray Cod and Golden Perch; European Carp did not suffer mortality. Investigations into water quality at the time indicated that pesticides, herbicides, lake foam, metals, and metalloids are all likely causes of the fish kill.

The subject land falls within the mapped distribution of the Endangered Ecological Community (EEC) Lower Murray River aquatic ecological community. This listing applies to “natural creeks, rivers and associated lagoons, billabongs and lakes of the regulated portions of the Murray, Murrumbidgee and Tumut rivers, as well as their tributaries and branches,” and extends to the following watercourses and waterbodies: Billabong Creek, Yanco Creek, Colombo Creek, and their tributaries; Frenchmans Creek; Edward River, the Wakool River and their tributaries; the Rufus River; and Lake Victoria. While Lake Wyangan and Little Swamp fall within the overall extent of the community, they are not associated with any of the named watercourses or their tributaries. Lake Wyangan is fed largely by artificial canals and by minor local drainage channels and Little Swamp is not connected to any

mapped watercourse. For this reason, they are not considered to form part of this EEC and no tests of significance are required for this EEC under the FM Act.

No watercourses within the study area are mapped as containing the distributions of threatened fish species or populations listed under the FM Act. Furthermore, the two threatened fish species outlined in the EPBC Act Protected Matters Report are unlikely to occur within Little Swamp. This is due to the Macquarie Perch (*Macquaria australasica*) being primarily a riverine species, and the Flathead Galaxias (*Galaxias Rostratus*) being considered locally extinct in the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. As such, the proposal is not expected to impact any of these species or populations. Therefore, no tests of significance for threatened species were considered necessary under the FM Act.

During the course of field surveys, Little Swamp was observed to contain European Carp. No other fish species were observed in the swamp, no tadpoles were observed in the water, and very few aquatic invertebrates were observed. Judging by the presence of a salt crust, and the salt-tolerant plants in residence, the water is assumed to be saline.

Considering the proposal includes the remediation of Little Swamp, LWLE Pty Ltd must obtain a permit for dredging and reclamation from DPI – Fisheries, under the FM Act.



Figure 3-3. View of Little Swamp, facing south (October 2023).

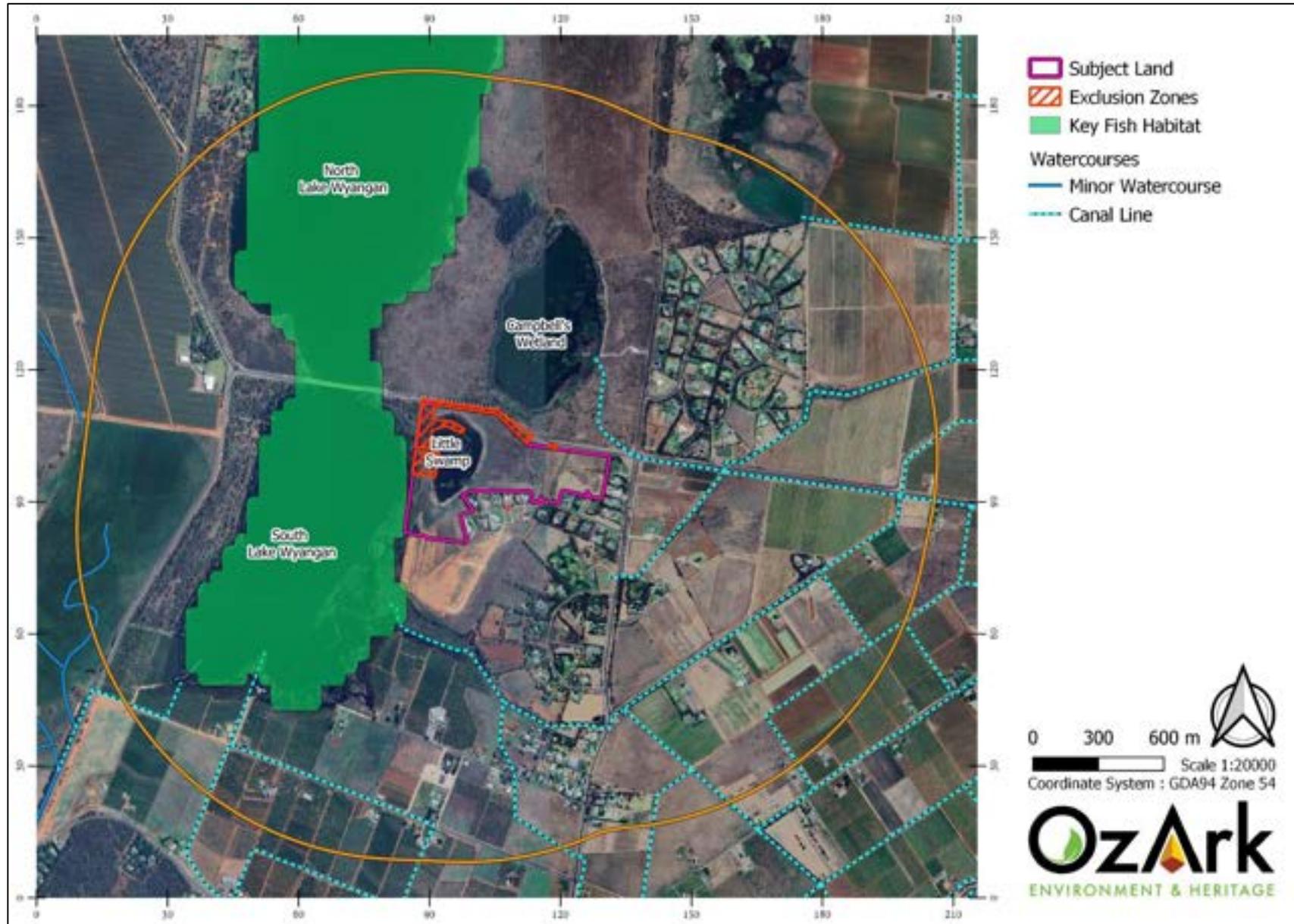


Figure 3-4. Watercourses, Key Fish Habitat, and protected Riparian Land within the Study Area.

3.10 Groundwater Dependent Ecosystems

Groundwater plays an important ecological role in directly and indirectly supporting terrestrial and aquatic ecosystems. Groundwater sustains terrestrial and aquatic ecosystems by supporting vegetation and providing discharge to channels, lacustrine and palustrine wetlands, and both the estuarine and marine environment.

The degree of groundwater dependence of ecosystems can be categorised into three broad categories:

- Non-dependent ecosystems that occur mostly in recharge areas and have no connection with groundwater.
- Facultative GDEs that require groundwater in some locations but not in others, particularly where an alternative source of water can be accessed to maintain ecological function. Minor changes to the groundwater regime in facultative GDEs with proportional or opportunistic groundwater dependence may not have any adverse impacts but these ecosystems can be damaged or destroyed if a lack of access to groundwater is prolonged.
- Obligate GDEs that are restricted to locations of groundwater discharge and ecosystems located within aquifers (e.g., subterranean cave and stygofauna communities (Kuginis *et al.* 2012). Aquifer ecosystems are inherently groundwater dependent.

Groundwater dependent ecosystems have been classified into seven types under two broad categories as follows (Serov *et al.* 2012):

- Subsurface ecosystems – Underground ecosystems
- Karst systems and caves (limestone geology)
- Subsurface aquifer (phreatic) ecosystems
- Baseflow streams (hyporheic or subsurface component)
- Surface ecosystems – Above ground ecosystems
- Groundwater dependent wetlands
- Baseflow surface streams (surface/free-water component)
- Estuarine and near shore marine ecosystems
- Groundwater dependent terrestrial ecosystems; dependent on subsurface groundwater (phreatophytic).

The Bureau of Meteorology Atlas of Groundwater Dependent Ecosystems (GDEs) identifies No GDEs within the subject land (**Figure 3-5**). However, high potential aquatic and terrestrial GDEs are associated with Lake Wyangan and Campbell's Wetland, to the west and north of the subject land,

respectively.

Little Swamp is not mapped as containing any GDEs; however, considering that the surrounding wetlands are mapped as high-potential aquatic and terrestrial GDEs, Little Swamp is also likely to contain such GDEs. Construction activities will involve direct interactions with groundwater in this location. The proposal includes the conversion of the existing swamp to a sediment basin and a two-cell constructed wetland, one cell expected to contain water permanently and one seasonally, to handle the drainage and runoff requirements of the site. It is assumed that these activities will require excavation within Little Swamp. As the water table is at or above the soil surface, any activities in this area will directly impact groundwater. Alterations to groundwater dynamics and contamination of groundwater by construction activities have the potential to adversely affect sensitive ecosystems located outside the subject land, for example by drawing soil moisture away from those habitats. The long-term impacts of the proposal on the surrounding landscape are uncertain; however, as most remnant native vegetation occurs adjacent to Lake Wyangan and may be supported by discharge from that waterbody, impacts from construction activities in Little Swamp may be relatively minor, provided serious contamination is avoided. Mitigation measures to reduce the impacts of erosion and runoff, which may adversely affect groundwater, have been provided in **Section 7**. A Construction Environmental Management Plan will also be required, which will contain further mitigation.

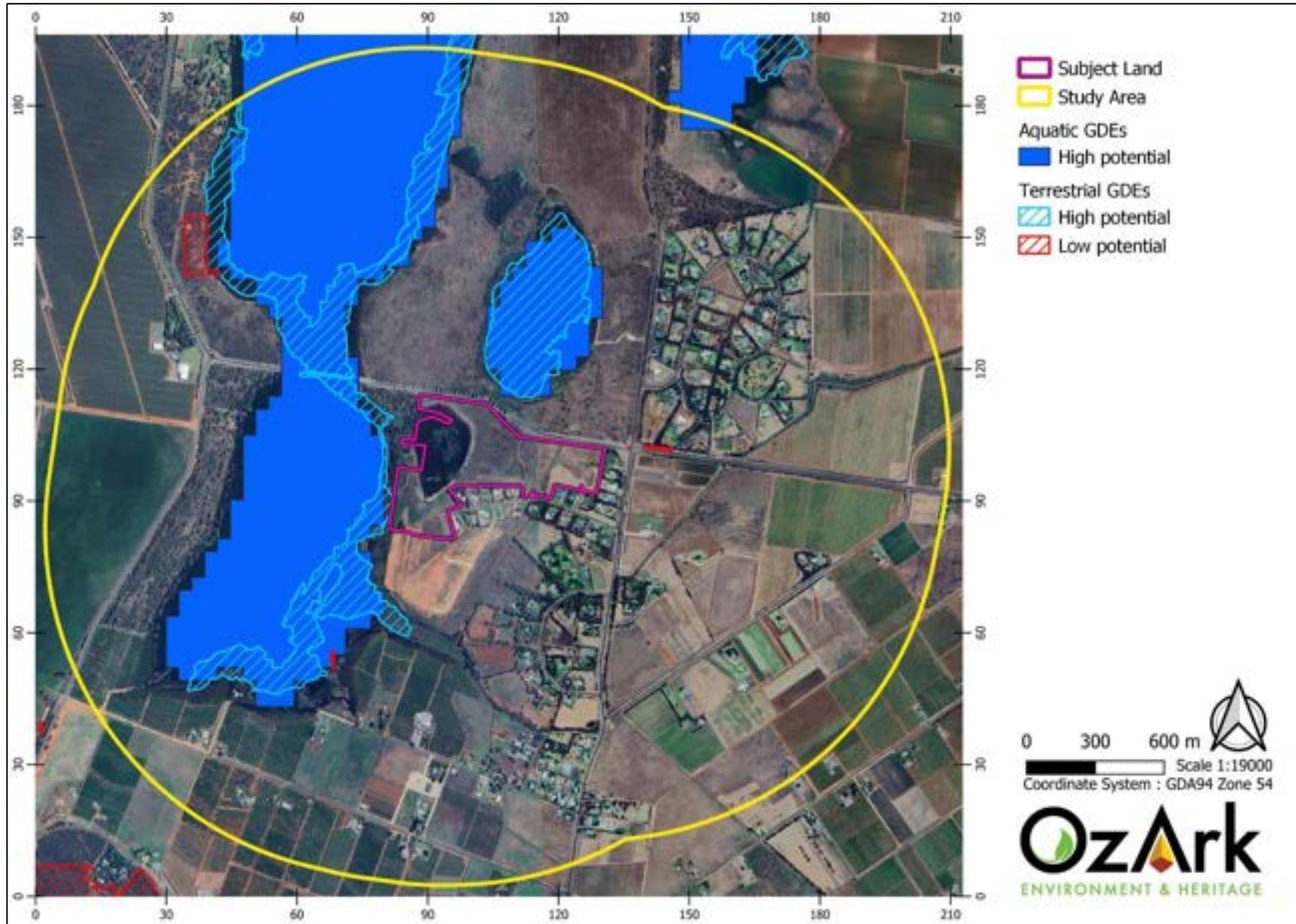


Figure 3-5. Groundwater-dependent ecosystems (GDEs) within the study area.

3.11 Connectivity Features

The landscape surrounding the subject land has been heavily cleared for urban development. Limited impacts to woodland connectivity are likely as only 0.22 ha of wooded vegetation remain within the site. The most significant vegetation connectivity features in the local landscape are the woodland remnants growing along the banks of Lake Wyangan, west of the site. These areas will be largely unaffected by the proposal. Excluding wetlands, most of the impacts of the proposed development would be to derived grassland communities. These derived grasslands offer little to no connectivity to surrounding lands, as they consist of small native fragments in a matrix of highly disturbed, predominantly non-native vegetation. Only species tolerant of high degrees of disturbance are likely to make use of the site. Connectivity to surrounding lots is similarly limited as the site is bounded on two sides by residential development and on one by Jones Rd. While the proposal would result in loss of habitat, no significant impacts to connectivity features are likely.

Wetland vegetation within the site (zone 181_Moderate) may facilitate movement of certain migratory species by acting as a temporary stopover point. However, similar habitat will remain within the study area (Lake Wyangan and Campbell's Wetland) and wider search area (Tharbogang Wetlands Reserve and Nericon Wetlands Reserve).

4 Native Vegetation

4.1 Land Category Assessment

According to section 6.8(3) of the BC Act, land defined as Category 1 – Exempt Land (within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act) is to be excluded from assessment under the BAM. Category 1 exemption applies to rural land (zoned RU1, RU2, or RU3) that was cleared of native vegetation as of 1 January 1990 or lawfully cleared of vegetation between 1 January 1990 and 25 August 2017. The subject land is situated on land zoned R5, therefore, none of the subject land can be considered Category 1 – Exempt Land.

4.2 Plant Community Types (PCTs)

Three PCTs were recorded during the site survey:

- PCT 16 – Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion),
- PCT 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, and
- PCT 181 – Common Reed - Bushy Groundsel aquatic tall reedland grassland wetland of inland river systems.

Justification for PCT determination is given in **Table 4-1**. In accordance with the BAM, PCTs have been further stratified into vegetation zones (see **Section 4.3**). Vegetation zones within the assessed area and the locations of supporting BAM plots are mapped in **Figure 4-1**. Photographs and data sheets completed in the field are provided in **Appendices B** and **C**.

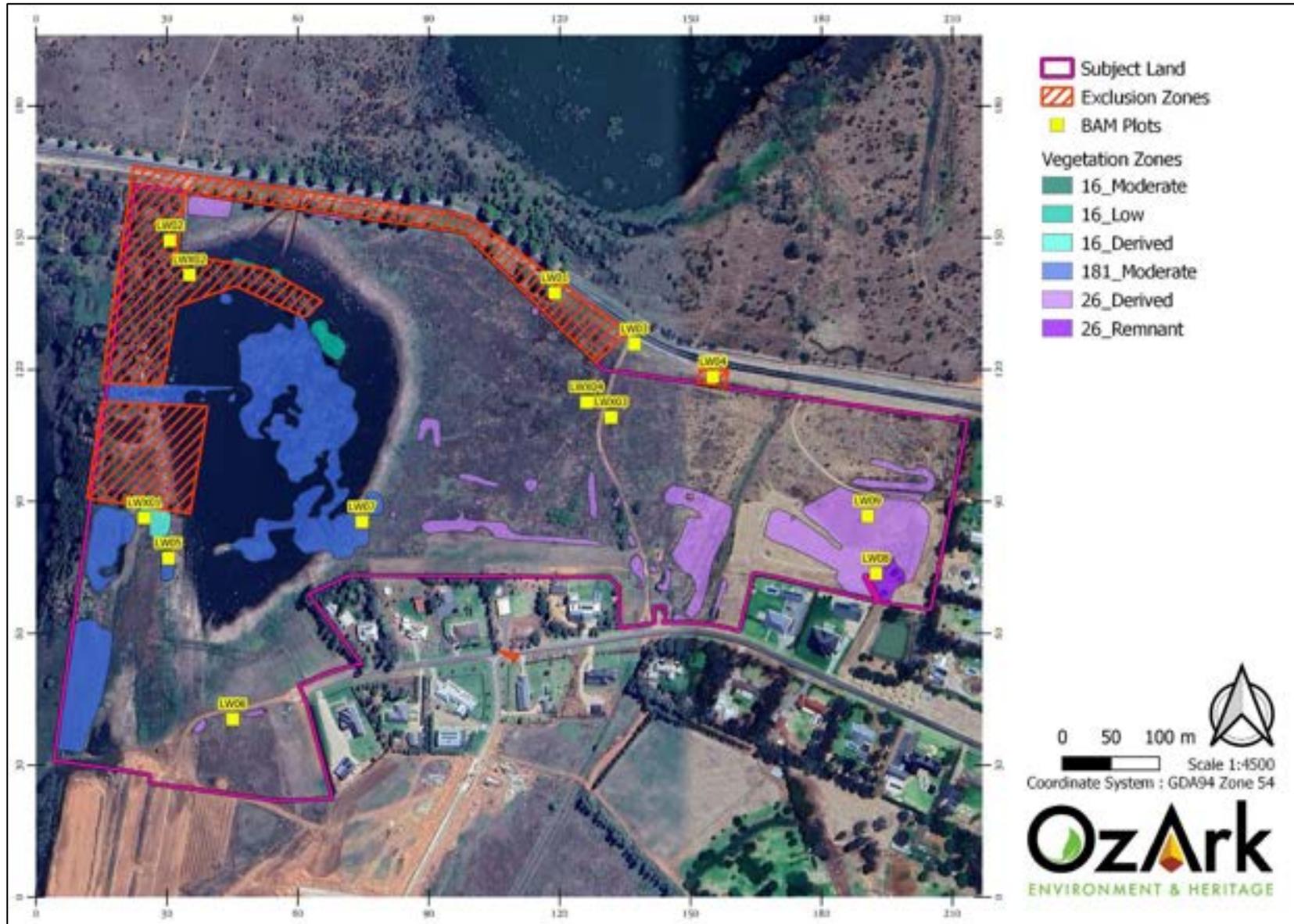


Figure 4-1. Vegetation zones and BAM Vegetation Integrity plots.

Table 4-1. Plant Community Types and vegetation zones present within the subject land.

PCT ID	PCT Name	Vegetation Class	TEC Status BC Act	TEC Status EPBC Act	Justification of Identification	Current NSW Extent Percent Cleared
16	Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Inland Floodplain Woodlands	No TEC	No TEC	<p>“Moderate” condition:</p> <ul style="list-style-type: none"> Woodland in which a range of planted species co-occur with possibly natural regrowth of Black Box (<i>Eucalyptus largiflorens</i>). Plantings include many species not native to NSW but also River Red Gum (<i>E. camaldulensis</i>) and River Oak (<i>Casuarina cunninghamiana</i>), the latter native to NSW but not seen naturally near Griffith. Understorey relatively sparse. Dominated by small chenopod shrubs (particularly <i>Rhagodia spinescens</i> and <i>Enchylaena tomentosa</i>) and native grasses (e.g. <i>Austrostipa scabra</i>, <i>Enteropogon acicularis</i> and <i>Rytidosperma caespitosum</i>). Native forbs are scarce but include common colonising natives, such as <i>Sida corrugata</i> and <i>Pseudognaphalium luteoalbum</i>. The unnatural assemblage of species recorded complicates identification of an appropriate PCT and filtering the NSW BioNet Vegetation Classification Database by the relevant IBRA subregion and most commonly recorded species returns a range of PCTs that do not align closely with the vegetation recorded in situ. As the chenopod-dominated understorey aligns more closely with local Black Box communities (PCT 13 and PCT 16) than with local River Red Gum communities (e.g. PCT 2), it was determined that these areas should be mapped to a Black Box community. Of the two local options, PCT 16 was preferred as PCT 13 is considered to be dominated by the shrub Lignum (<i>Duma florulenta</i>), which was not recorded within the zone. <p>“Low” condition:</p> <ul style="list-style-type: none"> Woodland in which significant regrowth or plantings of Black Box (<i>Eucalyptus largiflorens</i>) occur under a canopy of River Red Gum (<i>E.</i> 	100,000 ha 50.00% ±80%

PCT ID	PCT Name	Vegetation Class	TEC Status BC Act	TEC Status EPBC Act	Justification of Identification	Current NSW Extent Percent Cleared
					<p><i>camaldulensis</i>) and River Oak (<i>Casuarina cunninghamiana</i>). Black Tea-tree (<i>Melaleuca lanceolata</i>) has been planted at high densities.</p> <ul style="list-style-type: none"> Owing to recent inundation, the understorey was almost entirely bare at the time of survey; however, this patch is continuous with 16_Moderate and is treated here as a poorer-condition example of the same community. For the reasons identified for the moderate condition community, filtering the Vegetation Classification Database returns largely inappropriate PCTs and instead the community was assigned to PCT 16 owing to its similar canopy assemblage to the moderate zone and regrowth of Black Box. Lignum was also absent from this zone. <p>“Derived” condition:</p> <ul style="list-style-type: none"> Grassland with chenopod shrubs recorded adjacent to small planted or regrowing individuals of Black Box (<i>Eucalyptus largiflorens</i>). While the origin of these Black Box trees is uncertain, no other evidence is available to identify the most likely parent community of this derived grassland. As the Black Box trees have been assigned to PCT 16, the adjacent derived grassland is considered to be a derived form of this PCT. This abundance of Ruby Saltbush (<i>Enchylaena tomentosa</i>) within the derived community also aligns it with PCT 16, as this species is the first-listed ground stratum species in the PCT profile. 	
26	Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Riverine Plain Woodlands	Endangered	Does not meet criteria	<p>“Remnant” condition:</p> <ul style="list-style-type: none"> Sparse open woodland in which Weeping Myall (<i>Acacia pendula</i>) is the dominant canopy species. A range of shrub or small tree species co-occur – notably the wattles <i>A. salicina</i>, <i>A. stenophylla</i>, and <i>A. oswaldii</i> – and were occasionally recorded as scattered individuals. The understorey is highly disturbed but contains a mixture of chenopod shrubs and native grasses, along with a small number of native forbs. 	160,000 ha 90.00% ±50%

PCT ID	PCT Name	Vegetation Class	TEC Status BC Act	TEC Status EPBC Act	Justification of Identification	Current NSW Extent Percent Cleared
					<ul style="list-style-type: none"> Filtering the NSW BioNet Vegetation Classification Database by the relevant IBRA subregion and the four tree or shrub species above returned only one perfect (5/5) match, PCT 26. As the observed community possesses many of the understorey species known to occur in this PCT, it was adopted in this assessment. <p>“Derived” condition:</p> <ul style="list-style-type: none"> Derived grassland or sparse chenopod shrubland occurring in patches across the site, separated by large areas of non-native vegetation. Owing to the scarcity of remnant woody vegetation, the parent community of this grassland is uncertain. The presence of scattered shrubs of Miljee (<i>Acacia oswaldii</i>), River Cooba (<i>A. stenophylla</i>), and Willow Wattle (<i>A. salicina</i>) suggests an affinity to PCT 26, with which these species are associated. On this basis, the derived grassland has been assigned to PCT 26. 	
181	Common Reed - Bushy Groundsel aquatic tall reedland grassland wetland of inland river systems	Inland Floodplain Swamps	Does not meet criteria	No TEC	<p>“Moderate” condition:</p> <ul style="list-style-type: none"> Wetland in which Common Reed (<i>Phragmites australis</i>) occurs in a near-monoculture, with a small number of grasses and chenopods recorded around the margins of the community. As most of these species are common, “weedy” natives, they are of limited use in PCT determination. The State Vegetation Type Map predicts PCT 182 in some of these areas but the observed vegetation lacks the characteristically dominant species of that community, Narrow-leaved Cumbungi (<i>Typha domingensis</i>). Filtering the NSW BioNet Vegetation Classification Database by the relevant IBRA subregion, the vegetation class Inland Floodplain Swamps, and the species <i>Phragmites australis</i> returns four candidate PCTs: 12, 181, 182, and 238. PCT 182 was rejected for the reasons given above. PCT 12 comprises a mixed community including sedges, 	20,000 ha 33% ±80%

PCT ID	PCT Name	Vegetation Class	TEC Status BC Act	TEC Status EPBC Act	Justification of Identification	Current NSW Extent Percent Cleared
					<p>forbs, grasses and waterplants, as well as grasses and forbs. This aligns poorly with the near-monoculture of Common Reed recorded on site. PCT 238 describes a community chiefly of open water, grading into rush or sedge communities around the edges of waterbodies; in the present case, areas of open water lack aquatic vegetation. By contrast, PCT 181 is described in the database as a “very tall, dense aquatic grassland dominated by Common Reed (<i>Phragmites australis</i>),” which closely aligns with the vegetation recorded on site. While Bushy Groundsel (<i>Senecio cunninghamii</i>) was not recorded locally, this may reflect the high degree of disturbance to drier parts of the site or the more restricted distribution of that species.</p>	

4.3 Vegetation Zones, Patch Size and Vegetation Integrity

4.3.1 Vegetation Zones

In order to be assessed under the BAM (2020), all native vegetation on the subject land must be assigned to a zone, based on its condition state and the patch to which it belongs.

Three PCTs, consisting of one to three vegetation zones each, were identified during the site assessment (**Table 4-1**; **Table 4-2**; **Figure 4-1**). Broad condition states have been determined chiefly by the presence or absence of the key structural elements of the PCT, as well as by differences in composition observed *in situ*, and, to a lesser degree, the vegetation integrity (VI) score, calculated in the BAM-C using plot data. This method also compares data collected with the benchmarks for each PCT. The presence or absence of structural elements was assessed both by reviewing plot data and by general observations made whilst carrying out field work. A description of each zone is provided in **Table 4-1** and summarized below:

- **16_Moderate** – Woodland community slightly above the level of the last inundation in which Black Box (*Eucalyptus largiflorens*) occurs alongside a range of planted local and non-local tree species. The understorey is dominated by chenopods, particularly Spiny Saltbush (*Rhagodia spinescens*) and Ruby Saltbush (*Enchylaena tomentosa*), along with a small number of native grasses and forbs.
- **16_Poor** – Woodland community on inundated lands adjacent to 16_Moderate, featuring the same combination of Black Box (*Eucalyptus largiflorens*) and planted trees. The understorey is almost absent due to inundation but includes halophytes such as Lesser Sea-spurrey (*Spergularia marina*) and saltbushes (chiefly *Atriplex suberecta*) that are capable of tolerating the highly saline environment.
- **16_Derived** – Derived grassland or sparse chenopod shrubland occurring adjacent to areas of Black Box (*Eucalyptus largiflorens*) woodland. Possesses relatively high cover of some chenopod species, including Ruby Saltbush (*Enchylaena tomentosa*), which aligns it with PCT 16, but is subject to severe weed infestation. Native grass and forb diversity in this zone is relatively low.
- **26_Remnant** – Sparse open woodland in which the dominant canopy species is Weeping Myall (*Acacia pendula*). The shrubs or small trees Miljee (*Acacia oswaldii*), River Cooba (*A. stenophylla*), and Willow Wattle (*A. salicina*) also occur in this zone and remain in some areas where *A. pendula* has been lost. Highly disturbed, with the local examples subject to slashing and weed invasion.
- **26_Derived** – Derived grassland of uncertain parentage but with scattered occurrences of Miljee (*Acacia oswaldii*), River Cooba (*A. stenophylla*), and Willow Wattle (*A. salicina*) suggesting an affinity to PCT 26. All grassland areas in which a significant native component

was recorded have been assigned to this zone. This zone frequently grades into areas of wholly non-native vegetation, which accounts for much of the site.

