Maari Ma Wellbeing Centre, Wilcannia Flora and Fauna Impact Assessment

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Abbreviations

Abbreviation	Definition
ADD	Aboriginal Due Diligence
Barnson Pty Ltd	Barnson
BC Act	*Biodiversity Conservation Act 2016*
BS Act	*Biosecurity Act 2015*
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection Biodiversity Conservation Act 1999*
FFIA	Flora and Fauna Impact Assessment
FM Act	*Fisheries Management Act 1995*
IBRA	Interim Biogeographic Regionalisation for Australian
LEP	Local Environment Plan
LGA	Local Government Area
LLS	Local Land Service
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	Plant Community Type
PMST	Protected Matters Search Tool
TEC	Threatened Ecological Community

Executive Summary

Eco Logical Australia (ELA) was engaged by Barnson Pty Ltd (Barnson) to undertake a Flora and Fauna Impact Assessment (FFIA) for the proposed Maari Ma Wellbeing Centre located south west of Bonney Street, Wilcannia, NSW. The proposed works involve the construction of buildings, roads and associated landscaping on Lot 2 DP 1201089, Lot 111 DP 1201028, Lot 4 DP 1201089 and Lot 3 DP 1201089.

Works associated with the construction of the Maari Ma Wellbeing Centre is hereafter referred to as the 'Project'. Based on preliminary designs, the proposed impact area for the Project is approximately 2,701 m^2 consisting of 521 m^2 of existing vehicle tracks and 2,179 m^2 of native vegetation. A larger study area of approximately 5,000 m^2 was surveyed to allow for finalisation of construction plans. The existing vehicle tracks will be upgraded as part of the Project and have therefore been included within impact calculations.

This report has been compiled in accordance with Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), and as per the requirements of Part 7 of the NSW *Biodiversity Conservation Act 2016* (BC Act). Relevant Matters of National Environmental Significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were also assessed within this report.

The biodiversity values of the study area were identified through a comprehensive data review and ecological field surveys. The data review included searches of relevant threatened species registers and background information, while field surveys involved vegetation validation and mapping, targeted flora surveys, opportunistic fauna surveys and threatened fauna habitat assessment.

Two (2) Plant Community Types (PCTs) were mapped within the study area:

- PCT 39 *Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains Manly in the Darling Riverine Plains Bioregion*,
- PCT 40 *Coolabah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*.

Both of these PCTs are associated, in part, with the Threatened Ecological Communities (TECs) *Coolabah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions* listed as Endangered under the BC Act and EPBC Act and the *Artesian Springs Ecological Community in the Great Artesian Basin* which is listed as Critically