- **181_Moderate** – An aquatic grassland in which Common Reed (*Phragmites australis*) forms dense, near-monocultural stands. Where Common Reed thins around the margins of the community, a small number of disturbance-tolerant native grasses and forbs were noted.
- **Non-native** – Designation of vegetation as non-native was reserved for highly degraded areas in which <15% of the total vegetative cover was native. Often, these areas were found not to possess any remaining native species. These areas were instead dominated by Horehound (*Marrubium vulgare*), Sea Barley Grass (*Hordeum marinum*), bromegrasses (*Bromus* spp.), Prickly Lettuce (*Lactuca serriola*), Wild Oat (*Avena fatua*), and several brassicas, notably Turnip Weed (*Rapistrum rugosum*).

4.3.2 Patch Size and Vegetation Integrity Score

A patch is defined in the BAM operational manual – Stage 1 (2020) as an area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100 metres from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems). The patch may extend onto land adjoining the subject land. The patch size should include derived communities (i.e. where one or more of the structural components or strata layers is missing, modified or new) as these are likely to provide suitable habitat for at least some species. The extent of native vegetation was determined from a combination of satellite imagery, ground-truthing and State Vegetation Mapping (**Figure 4-2**).

Despite being highly fragmented, most of the vegetation recorded on site can be assigned to a single patch, which extends well beyond the boundaries of the subject land. One small (<0.05 ha) area of the non-woody zone 26_Derived was assigned to a second patch as it was found to occur slightly more than 30 m from the next area of native vegetation. In the BAM-C, this vegetation zone has been assigned to the largest of the two patch sizes. It should be noted that the larger patch extends well beyond the limits of the study area and it was not considered necessary to map its full extent. For this reason, references to patch size should be taken to refer to the size of the patch within the study area only. A patch size in the >100 ha size class was used for all vegetation zones. Patch size and vegetation integrity score (VIS) are displayed in **Table 4-2**. Patch size is depicted in **Figure 4-2**.

Table 4-2. Vegetation zones and patch sizes of native vegetation in the disturbance footprint.

BAM-C Zone No.	PCT ID	Condition State	VI Score	HBT ¹	Area Impacted (ha)	Patch Number	Patch Size (ha)	BAM Patch Size Class	Vegetation Zone	BAM Plots	Minimum No. Plots
1	26	Remnant	58.1	N	0.09	1	194.45	>100 ha	26_Remnant	LW01 LW08	1
2	26	Derived	22	N	2.3	1	194.45	>100 ha	26_Derived	LW03 LW09	2
3	16	Derived	5.1	N	0.08	1	194.45	>100 ha	16_Derived	LWX01	1
4	16	Moderate	59.5	N	0.02	1	194.45	>100 ha	16_Moderate	LW02	1
5	181	Moderate	46.5	N	2.96	1	194.45	>100 ha	181_Moderate	LW05 LW07	2
6	16	Low	37.8	N	0.11	1	194.45	>100 ha	16_Low	LWX02	1

¹Hollow-bearing trees within patch (Yes/No).

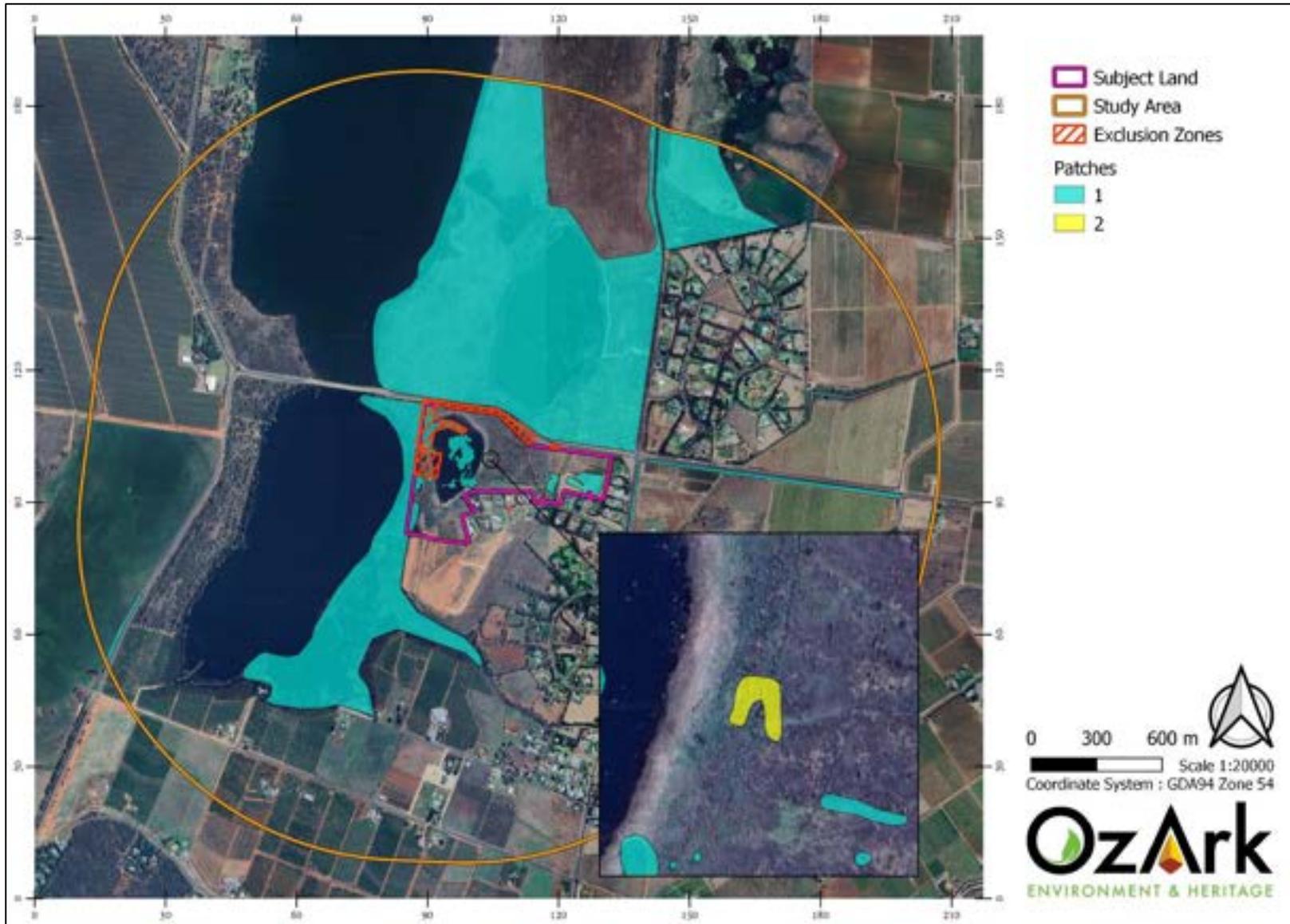


Figure 4-2. Native vegetation patches associated with the vegetation zones.

4.4 Flora Species Observed

In total, 96 plant species were detected during the February 2023 field survey. Of this number, 46 (47.92%) are native and 50 (52.08%) are introduced. Seven species are listed as High-threat Exotic species (HTE) under the BAM (**Table 4-3**). Of these, one species – African Boxthorn (*Lycium ferocissimum*) – is listed as a Priority Weeds (PW) for the Riverina Local Land Services (LLS) region, and as a Weed of National Significance (WoNS). Plot data, plot photographs and a list of all flora species observed during the field assessment are provided in **Appendices B** and **C**.

Table 4-3. Significant weeds recorded during the field assessment.

Scientific Name	Common Name	² Status	³ HTE	⁴ WoNS	⁵ PW
<i>Alternanthera pungens</i>	Khaki Weed	E	Yes	No	No
<i>Bidens subalternans</i>	Greater Beggar's Ticks	E	Yes	No	No
<i>Bromus diandrus</i>	Great Brome	E	Yes	No	No
<i>Carthamus lanatus</i>	Saffron Thistle	E	Yes	No	No
<i>Lycium ferocissimum</i>	African Boxthorn	E	Yes	Yes	Yes
<i>Paspalum dilatatum</i>	Paspalum	E	Yes	No	No
<i>Pinus halepensis</i>	Aleppo Pine	E	Yes	No	No

4.5 Fauna Species Observed

In total, 76 fauna species were recorded during the biodiversity survey, of which 70 (92.11%) were native and 6 (7.89%) were introduced. A list of all observed fauna species is provided in **Appendices C**; this list is annotated with the nature of the species' use of the site (e.g., flying over only, foraging etc). Three threatened fauna species were encountered (**Figure 4-3, Table 4-4**):

- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) listed as Vulnerable under the BC and EPBC Acts. This species occurred mainly within the Weeping Myall on the northern boundary of the site and in remnant vegetation approximately 40 m from the subject site, on the opposite side of Jones Road. The species was sighted on multiple occasions in February, September, and October 2023.
- Magpie Goose (*Anseranas semipalmata*) listed as Vulnerable under the BC Act and Marine under the EPBC Act. This species was observed flying over the subject site and perched on standing dead trees in Campbell's Wetland approximately 240 m outside of the subject site. The species was sighted in October 2023.
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) listed as Vulnerable under the BC Act and Endangered under the EPBC Act. Three birds were observed on the 21st of September 2023 perched in a standing dead tree on the subject land. This tree did not contain hollows.

Six EPBC Act-listed Marine species, all birds, were observed, one of which is additionally listed as Migratory under the Bonn Convention (**Table 4-4**).

Table 4-4. BC and/or EPBC Act-listed species encountered on the subject land during field surveys.

Scientific name	Common Name	BC Act	EPBC Act	Notes
<i>Anseranas semipalmata</i>	Magpie Goose	Vulnerable	Marine	Flying over only
<i>Ardea alba</i>	Great Egret	-	Marine	Foraging in Little Swamp
<i>Ardea intermedia</i>	Intermediate Egret	-	Marine	Foraging in Little Swamp
<i>Circus approximans</i>	Swamp Harrier	-	Marine	Flying & foraging over subject land
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	Vulnerable	Endangered	Three birds perched on stag in subject land
<i>Nycticorax caledonicus</i>	Nankeen Night Heron	-	Marine	Foraging in Little Swamp, flying over
<i>Plegadis falcinellus</i>	Glossy Ibis	-	Marine, Bonn.	Foraging in Little Swamp

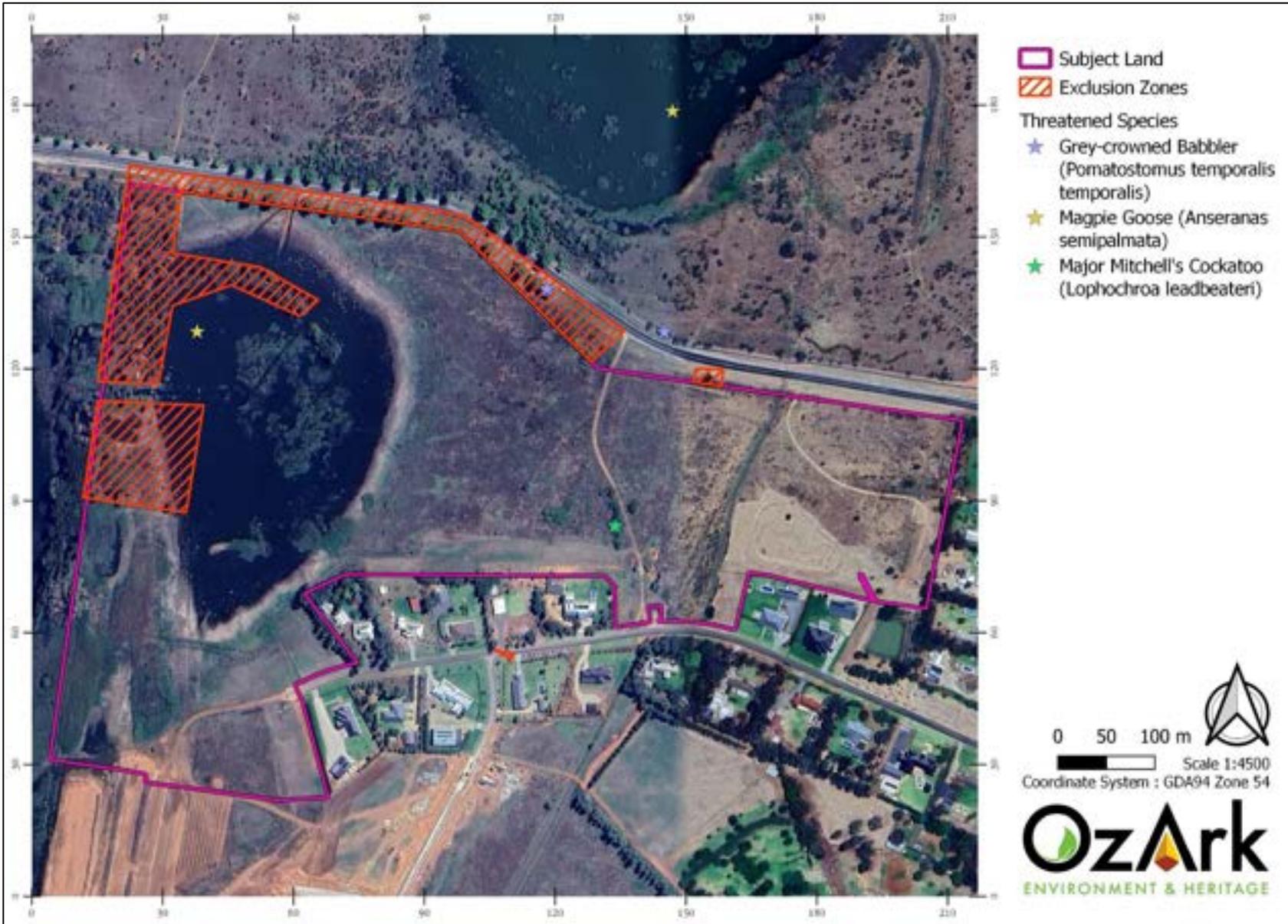


Figure 4-3. Threatened species recorded on or near the subject land during site surveys.

4.6 Threatened Ecological Communities

Two of the recorded PCTs are associated with Threatened Ecological Communities (TECs).

PCT 26 is associated with the following TECs:

- BC Act-listed Endangered Ecological Community (EEC): *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions*
- EPBC Act-listed EEC: *Weeping Myall Woodlands*

PCT 181 is associated with the following TEC:

- BC Act-listed Critically Endangered Ecological Community (CEEC): *Artesian Springs Ecological Community in the Great Artesian Basin*

PCT 16 is not associated with any BC or EPBC Act-listed TECs.

The local occurrence of zone 26_Remnant (0.09 ha) meets the conditions to be considered an example of the associated BC Act-listed EEC *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* as this listing applies to all woodlands in the relevant subregions in which Weeping Myall (*Acacia pendula*) is dominant (**Figure 4-4**). However, the zone does not meet the condition thresholds for the equivalent EPBC Act-listed community as the patch falls below the minimum patch size threshold. The occurrences of zone 26_Derived are considered not to constitute examples of the BC or EPBC Act-listed EECs owing to the absence of Weeping Myall and uncertainty as to whether Weeping Myall was ever dominant in these areas.

The local occurrence of PCT 181 does not meet the conditions to be considered an example of the BC Act-listed CEEC *Artesian Springs Ecological Community in the Great Artesian Basin* as the site does not fall within the Great Artesian Basin and no artesian spring activity was noted.

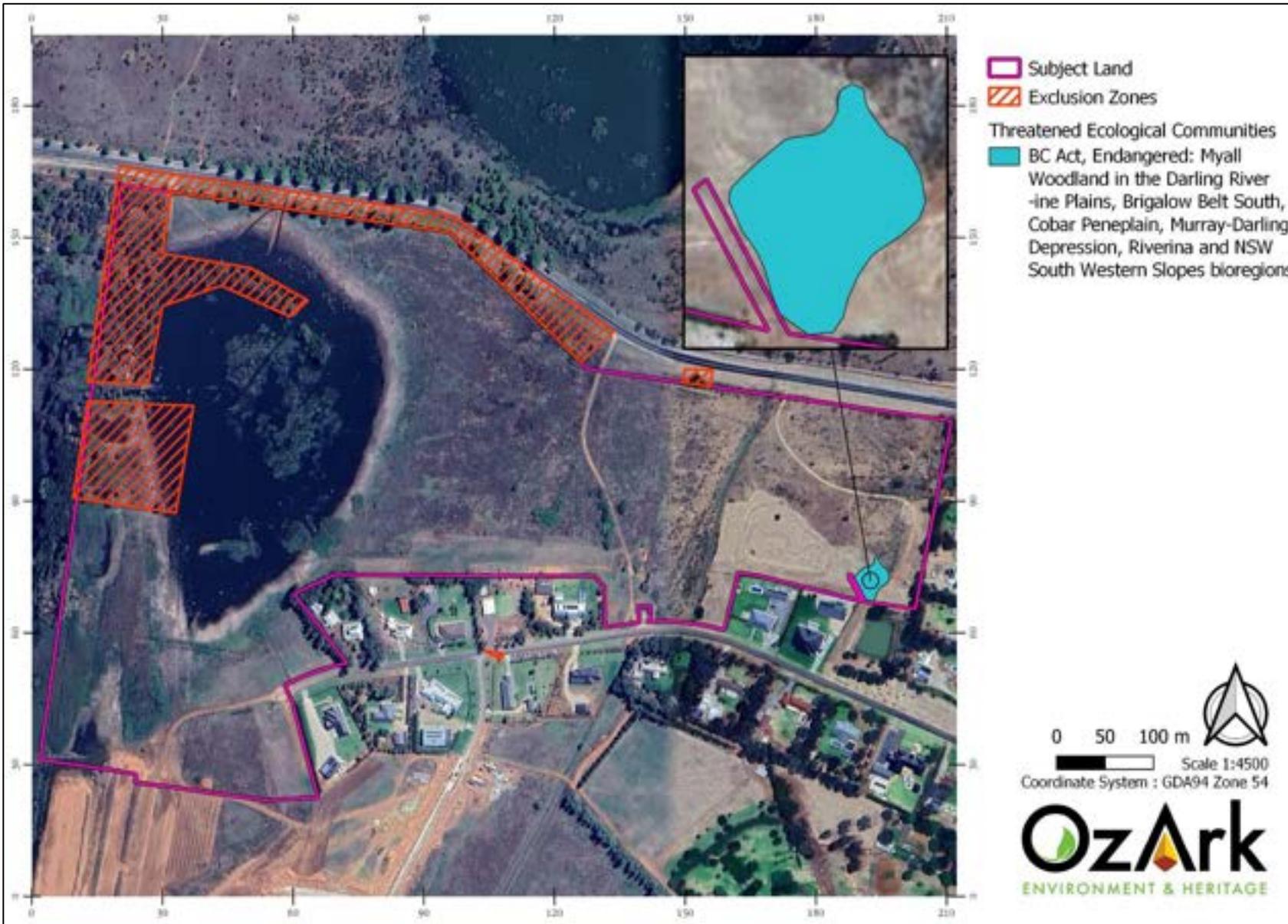


Figure 4-4. Threatened Ecological Communities present within the subject land.

5 Threatened Species

For the purpose of credit calculations, threatened species are listed as either ecosystem credit species or species credit species:

- An ecosystem credit species is a species whose likelihood of occurrence can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection. A targeted survey is not required for these species (DPIE, 2020b).
- A species credit species is a species whose likelihood of occurrence cannot be predicted by vegetation surrogates and/or landscape features and can be reliably detected by survey. A targeted survey or expert report is required to confirm presence/absence of these species (DPIE, 2020b).

5.1 Habitat Features Present

The subject land was assessed for its potential to provide habitat for threatened flora and fauna known or predicted to occur in the study area. Habitat features including but not limited to rock outcrops, caves, hollow-bearing trees, nests, wetlands (including dams), and watercourses were searched for and recorded, if present.

The subject land was found to be devoid of caves, significant outcropping rock, hollow-bearing trees and nests.

A wetland (Little Swamp) occurs directly within the subject land. The extent of inundation during the initial survey (16 February 2023) is shown in **Figure 5-1** along with the location and extent of wetland habitat within the disturbance footprint, namely the *Phragmites australis* reedbeds contained in zone 151_Moderate. This wetland provides habitat for many fauna species, including EPBC Act-listed marine and migratory birds and likely including threatened birds (although no threatened birds were located within Little Swamp during the field surveys). **Appendix C** contains a full list of all fauna species observed during the field surveys; this list is annotated with the nature of the species' use of the site (e.g., flying over only, foraging etc).

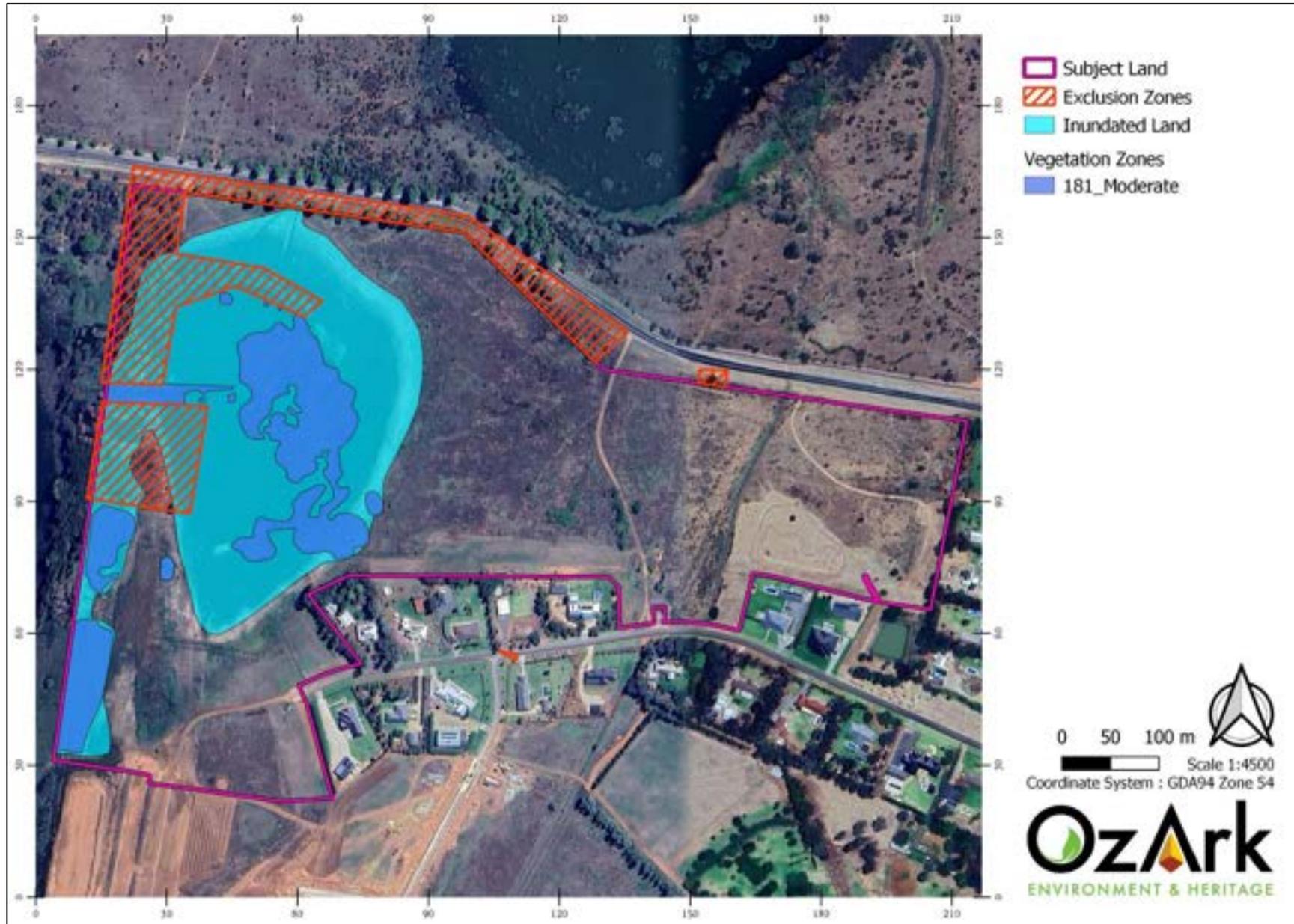


Figure 5-1. Extent of inundation during initial survey and location of wetland habitat (181_Moderate).

5.2 Ecosystem Credit Species

In total, 27 ecosystem credit species were generated by the BAM-C (**Table 5-1**). The habitat suitability of the subject land for these species was assessed. One species was removed from the list due to habitat constraints:

- The Painted Honeyeater (*Grantiella picta*) require mistletoe at a density of greater than five mistletoes per hectare; these plants were not present within the subject land.

After the exclusion of this species, 23 species were assumed present and the remaining three species were detected during the field surveys (see **Table 5-1**).

Table 5-1. Ecosystem credit species predicted to occur and the nature of their presence within, or absence from, the subject land.

Common Name	Scientific Name	Presence
<i>Anseranas semipalmata</i>	Magpie Goose	Present (Surveyed)
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Assumed Present
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Assumed Present
<i>Certhionyx variegatus</i>	Pied Honeyeater	Assumed Present
<i>Chalinolobus picatus</i>	Little Pied Bat	Assumed Present
<i>Circus assimilis</i>	Spotted Harrier	Assumed Present
<i>Daphoenositta chrysoptera</i>	Varied Sitella	Assumed Present
<i>Epthianura albifrons</i>	White-fronted Chat	Assumed Present
<i>Falco hypoleucos</i>	Grey Falcon	Assumed Present
<i>Falco subniger</i>	Black Falcon	Assumed Present
<i>Grantiella picta</i>	Painted Honeyeater	Absent (Constraint)
<i>Grus rubicunda</i>	Brolga	Assumed Present
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle (foraging)	Assumed Present
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	Assumed Present
<i>Hieraaetus morphnoides</i>	Little Eagle	Assumed Present
<i>Hirundapus caudacutus</i>	White-throated Needletail	Assumed Present
<i>Lophochroa leadbeateri</i>	Pink Cockatoo	Present (Surveyed)
<i>Lophoictinia isura</i>	Square-tailed Kite	Assumed Present
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	Assumed Present
<i>Oxyura australis</i>	Blue-billed Duck	Assumed Present
<i>Polytelis swainsonii</i>	Superb Parrot	Assumed Present
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	Present (Surveyed)
<i>Rostratula australis</i>	Australian Painted Snipe	Assumed Present
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Assumed Present
<i>Stagonopleura guttata</i>	Diamond Firetail	Assumed Present
<i>Stictonetta naevosa</i>	Freckled Duck	Assumed Present

5.3 Species Credit Species

In total, 17 species credit species were generated by the BAM-C. The habitat suitability of the subject land for these species was assessed. According to the BAM, if suitable habitat for these species occurs on the subject land, they must be the subject of targeted survey according to recommended guidelines, or else assumed present. After consideration of geographical and habitat constraints, five species could be discounted due to the absence of features necessary for breeding:

1. Barking Owl (*Ninox connivens*): the subject land does not contain living or dead trees with a hollow >20 cm diameter that occurs >4 metres above the ground.
2. Black-breasted Buzzard (*Hamirostra melanosternon*): the subject land does not contain land within 40 m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts.
3. Major Mitchell's Cockatoo (*Lophochroa leadbeateri*): the subject land does not contain living or dead tree with hollows greater than 10 cm diameter.
4. Masked Owl (*Tyto novaehollandiae*): the subject land does not contain living or dead trees with a hollow >20 cm diameter that occurs >4 metres above the ground.
5. Superb Parrot (*Polytelis swainsonii*): the subject land does not contain living or dead *E. blakelyi*, *E. melliodora*, *E. albens*, *E. camaldulensis*, *E. microcarpa*, *E. polyanthemus*, *E. mannifera*, *E. intertexta*, *E. bridgesiana* with hollows greater than 5 cm diameter that are greater than 4 m above the ground or trees with a DBH of greater than 30 cm.

Following these exclusions, 12 species credit species were retained in the assessment (**Table 5-2**). Surveys were conducted for all 12 species, following relevant survey methodologies (**Section 2.2.3**). None of the targeted threatened species were detected, therefore they are deemed absent from the subject land. No species credit obligation will be generated by this proposal.

Table 5-2. Species credit species predicted to occur and the nature of their presence within or absence from the subject land.

Scientific Name	Common Name	Species presence
<i>Ardeotis australis</i>	Australian Bustard	Absent (Surveyed)
<i>Austrostipa wakoolica</i>	A spear-grass	Absent (Surveyed)
<i>Brachyscome papillosa</i>	Mossgiel Daisy	Absent (Surveyed)
<i>Burhinus grallarius</i>	Bush Stone-curlew	Absent (Surveyed)
<i>Eleocharis obicis</i>	Spike-Rush	Absent (Surveyed)
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Absent (Surveyed)
<i>Hieraetus morphnoides</i>	Little Eagle	Absent (Surveyed)
<i>Lepidium monoplocoides</i>	Winged Peppercross	Absent (Surveyed)
<i>Litoria raniformis</i>	Southern Bell Frog	Absent (Surveyed)
<i>Lophoictinia isura</i>	Square-tailed Kite (breeding)	Absent (Surveyed)
<i>Swainsona murrayana</i>	Slender Darling Pea	Absent (Surveyed)
<i>Swainsona sericea</i>	Silky Swainson-pea	Absent (Surveyed)

The BioNet species records for BC and/or EPBC Act-listed species or populations with records within 10 km of the subject land are displayed in **Table 5-3** for site context.

Table 5-3. BioNet records of threatened species within 10 km of the subject land.

Scientific Name	Common Name	*NSW Status	+Comm. Status	No. records
^^<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V,P,2	V	11
^^<i>Falco hypoleucos</i>	Grey Falcon	V,P,2	V	1
^^<i>Lophochroa leadbeateri</i>	Pink Cockatoo	V,P,2	E	125
<i>Actitis hypoleucos</i>	Common Sandpiper	P	C,J,K,M	1
<i>Anseranas semipalmata</i>	Magpie Goose	V,P		28
<i>Aphelocephala leucopsis</i>	Southern Whiteface	V,P	V	56
<i>Apus pacificus</i>	Fork-tailed Swift	P	C,J,K,M	3
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		4
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	27
<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		3
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	P	V,C,J,K,M	62
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE, C,J,K,M	16
<i>Calidris melanotos</i>	Pectoral Sandpiper	P	J,K,M	2
<i>Calidris ruficollis</i>	Red-necked Stint	P	C,J,K,M	10
<i>Certhionyx variegatus</i>	Pied Honeyeater	V,P		4
<i>Chthonicola sagittata</i>	Speckled Warbler	V,P		16
<i>Circus assimilis</i>	Spotted Harrier	V,P		3
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P	V	20
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		5
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1,P		1
<i>Epthianura albifrons</i>	White-fronted Chat	V,P		33
<i>Falco subniger</i>	Black Falcon	V,P		11
<i>Gallinago hardwickii</i>	Latham's Snipe	P	V,J,K,M	9
<i>Gelochelidon nilotica</i>	Gull-billed Tern	P	C,M	1
<i>Grantiella picta</i>	Painted Honeyeater	V,P	V	37
<i>Grus rubicunda</i>	Brolga	V,P		1
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		15
<i>Hieraetus morphnoides</i>	Little Eagle	V,P		41
<i>Hirundapus caudacutus</i>	White-throated Needletail	V	V,C,J,K,M	2
<i>Hydroprogne caspia</i>	Caspian Tern	P	J,M	9
<i>Lathamus discolor</i>	Swift Parrot	E1,P	CE,M	1
<i>Limosa lapponica</i>	Bar-tailed Godwit	P	C,J,K,M	1
<i>Limosa limosa</i>	Black-tailed Godwit	V,P	E,C,J,K,M	14
<i>Melanodryas cucullata cucullata</i>	South-eastern Hooded Robin	E1,P	E	32
<i>Neophema chrysostoma</i>	Blue-winged Parrot	V,P	V	1

Scientific Name	Common Name	*NSW Status	+Comm. Status	No. records
<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		2
<i>Ninox connivens</i>	Barking Owl	V,P,3		4
<i>Oxyura australis</i>	Blue-billed Duck	V,P		92
<i>Petroica phoenicea</i>	Flame Robin	V,P		1
<i>Pluvialis squatarola</i>	Grey Plover	P	C,J,K,M	1
<i>Polytelis swainsonii</i>	Superb Parrot	V,P,3	V	6
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V,P		86
<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E	2
<i>Stagonopleura guttata</i>	Diamond Firetail	V,P	V	20
<i>Stictonetta naevosa</i>	Freckled Duck	V,P		58
<i>Tringa glareola</i>	Wood Sandpiper	P	C,J,K,M	11
<i>Tringa nebularia</i>	Common Greenshank	P	E,C,J,K,M	17
<i>Tringa stagnatilis</i>	Marsh Sandpiper	P	C,J,K,M	61
<i>Chalinolobus picatus</i>	Little Pied Bat	V,P		2
<i>Myotis macropus</i>	Southern Myotis	V,P		1
<i>Vespadelus baverstocki</i>	Inland Forest Bat	V,P		1
<i>Grevillea ilicifolia</i> subsp. <i>ilicifolia</i>	Holly-leaf Grevillea	E4A		5

* V=Vulnerable, E1=Endangered, E4A=Critically Endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species

+V=Vulnerable, E=Endangered, CE=Critically Endangered, C=CAMBA, J=JAMBA, K= ROKAMBA, M=Marine.

6 Impact Summary

6.1 Direct Impacts to Native Vegetation

There are three PCTs (16, 26, and 181) within the disturbance footprint, with up to 5.48 ha of native vegetation to be removed. This includes 0.09 ha of open woodland that meets the conditions to be considered an example of the BC Act-listed EEC *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* (see discussion in **Section 4.6**).

6.2 Impacts to Wetlands, Watercourses, and Aquatic Habitat

The proposal will result in direct impacts to Little Swamp through excavation to form a sediment basin and to provide site drainage. The majority of the swamp – excluding the sediment basin – will be retained as a constructed wetland and short-term impacts to aquatic habitat by excavation may be mitigated in the long term. At present, this swamp is dominated by Common Reed (*Phragmites australis*), a common colonising species of mainly shallow-water habitats. The future vegetation composition of these constructed wetlands is uncertain; however, if, as expected, excavation results in deeper waters throughout, the potential area of occupancy for Common Reed may be reduced. If the proponent intends to revegetate the site in the course of constructing the wetland, this may provide opportunities to enhance habitat value within the site. Given the high potential for weediness among waterplants, however, the selection of species must be locally appropriate. Native wetland species recorded locally and which may be appropriate for the site include Common Reed, Narrow-leaved Cumbungi (*Typha domingensis*), Pale Knotweed (*Persicaria lapathifolia*), Prickly Waternymph (*Najas marina*), rushes (including *Juncus articulatas*, *J. flavidus*, and *J. usitatus*), Ribbonweed (*Vallisneria australis*), and Curly Pondweed (*Potamogeton crispus*). Advice from a qualified local ecologist or bush regenerator may be required to aid in the selection of appropriate species.

No watercourses fall within the direct impact footprint, though drainage channels have been constructed within the site, likely to direct the overflow from nearby basins. There is some potential for sedimentation or runoff to feed into these channels and adversely affect nearby waterbodies.

6.3 Matters of National Environmental Significance

Under the environmental assessment provisions of the EPBC Act, Matters of National Environmental Significance (MNES) and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government.

The EPBC Act protected matters search has identified four wetlands of international importance, four TECs, 29 threatened species, nine migratory species and 16 marine species that could possibly occur in the 10 km search area (**Appendix A**). Of these, one threatened species (the Pink Cockatoo) was detected on the subject land and a further 18 threatened and/or migratory species were assessed as

potentially occurring on the subject land, based on habitat available (**Table 6-1; Appendix D**). In addition, six marine species were detected during the field surveys that were not listed in the protected matters search (**Table 6-1**). An assessment of impact significance has been undertaken for each of these threatened and migratory species listed in **Table 6-1** following EPBC guidelines, as detailed in **Appendix D**. It is concluded that no MNES will be significantly impacted by the proposal. A summary of these matters and whether the proposal is likely to impact them is provided in

Table 6-2.

Table 6-1. EPBC Act-listed threatened and/or migratory species potentially impacted by the proposal.

Class	Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?
Aves	<i>Actitis hypoleucos</i>	Common Sandpiper	C,J,K,M	1
Aves*	<i>Anseranas semipalmata</i>	Magpie Goose	M	28
Aves	<i>Aphelocephala leucopsis</i>	Southern Whiteface	V	56
Aves	<i>Apus pacificus</i>	Fork-tailed Swift	C,J,K,M	3
Aves*	<i>Ardea alba</i>	Great Egret	M	69
Aves*	<i>Ardea intermedia</i>	Intermediate Egret	M	27
Aves	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	27
Aves	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	V,C,J,K,M	62
Aves	<i>Calidris ferruginea</i>	Curlew Sandpiper	CE,C,J,K,M	16
Aves	<i>Calidris melanotos</i>	Pectoral Sandpiper	J,K,M	2
Aves	<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V	11
Aves	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern)	V	20
Aves*	<i>Circus approximans</i>	Swamp Harrier	M	90
Aves	<i>Falco hypoleucos</i>	Grey Falcon	V	1
Aves	<i>Gallinago hardwickii</i>	Latham's Snipe	V,J,K,M	9
Aves	<i>Hirundapus caudacutus</i>	White-throated Needletail	V,C,J,K,M	2
Aves	<i>Lathamus discolor</i>	Swift Parrot	CE,M	1
Aves	<i>Lophochroa leadbeateri</i>	Pink Cockatoo	E	125
Aves	<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	E	32
Aves	<i>Neophema chrysostoma</i>	Blue-winged Parrot	V,M	1
Aves*	<i>Nycticorax caledonicus</i>	Nankeen Night Heron	M	14
Aves*	<i>Plegadis falcinellus</i>	Glossy Ibis	M,Bonn	54
Aves	<i>Rostratula australis</i>	Australian Painted Snipe	E,M	2
Aves	<i>Stagonopleura guttata</i>	Diamond Firetail	V	20
Aves	<i>Tringa nebularia</i>	Common Greenshank	E,C,J,K,M	17

+V=Vulnerable, E=Endangered, CE=Critically Endangered, C=CAMBA, J=JAMBA, K= ROKAMBA, M=Marine, Bonn= Bonn Convention

* Not listed in the EPBC Act Protected Matters Report but detected on site during the field surveys

Table 6-2. Impacts to Matters of National Environmental Significance and Commonwealth Land.

Consideration	Potential impact?
Any impact on a listed threatened species or communities?	Yes (non-significant, Appendix D)
Any impacts on listed migratory species?	Yes (non-significant, Appendix D)
Any impacts on a Ramsar wetland of international importance?	No
Any impacts on a Commonwealth marine environment?	No
Any impacts on a World Heritage property?	No
Any impacts on a National Heritage place?	No
Any impacts on the Great Barrier Reef Marine Park?	No
Does the proposal involve a nuclear action (including uranium mining)?	No
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	No
Additionally, any impact (direct or indirect) on Commonwealth land?	No

6.4 Prescribed Impacts

The *Biodiversity Conservation Regulation 2017* lists certain impacts as prescribed impacts that must be avoided, minimised and mitigated. These prescribed impacts and their relevance to the proposal are described in **Table 6-3**.

Table 6-3. Prescribed impacts of the proposal.

Prescribed Impacts	Site Assessment	Mitigation Measure
Impacts on the habitat of threatened species or ecological communities associated with karst, caves, crevices, cliffs and other features of geological significance.	No karsts, caves, crevices, cliffs or other features of geological significance present on the subject land or within the study area.	None required.
Impacts of development on the habitat of threatened species or ecological communities associated with rocks.	No significant deposits of bush rock were noted during the site surveys.	None required.
Impacts of development on the habitat of threatened species or ecological communities associated with human made structures.	No human-made structures exist within the subject land.	None required.
Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation.	Non-native vegetation occurs across much of the site. While likely to be of lesser habitat value than native grasslands, non-native vegetation on the subject land may still provide habitat for species or ecosystem credit species, and mitigations associated with fauna interactions still apply.	Table 7-1.
Impacts of development on the connectivity of different areas of	The landscape surrounding the subject land has been heavily cleared for urban development. Limited impacts to woodland connectivity are likely as only 0.22 ha of wooded vegetation	Table 7-1.

habitat of threatened species that facilitates the movement of those species across their range.	remain within the site. Wetland vegetation within the site (zone 181_Moderate) may facilitate movement of certain migratory species by acting as a temporary stopover point. However, similar habitat will remain within the study area (Lake Wyangan and Campbell's Wetland) and wider search area (Tharbogang Wetlands Reserve and Nericon Wetlands Reserve).	
Impacts of the development on movement of threatened species that maintains their life cycle.	The limited connectivity within the site, small size of the subject land, and scarcity of habitat features present, suggest that limited impacts to the movement of any threatened species would result this proposal. Impacts to Little Swamp, which represents a potential stopover point for migratory birds, may affect movement of threatened species but the availability of similar habitat at Lake Wyangan and Campbell's Wetland should mitigate this.	Table 7-1.
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.	No watercourses are mapped as occurring within the subject land, though Little Swamp is present (Figure 3-4). As there are no natural watercourses feeding Little Swamp and the other wetlands within the Lake Wyangan catchment, the water is sourced from rainfall and runoff from surrounding peri-urban and agricultural land. Accordingly, the water quality in Little Swamp is presumably similar to Lake Wyangan, the quality of which is monitored by Griffith City Council and is frequently poor, with a high frequency of toxic blue green algae blooms. Further encroachment of urban development on Little Swamp, and Lake Wyangan will likely further exacerbate these issues, however, considering that these processes are already present, it is unlikely the resultant impacts on water quality, water bodies, and hydrological processes will significantly impact any threatened species or TECs.	Table 7-1.
Impacts of wind turbine strikes on protected animals.	None associated with the proposal.	None required.
Impact of vehicle strikes on threatened species of animals or on animals that are part of a TEC.	A substantial increase in overall traffic movement is anticipated during the construction and operational phase of the proposal. Maintaining suitably low speed limits on site will help to mitigate impacts that arise from this increase.	Table 7-1.

6.5 Indirect Impacts

Potential indirect impacts associated with the proposal are explored further in

Table 6-4. The main impacts of the proposal are expected to be contained within the disturbance footprint, provided there is adequate demarcation of the project boundary. Disturbance from machinery and operational activities will occur, such as noise and dust. However, these impacts will be minimised by following the environmental safeguards proposed in **Section 7**.

Table 6-4. Potential indirect impacts of the proposal.

Nature of impact	Timing	Frequency	PCTs, threatened species and/or TECs impacted	Consequence of impact on biodiversity
Inadvertent impacts on adjacent habitat or vegetation	Construction phase	Possible	<ul style="list-style-type: none"> Native vegetation surrounding the disturbance footprint Threatened species assumed present 	Increased edge effects, loss of foraging habitat, potential mortality to neighbouring fauna
Reduced viability of adjacent habitat due to edge effects	Construction phase	Possible	<ul style="list-style-type: none"> Native vegetation surrounding the disturbance footprint Threatened species assumed present 	Degradation of native vegetation and habitat for threatened flora and fauna.
Reduce viability of adjacent habitat due to noise, dust or light spill	Construction and Operation phase	Possible	<ul style="list-style-type: none"> Threatened species assumed present 	Minor foraging and breeding habitat for fauna may be altered or removed.
Transport of weeds and pathogens from the site to adjacent vegetation	Construction and Operation phase	Possible	<ul style="list-style-type: none"> Native vegetation surrounding the disturbance footprint 	Degradation of native vegetation.
Increased risk of starvation or exposure, and loss of shade or shelter	Construction phase	Rare	<ul style="list-style-type: none"> Threatened species assumed present 	Minor loss of foraging and refuging habitat
Loss of breeding habitat	Construction and Operation phase	Possible	<ul style="list-style-type: none"> Threatened species assumed present 	Minor loss of potential breeding habitat
Trampling of threatened flora species	Construction and Operation phase	Rare	<ul style="list-style-type: none"> Threatened species assumed present 	Possible minor loss of threatened flora

6.6 Serious and Irreversible Impacts

The Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE 2019) and the NSW threatened species data collection have been used to determine which threatened entities require further assessment for Serious and Irreversible Impacts (SAIL). An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species (including endangered populations) or ecological community becoming extinct based on

following 4 principles (set out in clause 6.7 of the *Biodiversity Conservation Regulation 2017*):

- **Principle 1:** The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline
- **Principle 2:** The impact will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size
- **Principle 3:** The impact is made on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution
- **Principle 4:** The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity, and therefore its members are not replaceable.

No SAIL species were generated by the BAM-C; consequently, no further consideration of SAIL requirements is necessary.

6.7 Cumulative Impacts

Numerous active or recently completed construction projects exist within the study area, including the Pelican Shores subdivision, the Jones x Boorga Road intersection upgrade, and the Jones Road Causeway Upgrade.

The potential impacts of this proposal must be regarded as a contribution to the wider loss of biodiversity in the local area and across NSW. The incremental effects of multiple impacts – past, present, and future – are referred to as cumulative impacts. This BDAR provides an opportunity to consider the impacts associated with this proposal within a wider context.

Historical clearing for urban development and agriculture in the wider Griffith area has resulted in a landscape dominated by human-made infrastructure, horticultural enterprises retaining little or no native biodiversity, and treeless pastures. Remnant woody vegetation is largely confined to riparian areas and road corridors, or occurs as scattered paddock trees or small remnants. Almost all woody vegetation within or adjacent to the subject land is planted. These plantings combine locally native plants with species native to other areas of NSW and species not known to occur naturally within the state. They do not accurately reflect the vegetation that would have been present prior to clearing.

The present proposal would result in the loss of up to 5.48 ha of native vegetation, more than half of which involves the removal of a wetland community (Little Swamp) dominated by Common Reed (*Phragmites australis*). Historical and ongoing impacts to local watercourses and waterbodies by damming, irrigation, excavation, sedimentation, and eutrophication have altered local wetland habitats in complex ways. While the proliferation of irrigation channels has provided novel niches for

colonisation by Common Reed and similar species, this is unlikely to have fully compensated for the historical loss or modification of wetland habitat (for example, the development of Lake Wyangan from a former swamp) for species dependent on wetland environments. Vegetation within Little Swamp is species poor, consisting almost entirely of Common Reed and lacking commonly associated species such as rushes, spike-rushes, and submerged or floating water plants. Nevertheless, the site provides habitat for a range of wetland fauna, and the proposal is expected to reduce the availability of this habitat within the local landscape.

The proposal also entails the clearing of 0.09 ha of remnant Weeping Myall (*Acacia pendula*) woodland and 2.3 ha of derived grassland that may formerly have supported this same woodland community. Weeping Myall woodlands have undergone a marked decline in extent and condition in NSW and are now endangered. Historically, the community is likely to have occupied much of the low-lying terrain within and surrounding the subject land. In addition to the small woody remnant within the site, minor occurrences of *A. pendula* were recorded north of the site in the road corridor of Jones Rd and in the area surrounding Campbell's Wetland, and east of the site along Boorga Rd. It was noted that the latter population was impacted by roadworks during the survey period. It is clear that the community has experienced a significant historical reduction in extent in the local landscape. While the impacts associated with the present proposal are relatively small in scale – particularly the impacts to the woody form of the community – they nevertheless represent a contribution to the ongoing decline in a community that is already endangered.

Considered individually, this proposal is highly unlikely to result in significant adverse impacts to biodiversity at either local or state level. Taken cumulatively, however, the impacts of this and other local development activities contribute to the ongoing decline in biodiversity values across the state.

7 Avoidance, Minimisation and Mitigation

The following avoidance measures have been integrated into the design and/or are suggested for the implementation of the project:

- The proposed impact area has been reduced in the planning phase to minimise impacts to native vegetation on the subject land. Exclusion zones have been implemented to avoid impacts to most woodland vegetation and to some wetland areas.
- In addition, minimisation and mitigation methods will be implemented. **Table 7-1** outlines recommended environmental safeguards to reduce impacts on vegetation, soil and biodiversity.

Table 7-1. Mitigation measures for implementation.

Aspect	Environmental safeguards	Responsibility	Timing
General	<ol style="list-style-type: none"> 1. Any change in design outside the assessed impact footprint (subject site) will require further ecological survey and assessment. 2. All personnel working on site will be made aware of the environmental sensitivities of the site and safeguards/mitigations to be implemented, e.g., site induction and 'toolbox' style briefings. This includes all native vegetation, threatened ecological communities, potential threatened flora and fauna, and any Key Fish Habitat or Protected Riparian Land. Evidence of all personnel receiving an induction will be kept on file (e.g., signed induction sheets). 	Proponent	Pre-construction, construction, operation
Clearing of native vegetation	<ol style="list-style-type: none"> 3. All construction personnel should be inducted to be aware that any deliberate or accidental damage of a stand of native vegetation outside the subject site has legislative consequences under Part 4 or 5 of the EP&A Act. Evidence of all personnel receiving this induction would be kept on file (signed induction sheets etc.). 4. Before starting work, a physical vegetation clearing boundary at the approved clearing limit is to be demarcated and implemented. The delineation of such a boundary may include the use of temporary fencing, parawebbing or similar. 5. Vegetation would be removed in such a way as to avoid damage to surrounding vegetation. 6. Groundcover disturbance would be kept to a minimum. 7. Any stockpile and compound sites should be located using the following criteria: <ul style="list-style-type: none"> • At least 40 m away from the nearest waterway • In areas of low ecological conservation significance (i.e. previously disturbed land) • On relatively level ground • Outside the one in 10-year Average Recurrence Interval (ARI) floodplain 	Proponent / contractor	Pre-construction, construction

	<p>8. Stockpiling materials and equipment and parking vehicles would be avoided within the dripline (extent of foliage cover) of any tree.</p> <p>9. Where possible, vegetation to be removed would be mulched on-site and re-used to stabilise disturbed areas.</p>		
Threatened Species	<p>10. Provide identification resources for personnel to enable identification of threatened species that might occur on the work site, i.e. those species listed in Table 5-1.</p> <p>11. Keep records of any threatened species recorded on site during works.</p> <p>12. Construction work to occur only during daylight hours to avoid indirect impacts on threatened fauna such as vehicle strikes.</p> <p>13. If unexpected threatened fauna or flora species are discovered, stop works immediately and contact a suitably qualified ecologist for advice.</p>	Contractor	Pre-construction and construction
Light	<p>14. Any artificial lighting to be used during construction or operation should follow the Best Practice Lighting Design within the National Light Pollution Guidelines (DoEE 2020). In particular, all lighting should be kept close to the ground, directed, and shielded to avoid light spill.</p>		
Soil Management	<p>15. A Construction Environmental Management Plan (CEMP) is required.</p> <p>16. Install erosion and sediment controls in line with Landcom's Managing Urban Stormwater, Soils & Construction Guidelines (The Blue Book. Landcom 2004).</p> <p>17. Where practicable, spread mulch made from vegetation cleared on site on areas of bare soil to stabilise, preventing dust and erosion.</p> <p>18. Erosion and sedimentation controls are to be checked and maintained on a regular basis. This includes clearing of sediment from behind barriers and after heavy rainfall events.</p> <p>19. Erosion and sediment control measures are not to be removed until the works are complete and areas are stabilised.</p> <p>20. Stockpile topsoil removed to be redistributed across site at completion of construction.</p> <p>21. Implement dust suppression activities.</p>	Contractor	Pre-construction and construction
Introduction and spread of priority weeds and pathogens	<p>22. Construction crew should be briefed on the identification of priority weeds that occur on site during inductions (see Table 4-3).</p> <p>23. If declared priority weeds are identified during construction they will be managed according to the requirements of the <i>Biosecurity Act 2015</i>.</p> <p>24. Construction machinery (bulldozers, excavators, trucks, loaders and graders) will be cleaned using a high-pressure washer or other suitable device before entering and exiting work sites.</p> <p>25. Machinery will be inspected by designated personnel following washdown to ensure no soil, mud, or vegetative material remains. Records of inspections to be maintained.</p>	Contractor	Construction

	<p>26. All pesticides will be used in accordance with the requirements on the label. Any person carrying out pesticide (including herbicide) application will be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.</p> <p>27. Keep records of any weed control activities that take place.</p>		
Disturbance to fallen timber, dead wood, and bush rock	28. Any fallen timber, dead wood, and bush rock encountered on site would be left <i>in situ</i> (where possible) or relocated to a suitable place nearby.	Contractor	Construction
Rehabilitating cleared areas	<p>29. Revegetation of any bare soil or cleared areas with locally occurring native flora species typical of the original habitat types is usually recommended.</p> <p>30. Revegetation of cleared wetland habitat with locally appropriate wetland species in line with Section 6.2 of this report. Species that may be used are identified in that section. Additional guidance may be required from qualified local ecologists or bush regenerators to aid in species selection.</p> <p>31. Stockpiled topsoil to be re-spread over cleared areas.</p>	Proponent, contractor	Construction and post-construction
Exacerbating invasive fauna	32. All food scraps and rubbish are to be appropriately disposed of in sealed receptacles to prevent providing forage habitats for foxes, rats, dogs, and cats.	Contractor	Construction
Increased risk of fire	33. If any “hot works” are to be undertaken, these activities will not take place on days of extreme fire danger (where possible).	Contractor	Construction
Aquatic habitat	<p>34. Mitigation measures from DPI's Policy and guidelines for fish habitat conservation and management (Fairfull 2013) shall be incorporated into detailed design and the CEMP, to maintain connectivity between aquatic habitats and minimise impacts to fish passage and aquatic and riparian habitats</p> <p>35. Consideration will be given to undertaking the works during low (or no) flow conditions where possible, to minimise impacts on aquatic organisms.</p> <p>36. Impacts to snags large woody debris >50 cm in two dimensions) within waterways will be avoided. If snags must be moved, they would be realigned within the waterway, rather than removed.</p> <p>37. Where works are to take place in Key Fish Habitat, a permit will be required under the FM Act.</p>	Proponent, contractor	Pre-construction, construction and post-construction

8 Biodiversity Credit and Offset Report

8.1 Management Zones

The BAM considers future vegetation condition of different areas of the disturbance footprint when calculating biodiversity credits and offsets. It has been assumed that all vegetation within the disturbance footprint will be cleared (i.e., its future Vegetation Integrity [VI] Score will be 0). Therefore, offset requirements have been assessed assuming only one management zone.

8.2 Vegetation Integrity Assessment

VI Scores have been calculated for each vegetation zone based on patch size, area to be impacted, vegetation composition, structure and function, as defined below.

Patch size – Area in hectares of total vegetation zone patch (i.e. the connected woody and non-woody vegetation). See **Section 4.3.2**.

Area – Area within the property that will be subject to clearing, modification or other treatment by the Proposal. There is only one management zone as described above.

Composition (Comp.) – Score calculated based on species richness, i.e. the number of native species present.

Structure (Struct.) – Score calculated based on the cover (%) of each native species growth form.

Function (Funct.) – Score calculated based on habitat features, i.e. presence of tree sizes, hollow trees, coarse woody debris, litter cover (%) and high threat weed cover (%). The function score does not apply to grassland PCTs.

Benchmark data for the PCTs is also used in this calculation.

Data required for the calculation was collected in the field using the BAM, as described above. The VI assessment for each vegetation zone including the loss of VI due to the Proposal, averaged across the construction and any APZ areas, is shown in **Table 8-1**.

Table 8-1. Vegetation Integrity (VI) assessment.

Vegetation Zone	PCT	Area	Comp.	Struct.	Funct.	Current VIS	Management Zone	Future VIS	Change in VIS
26_Remnant	26	0.09	43.4	91.7	46.4	58.1	Disturbance footprint	0	-58.1
26_Derived	26	2.3	36.9	28.8	10	22	Disturbance footprint	0	-22
16_Derived	16	0.08	30.9	30.7	0.1	5.1	Disturbance footprint	0	-5.1
16_Moderate	16	0.02	48.5	96.5	45	59.5	Disturbance footprint	0	-59.5
181_Moderate	181	2.96	24.7	87.5	-	46.5	Disturbance footprint	0	-46.5

16_Low	16	0.11	17.9	66.3	45.7	37.8	Disturbance footprint	0	-37.8
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8.3 Ecosystem Credit Summary

Based on the VI score and area of PCT impacted, 90 Ecosystem Credits are required to be offset for the proposal. The ecosystem credits required for the proposal are summarised in **Table 8-2**. The full biodiversity credit summary report is provided in **Appendix E**.

Table 8-2. Ecosystem credits requiring offsetting (copied from BAM-C).

Vegetation zone name	BAM-C Zone	Current VIS	Change in VIS	Area (ha)	BC Act listing status	EPBC Act listing status	TEC name	Sensitivity to gain class	Biodiversity risk weighting	Potential SAI	Ecosystem credits
26_Remnant	1	58.1	-58.1	0.09	Endangered	Does not fit listing	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	High Sensitivity to Gain	2.0	False	3
26_Derived	2	22	-22	2.3	Does not fit listing	Does not fit listing	Not a TEC	High Sensitivity to Gain	2.5	False	32
16_Derived	3	5.1	-5.1	0.08	No TEC	No TEC	Not a TEC	High Sensitivity to Gain	1.75	False	0
16_Moderate	4	595	-59.5	0.02	No TEC	No TEC	Not a TEC	High Sensitivity to Gain	1.75	False	1
181_Moderate	5	46.5	-46.5	2.96	Does not fit listing	No TEC	Not a TEC	High Sensitivity to Gain	1.5	False	52
16_Low	6	37.8	-37.8	0.11	No TEC	No TEC	Not a TEC	High Sensitivity to Gain	1.75	False	2
TOTAL											90

8.4 Species Credit Summary

All species credit species generated by the BAM-C were removed from consideration by targeted surveys or by habitat constraints. Consequently, no species credit obligation attaches to this proposal.

The full biodiversity credit summary report is provided in **Appendix E**.

8.5 Offset Requirement

Offsetting is required for the 90 Ecosystem Credits listed above and summarised in **Appendix E**.

The proponent intends to purchase and retire the necessary number of credits on the open market or, if not available, offset credits through a direct payment into the Biodiversity Conservation Fund.

9 Summary and Conclusions

OzArk has been engaged on behalf of LWLE Pty Ltd to conduct the biodiversity assessment for a proposal to develop a residential subdivision (Lakeside Estate) at Lake Wyangan, north of Griffith, NSW

The proposal would clear up to 5.48 ha of native vegetation on Lot 146/-/DP1214737. The proposal triggers entry into the BOS as it exceeds the vegetation clearance threshold of 0.50 ha; consequently, the proponent is required to prepare a BDAR and to offset impacts to biodiversity. This report documents the assessment, which has been completed in accordance with the BAM 2020 and details the proponent's biodiversity offset requirement (number of ecosystem and species credits).

The native vegetation present in the disturbance footprint consists of three PCTs:

- PCT 16 – Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.
- PCT 181 – Common Reed - Bushy Groundsel aquatic tall reedland grassland wetland of inland river systems.

In accordance with the BAM, PCTs were further stratified into vegetation zones based on observed condition. This process resulted in six vegetation zones being recognised: 16_Moderate, 16_Low, 16_Derived, 26_Remnant, 26_Derived, and 181_Moderate.

PCT 26 is associated with the following TECs:

- BC Act-listed EEC: *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions.*
- EPBC Act-listed EEC: *Weeping Myall Woodlands.*

Zone 26_Remnant was found to meet the thresholds to be considered an example of the BC Act-listed EEC but not the EPBC Act-listed equivalent. Zone 26_Derived did not meet the thresholds for either listing. In total, 0.09 ha of the BC Act-listed EEC will be impacted by this proposal.

PCT 181 is associated with the following TEC:

- BC Act-listed CEEC: *Artesian Springs Ecological Community in the Great Artesian Basin.*

PCT 181 does not meet the conditions to be considered an example of this CEEC as the site is not within the Great Artesian Basin and no artesian spring activity was noted.

PCT 16 is not associated with any TEC.

Impacts to native vegetation will generate an obligation to retire a total of 90 ecosystem credits.

In total, 17 species credit species were generated by the BAM-C. The habitat suitability of the subject land for these species was assessed. According to the BAM, if suitable habitat for these species occurs on the subject land, they must be the subject of targeted survey according to recommended guidelines, or else assumed present. After consideration of geographical and habitat constraints, five species could be discounted due to the absence of features necessary for breeding and 12 species credit species were retained in the assessment. Surveys were conducted for all 12 of these species, following relevant and approved BAM survey methodologies. These species were not detected on site. Consequently, the proposal will not generate a requirement to offset any species credits.

The proponent intends to satisfy their offset obligations by buying and retiring the necessary credits from the open market or, if appropriate credits are not available, by paying directly into the Biodiversity Conservation Fund.

The significance of the proposed impact to EPBC Act-listed threatened, migratory, wetland and marine species, populations and communities predicted to occur within a 10 km search area was assessed. No significant impact to any threatened entity likely to result in the extinction of a local population was identified. The residual ecological impacts of the proposal would be adequately mitigated and offset using the management actions recommended and the offset requirements detailed within this BDAR. Therefore, a referral of the proposal to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) for these matters is not required.

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Appendix A: Database Search Results

Biodiversity Values Map and Threshold Report.



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Biodiversity Values Map and Threshold Report

This report is generated using the Biodiversity Values Map and Threshold (BMAT) tool. The BMAT tool is used by proponents to supply evidence to your local council to determine whether or not a Biodiversity Development Assessment Report (BDAR) is required under [the Biodiversity Conservation Regulation 2017 \(Cl. 7.2 & 7.3\)](#).

The report provides results for the proposed development footprint area identified by the user and displayed within the blue boundary on the map.

There are two pathways for determining whether a BDAR is required for the proposed development:

1. Is there Biodiversity Values Mapping?
2. Is the 'clearing of native vegetation area threshold' exceeded?

Biodiversity Values Map and Threshold Report

Date of Report Generation		14/03/2024 2:20 PM
1. Biodiversity Values (BV) Map - Results Summary (Biodiversity Conservation Regulation Section 7.3)		
1.1	Does the development Footprint intersect with BV mapping?	no
1.2	Was ALL BV Mapping within the development footprinted added in the last 90 days? (dark purple mapping only, no light purple mapping present)	no
1.3	Date of expiry of dark purple 90 day mapping	N/A
1.4	Is the Biodiversity Values Map threshold exceeded?	no
2. Area Clearing Threshold - Results Summary (Biodiversity Conservation Regulation Section 7.2)		
2.1	Size of the development or clearing footprint	268,834.6 sqm
2.2	Native Vegetation Area Clearing Estimate (NVACE) (within development/clearing footprint)	3,387.9 sqm
2.3	Method for determining Minimum Lot Size	LEP
2.4	Minimum Lot Size (10,000sqm = 1ha)	50,000 sqm
2.5	Area Clearing Threshold (10,000sqm = 1ha)	5,000 sqm
2.6	Does the estimate exceed the Area Clearing Threshold? (NVACE results are an estimate and can be reviewed using the Guidance)	no
REPORT RESULT: Is the Biodiversity Offset Scheme (BOS) Threshold exceeded for the proposed development footprint area? (Your local council will determine if a BDAR is required)		no

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What do I do with this report?

- If the result above indicates the BOS Threshold has been exceeded, your local council **may require** a Biodiversity Development Assessment Report with your development application. Seek further advice from Council. An accredited assessor can apply the Biodiversity Assessment Method and prepare a BDAR for you. For a list of accredited assessors go to: <https://customer.lmhc.nsw.gov.au/assessment/AccreditedAssessor>.
- If the result above indicates the BOS Threshold has not been exceeded, you may not require a Biodiversity Development Assessment Report. This BMAT report can be provided to Council to support your development application. Council can advise how the area clearing threshold results should be considered. Council will review these results and make a determination if a BDAR is required. Council may ask you to review the area clearing threshold results. You may also be required to assess whether the development is "likely to significantly affect threatened species" as determined under the test in Section 7.3 of the *Biodiversity Conservation Act 2016*.
- If a BDAR is not required by Council, you may still require a permit to clear vegetation from your local council.
- If **all** Biodiversity Values mapping within your development footprint was less than 90 days old, i.e. areas are displayed as dark purple on the BV map, a BDAR may not be required if your Development Application is submitted within that 90 day period. Any BV mapping less than 90 days old on this report will expire on the date provided in Line item 1.3 above.

For more detailed advice about actions required, refer to the **Interpreting the evaluation report** section of the [Biodiversity Values Map Threshold Tool User Guide](#).

Review Options:

- If you believe the Biodiversity Values mapping is incorrect please refer to our [BV Map Review webpage](#) for further information.
- If you or Council disagree with the area clearing threshold estimate results from the NVACE in Line Item 2.6 above (i.e. area of Native Vegetation within the Development footprint proposed to be cleared), review the results using the [Guide for reviewing area clearing threshold results from the BMAT Tool](#).

Acknowledgement

I, as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature: _____

(Typing your name in the signature field will be considered as your signature for the purposes of this form)

Date: _____

14/03/2024 02:20 PM



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Biodiversity Values Map and Threshold Tool

The Biodiversity Values (BV) Map and Threshold Tool identifies land with high biodiversity value, particularly sensitive to impacts from development and clearing.

The BV map forms part of the Biodiversity Offsets Scheme threshold, which is one of the factors for determining whether the Scheme applies to a clearing or development proposal. You have used the Threshold Tool in the map viewer to generate this BV Threshold Report for your nominated area. This report calculates results for your proposed development footprint and indicates whether Council may require you to engage an accredited assessor to prepare a Biodiversity Development Assessment Report (BDAR) for your development.

This report may be used as evidence for development applications submitted to councils. You may also use this report when considering native vegetation clearing under the State Environmental Planning Policy (Biodiversity and Conservation) 2021 - Chapter 2 vegetation in non-rural areas.

What's new? For more information about the latest updates to the Biodiversity Values Map and Threshold Tool go to the updates section on the [Biodiversity Values Map webpage](#).

Map Review: Landholders can request a review of the BV Map where they consider there is an error in the mapping on their property. For more information about the map review process and an application form for a review go to the [Biodiversity Values Map Review webpage](#).

If you need help using this map tool see our [Biodiversity Values Map and Threshold Tool User Guide](#) or contact the Map Review Team at map.review@environment.nsw.gov.au or on 1800 001 490.

Biodiversity Values Map



346.5 173.24 346.5 Metres

WGS, 1984, Web_Mercator, Auxiliary_Sphere

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days
- Native Vegetation Area Clearing Estimate (NVACE)
- Development area selected by proponent

14/03/2024 02:20 PM

This map is a user-generated static output from an internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

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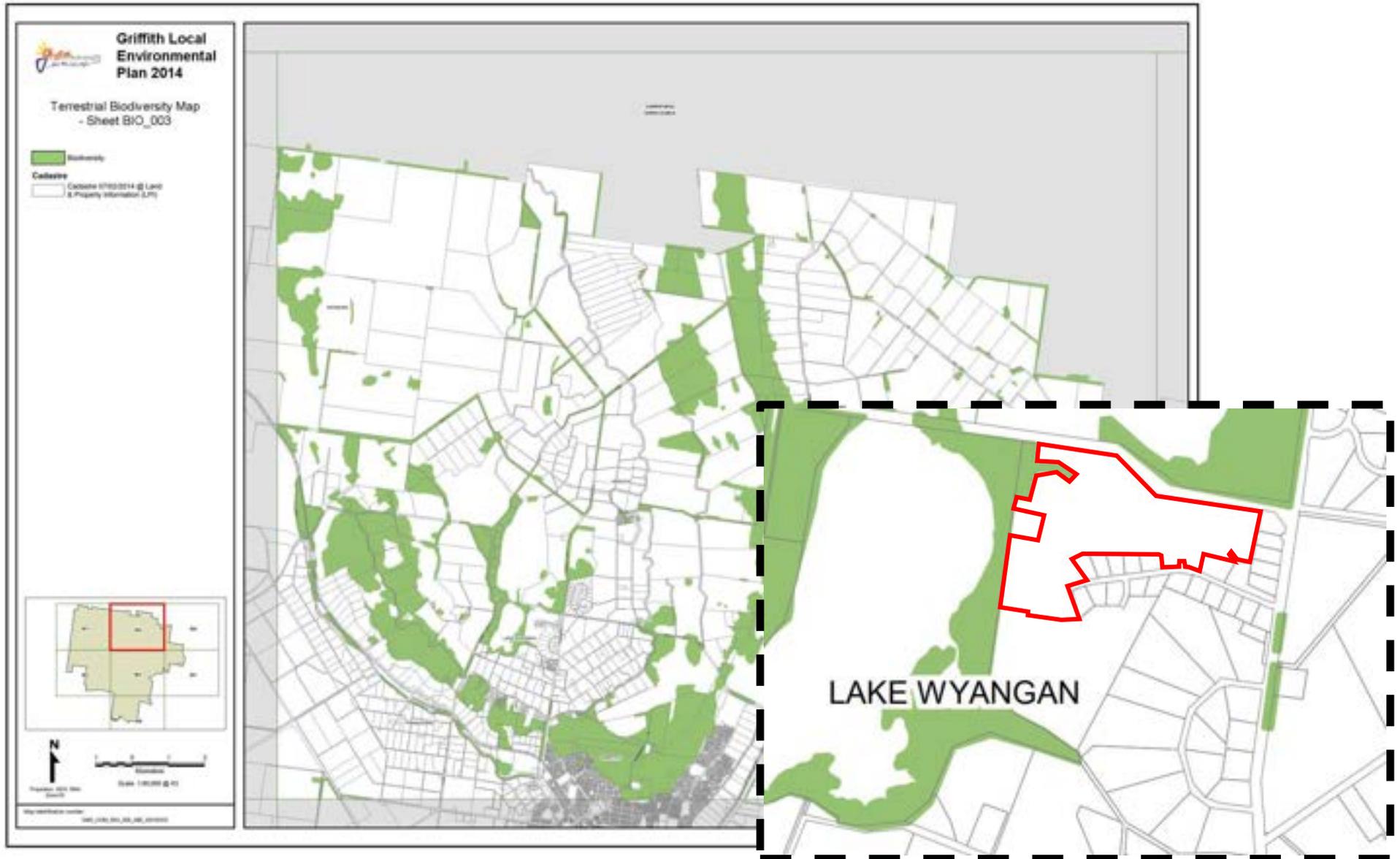
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The results provided in this tool are generated using the best available mapping and knowledge of species habitat requirements.

This map is valid as at the date the report was generated. Checking the [Biodiversity Values Map viewer](#) for mapping updates is recommended.

Griffith Local Environmental Plan 2014: Terrestrial Biodiversity Values Mapping.

The red polygon approximately shows the location of the subject land.



EPBC Act Protected Matters Report



Australian Government
Department of Climate Change, Energy,
the Environment and Water

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: 14-Mar-2024

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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)	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	29
Listed Migratory Species:	9

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
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:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)

[\[Resource Information \]](#)

Ramsar Site Name	Proximity
Banrock station wetland complex	500 - 600km upstream from Ramsar site
Hattah-kulkyne lakes	300 - 400km upstream from Ramsar site
Riverland	400 - 500km upstream from Ramsar site
The coorong, and lakes alexandrina and albert wetland	600 - 700km upstream from Ramsar site

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
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within 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
BIRD		

Scientific Name	Threatened Category	Presence Text
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat may occur within area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Lophochroa leadbeateri leadbeateri Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo, Pink Cockatoo (eastern) [82926]	Endangered	Species or species habitat known to occur within area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely to occur within area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
FISH		
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
FROG		
Crinia sloanei Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
MAMMAL		
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
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 may occur within area
PLANT		
Austrostipa metatoris		
[66704]	Vulnerable	Species or species habitat may occur within area
Lepidium monoplocoides		
Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area
Swainsona murrayana		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat may occur within area
REPTILE		
Aprasia parapulchella		
Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area
Hemiaspis damelli		
Grey Snake [1179]	Endangered	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
Other Matters Protected by the EPBC Act		
Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Griffith Rural Residential Development	2000/9	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed
Not controlled action (particular manner)			
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval

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.

[@Commonwealth of Australia](#)

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BioNET Atlas search – threatened species predicted to occur within the Lachlan Plains, Lower Slopes, and Murrumbidgee Subregions of the Cobar Peneplain, NSW South Western Slopes, and Riverina Bioregion, respectively.

Class	Scientific Name	Common Name	NSW Status*	Comm. Status+	Records
Amphibia	<i>Crinia sloanei</i>	Sloane's Froglet	E1,P	E	11
Amphibia	<i>Litoria raniformis</i>	Southern Bell Frog	E1,P	V	2260
Aves	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P,2	CE	17
Aves	<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V,P,2	V	172
Aves	<i>Falco hypoleucos</i>	Grey Falcon	V,P,2	V	65
Aves	<i>Lophochroa leadbeateri</i>	Pink Cockatoo	V,P,2	E	424
Aves	<i>Actitis hypoleucos</i>	Common Sandpiper	P	C,J,K,M	13
Aves	<i>Anseranas semipalmata</i>	Magpie Goose	V,P		176
Aves	<i>Aphelocephala leucopsis</i>	Southern Whiteface	V,P	V	1275
Aves	<i>Apus pacificus</i>	Fork-tailed Swift	P	C,J,K,M	44
Aves	<i>Ardeotis australis</i>	Australian Bustard	E1,P		13
Aves	<i>Arenaria interpres</i>	Ruddy Turnstone	P	V,C,J,K,M	11
Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		1247
Aves	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	341
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		91
Aves	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	P	V,C,J,K,M	671
Aves	<i>Calidris canutus</i>	Red Knot	P	E,C,J,K	4
Aves	<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K,M	125
Aves	<i>Calidris melanotos</i>	Pectoral Sandpiper	P	J,K,M	82
Aves	<i>Calidris ruficollis</i>	Red-necked Stint	P	C,J,K	181
Aves	<i>Calidris subminuta</i>	Long-toed Stint	P	C,J,K	22
Aves	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3	E	3
Aves	<i>Certhionyx variegatus</i>	Pied Honeyeater	V,P		65
Aves	<i>Charadrius veredus</i>	Oriental Plover	P	C,J,K	1
Aves	<i>Chlidonias leucopterus</i>	White-winged Black Tern	P	C,J,K	7
Aves	<i>Chthonicola sagittata</i>	Speckled Warbler	V,P		1167
Aves	<i>Cinclosoma castanotum</i>	Chestnut Quail-thrush	V,P		25
Aves	<i>Circus assimilis</i>	Spotted Harrier	V,P		358
Aves	<i>Climacteris affinis</i>	White-browed Treecreeper population in Carrathool local government area south of the Lachlan River and Griffith local government area	E2,P		39
Aves	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P	V	3072
Aves	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		477
Aves	<i>Drymodes brunneopygia</i>	Southern Scrub-robin	V,P		29

Class	Scientific Name	Common Name	NSW Status*	Comm. Status+	Records
Aves	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1,P		1
Aves	<i>Epthianura albigrons</i>	White-fronted Chat	V,P		648
Aves	<i>Falco subniger</i>	Black Falcon	V,P		303
Aves	<i>Gallinago hardwickii</i>	Latham's Snipe	P	V,J,K,M	155
Aves	<i>Gelochelidon nilotica</i>	Gull-billed Tern	P	C	189
Aves	<i>Glareola maldivarum</i>	Oriental Pratincole	P	C,J,K	2
Aves	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	V,P,3		1
Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		114
Aves	<i>Grantiella picta</i>	Painted Honeyeater	V,P	V	385
Aves	<i>Grus rubicunda</i>	Brolga	V,P		291
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		632
Aves	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V,P,3		8
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		507
Aves	<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	40
Aves	<i>Hirundo rustica</i>	Barn Swallow	P	C,J,K	2
Aves	<i>Hydroprogne caspia</i>	Caspian Tern	P	J	140
Aves	<i>Hylacola cautus</i>	Shy Heathwren	V,P		181
Aves	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		1
Aves	<i>Lathamus discolor</i>	Swift Parrot	E1,P	CE,M	141
Aves	<i>Leipoa ocellata</i>	Malleefowl	E1,P	V	180
Aves	<i>Limosa lapponica</i>	Bar-tailed Godwit	P	C,J,K	13
Aves	<i>Limosa limosa</i>	Black-tailed Godwit	V,P	E,C,J,K	85
Aves	<i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		32
Aves	<i>Melanodryas cucullata cucullata</i>	South-eastern Hooded Robin	E1,P	E	573
Aves	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V,P		266
Aves	<i>Neophema chrysostoma</i>	Blue-winged Parrot	V,P	V,M	61
Aves	<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		394
Aves	<i>Ninox connivens</i>	Barking Owl	V,P,3		110
Aves	<i>Numenius minutus</i>	Little Curlew	P	C,J,K	3
Aves	<i>Numenius phaeopus</i>	Whimbrel	P	C,J,K	1
Aves	<i>Oxyura australis</i>	Blue-billed Duck	V,P		396
Aves	<i>Pachycephala inornata</i>	Gilbert's Whistler	V,P		368
Aves	<i>Pachycephala rufogularis</i>	Red-lored Whistler	E4A,P	V	9
Aves	<i>Pandion cristatus</i>	Eastern Osprey	V,P,3		4
Aves	<i>Pedionomus torquatus</i>	Plains-wanderer	E1,P,3	CE	1449
Aves	<i>Petroica boodang</i>	Scarlet Robin	V,P		94

Class	Scientific Name	Common Name	NSW Status*	Comm. Status+	Records
Aves	<i>Petroica phoenicea</i>	Flame Robin	V,P		307
Aves	<i>Philomachus pugnax</i>	Ruff	P	C,J,K	12
Aves	<i>Pluvialis fulva</i>	Pacific Golden Plover	P	C,J,K	17
Aves	<i>Pluvialis squatarola</i>	Grey Plover	P	C,J,K	1
Aves	<i>Polytelis anthopeplus monarchoides</i>	Regent Parrot (eastern subspecies)	E1,P,3	V	8
Aves	<i>Polytelis swainsonii</i>	Superb Parrot	V,P,3	V	2627
Aves	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V,P		2978
Aves	<i>Pyrrholaemus brunneus</i>	Redthroat	V,P		3
Aves	<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E,M	65
Aves	<i>Stagonopleura guttata</i>	Diamond Firetail	V,P	V	1052
Aves	<i>Stictonetta naevosa</i>	Freckled Duck	V,P		469
Aves	<i>Tringa glareola</i>	Wood Sandpiper	P	C,J,K	344
Aves	<i>Tringa nebularia</i>	Common Greenshank	P	E,C,J,K,M	320
Aves	<i>Tringa stagnatilis</i>	Marsh Sandpiper	P	C,J,K	490
Aves	<i>Tyto longimembris</i>	Eastern Grass Owl	V,P,3		2
Aves	<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		5
Mammalia	<i>Antechinomys laniger</i>	Kultarr	E1,P		1
Mammalia	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		P
Mammalia	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	E	1
Mammalia	<i>Chalinolobus picatus</i>	Little Pied Bat	V,P		34
Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	11
Mammalia	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		1
Mammalia	<i>Macrotis lagotis</i>	Bilby	E4,P	V	3
Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		1
Mammalia	<i>Myotis macropus</i>	Southern Myotis	V,P		21
Mammalia	<i>Ningui yvonneae</i>	Southern Ningui	V,P		K
Mammalia	<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V,P	V	12
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		131
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider in the Wagga Wagga Local Government Area	E2,V,P		12
Mammalia	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V,P		1
Mammalia	<i>Phascolarctos cinereus</i>	Koala	E1,P	E	452
Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	35
Mammalia	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		38

Class	Scientific Name	Common Name	NSW Status*	Comm. Status+	Records
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		1
Mammalia	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	V,P		1
Mammalia	<i>Vespadelus baverstocki</i>	Inland Forest Bat	V,P		6
Reptilia	<i>Aprasia inaurita</i>	Mallee Worm-lizard	E1,P		2
Reptilia	<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	V,P	V	4
Reptilia	<i>Hemiaspis damelii</i>	Grey Snake	E1,P	E	33
Reptilia	<i>Tiliqua occipitalis</i>	Western Blue-tongued Lizard	V,P		3
Flora	<i>Caladenia arenaria</i>	Sand-hill Spider Orchid	E1,P,2	E	1447
Flora	<i>Caladenia concolor</i>	Crimson Spider Orchid	E1,P,2	V	P
Flora	<i>Diuris</i> sp. (Oaklands, D.L. Jones 5380)	Oaklands Diuris	E1,P,2		1294
Flora	<i>Diuris tricolor</i>	Pine Donkey Orchid	V,P,2		435
Flora	<i>Acacia curranii</i>	Curly-bark Wattle	V	V	53
Flora	<i>Amphibromus fluitans</i>	Floating Swamp Wallaby-grass	V	V	3
Flora	<i>Austrostipa metatoris</i>	A spear-grass	V	V	6
Flora	<i>Austrostipa wakoolica</i>	A spear-grass	E1	E	89
Flora	<i>Brachyscome muelleroides</i>	Claypan Daisy	V	V	66
Flora	<i>Brachyscome papillosa</i>	Mossgiel Daisy	V	V	90
Flora	<i>Calotis moorei</i>	A burr-daisy	E1	E	P
Flora	<i>Convolvulus tedmoorei</i>	Bindweed	E1		1
Flora	<i>Cullen parvum</i>	Small Scurf-pea	E1		8
Flora	<i>Distichlis distichophylla</i>	Australian Saltgrass	E1		6
Flora	<i>Eleocharis obicis</i>	Spike-Rush	V	V	6
Flora	<i>Eucalyptus leucoxydon</i> subsp. <i>pruinosa</i>	Yellow Gum	V		2
Flora	<i>Grevillea ilicifolia</i> subsp. <i>ilicifolia</i>	Holly-leaf Grevillea	E4A		5
Flora	<i>Kippistia suaedifolia</i>	Fleshy Minuria	E1		6
Flora	<i>Lepidium aschersonii</i>	Spiny Peppercross	V	V	12
Flora	<i>Lepidium monoplocoides</i>	Winged Peppercross	E1	E	60
Flora	<i>Leptorhynchos orientalis</i>	Lanky Buttons	E1		108
Flora	<i>Leucochrysum albicans</i> subsp. <i>tricolor</i>	Hoary Sunray	E1	E	1
Flora	<i>Maireana cheelii</i>	Chariot Wheels	V	V	72
Flora	<i>Philotheca angustifolia</i> subsp. <i>angustifolia</i>		E4,P		1
Flora	<i>Pilularia novae-hollandiae</i>	Austral Pillwort	E1,3		33
Flora	<i>Pomaderris cocoparrana</i>	Cocoparra Pomaderris	E1	E	474
Flora	<i>Ptilotus extenuatus</i>		E4		2
Flora	<i>Sclerolaena napiformis</i>	Turnip Copperburr	E1	E	186

Class	Scientific Name	Common Name	NSW Status*	Comm. Status+	Records
Flora	<i>Senecio garlandii</i>	Woolly Ragwort	V		3
Flora	<i>Solanum karsense</i>	Menindee Nightshade	V	V	7
Flora	<i>Stenopetalum velutinum</i>	Velvet Thread-petal	E4		1
Flora	<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	270
Flora	<i>Swainsona plagiotropis</i>	Red Darling Pea	V	V	1354
Flora	<i>Swainsona recta</i>	Small Purple-pea	E1	E	2
Flora	<i>Swainsona sericea</i>	Silky Swainson-pea	V		245
Flora	<i>Threlkeldia inchoata</i>	Tall Bonefruit	E1		2
Flora	<i>Tylophora linearis</i>		V	E	38
Flora	<i>Wilsonia rotundifolia</i>	Round-leafed Wilsonia	E1		1

*NSW Status: P=Protected, V=Vulnerable, E1=Endangered, E2=Endangered population, E4=Extinct, E4A=Critically endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.

+Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, CE=Critically endangered, E=Endangered, V=Vulnerable.

'Records: Number of records, P = predicted to occur.

^^ = Category 2 sensitive species.

BioNET Atlas search – threatened ecological communities predicted to occur within the Lachlan Plains, Lower Slopes, and Murrumbidgee Subregions of the Cobar Peneplain, NSW South Western Slopes, and Riverina Bioregion, respectively.

Community Name	NSW status*	Comm. Status+	Records‡
<i>Acacia melvillei</i> Shrubland in the Riverina and Murray-Darling Depression bioregions	E3		K
<i>Allocasuarina luehmannii</i> Woodland in the Riverina and Murray-Darling Depression Bioregions	E3		K
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions		E	K
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions		E	K
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	E3		K
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		E	K
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	E3		K
Mallee and Mallee-Broombush dominated woodland and shrubland, lacking <i>Triodia</i> , in the NSW South Western Slopes Bioregion	E4B		K
Mallee Bird Community of the Murray Darling Depression Bioregion		E	K
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	E3		K
Natural Grasslands of the Murray Valley Plains		CE	K
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions		CE	K
Poplar Box Grassy Woodland on Alluvial Plains		E	K
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	E3		P
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains		CE	K
Weeping Myall Woodlands		E	K
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and	E4B		K
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CE	K

*NSW Status: E3=Endangered, E4B=Critically endangered.

+Comm. Status: E=Endangered, CE=Critically endangered.

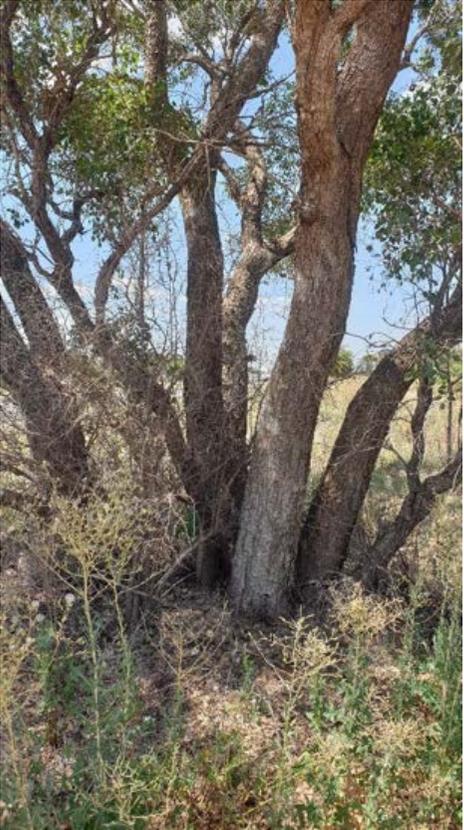
‡Records: P = predicted to occur, K = known to occur.

Appendix B: BAM Plot Locations and Photographs

Plot Name	PCT	Condition	Easting (Zone 55)	Northing (Zone 55)	Photographs
LW01	26	Remnant	410574	6211606	

LW02	16	Moderate	410177	6211660		
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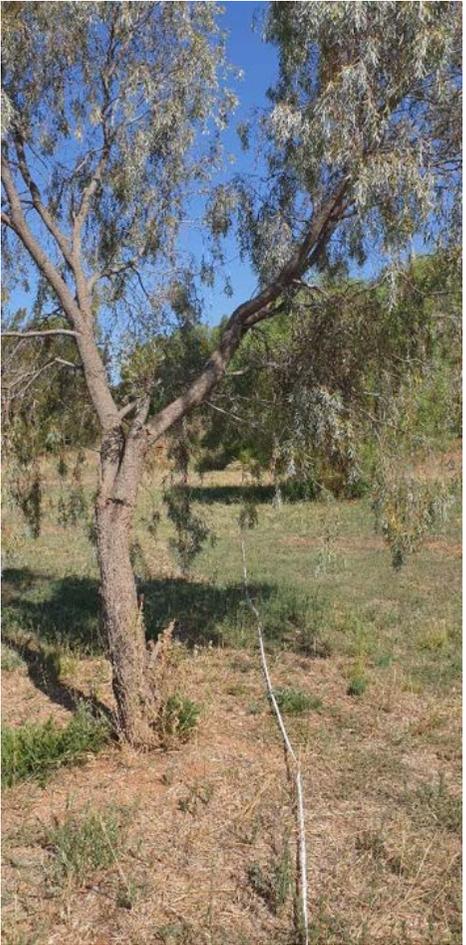
LW03	26	Derived	410657	6211554		
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<p>LW04 (Omitted from final analysis.)</p>	<p>105</p>	<p>Remnant</p>	<p>410737</p>	<p>6211520</p>		
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LW05	181	Moderate	410176	6211334		
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<p>LW06 (Omitted from final analysis.)</p>	<p>0</p>	<p>Non-native</p>	<p>410242</p>	<p>6211170</p>		
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LW07	181	Moderate	410376	6211372		
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LW08	26	Remnant	410906	6211319		
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LW09	26	Derived	410897	6211378		
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LWX01	16	Derived	410151	6211376		
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<p>LWX02</p>	<p>16</p>	<p>Low</p>	<p>410198</p>	<p>6211625</p>		
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<p>LWX03 (Omitted from final analysis.)</p>	<p>0</p>	<p>Non-native</p>	<p>410632</p>	<p>6211479</p>		
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<p>LWX04 (Omitted from final analysis.)</p>	<p>0</p>	<p>Non-native</p>	<p>410607</p>	<p>6211494</p>		
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Appendix C: Field Survey Results

Fauna species list

In total, 76 fauna species were recorded during the biodiversity survey, of which 70 (92.11%) were native and 6 (7.89%) were introduced. Three threatened species were encountered:

- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*), listed as Vulnerable under the BC and EPBC Acts. This species occurred mainly within the Weeping Myall on the northern boundary of the site and in remnant vegetation approximately 40 m from the subject site, on the opposite side of Jones Road.
- Magpie Goose (*Anseranas semipalmata*) listed as Vulnerable under the BC Act and Marine under the EPBC Act. This species was observed flying over the subject site and perched on trees approximately 240 m outside of the subject site.
- Major Mitchell's (*Lophochroa leadbeateri*) listed as Vulnerable under the BC Act and Endangered under the EPBC Act. Three individuals of this species alighted briefly on a dead tree within the site.

Six EPBC Act-listed Marine species, all birds, were observed, one of which is additionally listed as Migratory under the Bonn Convention

The following table should not be regarded as a comprehensive listing of all species likely to make use of the subject land.

Class	Scientific name	Common Name	Status ¹	BC Act ²	EPBC Act ³	Seen	Heard	Notes
Amphibia	<i>Limnodynastes fletcheri</i>	Long-thumbed Frog	N			Yes	Yes	Calling in Little Swamp
Amphibia	<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	N			Yes	Yes	Calling in Little Swamp
Amphibia	<i>Litoria peronii</i>	Peron's Tree Frog	N			Yes	No	Living in Little Swamp vegetation, calling in adjacent Lake Wyangan
Aves	<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater	N			Yes	No	Foraging on subject land
Aves	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	N			Yes	Yes	Foraging in street trees and occasionally in grassland
Aves	<i>Acrocephalus australis</i>	Australian Reed Warbler	N			Yes	Yes	In <i>Phragmites</i> reed beds
Aves	<i>Anas superciliosa</i>	Pacific Black Duck	N			Yes	No	Foraging in Little Swamp
Aves	<i>Anseranas semipalmata</i>	Magpie Goose	N	V	Marine	Yes	No	Flying over only
Aves	<i>Anthochaera carunculata</i>	Red Wattlebird	N			Yes	Yes	Brief visitor in Black Box/River Red Gum woodland
Aves	<i>Ardea alba</i>	Great Egret	N		Marine	Yes	No	Foraging in Little Swamp
Aves	<i>Ardea intermedia</i>	Intermediate Egret	N		Marine	Yes	No	Foraging in Little Swamp

Class	Scientific name	Common Name	Status ¹	BC Act ²	EPBC Act ³	Seen	Heard	Notes
Aves	<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	N			Yes	Yes	Flying & foraging over subject land
Aves	<i>Barnardius zonarius</i>	Australian Ringneck	N			Yes	No	Flying over only
Aves	<i>Chenonetta jubata</i>	Australian Wood Duck	N			Yes	Yes	Foraging in Little Swamp
Aves	<i>Cinclorhamphus mathewsi</i>	Rufous Songlark	N			Yes	Yes	Foraging and flying over, display flights
Aves	<i>Circus approximans</i>	Swamp Harrier	N		Marine	Yes	Yes	Flying & foraging over subject land
Aves	<i>Colluricincla harmonica</i>	Grey Shrike-thrush	N			Yes	Yes	Foraging in remnant woodland, often calling
Aves	<i>Columba livia</i>	Rock Dove	I			Yes	No	Flying over only
Aves	<i>Coracina novaehollandiae</i>	Black-faced Cuckooshrike	N			Yes	No	Foraging on subject land
Aves	<i>Corvus coronoides</i>	Australian Raven	N			Yes	Yes	Foraging on subject land
Aves	<i>Coturnix ypsilophora</i>	Brown Quail	N			Yes	Yes	In weedy grassland and around Little Swamp
Aves	<i>Cracticus nigrogularis</i>	Pied Butcherbird	N			Yes	Yes	Perched in wooded areas
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra	N			Yes	Yes	Periodic visitor, often calling
Aves	<i>Egretta novaehollandiae</i>	White-faced Heron	N			Yes	No	Foraging in Little Swamp
Aves	<i>Elanus axillaris</i>	Black-shouldered Kite	N			Yes	No	Flying & foraging over subject land
Aves	<i>Euseyornis melanops</i>	Black-fronted Dotterel	N			Yes	Yes	Living & foraging in Little Swamp
Aves	<i>Eolophus roseicapilla</i>	Galah	N			Yes	Yes	Foraging on subject land
Aves	<i>Falco cenchroides</i>	Nankeen Kestrel	N			Yes	No	Perched on stag, and flying over
Aves	<i>Falco peregrinus</i>	Peregrine Falcon	N			Yes	Yes	Flying & foraging over subject land
Aves	<i>Fulica atra</i>	Eurasian Coot	N			Yes	No	Living & foraging in Little Swamp
Aves	<i>Gallinula tenebrosa</i>	Dusky Moorhen	N			Yes	No	In Phragmites and in open water of Little Swamp
Aves	<i>Gavicalis virescens</i>	Singing Honeyeater	N			Yes	No	Foraging on subject land
Aves	<i>Grallina cyanoleuca</i>	Australian Magpie Lark	N			Yes	No	Foraging on subject land
Aves	<i>Gymnorhina tibicen</i>	Australian Magpie	N			Yes	Yes	Foraging on subject land
Aves	<i>Haliastur sphenurus</i>	Whistling Kite	N			Yes	Yes	Flying & foraging over subject land (juveniles and adults)
Aves	<i>Himantopus himantopus</i>	Black-winged Stilt	N			Yes	Yes	Foraging and refuging overnight in Little Swamp
Aves	<i>Hirundo neoxena</i>	Welcome Swallow	N			Yes	Yes	Mainly circling Little Swamp

Class	Scientific name	Common Name	Status ¹	BC Act ²	EPBC Act ³	Seen	Heard	Notes
Aves	<i>Lalage tricolor</i>	White-winged Triller	N			Yes	No	Foraging on subject land
Aves	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	N			Yes	No	Foraging on subject land
Aves	<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	N	V	E	Yes	Yes	Three birds perched on stag in subject land
Aves	<i>Malurus cyaneus</i>	Superb Fairy Wren	N			Yes	Yes	Foraging on subject land
Aves	<i>Manorina melanocephala</i>	Noisy Miner	N			Yes	Yes	Foraging on subject land
Aves	<i>Megalurus gramineus</i>	Little Grassbird	N			Yes	Yes	In <i>Phragmites</i> reed beds, calling often, only briefly seen
Aves	<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater	N			Yes	No	Small flock in Black Box/River Red Gum woodland, passing through
Aves	<i>Milvus migrans</i>	Black Kite	N			Yes	Yes	Flying & foraging over subject land
Aves	<i>Nycticorax caledonicus</i>	Nankeen Night Heron	N		Marine	Yes	Yes	Foraging in Little Swamp, flying over
Aves	<i>Ocyphaps lophotes</i>	Crested Pigeon	N			Yes	Yes	Foraging on subject land
Aves	<i>Passer domesticus</i>	House Sparrow	I			Yes	Yes	Around habitation and in weedy grassland
Aves	<i>Pelecanus conspicillatus</i>	Australian Pelican	N			Yes	No	Flying over only
Aves	<i>Petrochelidon ariel</i>	Fairy Martin	N			Yes	No	Around habitation, over swamp, near road
Aves	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	N			Yes	No	Flying over only
Aves	<i>Phaps chalcoptera</i>	Common Bronzewing	N			Yes	No	Foraging on subject land
Aves	<i>Plegadis falcinellus</i>	Glossy Ibis	N		Marine, Bonn.	Yes	No	Foraging in Little Swamp
Aves	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	N	V		Yes	Yes	In vegetation along the Jones Rd corridor and calling from near Campbell's Wetland. No sign of dormitory nests within or near site.
Aves	<i>Porphyrio melanotus</i>	Australian Swamp Hen	N			Yes	Yes	Living & foraging in Little Swamp
Aves	<i>Porzana fluminea</i>	Australian Spotted Crake	N			Yes	Yes	Living & foraging in Little Swamp
Aves	<i>Psephotus haematonotus</i>	Red-rumped Parrot	N			Yes	Yes	Foraging on subject land
Aves	<i>Psephotus varius</i>	Mulga Parrot	N			Yes	Yes	Small flocks in grassland
Aves	<i>Rhipidura albiscapa</i>	Grey Fantail	N			Yes	Yes	Foraging on subject land
Aves	<i>Rhipidura leucophrys</i>	Willy Wagtail	N			Yes	Yes	Foraging on subject land
Aves	<i>Stizoptera bichenovii</i>	Double-barred Finch	N			Yes	Yes	Flying past, alighting briefly on African Boxthorn, a few foraging in grasses

Class	Scientific name	Common Name	Status ¹	BC Act ²	EPBC Act ³	Seen	Heard	Notes
Aves	<i>Sturnus vulgaris</i>	European Starling	I			Yes	Yes	Foraging on subject land
Aves	<i>Taeniopygia guttata</i>	Zebra Finch	N			Yes	Yes	Foraging in grassland and woodland
Aves	<i>Threskiornis moluccus</i>	Australian White Ibis	N			Yes	No	Flying over only
Aves	<i>Threskiornis spinicollis</i>	Straw-necked Ibis	N			Yes	No	Flying over only
Aves	<i>Todiramphus sanctus</i>	Sacred Kingfisher	N			Yes	Yes	Perching in Black Box and calling from lake
Aves	<i>Trichoglossus moluccanus</i>	Rainbow Lorikeet	N			Yes	Yes	Flying over only
Aves	<i>Turdus merula</i>	Common Blackbird	I			Yes	Yes	Around habitation and in weedy grassland
Aves	<i>Vanellus miles</i>	Masked Lapwing	N			Yes	Yes	Foraging on subject land
Mammalia	<i>Lepus europaeus</i>	European Hare	I			Yes	No	Occasional in weedy grassland
Mammalia	<i>Macropus giganteus</i>	Eastern Grey Kangaroo	N			Yes	No	Foraging mainly in weedy grassland
Mammalia	<i>Oryctolagus cuniculus</i>	European Rabbit	I			Yes	No	Occasional in weedy grassland
Mammalia	<i>Wallabia bicolor</i>	Swamp Wallaby	N			Yes	No	Foraging around Little Swamp
Reptilia	<i>Cryptoblepharus pannosus</i>	Ragged Snake-eyed Skink	N			Yes	No	Mainly around debris piles, timber, concrete etc
Reptilia	<i>Pseudechis porphyriacus</i>	Red-bellied Black Snake	N			Yes	No	In Little Swamp
Reptilia	<i>Pseudonaja textilis</i>	Eastern Brown Snake	N			Yes	No	Multiple locations in native and weedy grassland

¹N = Native, I = Introduced.

²V= Vulnerable.

³Migratory, Bonn Convention

Flora Species List

In total, 96 plant species were detected during the 2023 field surveys. Of this number, 46 (47.92%) are native and 50 (52.08%) are introduced.

Seven species are listed as High-threat Exotic species (HTE) under the BAM. Of these, one species – African Boxthorn (*Lycium ferocissimum*) – is listed as a Priority Weed (PW) for the Riverina Local Land Services (LLS) region, and as a Weed of National Significance (WoNS).

¹ Growth Form	Scientific Name	Common Name	² Status	³ HTE	⁴ WoNS	⁵ PW
TG	<i>Acacia pendula</i>	Weeping Myall	N	No	No	No
TG	<i>Acacia oswaldii</i>	Umbrella Wattle	N	No	No	No
TG	<i>Eucalyptus camaldulensis</i>	River Red Gum	N	No	No	No
TG	<i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i>	River Oak	N	No	No	No
TG	<i>Acacia salicina</i>	Willow Wattle	N	No	No	No
TG	<i>Acacia stenophylla</i>	Cooba	N	No	No	No
TG	<i>Eucalyptus largiflorens</i>	Black Box	N	No	No	No
TG	<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	Poplar Box	N	No	No	No
SG	<i>Atriplex nummularia</i>	Old Man Saltbush	N	No	No	No
SG	<i>Enchylaena tomentosa</i>	Ruby Saltbush	N	No	No	No
SG	<i>Rhagodia spinescens</i>	Spiny Saltbush	N	No	No	No
SG	<i>Maireana brevifolia</i>	Small-Leaf Bluebush	N	No	No	No
SG	<i>Salsola australis</i>	Buckbush	N	No	No	No
SG	<i>Atriplex semibaccata</i>	Creeping Saltbush	N	No	No	No
SG	<i>Atriplex stipitata</i>	Mallee Saltbush	N	No	No	No
SG	<i>Sclerolaena muricata</i>	Black Rolypoly	N	No	No	No
SG	<i>Sida petrophila</i>	Rock Sida	N	No	No	No
SG	<i>Melaleuca lanceolata</i>	Moonah	N	No	No	No
FG	<i>Einadia nutans</i>	Climbing Saltbush	N	No	No	No
FG	<i>Maireana enchylaenoides</i>	Wingless Bluebush	N	No	No	No
FG	<i>Sida corrugata</i>	Corrugated Sida	N	No	No	No
FG	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed	N	No	No	No
FG	<i>Vittadinia pterochaeta</i>	Winged New Holland Daisy	N	No	No	No
FG	<i>Atriplex suberecta</i>	Sprawling Saltbush	N	No	No	No
FG	<i>Portulaca oleracea</i>	Pigweed	N	No	No	No
FG	<i>Zaleya galericulata</i>	Hogweed	N	No	No	No
FG	<i>Rumex brownii</i>	Swamp Dock	N	No	No	No
FG	<i>Spergularia marina</i>	Lesser Sea-Spurrey	N	No	No	No

¹ Growth Form	Scientific Name	Common Name	² Status	³ HTE	⁴ WoNS	⁵ PW
GG	<i>Bromus arenarius</i>	Sand Brome	N	No	No	No
GG	<i>Paspalidium constrictum</i>	Knottybutt Grass	N	No	No	No
GG	<i>Austrostipa scabra</i>	Speargrass	N	No	No	No
GG	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	N	No	No	No
GG	<i>Enteropogon acicularis</i>	Curly Windmill Grass	N	No	No	No
GG	<i>Cynodon dactylon</i>	Couch	N	No	No	No
GG	<i>Chloris truncata</i>	Windmill Grass	N	No	No	No
GG	<i>Walwhalleya proluta</i>	Rigid Panic	N	No	No	No
GG	<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass	N	No	No	No
GG	<i>Bothriochloa macra</i>	Red Grass	N	No	No	No
GG	<i>Phragmites australis</i>	Common Reed	N	No	No	No
GG	<i>Sporobolus caroli</i>	Fairy Grass	N	No	No	No
GG	<i>Juncus usitatus</i>	Rush	N	No	No	No
GG	<i>Panicum effusum</i>	Hairy Panic	N	No	No	No
GG	<i>Paspalum distichum</i>	Water Couch	N	No	No	No
OG	<i>Amyema linophylla</i> subsp. <i>orientalis</i>	Sheoak Mistletoe	N	No	No	No
OG	<i>Amyema quandang</i>	Grey Mistletoe	N	No	No	No
OG	<i>Convolvulus graminetinus</i>	Bindweed	N	No	No	No
SG	<i>Lycium ferocissimum</i>	African Boxthorn	E	Yes	Yes	Yes
TG	<i>Pinus halepensis</i>	Aleppo Pine	E	Yes	No	No
FG	<i>Carthamus lanatus</i>	Saffron Thistle	E	Yes	No	No
FG	<i>Alternanthera pungens</i>	Khaki Weed	E	Yes	No	No
FG	<i>Bidens subalternans</i>	Greater Beggar's Ticks	E	Yes	No	No
GG	<i>Paspalum dilatatum</i>	Paspalum	E	Yes	No	No
GG	<i>Bromus diandrus</i>	Great Brome	E	Yes	No	No
TG	<i>Eucalyptus</i> spp. (planted)	Gum	E	No	No	No
FG	<i>Salvia verbenaca</i>	Vervain	E	No	No	No
FG	<i>Lactuca serriola</i>	Prickly Lettuce	E	No	No	No
FG	<i>Sonchus oleraceus</i>	Common Sowthistle	E	No	No	No
FG	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	E	No	No	No
FG	<i>Medicago sativa</i>	Lucerne	E	No	No	No
FG	<i>Cichorium intybus</i>	Chicory	E	No	No	No
FG	<i>Cirsium vulgare</i>	Spear Thistle	E	No	No	No
FG	<i>Sisymbrium erysimoides</i>	Smooth Mustard	E	No	No	No
FG	<i>Euphorbia davidii</i>	Spurge	E	No	No	No
FG	<i>Chenopodium album</i>	Fat Hen	E	No	No	No

¹ Growth Form	Scientific Name	Common Name	² Status	³ HTE	⁴ WoNS	⁵ PW
FG	<i>Heliotropium europaeum</i>	Potato Weed	E	No	No	No
FG	<i>Echium plantagineum</i>	Paterson's Curse	E	No	No	No
FG	<i>Asphodelus fistulosus</i>	Onion Weed	E	No	No	No
FG	<i>Marrubium vulgare</i>	White Horehound	E	No	No	No
FG	<i>Polygonum arenastrum</i>	Wireweed	E	No	No	No
FG	<i>Silybum marianum</i>	Variegated Thistle	E	No	No	No
FG	<i>Chondrilla juncea</i>	Skeleton Weed	E	No	No	No
FG	<i>Rapistrum rugosum</i>	Turnip Weed	E	No	No	No
FG	<i>Heliotropium curassavicum</i>	Smooth Heliotrope	E	No	No	No
FG	<i>Sonchus asper</i>	Prickly Sowthistle	E	No	No	No
FG	<i>Verbena incompta</i>	Purpletop	E	No	No	No
FG	<i>Modiola caroliniana</i>	Red-Flowered Mallow	E	No	No	No
FG	<i>Plantago lanceolata</i>	Lamb's Tongues	E	No	No	No
FG	<i>Rumex crispus</i>	Curled Dock	E	No	No	No
FG	<i>Helminthotheca echioides</i>	Ox-Tongue	E	No	No	No
FG	<i>Tragopogon porrifolius</i>	Salsify	E	No	No	No
FG	<i>Medicago truncatula</i>	Barrel Medic	E	No	No	No
FG	<i>Melilotus indicus</i>	Hexham Scent	E	No	No	No
FG	<i>Medicago polymorpha</i>	Burr Medic	E	No	No	No
FG	<i>Malva parviflora</i>	Small-Flowered Mallow	E	No	No	No
FG	<i>Polygonum aviculare</i>	Wireweed	E	No	No	No
FG	<i>Ranunculus sceleratus</i>	Celery Buttercup	E	No	No	No
FG	<i>Sisymbrium irio</i>	London Rocket	E	No	No	No
FG	<i>Taraxacum officinale</i>	Dandelion	E	No	No	No
FG	<i>Hypochaeris radicata</i>	Catsear	E	No	No	No
GG	<i>Avena fatua</i>	Wild Oats	E	No	No	No
GG	<i>Lolium sp.</i>	Ryegrass	E	No	No	No
GG	<i>Echinochloa oryzoides</i>	Hairy Millet	E	No	No	No
GG	<i>Chloris virgata</i>	Feathertop Rhodes Grass	E	No	No	No
GG	<i>Setaria parviflora</i>	Marsh Bristlegrass	E	No	No	No
GG	<i>Hordeum marinum</i>	Sea Barley Grass	E	No	No	No
GG	<i>Bromus rubens</i>	Weeping Myall	E	No	No	No

¹Growth form: FG = forb, GG = grass and grass-like, SG = shrub, TG = tree, EG = fern, OG = other. ²Status: N = native, I = introduced. ³High-threat exotic species (Yes/No). ⁴Weed of National Significance (Yes/No). ⁵Priority weed for the Riverina (Yes/No).

BAM Data Sheets

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan
Recorders	David Orchard	Plot ID #	LW01
Photo #	-	Zone ID	26_Remn.
Datum	GDA94	Plot dimensions	10 x 12 m
Eastings	410574	Zone	55
Northings	6211606	Plot bearing along midline	301

Record easting, northing at plot marker (0 m point). Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot.	
IBRA region	Cobar Penneplain
Subregion	Lachlan Plains
Likely Vegetation Class	Riverine Plain Woodlands
Plant Community Type	26
Condition state	Remnant

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	10 x 12 m	Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	3
	Grasses etc	2
	Forbs	3
	Ferns	0
Cover (sum of cover of natives species)	Other	1
	Trees	90.1
	Shrubs	62
	Grasses etc	0.3
	Forbs	1.2
	Ferns	0
	Other	0.1
High threat weed cover		2

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	10 x 100 m	10 x 12 m
Tree stem DBH (cm)	Notes on function attributes:	
>80	0	Stem size class records # large trees (cf. benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	1	For multitemmed trees, record only the largest stem
20 - 29	+	Presence of <5cm stems records regeneration
10 - 19	+	Record # trees with hollows, not number of hollows
5 - 9	+	Count as one stem where tree is multitemmed
< 5	+	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm 0	Total #
	>20cm** 0	0
Length of logs		Total (m)
		5.7

*These values summarise the floristic data for input into BAM calculator

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	80	90	100	80	80	86
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy layer?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3=severe
 Timing code: R= recent (<3y), NR= not recent, O= old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan			
Recorders	David Orchard		Plot ID #	LW02	Zone ID	16_Mod.
Photo #	-		Plot dimensions	20 x 50 m		
Datum	GDA94	Zone	55	Plot bearing along midline	349	
Easting	410177	Northing	6211660	Record magnetic bearing along midline from 0 m point		
Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot						
IBRA region	Cobar Penneplain					
Subregion	Lachlan Plains					
Likely Vegetation Class	Inland Floodplain Woodlands					
Plant Community Type	16	Condition state	Moderate			

Floristics plot is centred on the midline, at 0m point, 10m either side

Function plot is an extension of floristics plot out to 50m along midline (or equiv. area)

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	5
	Shrubs	4
	Grasses etc	3
	Forbs	3
	Ferns	0
Cover (sum of cover of natives species)	Trees	52
	Shrubs	25.2
	Grasses etc	8
	Forbs	2.2
	Other	0
High threat weed cover	5	

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	40 x 100 m	
Tree stem DBH (cm) Notes on function attributes:		
>80	0	Stem size class records # large trees (cf. benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	+	For multitemmed trees, record only the largest stem
20 - 29	+	Presence of <5cm stems records regeneration
10 - 19	+	Record # trees with hollows, not number of hollows
5 - 9	+	Count as one stem where tree is multitemmed
< 5	+	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm	0
	>20cm**	0
Length of logs	Total #	
	0	

*These values summarise the floristic data for input into BAM calculator

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	50	70	70	60	60	62
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 25, 35, 45 m (alternating sides) along the midline of function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid. canopy burnt)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=light, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan			
Recorders	David Orchard		Plot ID #	LW03	Zone ID	26_Der.
Photo #	-		Plot dimensions		20 x 50 m	
Datum	GDA94	Zone	55	Plot bearing along midline		121
Easting	410657	Northing	6211554	Record magnetic bearing along midline from 0 m point.		

Record easting, northing at plot marker (0 m point), 10 m either side. Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Cobar Penneplain				
Subregion	Lachlan Plains				
Likely Vegetation Class	Riverine Plain Woodlands				
Plant Community Type	26	Condition state	Derived		

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extension of floristics plot out to 50 m along midline (or eqv. area)

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	10 x 40 m	Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	2
	Grasses etc	7
	Forbs	2
	Ferns	0
Cover (sum of cover of natives species)	Other	0
	Trees	0
	Shrubs	0.3
	Grasses etc	65.3
	Forbs	0.3
	Ferns	0
	Other	0
High threat weed cover	0	

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m ²)			
Dimensions (circle applicable size)			
20 x 50 m	10 x 100 m		
Tree stem DBH (cm)			
>80	0	Notes on function attributes: Stem size class records # large trees (cf. benchmark) Record stems for living trees only, and for all species For multitempered trees, record only the largest stem Presence of <5cm stems records regeneration Record # trees with hollows, not number of hollows Count as one stem where tree is multitempered Hollow bearing stem may be a dead stem (incl. snag)	
50 - 79	0		
30 - 49	-		
20 - 29	-		
10 - 19	-		
5 - 9	-		
< 5	-		
# Trees with hollows	<20cm	0	Total #
	>20cm**	0	0
Length of logs			Total (m)
			0

Measure length of logs >50cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	40	30	20	10	20	24
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground streams, mild, lamby burnt)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan			
Recorders	David Orchard		Plot ID #	LW04	Zone ID	105_Rem.
Photo #	-		Plot dimensions		10 x 10 m	
Datum	GDA94	Zone	55	Plot bearing along midline		97
Easting	410737	Northing	6211520	Record magnetic bearing along midline from 0 m point		

Record easting, northing at plot marker (0 m point). Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Cobar Peneplain		
Subregion	Lachlan Plains		
Likely Vegetation Class	Western Peneplain Woodlands		
Plant Community Type	105	Condition state	Remnant

Floristics plot is centred on the midline, at 0 m point, 10 m either side

Function plot is an extension of floristics plot out to 50 m along midline (for equiv. area)

BAM Composition / Structure plot (400m ²)		
Dimensions (single applicable size)		
20 x 20 m	10 x 10 m	Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	0
	Grasses etc	2
	Forbs	0
	Ferns	0
Cover (sum of cover of natives species)	Trees	90.2
	Shrubs	0
	Grasses etc	2.1
	Forbs	0
	Ferns	0
Other	0	
High threat weed cover	1	

BAM Function plot (1000m ²)		
Dimensions (single applicable size)		
20 x 50 m	10 x 100 m	10 x 10 m
Tree stem DBH (cm)		Notes on function attributes:
>80	0	Stem size class records # large trees (cf. benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	+	For multitemmed trees, record only the largest stem
20 - 29	-	Presence of +5cm stems records regeneration
10 - 19	-	Record # trees with hollows, not number of hollows
5 - 9	-	Count as one stem where tree is multitemmed
< 5	-	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm 0	Total #
	>20cm** 0	0
Length of logs		Total (m)
		0

*These values summarise the floristic data for input into BAM calculator

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
<small>Litter cover is used for BAM, other attributes are useful for recording site condition in general</small>							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	40	100	90			76.7
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground surface, soil, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (cby), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan
Recorders	David Orchard	Plot ID #	LW05
Photo #	-	Zone ID	181_Mod.
Datum	GDA94	Plot dimensions	20 x 20 m
Zone	55	Plot bearing along midline	186
Easting	410176	Northing	6211334

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Cobar Peneplain
Subregion	Lachlan Plains
Likely Vegetation Class	Inland Floodplain Swamps
Plant Community Type	181
Condition state	Moderate

Floristics plot is centred on the midline, at 0 m point, 20 m either side

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	10 x 40 m	Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	2
	Grasses etc	3
	Forbs	3
	Ferns	0
Cover (sum of cover of natives species)	Other	0
	Trees	0
	Shrubs	1.2
	Grasses etc	96.1
	Forbs	0.3
	Ferns	0
	Other	0
High threat weed cover		0

*These values summarise the floristic data for input into BAM calculator

Function plot is an extension of floristics plot out to 50-m along midline (or equiv. area)

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	10 x 100 m	20 x 20 m
Tree stem DBH (cm)		
>80	0	Notes on function attributes: Stem size class records # large trees (cf. benchmark) Record stems for living trees only, and for all species For multitemmed trees, record only the largest stem Presence of <5cm stems records regeneration Record # trees with hollows, not number of hollows Count as one stem where tree is multitemmed Hollow bearing stem may be a dead stem (incl. snag)
50 - 79	0	
30 - 49	-	
20 - 29	-	
10 - 19	-	
5 - 9	-	
< 5	-	
# Trees with hollows	<20cm	0
	>20cm**	0
		Total #
		0
Length of logs		Total (m)
		0

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	5	20	30	10	5	14
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stratum, mid, canopy burn?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<5y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan			
Recorders	David Orchard		Plot ID #	LW06	Zone ID	0_NN
Photo #	-		Plot dimensions	20 x 50 m		
Datum	GDA94	Zone	55	Plot bearing along midline	172	
Easting	410242	Northing	6211170	Record magnetic bearing along midline from 0 m point		

Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot

IBRA region	Cobar Penneplain				
Subregion	Lachlan Plains				
Likely Vegetation Class	Non-native vegetation				
Plant Community Type	0	Condition state	NN		

Floristics plot is centred on the midline, at 0 m point, 30 m either side

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	2
	Grasses etc	3
	Forbs	3
	Ferns	0
Cover (sum of cover of natives species)	Other	0
	Trees	0
	Shrubs	1.2
	Grasses etc	96.1
	Forbs	0.3
	Ferns	0
	Other	0
High threat weed cover	0	

*These values summarise the floristic data for input into BAM calculator

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	40 x 100 m	
Tree stem DBH (cm) Notes on function attributes:		
>80	0	Stem size class records # large trees (d.f. benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	-	For multitempered trees, record only the largest stem
20 - 29	-	Presence of <5cm stems records regeneration
10 - 19	-	Record # trees with hollows, not number of hollows
5 - 9	-	Count as one stem where tree is multitempered
< 5	-	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm	0
	>20cm**	0
Total #	0	
Length of logs	0	
Total (m)	0	

Measure length of logs >30cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	20	10	10	30	90	3.2
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground strom, mid, canopy burnt)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3=severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan		
Recorders	David Orchard	Plot ID #	LW07	Zone ID	181_Mod.
Photo #	-	Plot dimensions	20 x 25 m		
Datum	GDA94	Zone	55	Plot bearing along midline	200
Easting	410376	Northing	6211372	Record magnetic bearing along midline from 0 m point	
Record easting, northing at plot marker (0 m point), Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot.					
IBRA region	Cobar Peneplain				
Subregion	Lachlan Plains				
Likely Vegetation Class	Inland Floodplain Swamps				
Plant Community Type	181	Condition state	Moderate		

Floristics plot is centred on the midline, at 0 m point, 30 m either side

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	±0 x 40 m	Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	2
	Grasses etc	2
	Forbs	1
	Ferns	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	0.2
	Grasses etc	96
	Forbs	0.1
	Ferns	0
Other	0.1	
High threat weed cover	0	

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	±0 x 100 m	20 x 25 m
Tree stem DBH (cm)		
>80	0	Notes on function attributes: Stem size class records # large trees (cf. benchmark) Record stems for living trees only, and for all species For multitemmed trees, record only the largest stem Presence of +5cm stems records regeneration Record # trees with hollows, not number of hollows Count as one stem where tree is multitemmed Hollow bearing stem may be a dead stem (incl. snag)
50 - 79	0	
30 - 49	-	
20 - 29	-	
10 - 19	-	
5 - 9	-	
< 5	-	
# Trees with hollows	<20cm 0	Total #
	>20cm** 0	0
Length of logs		Total (m)
		0

*These values summarise the floristic data for input into BAM calculator

**hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	20	10	10	30	90	32
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stems, incl. canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=light, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan				
Recorders	David Orchard		Plot ID #	LW08	Zone ID	26_Remn.	
Photo #	-		Plot dimensions			20 x 25 m	
Datum	GDA94	Zone	55		Plot bearing along midline		337
Easting	410906	Northing	6211319		Record magnetic bearing along midline from 0 m point		
Floristics plot is centred on the midline, at 0 m point, 20 m either side							
Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)							
IBRA region	Cobar Peneplain						
Subregion	Lachlan Plains						
Likely Vegetation Class	Riverine Plain Woodlands						
Plant Community Type	26	Condition state	Remnant				

Floristics plot is centred on the midline, at 0 m point, 20 m either side

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	2
	Shrubs	6
	Grasses etc	3
	Forbs	4
	Ferns	0
Cover (sum of cover of natives species)	Other	0
	Trees	6
	Shrubs	19.1
	Grasses etc	8
	Forbs	20.7
	Ferns	0
	Other	0
High threat weed cover		0.1

BAM Function plot (1000m²)			
Dimensions (circle applicable size)			
20 x 50 m	40 x 100 m	20 x 25 m	
Tree stem DBH (cm)			
>80	0	Notes on function attributes: Stem size class records # large trees (if benchmark) Record stems for living trees only, and for all species For multitemmed trees, record only the largest stem Presence of <5cm stems records regeneration Record # trees with hollows, not number of hollows Count as one stem where tree is multitemmed Hollow bearing stem may be a dead stem (incl. snag)	
50 - 79	0		
30 - 49	-		
20 - 29	+		
10 - 19	+		
5 - 9	-		
< 5	+		
# Trees with hollows	<20cm	0	Total #
	>20cm**	0	
Length of logs			Total (m)
			0

*These values summarise the floristic data for input into BAM calculator

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	70	40	20	80	20	46
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stream, mt, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe
Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	16/02/2023	Survey Name	Lakeside Estate, Lake Wyangan				
Recorders	David Orchard		Plot ID #	LW09	Zone ID	26_Der.	
Photo #	-		Plot dimensions			20 x 50 m	
Datum	GDA94	Zone	55		Plot bearing along midline		267
Easting	410897	Northing	6211378		Record magnetic bearing along midline from 0 m point		

Record easting, northing at plot marker 00 m point. Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot.

IBRA region	Cobar Peneplain		
Subregion	Lachlan Plains		
Likely Vegetation Class	Riverine Plain Woodlands		
Plant Community Type	26	Condition state	Remnant

Floristics plot is centred on the midline, at 0 m point, 20 m either side

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	1
	Shrubs	3
	Grasses etc	5
	Forbs	3
	Ferns	0
	Other	1
Cover (sum of cover of natives species)	Trees	5
	Shrubs	2.1
	Grasses etc	44
	Forbs	0.3
	Other	0.1
High threat weed cover		7.1

*These values summarise the floristic data for input into BAM calculator

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	40 x 100 m	
Tree stem DBH (cm)		Notes on function attributes:
>80	0	Stem size class records # large trees (if benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	-	For multitemmed trees, record only the largest stem
20 - 29	-	Presence of <5cm stems records regeneration
10 - 19	+	Record # trees with hollows, not number of hollows
5 - 9	-	Count as one stem where tree is multitemmed
< 5	-	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm	0
	>20cm**	0
		Total #
		0
Length of logs		Total (m)
		0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.
**Hollows of >20cm are recorded for habitat for some threatened species.

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	20	40	10	10	10	18
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stream, mt, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe
Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Date	21/09/2023	Survey Name	Lakeside Estate, Lake Wyangan				
Recorders	David Orchard		Plot ID #	LWX01	Zone ID	16_Der.	
Photo #	-		Plot dimensions			20 x 25 m	
Datum	GDA94	Zone	55		Plot bearing along midline		98
Easting	410151	Northing	6211376		Record magnetic bearing along midline from 0 m point		

Record easting, northing at plot marker 00 m point. Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot.

IBRA region	Cobar Peneplain		
Subregion	Lachlan Plains		
Likely Vegetation Class	Inland Floodplain Woodlands		
Plant Community Type	16	Condition state	Derived

Floristics plot is centred on the midline, at 0 m point, 20 m either side

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	3
	Grasses etc	5
	Forbs	1
	Ferns	0
	Other	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	42
	Grasses etc	8.3
	Forbs	0.1
	Ferns	0
	Other	0
High threat weed cover		10.2

*These values summarise the floristic data for input into BAM calculator

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m ²)			
Dimensions (circle applicable size)			
20 x 50 m	40 x 100 m	20 x 25 m	
Tree stem DBH (cm)			
>80	0	Notes on function attributes: Stem size class records # large trees (if benchmark) Record stems for living trees only, and for all species For multitemmed trees, record only the largest stem Presence of <5cm stems records regeneration Record # trees with hollows, not number of hollows Count as one stem where tree is multitemmed Hollow bearing stem may be a dead stem (incl. snag)	
50 - 79	0		
30 - 49	-		
20 - 29	-		
10 - 19	-		
5 - 9	-		
< 5	-		
# Trees with hollows	<20cm	0	Total #
	>20cm**	0	
Length of logs			Total (m)
			0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	5	2	0	10	1	3.6
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground streams, mt, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Page 1 of (2)

Date	21/09/2023	Survey Name	Lakeside Estate, Lake Wyangan				
Recorders	David Orchard		Plot ID #	LWX02	Zone ID	16_Low	
Photo #	-		Plot dimensions			20 x 50 m	
Datum	GDA94	Zone	55	Plot bearing along midline			75
Easting	410198	Northing	6211625	Record magnetic bearing along midline from 0 m point			
Floristics plot is centred on the midline, at 0 m point, 20 m either side							
IBRA region	Cobar Peneplain						
Subregion	Lachlan Plains						
Likely Vegetation Class	Inland Floodplain Woodlands						
Plant Community Type	16	Condition state	Low				

Floristics plot is centred on the midline, at 0 m point, 20 m either side

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	4
	Shrubs	1
	Grasses etc	0
	Forbs	2
	Ferns	0
Cover (sum of cover of natives species)	Other	1
	Trees	59
	Shrubs	5
	Grasses etc	0
	Forbs	0.3
	Ferns	0
	Other	0.1
High threat weed cover	2	

BAM Function plot (1000m²)		
Dimensions (circle applicable size)		
20 x 50 m	40 x 100 m	
Tree stem DBH (cm)	Notes on function attributes:	
>80	0	Stem size class records # large trees (if benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	+	For multitemmed trees, record only the largest stem
20 - 29	+	Presence of <5cm stems records regeneration
10 - 19	+	Record # trees with hollows, not number of hollows
5 - 9	+	Count as one stem where tree is multitemmed
< 5	+	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm	0
	>20cm**	0
		Total #
		0
Length of logs	Total (m)	
		5.4

*These values summarise the floristic data for input into BAM calculator

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	10	80	30	80	20	44
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stream, mt, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe
Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Page 1 of (2)

Date	21/09/2023	Survey Name	Lakeside Estate, Lake Wyangan		
Recorders	David Orchard	Plot ID #	LWX03	Zone ID	0 NN
Photo #	-	Plot dimensions	20 x 50 m		
Datum	GDA94	Zone	55	Plot bearing along midline	121
Easting	410632	Northing	6211479	Record magnetic bearing along midline from 0 m point	
Floristics plot is centred on the midline, at 0 m point, 20 m either side					
IBRA region	Cobar Peneplain				
Subregion	Lachlan Plains				
Likely Vegetation Class	Non-native vegetation				
Plant Community Type	0	Condition state	NN		

Floristics plot is centred on the midline, at 0 m point, 20 m either side

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	3
	Grasses etc	1
	Forbs	0
	Ferns	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	1.3
	Grasses etc	0.2
	Forbs	0
	Ferns	0
Other	0	
High threat weed cover	20	

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	40 x 100 m	
Tree stem DBH (cm)	Notes on function attributes:	
>80	0	Stem size class records # large trees (if benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	-	For multitemmed trees, record only the largest stem
20 - 29	-	Presence of <5cm stems records regeneration
10 - 19	-	Record # trees with hollows, not number of hollows
5 - 9	-	Count as one stem where tree is multitemmed
< 5	-	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm 0	Total #
	>20cm** 0	0
Length of logs		Total (m)
		0

*These values summarise the floristic data for input into BAM calculator

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	0	0	0	5	1	1.2
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stream, mt, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe

Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

BAM Plot - Field Survey Sheet

Page 1 of (2)

Date	21/09/2023	Survey Name	Lakeside Estate, Lake Wyangan			
Recorders	David Orchard		Plot ID #	LWX04	Zone ID	0 NN
Photo #	-		Plot dimensions		20 x 50 m	
Datum	GDA94	Zone	55	Plot bearing along midline		275
Easting	410607	Northing	6211494	Record magnetic bearing along midline from 0 m point		

Record easting, northing at plot marker 00 m point. Photos taken vertically and horizontally at 0m point and 50 m point, looking into plot.

IBRA region	Cobar Peneplain		
Subregion	Lachlan Plains		
Likely Vegetation Class	Non-native vegetation		
Plant Community Type	0	Condition state	NN

Floristics plot is centred on the midline, at 0 m point, 20 m either side

BAM Composition / Structure plot (400m ²)		
Dimensions (circle applicable size)		
20 x 20 m	40 x 40 m	Sum values*
Native Richness (count of native species)	Trees	0
	Shrubs	3
	Grasses etc	1
	Forbs	1
	Ferns	0
Cover (sum of cover of natives species)	Trees	0
	Shrubs	2.3
	Grasses etc	0.1
	Forbs	0.1
	Ferns	0
Other	0	
High threat weed cover	20	

*These values summarise the floristic data for input into BAM calculator

Function plot is an extension of floristics plot out to 50 m along midline (or equiv. area)

BAM Function plot (1000m ²)		
Dimensions (circle applicable size)		
20 x 50 m	40 x 100 m	
Tree stem DBH (cm)		Notes on function attributes:
>80	0	Stem size class records # large trees (if benchmark)
50 - 79	0	Record stems for living trees only, and for all species
30 - 49	-	For multitemmed trees, record only the largest stem
20 - 29	-	Presence of <5cm stems records regeneration
10 - 19	-	Record # trees with hollows, not number of hollows
5 - 9	-	Count as one stem where tree is multitemmed
< 5	-	Hollow bearing stem may be a dead stem (incl. snag)
# Trees with hollows	<20cm	0
	>20cm**	0
Total #		0
Length of logs		Total (m)
		0

Measure length of logs >10cm, fully or partly in contact with the ground, and within the plot.

**Hollows of >20cm are recorded for habitat for some threatened species

BAM Litter/ Groundcover (1 x 1 m plots)							
Litter cover is used for BAM, other attributes are useful for recording site condition in general							
		1	2	3	4	5	Average
Sub-plot score (% cover)	Litter	1	0	1	1	0	0.6
	Bare ground						
	Cryptogam						
	Rock						

Litter / groundcover plots are located at 5, 15, 25, 35, 45 m (alternating sides) along the midline of Function plot

Other plot information (not essential for BAM)

Disturbance	Severity	Timing	Landform
Clearing (incl. logging)			Microrelief
Cultivation			Slope
Grazing (native / stock)			Aspect
Soil erosion			Soil surface texture
Firewood removal			Soil colour
Fire (ground stream, mt, canopy burnt?)			Site drainage
Storm damage			Distance to nearest water
Weediness			Distance to nearest rock outcrop /cave

Severity code: 0=no evidence, 1=slight, 2=moderate, 3= severe
 Timing code: R = recent (<3y), NR = not recent, O = old/historic

Notes

Appendix D: EPBC Act Habitat Assessment and Matters of National Environmental Significance

The EPBC Act protects nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance. The EPBC Act policy *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DoE, 2013) forms the basis of determining if impact to protected matters is significant.

The EPBC Act protected matters search has identified four wetlands of international importance, four TECs, 29 threatened species, 9 migratory species and 16 marine species that could possibly occur in the search area (**Appendix A**).

The following tables give an overview of the assessments of these threatened entities and shows that the Proposed activity:

1. Is not likely to have a significant impact on a matter of national environmental significance. The matters of national environmental significance are:
 - i. World heritage properties.
 - ii. National heritage places.
 - iii. Wetlands of international importance.
 - iv. Threatened species and ecological communities.
 - v. Migratory species.
 - vi. Commonwealth marine areas.
 - vii. The Great Barrier Reef Marine Park. and;
 - viii. Nuclear actions (including uranium mines).
 - ix. A water resource, in relation to coal seam gas development and large coal mining development.
2. Is not likely to have a significant impact on the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).

Notes:

Important Population as determined by the *Environment Protection and Biodiversity Conservation Act 1999*, is one that for a vulnerable species:

- a) is likely to be key source populations either for breeding or dispersal
- b) is likely to be necessary for maintaining genetic diversity
- c) is at or near the limit of the species range.

A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity (DoE, 2013).

Wetlands of International Importance

Name	Proximity	Assessment of significance required (Yes / No)
Banrock station wetland complex	500 – 600 km upstream	No, the proposal does not occur close to the wetland.
Hattah-Kulkyne lakes	300 – 400 km upstream	No, the proposal does not occur close to the wetland.
Riverland	400 – 500 km upstream	No, the proposal does not occur close to the wetland.
The Coorong, and Lakes Alexandrina and Albert Wetland	600 – 700 km upstream	No, the proposal does not occur close to the wetland.

EPBC Act-Listed Threatened Ecological Communities

Name	Status	Assessment of significance required (Yes / No)
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	No, this community does not occur within the subject land.
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	No, this community does not occur within the subject land.
Weeping Myall Woodlands	Endangered	No, this community does not occur within the subject land.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	No, this community does not occur within the subject land.

Habitat Assessment Table for EPBC Act-listed threatened or migratory species predicted to occur

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
THREATENED BIRDS					
<i>Aphelocephala leucopsis</i>	Southern Whiteface	V	56	<p>The southern whiteface typically inhabits arid open woodlands with a shrubby or grassy understory, as well as grass plains throughout much of southern Australia. It prefers Acacia woodlands, particularly those dominated by mulga and drought-resistant chenopod shrub species, including saltbush and bluebush.</p> <p>Moderate – Subject land is within the species known geographic distribution and 56 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	27	<p>Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch.</p> <p>High – Subject land is within the species known geographic distribution, an associated vegetation community (PCT 181) is present, and there are 27 records within 10 km.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	V,C,J,K,M	62	<p>The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands.</p> <p>Moderate – Subject land is within the species known geographic distribution and 62 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE,C,J,K,M	16	<p>In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one-year old birds remain in Australia rather than migrating north. In NSW, they are widespread east of the Great Divide, especially in coastal regions. They are occasionally recorded in the Tablelands and are widespread in the Riverina and south-west NSW, with scattered records elsewhere.</p> <p>Moderate – Subject land is within the species known geographic distribution and 16 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Calyptorhynchus lathamii lathamii</i>	South-eastern Glossy Black-Cockatoo	V	11	<p>The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (<i>Allocasuarina littoralis</i>) and Forest Sheoak (<i>A. torulosa</i>) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, <i>Allocasuarina diminuta</i>, and <i>A. gymnathera</i>. Belah is also utilised and may be a critical food source for some populations. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.</p> <p>Moderate – Subject land is within the species known geographic distribution and 11 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern)	V	20	<p>The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of the range of <i>Climacteris picumnus victoriae</i> runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell and along this line the subspecies intergrades with the arid zone subspecies of Brown Treecreeper <i>Climacteris picumnus picumnus</i> which then occupies the remaining parts of the state. The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys. The population density of this subspecies has been greatly reduced over much of its range, with major declines recorded in central NSW and the northern and southern tablelands. Declines have occurred in remnant vegetation fragments smaller than 300 hectares, that have been isolated or fragmented for more than 50 years.</p> <p>Moderate – Subject land is within the species known geographic distribution and 20 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Falco hypoleucos</i>	Grey Falcon	V	1	<p>The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey. Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken. Like other falcons it utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; peak laying season is in late winter and early spring; two or three eggs are laid.</p> <p>High – Subject land is within the species known geographic distribution, associated vegetation communities (PCT 16, 26, and 181) are present, and there is a record within 10 km.</p>	Yes
<i>Gallinago hardwickii</i>	Latham's Snipe	V,J,K,M	9	<p>Latham's Snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia (i.e. it travels through northern Australia to reach non-breeding areas located further south). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia (including the Adelaide plains and Mount Lofty Ranges, and the Eyre Peninsula). The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South. The species is widespread in Tasmania and is found in all regions of Victoria except for the north-west. Most birds spend the non-breeding period at sites located south of the Richmond River in New South Wales. In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.</p> <p>Moderate – Subject land is within the species known geographic distribution and nine records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Grantiella picta</i>	Painted Honeyeater	V	37	<p>The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests.</p> <p>Absent – Subject land is within the species known geographic distribution, associated vegetation communities (PCT 16 and 26) are present, and there are 37 records within 10 km. However, this species was eliminated via habitat constraint.</p>	No
<i>Lathamus discolor</i>	Swift Parrot	CE,M	1	<p>Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i>, Spotted Gum <i>Corymbia maculata</i>, Red Bloodwood <i>C. gummifera</i>, Forest Red Gum <i>E. tereticornis</i>, Mugga Ironbark <i>E. sideroxylon</i>, and White Box <i>E. albens</i>.</p> <p>High – Subject land is within the species predicted geographic distribution, associated vegetation communities (PCT 16 and 26) are present, and there is a record within 10 km.</p>	Yes
<i>Leipoa ocellata</i>	Malleefowl	V	0	<p>The stronghold for this species in NSW is the mallee in the south west centred on Mallee Cliffs NP and extending east to near Balranald and scattered records as far north as Mungo NP. The population in central NSW has been significantly reduced through land clearance and fox predation and now occurs chiefly in Yathong, Nombinnie and Round Hill NRs and surrounding areas, though birds continue to survive in Loughnan NR. Predominantly inhabit mallee communities, preferring the tall, dense and floristically rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species.</p> <p>Low – Subject land is within the species known geographic distribution. However, there are no associated vegetation communities present or records within 10 km.</p>	No

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Lophochroa leadbeateri</i>	Pink Cockatoo	E	125	<p>Found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Normally found in pairs or small groups, though flocks of hundreds may be found where food is abundant. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1 km apart, with no more than one pair every 30 square kilometres.</p> <p>Present (foraging) – Subject land is within the species known geographic distribution, associated vegetation communities (PCT 16 and 26) are present, and there are 125 records within 10 km. This species was recorded during the field survey.</p>	Yes
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	E	32	<p>The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies <i>cucullata</i>) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i>. Two other subspecies occur outside NSW. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.</p> <p>High – Subject land is within the species known geographic distribution, associated vegetation communities (PCT 16 and 26) are present, and there are 32 records within 10 km.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Neophema chrysostoma</i>	Blue-winged Parrot	V,M	1	<p>The main populations of Blue-winged Parrots are in Tasmania and Victoria, particularly in southern Victoria and the midlands and eastern areas of Tasmania. Sparser populations are found in western New South Wales and eastern South Australia, extending to south-west Queensland and occasionally into the Northern Territory. The species is a partial migrant, with variable numbers of birds migrating across the Bass Strait in winter.</p> <p>Moderate – Subject land is within the species known geographic distribution and a record occur within 10 km. However, no associated vegetation communities are present.</p>	Yes
<i>Pedionomus torquatus</i>	Plains-wanderer	CE	0	<p>Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species. The Plains-wanderer has declined greatly since European settlement. Areas where the species was formerly common and is now so reduced in numbers that it is effectively extinct include eastern NSW, south-western Victoria, and south-eastern South Australia. Its current stronghold is the western Riverina of southern NSW. Areas of secondary importance include north-central Victoria and central-western Queensland. The bird was formerly fairly common until about 1920 on the Slopes and Tablelands, and there are two earlier records of birds near Sydney. The main reason for the decline in the numbers and distribution of Plains-wanderers in all eastern States has been the conversion of native grasslands to dense introduced pasture or croplands. If native grasslands are not overgrazed or cultivated then Plains-wanderers are largely sedentary, though there is some recent evidence to suggest that birds may not remain sedentary during prolonged drought conditions.</p> <p>Low – Subject land is within the species predicted geographic distribution. However, there are no associated vegetation communities present or records within 10 km.</p>	No

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Polytelis swainsonii</i>	Superb Parrot	V	6	<p>The Superb Parrot is found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. This species inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.</p> <p>Absent – Subject land is within the species known geographic distribution, an associated vegetation community (PCT 26) is present, and there are six records within 10 km. However, this species was eliminated via habitat constraints and the species was not detected during targeted surveys within the survey window for this species.</p>	No
<i>Rostratula australis</i>	Australian Painted Snipe	E,M	2	<p>The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.</p> <p>High – Subject land is within the species known geographic distribution, an associated vegetation community (PCT 181) is present, and there are six records within 10 km.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Stagonopleura guttata</i>	Diamond Firetail	V	20	<p>The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities.</p> <p>High – Subject land is within the species known geographic distribution, associated vegetation communities (PCT 16 and 26) are present, and there are 20 records within 10 km.</p>	Yes
<i>Tringa nebularia</i>	Common Greenshank	E,C,J,K,M	17	<p>The Common Greenshank does not breed in Australia, however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia. The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. It was once recorded with Black-winged Stilts (<i>Himantopus himantopus</i>) in pasture, but are generally not found in dry grassland.</p> <p>Moderate – Subject land is within the species known geographic distribution and 17 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes
FISH					

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Galaxias rostratus</i>	Flathead Galaxias	CE	0	<p>Flathead Galaxias, also known as Murray jollytail are a small native fish that are known from the southern part of the Murray Darling Basin. They have been recorded in the Macquarie, Lachlan, Murrumbidgee and Murray Rivers in NSW. Despite extensive scientific sampling over the past 15 years there have been very few recorded sightings of Flathead Galaxias. They have not been recorded and are considered locally extinct in the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. The species is now only known from the upper Murray River near Tintalra and wetland areas near Howlong. Flathead Galaxias are found in still or slow-moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation. Flathead Galaxias spawn in spring and lay slightly adhesive demersal eggs.</p> <p>Low – This species is considered to be locally extinct in the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. Furthermore, no records occur within the 10 km search area.</p>	No

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Macquaria australasica</i>	Macquarie Perch	E	0	<p>The Macquarie Perch is a moderate-sized fish with an elongate-oval body which is laterally compressed. In the Murray-Darling Basin the species varies from almost black or dark silvery grey to bluish grey or green-brown above, paler to off-white below, often with a yellowish tinge.</p> <p>Macquarie Perch have declined considerably from their historical distribution within NSW and they are now considered isolated to the upper reaches of the Lachlan and Murrumbidgee Rivers in southern NSW (Ingram et al. 1990). It is also found in low numbers in the Mongarlowe River (Lintermans 2008). Other populations exist in Cataract Dam in the Nepean River catchment, as well as a 2008 record from Georges River near Campbelltown, the first record from the river since 1894 (NSW DPI 2008a). It persists in the Burrinjuck, Cotter (Murrumbidgee) and Wyangala impoundments (McDowall 1996). A breeding population in the Queanbeyan River upstream of the Googong Reservoir exists solely due to a translocation of individuals from the reservoir past a natural barrier (Lintermans 2006). The Googong reservoir population is believed to be effectively extinct. Macquarie perch may occasionally become displaced downstream from the Queanbeyan River into Googong, but they do not form a population in the reservoir (Lintermans pers comm 2009). Hawkesbury and Shoalhaven River populations, seem abundant. Records have also been made in the Dharawal State Conservation Area, the Metropolitan Special Area and in adjacent areas around Appin (Bio-Analysis Pty Ltd 2009).</p> <p>The Macquarie Perch is a riverine, schooling species. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks (Cadwallader & Eden 1979). Spawning occurs just above riffles (shallow running water). Populations may survive in impoundments if able to access suitable spawning sites (Wager & Jackson 1993).</p> <p>Low – No suitable riverine habitat occurs within the subject land. Furthermore, no records occur within the 10 km search area</p>	No
THREATENED FROGS					

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Crinia sloanei</i>	Sloane's Froglet	E	0	<p>Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. It has not been recorded recently in the northern part of its range and has only been recorded infrequently in the southern part of its range in NSW. It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats.</p> <p>Low – Subject land is within the species known geographic distribution. However, there are no associated vegetation communities present or records within 10 km.</p>	No
MAMMALS					
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	0	<p>Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Inhabits a variety of vegetation types, including mallee, buloke <i>Allocasuarina luehmannii</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.</p> <p>Low – Subject land is within the species known geographic distribution. However, there are no associated vegetation communities present or records within 10 km.</p>	No
<i>Phascolarctos cinereus</i>	Koala	E	0	<p>The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, Koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. Inhabit eucalypt woodlands and forests.</p> <p>Low – Subject land is not within the species known geographic distribution and no records occur within the 10 km search area. However, associated vegetation communities (PCT 16, 26, and 181) are present.</p>	No
PLANTS					

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Austrostipa metatoris</i>		V	0	<p>Most records occur in the Murray Valley with sites including Cunninyeuk Station, Stony Crossing, Kyalite State Forest (now part of Murrumbidgee Valley Regional Park) and Lake Benanee. Scattered records also occur in central NSW including Lake Cargelligo, east of Goolgowi, Condobolin and south west of Nymagee. Otherwise only known from near Bordertown in south east South Australia, where it may be locally extinct. Grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.</p> <p>Low – Subject land is within the species predicted geographic distribution. However, there are no associated vegetation communities present, and no records within 10 km.</p>	No
<i>Lepidium monoplocoides</i>	Winged Peppergrass	E	0	<p>Widespread in the semi-arid western plains regions of NSW. Collected from widely scattered localities, with large numbers of historical records but few recent collections. There is a single collection from Broken Hill and only two collections since 1915, the most recent being 1950. Also previously recorded from Bourke, Cobar, Urana, Lake Cargelligo, Balranald, Wanganella and Deniliquin. Recorded more recently from the Hay Plain, south-eastern Riverina, and from near Pooncarie.</p> <p>Absent – Subject land is within the species known geographic distribution and associated vegetation communities (PCT 16 and 26) are present. However, there are no records within 10 km. This species was eliminated via targeted survey.</p>	No
<i>Swainsona murrayana</i>	Slender Darling Pea	V	0	<p>Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams.</p> <p>Absent – Subject land is within the species predicted geographic distribution and associated vegetation communities (PCT 16 and 26) are present. However, there are no records within 10 km. This species was eliminated via targeted survey.</p>	No
REPTILES					

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	V	0	<p>The Pink-tailed Legless Lizard is only known from the Central and Southern Tablelands, and the South Western Slopes. There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the Australian Capital Territory. Inhabits sloping, open woodland areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (<i>Themeda australis</i>).</p> <p>Low – Subject land is not within the species known geographic distribution, there are no associated vegetation communities present, there is no suitable bush rock present and no records within 10 km.</p>	No
<i>Hemiaspis damelii</i>	Grey Snake	E	0	<p>Distributed throughout the eastern interior, from central inland New South Wales, north to coastal areas near Rockhampton in Queensland. <i>Hemiaspis damelii</i> favours woodlands (typically brigalow <i>Acacia harpophylla</i> and belah <i>Casuarina cristata</i>), usually on heavier, cracking clay soils, particularly in association with water bodies or in areas with small gullies and ditches (gilgais).</p> <p>Low – Subject land is not within the species known geographic distribution, there are no associated vegetation communities present, and no records within 10 km.</p>	No
MIGRATORY SPECIES					
Migratory Marine Birds					
<i>Apus pacificus</i>	Fork-tailed Swift	C,J,K,M	3	<p>In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide; however, a few populations have been found west of the Great Divide. These are widespread but scattered further west of the line joining Bourke and Dareton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs (Higgins 1999). The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher.</p> <p>Moderate – Subject land is within the species known geographic distribution and three records occur within 10 km. However, there are no associated vegetation communities present.</p>	Yes
Migratory Terrestrial Species					

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Motacilla flava</i>	Yellow Wagtail	C,J,K,M	0	<p>Widespread wagtail, favouring wet meadows, marshland, grassy and muddy lakeshores. Occurs in fields and often near livestock during migration. Like other wagtails, walks on ground and pumps its long, white-sided tail up and down. Plumage highly variable, but breeding male wholly bright yellow below, with greenish back. Male head pattern varies regionally: in U.K. has greenish head with yellow eyebrow; in northern Europe head slaty gray overall; in central and southwest Europe head blue-gray with white eyebrow. Individuals of several subspecies may winter together. Female and nonbreeding plumages drabber and paler, with ghosting of male patterns. Uncertainty exists regarding this species presence outside of northern Europe.</p> <p>Low – Subject land is within the species predicted geographic distribution. However, there are no associated vegetation communities present, and no records within 10 km.</p>	No
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	M	0	<p>The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea. The Satin Flycatcher is not a commonly seen species, especially in the far south of its range, where it is a summer breeding migrant. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher takes insects on the wing, foraging actively from perches in the mid to upper canopy. After the breeding season, it may forage in loose groups, usually of adults and their newly-fledged young, in drier, more open forests. The Satin Flycatcher nests in loose colonies of two to five pairs nesting at intervals of about 20 m - 50 m apart. It builds a broad-based, cup-shaped nest of shredded bark and grass, coated with spider webs and decorated with lichen. The nest is placed on a bare, horizontal branch, with overhanging foliage, about 3 m - 25 m above the ground. Both sexes build the nest, incubate the eggs and feed the young. Nests may be parasitised by the Brush Cuckoo and, sometimes, the Pallid Cuckoo, Horsfield's Bronze-Cuckoo or the Golden Bronze-Cuckoo.</p> <p>Low – Subject land is within the species predicted geographic distribution. However, there are no associated vegetation communities present, and no records within 10 km.</p>	No
Migratory Wetlands Species					

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Actitis hypoleucos</i>	Common Sandpiper	C,J,K,M	1	<p>Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags.</p> <p>Moderate – Subject land is within the species predicted geographic distribution and a record occurs within 10 km. However, there are no associated vegetation communities present.</p>	Yes
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	V,C,J,K,M	62	<p>The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.</p> <p>Moderate – Subject land is within the species known geographic distribution and 62 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE,C,J,K,M	16	<p>In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one-year old birds remain in Australia rather than migrating north. In NSW, they are widespread east of the Great Divide, especially in coastal regions. They are occasionally recorded in the Tablelands and are widespread in the Riverina and south-west NSW, with scattered records elsewhere. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters.</p> <p>Moderate – Subject land is within the species known geographic distribution and 16 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes
<i>Calidris melanotos</i>	Pectoral Sandpiper	J,K,M	2	<p>The Pectoral Sandpiper breeds in northern Russia and North America. Within Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. In New South Wales (NSW), the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.</p> <p>Moderate – Subject land is within the species predicted geographic distribution and two records occur within 10 km. However, there are no associated vegetation communities present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Gallinago hardwickii</i>	Latham's Snipe	V,J,K,M	9	<p>Latham's Snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia (i.e. it travels through northern Australia to reach non-breeding areas located further south). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia (including the Adelaide plains and Mount Lofty Ranges, and the Eyre Peninsula). The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South. The species is widespread in Tasmania and is found in all regions of Victoria except for the north-west. Most birds spend the non-breeding period at sites located south of the Richmond River in New South Wales. In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.</p> <p>Moderate – Subject land is within the species known geographic distribution and nine records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes
<i>Tringa nebularia</i>	Common Greenshank	E,C,J,K,M	17	<p>The Common Greenshank does not breed in Australia, however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia. The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. It was once recorded with Black-winged Stilts (<i>Himantopus himantopus</i>) in pasture, but are generally not found in dry grassland.</p> <p>Moderate – Subject land is within the species known geographic distribution and 17 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
MARINE SPECIES					
<i>Actitis hypoleucos</i>	Common Sandpiper	C,J,K,M	1	<p>Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags.</p> <p>Moderate – See above.</p>	Yes
<i>Apus pacificus</i>	Fork-tailed Swift	C,J,K,M	3	<p>In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide; however, a few populations have been found west of the Great Divide. These are widespread but scattered further west of the line joining Bourke and Dareton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs (Higgins 1999). The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher.</p> <p>Moderate – See above.</p>	Yes
<i>Ardea ibis</i>	Cattle Egret	M	0	<p>In Australia it is most widespread and common in north-eastern Western Australia across the Top End, Northern Territory, and in south-eastern Australia from Bundaberg, Queensland to Port Augusta, South Australia, including Tasmania. The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at garbage dumps and is often seen with cattle and other stock.</p> <p>Low – Subject land is within the species predicted geographic distribution. However, there are no associated vegetation communities present or records within 10 km.</p>	No

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	V,C,J,K,M	62	<p>The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands.</p> <p>Moderate – See above.</p>	Yes
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE,C,J,K,M	16	<p>In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one-year old birds remain in Australia rather than migrating north. In NSW, they are widespread east of the Great Divide, especially in coastal regions. They are occasionally recorded in the Tablelands and are widespread in the Riverina and south-west NSW, with scattered records elsewhere. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters.</p> <p>Moderate – See above.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Calidris melanotos</i>	Pectoral Sandpiper	J,K,M	2	<p>The Pectoral Sandpiper breeds in northern Russia and North America. Within Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. In New South Wales (NSW), the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.</p> <p>Moderate – See above.</p>	Yes
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	M	0	<p>The Black-eared Cuckoo is widespread on mainland Australia, but avoids the wet, heavily forested areas on the east coast and the south-west corner of Western Australia. The species is found in drier country where species such as mulga and mallee form open woodlands and shrublands. It is often found in vegetation along creek beds.</p> <p>Low – Subject land is within the species known geographic distribution. However, there are no associated vegetation communities present or records within 10 km.</p>	No

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Gallinago hardwickii</i>	Latham's Snipe	V,J,K,M	9	<p>Latham's Snipe is a non-breeding visitor to south-eastern Australia and is a passage migrant through northern Australia (i.e. it travels through northern Australia to reach non-breeding areas located further south). The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia (including the Adelaide plains and Mount Lofty Ranges, and the Eyre Peninsula). The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South. The species is widespread in Tasmania and is found in all regions of Victoria except for the north-west. Most birds spend the non-breeding period at sites located south of the Richmond River in New South Wales. In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies. However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.</p> <p>Moderate – Subject land is within the species known geographic distribution and nine records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	M	15	<p>The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion. Hunts its prey from a perch or whilst in flight (by circling slowly, or by sailing along 10–20 m above the shore). Prey is usually carried to a feeding platform or (if small) consumed in flight, but some items are eaten on the ground. May be solitary, or live in pairs or small family groups consisting of a pair of adults and dependent young. Typically lays two eggs between June and September with young birds remaining in the nest for 65-70 days.</p> <p>Absent – Subject land is within the species known geographic distribution, associated vegetation communities (PCT 16, 26, and 181) are present, and 15 records occur within 10 km. However, this species was eliminated via targeted survey.</p>	No
<i>Lathamus discolor</i>	Swift Parrot	CE,M	1	<p>Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i>, Spotted Gum <i>Corymbia maculata</i>, Red Bloodwood <i>C. gummifera</i>, Forest Red Gum <i>E. tereticornis</i>, Mugga Ironbark <i>E. sideroxylon</i>, and White Box <i>E. albens</i>.</p> <p>High – See above.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Merops ornatus</i>	Rainbow Bee-eater	M	0	<p>The Rainbow Bee-eater is distributed across much of mainland Australia, and occurs on several near-shore islands. It is not found in Tasmania, and is thinly distributed in the most arid regions of central and Western Australia (Barrett et al. 2003; Blakers et al. 1984; Higgins 1999). The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins 1999). It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. The Rainbow Bee-eater occurs in open woodlands and shrublands, including mallee, and in open forests that are usually dominated by eucalypts. It also occurs in grasslands (Gibson 1986; Jones 1986; Leach 1988; Longmore 1978; McEvey & Middleton 1968; Saunders & Ingram 1995; Woinarski et al. 1988, 1989) and, especially in arid or semi-arid areas, in riparian, floodplain or wetland vegetation assemblages.</p> <p>Low – Subject land is within the species known geographic distribution. However, there are no associated vegetation communities present or records within 10 km.</p>	No
<i>Motacilla flava</i>	Yellow Wagtail	C,J,K,M	0	<p>Widespread wagtail, favoring wet meadows, marshland, grassy and muddy lakeshores. Occurs in fields and often near livestock during migration. Like other wagtails, walks on ground and pumps its long, white-sided tail up and down. Plumage highly variable, but breeding male wholly bright yellow below, with greenish back. Male head pattern varies regionally: in U.K. has greenish head with yellow eyebrow; in northern Europe head slaty gray overall; in central and southwest Europe head blue-gray with white eyebrow. Individuals of several subspecies may winter together. Female and nonbreeding plumages drabber and paler, with ghosting of male patterns. Uncertainty exists regarding this species presence outside of northern Europe.</p> <p>Low – Subject land is within the species predicted geographic distribution. However, there are no associated vegetation communities present, and no records within 10 km.</p>	No

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	M	0	<p>The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. It is also found in New Guinea. The Satin Flycatcher is not a commonly seen species, especially in the far south of its range, where it is a summer breeding migrant. The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. The Satin Flycatcher takes insects on the wing, foraging actively from perches in the mid to upper canopy. After the breeding season, it may forage in loose groups, usually of adults and their newly-fledged young, in drier, more open forests. The Satin Flycatcher nests in loose colonies of two to five pairs nesting at intervals of about 20 m - 50 m apart. It builds a broad-based, cup-shaped nest of shredded bark and grass, coated with spider webs and decorated with lichen. The nest is placed on a bare, horizontal branch, with overhanging foliage, about 3 m - 25 m above the ground. Both sexes build the nest, incubate the eggs and feed the young. Nests may be parasitised by the Brush Cuckoo and, sometimes, the Pallid Cuckoo, Horsfield's Bronze-Cuckoo or the Golden Bronze-Cuckoo.</p> <p>Low – Subject land is within the species predicted geographic distribution. However, there are no associated vegetation communities present, and no records within 10 km.</p>	No
<i>Neophema chrysostoma</i>	Blue-winged Parrot	V,M	1	<p>The main populations of Blue-winged Parrots are in Tasmania and Victoria, particularly in southern Victoria and the midlands and eastern areas of Tasmania. Sparser populations are found in western New South Wales and eastern South Australia, extending to south-west Queensland and occasionally into the Northern Territory. The species is a partial migrant, with variable numbers of birds migrating across the Bass Strait in winter.</p> <p>Moderate – Subject land is within the species known geographic distribution and a record occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

Scientific Name	Common Name	+Comm. Status	BioNet Records < 10 km?	Likelihood of Occurrence	Test of significance required (Yes/No)
<i>Rostratula australis</i>	Australian Painted Snipe	E,M	2	<p>The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.</p> <p>High – Subject land is within the species known geographic distribution, an associated vegetation community (PCT 181) is present, and there are six records within 10 km.</p>	Yes
<i>Tringa nebularia</i>	Common Greenshank	E,C,J,K,M	17	<p>The Common Greenshank does not breed in Australia, however, the species occurs in all types of wetlands and has the widest distribution of any shorebird in Australia. The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. It was once recorded with Black-winged Stilts (<i>Himantopus himantopus</i>) in pasture, but are generally not found in dry grassland.</p> <p>Moderate – Subject land is within the species known geographic distribution and 17 records occur within 10 km. However, no associated vegetation communities are present.</p>	Yes

+ **Comm. Status:** V=Vulnerable, E=Endangered, CE=Critically Endangered, C=CAMBA, J=JAMBA, K=ROKAMBA, M=Marine.

EPBC Act-listed Critically Endangered and Endangered Species

Australasian Bittern (<i>Botaurus poiciloptilus</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	The proposal will impact up to 2.89 ha of associated PCT for this species. The subject land is not within a priority management area for the species. In total, 27 records occur within the 10 km search area. Of these, 12 are located within the nearby Lake Wyangan, Campbell's Wetland, and Nericon Wetlands. However, no records occur from Little Swamp within the subject land and the species was not detected during the field surveys, despite call playback surveys and pedestrian transects through all suitable habitat being conducted diurnally and nocturnally. The likelihood that the species relies on Little Swamp is therefore low. More extensive areas of suitable habitat will remain within the surrounding wetlands and the subject land itself may, in the long-term, become suitable for habitation, once the proposed constructed wetlands have matured. In light of this, the proposal is unlikely to lead to the long-term decrease of any population of this species.
Reduce the area of occupancy of the species	As indicated above it is unlikely that an established population exists at the site. In addition, the subject land occurs in close proximity to known habitat for the species at Lake Wyangan, Campbell's Wetland, and Nericon Wetlands. When area of occupancy (AOO) for this species is assessed using a standard 2 km grid, the subject land is likely to fall within the same grid square as known habitat for the species. Consequently, provided habitat remains in these nearby sites, the current area of occupancy will not be reduced.
Fragment an existing population into two or more populations	Considering the presence of remnant wetland habitat within the study area, this proposal is not expected to result in any additional fragmentation for this species.
Adversely affect habitat critical to the survival of a species	Critical habitat for this species has been defined to include all natural habitat, including suitable constructed wetlands, in which the species is known or likely to occur. The species is not known to occur in Little Swamp and, given the site is likely highly saline and that salinisation is a threat to this species, it is unclear whether the local habitat is suitable. This may mean that the site should not be considered critical habitat. The species does make use of constructed wetlands and may be able to recolonise the site following excavation of the swamp. Considering that a greater area of suitable habitat will continue to remain within the surrounding wetlands, including areas known to support the species, and that no individuals were recorded within Little Swamp during the surveys or have been detected historically, the proposal is unlikely to adversely affect habitat critical to the survival of a species.
Disrupt the breeding cycle of a population	No evidence of current or former nesting by the species was detected within the site. Given that the species typically builds its nests on a platform of flattened reeds and that pedestrian transects conducted through the full extent of the reedbeds did not detect any such nests, it is highly unlikely that the species breeds within the site. In light of this, and considering that more extensive areas of suitable breeding habitat will remain in the local landscape, the proposal is unlikely to disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 2.89 ha of associated PCT for the species. The proposal will not isolate any habitat for this species. This removal/modification of available habitat is unlikely to cause the species to decline at a regional scale.

Result in invasive species that are harmful to a species becoming established in the species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species	Drainage of wetlands; reduction in water quality; predation by introduced species; inappropriate fire and grazing regimes; and exotic weeds are the main threats to this species. Although the proposal will result in impacts of Little Swamp, it is expected that some wetland habitat will be restored to the site in the longer-term. Considering that a greater area of suitable habitat will remain in the surrounding wetlands, including areas known to support the species, the proposal is unlikely to significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Curlew Sandpiper (<i>Calidris ferruginea</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	The proposal will not impact any PCT known to be associated with this species and the subject land is not within a priority management area for the species. In total, 16 records occur within the 10 km search area. Of these, 13 are located within the nearby Nericon Wetlands. No records occur from Little Swamp within the subject land and the species was not detected during the field surveys, despite pedestrian transects being conducted through all wetland habitat and extensive bird surveys being carried out in the area of the swamp. It is unlikely that any population of the species occurs locally. In light of the doubtful suitability of the local habitat and the failure to detect the species during surveys, and considering that a greater area of suitable habitat will continue to remain within the surrounding wetlands, the proposal is unlikely to lead to the long-term decrease of any population of this species.
Reduce the area of occupancy of the species	As indicated above it is unlikely that an established population relies on the site. In addition, sites known to support the species occur within 2 km of the subject land; therefore, when assessed using standard 2 km grid squares, the subject land is likely to fall within the same grid square as known habitat for the species. Consequently, provided habitat remains in these nearby sites, the current area of occupancy will not be reduced.
Fragment an existing population into two or more populations	Considering the presence of remnant wetland habitat within the study area, this proposal is not expected to result in any additional fragmentation for this species.
Adversely affect habitat critical to the survival of a species	Critical habitat for this species is primarily considered to include coastal or estuarine environments such as tidal flats, beaches, mudflats, and similar. It is noted that the species will use inland wetlands in certain conditions but the importance of these habitats is unclear. As the species is not known to occur within Little Swamp, and considering that a greater area of suitable habitat will continue to remain within the surrounding wetlands, the proposal is unlikely to adversely affect habitat critical to the survival of a species.
Disrupt the breeding cycle of a population	This species is a non-breeding visitor to Australia. As such, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Although no associated PCTs occur within the subject land, impacts to Little Swamp may alter or remove potential habitat for the species. In the long-term, the maturation of constructed wetlands may allow the species to colonise or recolonise the site. No isolation of habitat is anticipated and, given that the species is not known to make use of the site, the proposal is not expected to result in a decline in the species.
Result in invasive species that are harmful to a species becoming established in the species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species	Habitat alteration to feeding and roosting sites is a major threat to this species. Although the proposal will result in impacts to Little Swamp, which represents potential habitat (of uncertain suitability) for the species, the persistence of a much greater area of suitable habitat in the surrounding wetlands suggests the proposal is unlikely to significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Swift Parrot (<i>Lathamus discolor</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	<p>The proposal will impact up to 2.59 ha of associated PCT for this species. The subject land is not within a priority management area for the species. Furthermore, the favoured tree species (<i>Eucalyptus robusta</i>, <i>Corymbia maculata</i>, <i>C. gummifera</i>, <i>E. tereticornis</i>, <i>E. sideroxylon</i>, and <i>E. albens</i>) are absent from the subject land.</p> <p>The species was not detected during the field survey and only one record (from 2019) occurs within the 10 km search area (~5.7 km from the subject land). As such, it is unlikely the subject land contains critical habitat for this species. Therefore, the proposal is unlikely to lead to the long-term decrease of any population of this species.</p>
Reduce the area of occupancy of the species	As indicated above it is unlikely that an established population exists at the site. Therefore, the current area of occupancy will not likely be significantly reduced.
Fragment an existing population into two or more populations	As indicated above it is unlikely that an established population exists at the site. This proposal is not expected to result in any additional fragmentation for this species.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, containing a relatively small amount of potential habitat for this species (2.59 ha). Furthermore, no individuals have been recorded within or directly adjacent to the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of a population	The Swift Parrot breeds exclusively in Tasmania. Therefore, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 2.59 ha of associated PCT for the species. The proposal will not isolate any habitat for this species. This removal/modification of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a species becoming established in the species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species	Forest harvesting, residential/industrial development, agricultural clearing, senescence and dieback are the main threats to this species. Although this proposal will exacerbate the impacts habitat clearing, due to the clearing/modifying of up to 2.59 ha of associated PCT, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Pink Cockatoo (<i>Lophochroa leadbeateri</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	The proposal will impact up to 2.59 ha of associated PCT for this species. The subject land is not within a priority management area for the species. The species was detected during the field survey and a further 125 records occur within the 10 km search area. However, the subject land does not contain required habitat features for breeding (living or dead tree with hollows greater than 10cm diameter). As such, the subject site may only provide limited foraging habitat for the species and would not constitute critical habitat. Therefore, this proposal will not lead to the long-term decrease of any population of this species.
Reduce the area of occupancy of the species	As indicated above it is unlikely that an established population exists at the site. The current area of occupancy will not likely be significantly reduced.
Fragment an existing population into two or more populations	This proposal is not expected to result in any additional fragmentation for this species beyond what already exists.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, containing a relatively small amount of potential habitat for this species (2.59 ha). Furthermore, habitat features for breeding (living or dead tree with hollows greater than 10 cm diameter) are absent from the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of a population	Since no known population is believed to occur within the area, and habitat features for breeding (living or dead tree with hollows greater than 10cm diameter), are absent from the subject land, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 2.59 ha of associated PCT for the species. The proposal will not isolate any habitat for this species. This removal/modification of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a species becoming established in the species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species	Clearing of woodlands, heavy grazing of feeding areas resulting in the removal of seeding grasses and preventing regeneration of food plants, loss of existing and future hollow-bearing trees, and illegal nest-robbing and trapping are the main threats to this species. Although this proposal will exacerbate the clearing of woodland, due to the clearing/modifying of up to 2.59 ha of associated PCT, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Hooded Robin (south-eastern form) (<i>Melanodryas cucullata cucullata</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	<p>The proposal will impact up to 2.59 ha of associated PCT for this species. The subject land is not within a priority management area for the species. Furthermore, this species was not detected during the field survey and of the 32 records occurring within the 10 km search area, none occur within the 1.5 km study area. Most of the records (n=21) occur within densely vegetated areas >5 km from the subject land.</p> <p>Given the required habitat for this species (structurally diverse featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses) is largely absent from the subject land, this proposal will not lead to the long-term decrease of any population of this species.</p>
Reduce the area of occupancy of the species	As indicated above it is unlikely that an established population exists at the site. The current area of occupancy will not likely be significantly reduced.
Fragment an existing population into two or more populations	This proposal is not expected to result in any additional fragmentation for this species beyond what already exists.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, containing a relatively small amount of potential habitat for this species (2.59 ha). Furthermore, the required habitat (structurally diverse featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses) is largely absent from the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of a population	Since no known population is believed to occur within the area, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 2.59 ha of associated PCT for the species. The proposal will not isolate any habitat for this species. This removal/modification of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a species becoming established in the species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species	Clearing of woodlands, resulting in loss and fragmentation of habitat; modification and destruction of ground habitat through heavy grazing and compaction by stock, removal of litter and fallen timber, introduction of exotic pasture grasses and frequent fire; aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners; reduction in resources due to drought; and disturbance and changes to vegetation structure due to forestry activities (e.g. fire and harvesting) are the main threats to this species. Although this proposal will exacerbate the loss of habitat, due to the clearing/modifying of up to 2.59 ha of associated PCT, it is not ideal habitat and this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Australian Painted Snipe (<i>Rostratula australis</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	The proposal will impact up to 2.89 ha of associated PCT for this species. The subject land is not within a priority management area for the species. The species was not detected during the field survey despite pedestrian transects being conducted through all wetland habitat and extensive bird surveys being carried out in the area of the swamp. In addition, only two records (both from 1976) occur within the 10 km search area (5 km from the subject land). These records were both from water treatment ponds in Griffith, suggesting that the species is tolerant of artificial habitats and may not be deterred by the short-term impacts to Little Swamp. Considering this species has not been recorded within the area in over 40 years, it is unlikely the subject land contains critical habitat for this species. Therefore, the proposal is unlikely to lead to the long-term decrease of any population of this species.
Reduce the area of occupancy of the species	As indicated above it is unlikely that an established population exists at the site. Therefore, the current area of occupancy will not likely be significantly reduced.
Fragment an existing population into two or more populations	Considering the presence of remnant wetland habitat within the study area, this proposal is not expected to result in any additional fragmentation for this species.
Adversely affect habitat critical to the survival of a species	Critical habitat has not been formally defined for this species. Given the preference of the species for freshwater (or rarely brackish) environments, the likely saline environment of Little Swamp is unlikely to support the species. In light of this, and considering that the species has never been recorded in or near the site, Little Swamp should not be considered critical to its survival.
Disrupt the breeding cycle of a population	No evidence of breeding – or occurrence more generally – was noted within the site, despite extensive surveys through all wetland habitat. Considering that a greater area of similar habitat will continue to remain within the surrounding wetlands, and no individuals have been recorded within Little Swamp, the proposal is unlikely to disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 2.89 ha of associated PCT for the species, though the hydrological characteristics of the site suggest that this is of limited value as habitat. The proposal will not isolate any habitat for this species. This removal/modification of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a species becoming established in the species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species	Drainage of wetlands; reduction in water quality; predation by introduced species; inappropriate fire and grazing regimes; and exotic weeds are the main threats to this species. Although the proposal will result in direct impacts to Little Swamp, water quality may already be too poor (saline) within the site to support the species. Additionally, considering that a greater area of similar habitat will remain in the surrounding wetlands, the proposal is unlikely to significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Common Greenshank (<i>Tringa nebularia</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	The proposal will not impact any associated PCTs for this species. The subject land is not within a priority management area for the species. In total, 17 records occur within the 10 km search area. Of these, 11 are located within the nearby Campbell's Wetland and Nericon Wetlands. However, no records occur from Little Swamp within the subject land and the species was not detected during the field assessments, despite extensive bird surveys being conducted in the wetland area. Considering a greater area of suitable habitat will continue to remain within the surrounding wetlands, the proposal is unlikely to lead to the long-term decrease of any population of this species.
Reduce the area of occupancy of the species	As indicated above it is unlikely that an established population exists at the site. Therefore, the current area of occupancy will not likely be significantly reduced.
Fragment an existing population into two or more populations	Considering the presence of remnant wetland habitat within the study area, this proposal is not expected to result in any additional fragmentation for this species.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of this species has been broadly defined to include a wide range of coastal and inland wetlands necessary for feeding, breeding, dispersal, and genetic health of the population. No specific requirements for these environments have been identified. This broad definition may include Little Swamp, though the absence of local records and failure to detect the species during multiple rounds of surveys suggest that the site may not ultimately be necessary for the species. Similarly, the fact that PCT 181 is not considered to be associated with this species raises doubts as to the suitability of the local habitat for use by this species. Larger local wetlands, including Campbell's Wetland and Nericon Wetlands, are more likely to be considered critical. Considering that these environments will remain, and that impacts will be confined to a site that is not known to support the species, the proposal is unlikely to adversely affect habitat critical to the survival of a species
Disrupt the breeding cycle of a population	This species is a non-breeding visitor to Australia. As such, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Although no associated PCTs occur within the subject land, impacts to Little Swamp may alter or remove potential habitat for the species. In the long-term, the maturation of constructed wetlands may allow the species to colonise or recolonise the site. No isolation of habitat is anticipated and, given that the species is not known to make use of the site, the proposal is not expected to result in a decline in the species.
Result in invasive species that are harmful to a species becoming established in the species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species	Loss/modification of habitat; silt, pollution, weeds or pest invasion; and disturbance during foraging and roosting periods are major threats to this species. Although the proposal will result in the loss or modification of potential (though apparently unused) habitat associated with Little Swamp, the persistence of larger areas of habitat known to support this species in the local landscape suggests that the proposal is unlikely to significantly interfere

	with the recovery of the species within the region. The maturation of the constructed wetlands in the long-term may allow colonisation or recolonisation of the site by this species.
Conclusion	No significant impact

EPBC Act-listed Vulnerable Species

Southern Whiteface (<i>Aphelocephala leucopsis</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will not impact any associated PCTs for this species. The subject land is not within a priority management area for the species, nor is it at the edge of the species' distribution. In total, 56 records occur within the 10 km search area. However, the species was not recorded during the field survey and only one record (from 1961) occurs within the 1.5 km study area. Furthermore, most of the records within the 10 km search area (n=40) occur within densely vegetated areas >2.3 km from the subject land. Therefore, the subject land is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	It is unlikely that an important population exists at the site, see above.
Fragment an existing important population into two or more populations	It is unlikely that an important population exists at the site, see above.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, lacking any associated PCTs. Furthermore, no individuals have been recorded within or directly adjacent to the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of an important population	It is unlikely that an important population exists at the site, see above.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove/modify any associated PCTs for the species. As such, the proposal will not isolate any habitat for this species and is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	Habitat loss, degradation, fragmentation and removal, climate change, predation from invasive species, invasive weeds, firewood collection and competition with noisy miners are the main threats for this species. Although this proposal will exacerbate the loss of habitat, due to the clearing/modifying of up to 5.48 ha of native vegetation, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will not impact any PCTs known to be associated with this species, though the wide habitat tolerances of the species suggest that some use of the site may occur. The subject land is not within a priority management area for the species, nor is it at the edge of the species' distribution. In total, 62 records occur within the 10 km search area. Of these, 50 are located within the nearby Lake Wyangan, Tharbogang Swamp, Campbell's Wetland, and Nericon Wetlands. However, no records are known from Little Swamp within the subject land and the species was not detected during the field surveys, despite extensive bird surveys being conducted in the wetland area. It is therefore unlikely that the site supports a "key source population" of the species or one that is "necessary for maintaining genetic diversity." Given the above, no important population should be taken to occur within the site.
Reduce the area of occupancy of an important population	See above: no important population of the species occurs within the site.
Fragment an existing important population into two or more populations	See above: no important population of the species occurs within the site.
Adversely affect habitat critical to the survival of a species	This species makes use of a wide range of habitats including fresh and saline wetlands in coastal or inland environments, with the highest density of the species recorded from the grassy margins of shallow inland freshwater wetlands. The species may make use of the site as a foraging resource but it is doubtful whether the site is necessary for any core biological function of the species given the absence of local records and availability of extensive areas of similar or superior habitat in the wider landscape. This suggests that the site should not be considered critical habitat for the species.
Disrupt the breeding cycle of an important population	This species is a non-breeding visitor to Australia. As such, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Although no associated PCTs occur within the subject land, impacts to Little Swamp may reduce or alter available habitat for the species. However, considering the large expanse of similar or superior habitat in the wider landscape and that the species has not been detected within the site, the proposal is unlikely to cause the species to decline at a regional scale. No isolation of habitat is anticipated.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	Reduction in the availability of foraging and roosting sites, habitat degradation, and changes to the surface water regime are the main threats to this species. Although the proposal will result in some loss of potential foraging habitat associated with Little Swamp, the persistence of a large expanse of suitable habitat in the surrounding wetlands suggests that the proposal is unlikely to significantly interfere with the recovery of the species within the region. The maturation of the proposed constructed wetlands may also allow the species to colonise or recolonise the site.
Conclusion	No significant impact

South-eastern Glossy Black-Cockatoo (<i>Calyptorhynchus lathami lathami</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	<p>The proposal will not impact any associated PCTs for this species. The subject land is not within a priority management area for the species. However, it is at the edge of the species' distribution. Therefore, if a population is present, it would be considered an important population.</p> <p>Glossy Black-Cockatoos are dependent on an abundance of large tree hollows for reproduction, of which none were present within the subject land. They are also dependent on the presence of feed tree species (<i>Allocasuarina</i> spp. and <i>Casuarina</i> spp.), of which <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> was present. As such, the subject site would provide potential foraging habitat for the species – the majority of which is within exclusion zones and will therefore remain post-construction.</p> <p>Of the 11 records within the 10 km search area, all occur >6.9 km from the subject land. Furthermore, the species was not detected during the field survey. As such, the subject land is unlikely to contain an important population of this species.</p>
Reduce the area of occupancy of an important population	Considering the proposal will not impact associated PCTs, it is unlikely to reduce the area of occupancy of an important population of this species.
Fragment an existing important population into two or more populations	Considering the subject land is already significantly cleared, the proposal is unlikely to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape with limited available habitat, lacking large tree hollows for breeding. Furthermore, no individuals have been recorded within or directly adjacent to the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of an important population	It is unlikely that an important population exists at the site, see above. Furthermore, large tree hollows (required for breeding) are absent from the subject land.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove/modify any associated PCTs for the species. As such, the proposal will not isolate any habitat for this species and is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	Reduction of suitable habitat through clearing for development, and the decline of hollow bearing trees over time due to land management activities are the main threats facing this species. Although this proposal will exacerbate the loss of habitat, due to the clearing/modifying of up to 5.48 ha of native vegetation, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Brown Treecreeper (south-eastern) (<i>Climacteris picumnus victoriae</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will not impact any associated PCTs for this species. The subject land is not within a priority management area for the species. However, it is at the edge of the species' distribution. Therefore, if a population is present, it would be considered an important population. The species was not detected during the field survey and no hollows (required for breeding) are present. Furthermore, of the 20 records within the 10 km search area, all occur >4 km from the subject land. As such, the subject land is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	Considering the proposal will not impact associated PCTs, it is unlikely to reduce the area of occupancy of an important population of this species.
Fragment an existing important population into two or more populations	Considering the subject land is already significantly cleared, the proposal is unlikely to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape with limited available habitat, lacking tree hollows for breeding. Furthermore, no individuals have been recorded within or directly adjacent to the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of an important population	It is unlikely that an important population exists at the site, see above. Furthermore, tree hollows (required for breeding) are absent from the subject land.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove/modify any associated PCTs for the species. As such, the proposal will not isolate any habitat for this species and is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	Historical loss of woodland, forest and mallee habitats as a result of agriculture, forestry, mining and residential development; fragmentation of woodland and forest remnants which isolates populations and causes local extinctions; ongoing degradation of habitat, particularly the loss of tree hollows and fallen timber from firewood collection and overgrazing; and the lack of regeneration of eucalypt overstorey in woodland due to overgrazing and too-frequent fires are the main threats facing this species. Although this proposal will exacerbate the loss of habitat, due to the clearing/modifying of up to 5.48 ha of native vegetation, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Grey Falcon (<i>Falco hypoleucos</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will impact up to 5.48 ha of potential habitat for this species. The subject land is not within a priority management area for the species, nor is it at the edge of the species' distribution. Furthermore, the species was not detected during the field survey and only one record (from 2002) occurs within 10 km (~2.5 km from the subject land). Therefore, the subject land is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	It is unlikely that an important population exists at the site, see above.
Fragment an existing important population into two or more populations	It is unlikely that an important population exists at the site, see above.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, containing a relatively small amount of potential habitat for this species (2.59 ha). Furthermore, no individuals have been recorded within or directly adjacent to the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of an important population	It is unlikely that an important population exists at the site, see above. Furthermore, no suitable nests were detected during the field survey.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 5.48 ha of potential habitat for the species. The proposal will not isolate any habitat for this species. This removal/modification of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	Grazing and clearing of arid and semi-arid zone rangelands, secondary poisoning through mouse and locust control programs, and the taking of eggs and young for collections and falconry are the main threats to this species. Although this proposal will exacerbate the loss of habitat, due to the clearing/modifying of up to 5.48 ha of associated PCT, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Latham's Snipe (<i>Gallinago hardwickii</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will not impact any associated PCTs for this species. The subject land is not within a priority management area for the species, nor is it at the edge of the species' distribution. Furthermore, the species was not detected during the field survey, which included pedestrian transects through all wetland habitat, and only nine records occur within the 10 km search area. Of these records, only one occurs within the 1.5 km study area. Considering this species is a non-breeding visitor to Australia and has been recorded from Cape York Peninsula through to south-eastern Australia, the subject land is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	It is unlikely that an important population exists at the site, see above.
Fragment an existing important population into two or more populations	It is unlikely that an important population exists at the site, see above.
Adversely affect habitat critical to the survival of a species	The principal habitat of this species, according to the published conservation advice, is densely vegetated freshwater wetlands; however, they are known to use saline environments close to human habitat, and may therefore make use of the subject land. The wide habitat tolerances of the species, which may also include grasslands, heaths, shrublands of lignum or tea-tree, and wooded habitats, compounded by limitations in the available survey data, precludes identification of important sites for this species. Considering that a greater area of suitable habitat will continue to remain within the surrounding wetlands, and that no individuals have been recorded within Little Swamp historically and that no individuals were recorded during multiple site visits, the proposal is unlikely to adversely affect habitat critical to the survival of a species
Disrupt the breeding cycle of an important population	This species is a non-breeding visitor to Australia. As such, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Although no associated PCTs occur within the subject land, alterations to Little Swamp will, at least in the short term, remove available habitat for the species. The retention of areas as constructed wetlands may allow future colonisation by this species. Considering the greater area of suitable habitat that will continue to remain within the surrounding wetland and that the proposal will not isolate any habitat for this species, it is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	The major threat facing this species is the drainage and modification of wetlands. Although the proposal will result in alterations to Little Swamp, which represents potential habitat for this species, these are likely to be short-term impacts, with the maturation of the future constructed wetland allowing recolonisation by the species. Considering also that a greater area of suitable habitat will remain in the surrounding wetlands, the proposal is unlikely to significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

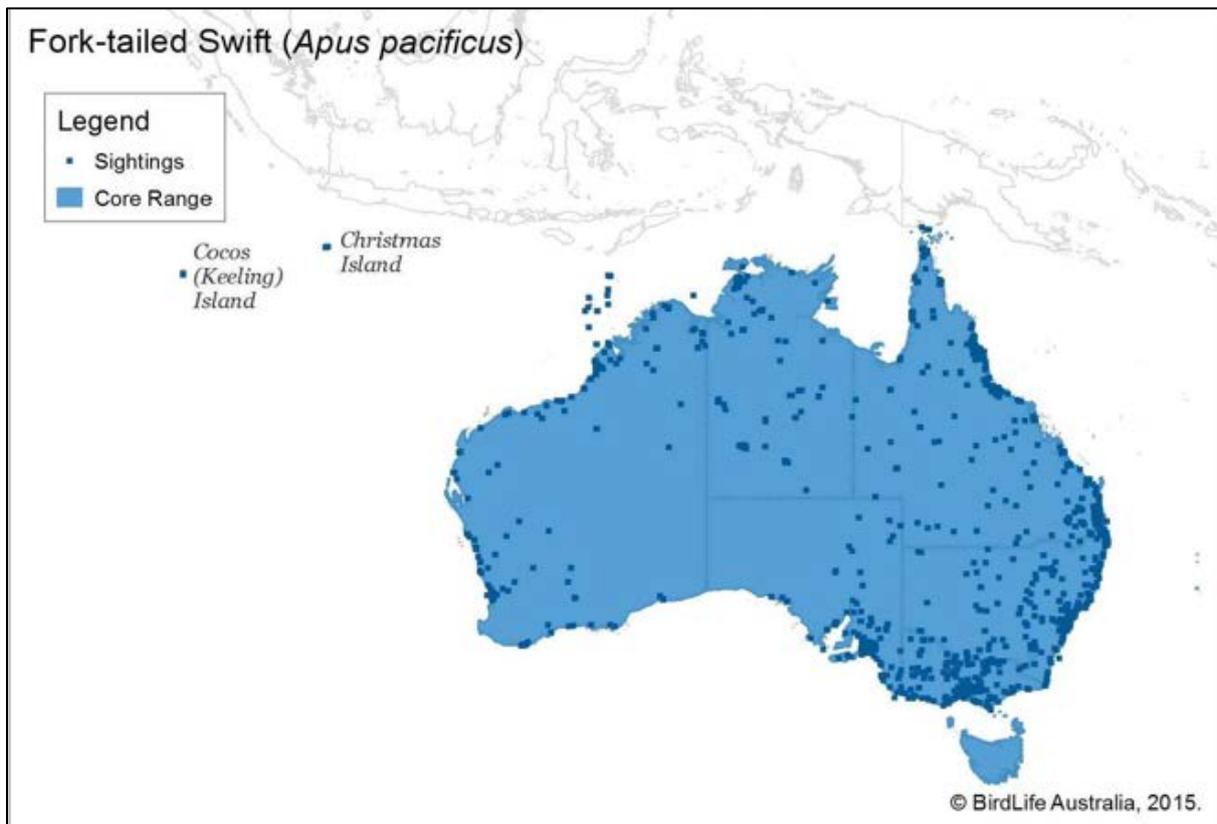
Blue-winged Parrot (<i>Neophema chrysostoma</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will not impact any associated PCTs for this species. The subject land is not within a priority management area for the species, nor is it at the edge of the species' distribution. Furthermore, the subject land does not contain tree hollows required for breeding. This species was not detected during the field survey and only one record (from 2006) occurs within 10 km (180 m from the subject land). Therefore, the subject land is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	It is unlikely that an important population exists at the site, see above.
Fragment an existing important population into two or more populations	It is unlikely that an important population exists at the site, see above.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, lacking any associated PCTs. Furthermore, no individuals have been recorded within or directly adjacent to the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of an important population	It is unlikely that an important population exists at the site, see above.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove/modify any associated PCTs for the species. As such, the proposal will not isolate any habitat for this species and is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	habitat loss, degradation, fragmentation and removal; climate change; predation from invasive species; invasive weeds; firewood collection; and competition with noisy miners (<i>Manorina melanocephala</i>) are the main threats for this species. Although this proposal will exacerbate the loss of habitat, due to the clearing/modifying of up to 5.48 ha of native vegetation, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

White-throated Needletail (<i>Hirundapus caudacutus</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will impact up to 5.48 ha of potential habitat for this species. The subject land is not within a priority management area for the species, nor is it at the edge of the species' distribution. The species was not recorded during the field survey and only two records occur within the 10 km search area. The closest record (from 2002) occurs ~ 4.5 km from the subject land. Considering how widespread this species occurs, and the small area of potential habitat for the species, the subject land is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	It is unlikely that an important population exists at the site, see above.
Fragment an existing important population into two or more populations	It is unlikely that an important population exists at the site, see above.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, containing a relatively small amount of potential habitat for the species (5.48 ha). Furthermore, no individuals have been recorded within or directly adjacent to the subject land. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of an important population	This species is a non-breeding visitor to Australia. As such, this proposal will not disrupt the breeding cycle for any population of this species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove/modify any associated PCTs for the species. As such, the proposal will not isolate any habitat for this species and is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	Vegetation clearing and windfarms are the main threats for this species. Although this proposal will exacerbate the impacts of vegetation clearing, due to the clearing/modifying of up to 5.48 ha of native vegetation, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

Diamond Firetail (<i>Stagonopleura guttata</i>)	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	The proposal will impact up to 2.59 ha of potential habitat for this species. The subject land is not within a priority management area for the species, nor is it at the edge of the species' distribution. The species was not detected during the field survey and suitable nesting habitat (shrubby understory and raptor or raven nests) is largely absent from the subject land. Furthermore, of the 20 records occurring within the 10 km search area, all are located >5.2 km from the subject land. Therefore, the subject land is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	It is unlikely that an important population exists at the site, see above.
Fragment an existing important population into two or more populations	It is unlikely that an important population exists at the site, see above.
Adversely affect habitat critical to the survival of a species	The subject land occurs within a heavily disturbed landscape, containing a relatively small amount of potential habitat for the species (2.59 ha). Furthermore, no individuals have been recorded within or directly adjacent to the subject site and no suitable nesting sites occur within the subject site. Therefore, it is unlikely to be critical habitat for the species.
Disrupt the breeding cycle of an important population	It is unlikely that an important population exists at the site, see above. Furthermore, suitable nesting habitat (shrubby understory and raptor or raven nests) is absent from the subject land.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 2.59 ha of associated PCT for the species. The proposal will not isolate any habitat for this species. This removal/modification of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Interfere with the recovery of the species.	Clearing and fragmentation of woodland, open forest, grassland and mallee habitat for agriculture and residential development, and firewood collection; poor regeneration of open forest and woodland habitats; and the invasion of weeds, resulting in the loss of important food plants are the main threats facing this species. Although this proposal will exacerbate the clearing and fragmentation of woodland habitat, due to the clearing/modifying of up to 2.59 ha of associated PCT, this should not significantly interfere with the recovery of the species within the region.
Conclusion	No significant impact

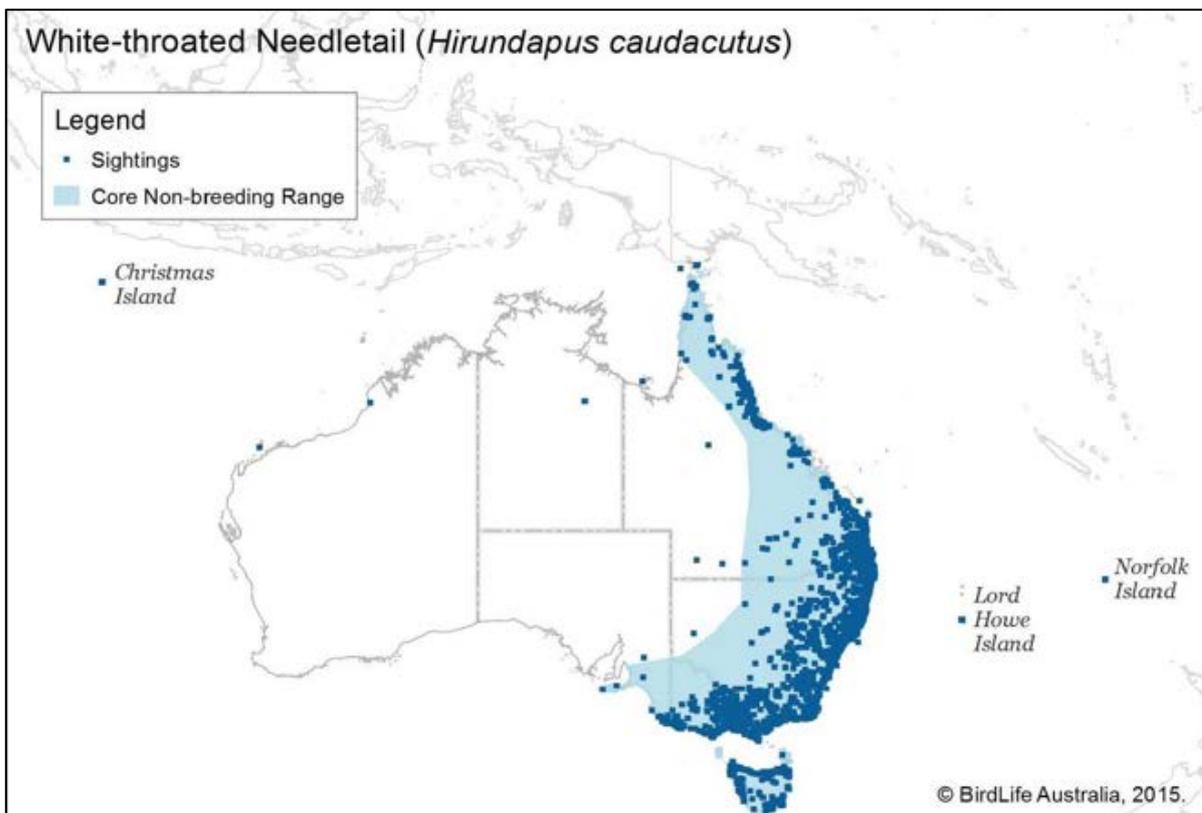
EPBC Act-listed Migratory Species

Fork-tailed Swift (<i>Apus pacificus</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<i>Apus pacificus</i> is widespread throughout Australia with the entire country being mapped as within their "core range". The species was not recorded during the field survey and only three records occur within the 10 km search area. The closest record (from 1987) occurs ~ 480 m from the subject land. Given the chiefly aerial nature of the species and its wide apparent habitat tolerances, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species
Conclusion	No significant impact



Fork-tailed Swift Core Range

White-throated Needletail (<i>Hirundapus caudacutus</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<p>This species is widespread in eastern Australia from Tasmania to Cape York, most often observed above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. The subject land falls within the mapped “non-breeding core range” for this species.</p> <p>The species was not recorded during the field survey and only two records occur within the 10 km search area. The closest record (from 2002) occurs ~ 4.5 km from the subject land. The subject land consists of a small area of potentially suitable habitat (5.48 ha). Similar habitat will remain in the area surrounding the subject land. As such, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species
Conclusion	No significant impact



White-throated Needletail Core Range

Curlew Sandpiper (<i>Calidris ferruginea</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<p>In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one year old birds remain in Australia rather than migrating north.</p> <p>In total, 16 records occur within the 10 km search area. Of these, 13 are located within the nearby Nericon Wetlands. However, no records occur from Little Swamp within the subject land and the species was not detected during the field surveys. Considering a greater area of suitable habitat will continue to remain within the surrounding wetlands, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species
Conclusion	No significant impact

Common Greenshank (<i>Tringa nebularia</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<p>This species has the widest distribution of any shorebird in Australia. Within NSW, the species has been recorded in most coastal regions. It is widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west regions.</p> <p>In total, 17 records occur within the 10 km search area. Of these, 11 are located within the nearby Campbell's Wetland and Nericon Wetlands. However, no records occur from Little Swamp within the subject land and the species was not detected during the field surveys. Considering a greater area of suitable habitat will continue to remain within the surrounding wetlands, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species
Conclusion	No significant impact

Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<p>Most of the population of this species spends the non-breeding season in south-eastern Australia. They are widespread in both inland and coastal locations and in both freshwater and saline habitats.</p> <p>In total, 62 records occur within the 10 km search area. Of these, 50 are located within the nearby Lake Wyangan, Tharbogang Swamp, Campbell's Wetland, and Nericon Wetlands. However, no records occur from Little Swamp within the subject land and the species was not detected during the field surveys. Considering a greater area of suitable habitat occurs within the surrounding wetlands, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species
Conclusion	No significant impact

Latham's Snipe (<i>Gallinago hardwickii</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<p>This species is a non-breeding visitor to south-eastern Australia with records along the east coast and extending west of the Great Dividing Range in NSW where they occur in permanent and ephemeral wetlands.</p> <p>The species was not detected during the field survey and only nine records occur within the 10 km search area. Of these records, only one occurs within the 1.5 km study area. Considering a greater area of suitable habitat occurs within the surrounding wetlands, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species
Conclusion	No significant impact

Common Sandpiper (<i>Actitis hypoleucos</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<p>This species is a non-breeding visitor to Australia and found along all coastlines and in many areas inland, in small numbers. The population when in Australia is concentrated to the north and west of the continent.</p> <p>The species was not recorded during the field survey and only one record (from 1981) occurs within the 10 km search area (~ 5 km from the subject land). Considering the non-breeding population of this species is concentrated in northern and western Australia, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species
Conclusion	No significant impact

Pectoral Sandpiper (<i>Calidris melanotos</i>)	
Significant Impact Guideline	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	<p>This species is a non-breeding visitor to Australia where it prefers shallow fresh to saline wetlands. Within NSW, the species is widespread, but scattered.</p> <p>The species was not recorded during the field survey and only two records (from 1996 and 1997) occur within the 10 km search area. The closest record (from 1996) occurs within Nericon Wetlands. Considering a greater area of suitable habitat occurs within the surrounding wetlands, the proposal is unlikely to substantially modify, destroy or isolate any area of important habitat for this migratory species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	While there is potential for works to introduce invasive species to the proposal site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see Section 7).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the proposal site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	No significant impact

Appendix E: BAM Credit Summary Report



BAM Credit Summary Report

Proposal Details

Assessment Id 00040911/BAAS21028/23/00040912	Proposal Name Lakeside Residential Subdivision	BAM data last updated * 14/03/2024
Assessor Name David Orchard	Report Created 22/04/2024	BAM Data version * 67
Assessor Number BAAS21028	BAM Case Status Finalised	Date Finalised 22/04/2024
Assessment Revision 0	Assessment Type Part 4 Developments (General)	BOS entry trigger BOS Threshold: Area clearing threshold

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAIL	Ecosystem credits
Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
3	16_Derived	Not a TEC	5.1	5.1	0.08	PCT Cleared - 50%	High Sensitivity to Gain			1.75		0

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4	16_Moderate	Not a TEC	59.5	59.5	0.02	PCT Cleared - 50%	High Sensitivity to Gain			1.75	1
6	16_Low	Not a TEC	37.8	37.8	0.11	PCT Cleared - 50%	High Sensitivity to Gain			1.75	2
										Subtotal	3
Common Reed - Bushy Groundsel aquatic tall reedland grassland wetland of inland river systems											
5	181_Mode rate	Not a TEC	46.5	46.5	3	PCT Cleared - 33%	High Sensitivity to Gain			1.50	52
										Subtotal	52
Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion											
1	26_Remnant	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	58.1	58.1	0.09	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	3
										Subtotal	3

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Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion										
2_26_Derived	Not a TEC	22	22.0	2.3	PCT Cleared - 90%	High Sensitivity to Gain			2.50	32
									Subtotal	32
									Total	90

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAll	Species credits

Assessment Id
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Proposal Name
Lakeside Residential Subdivision

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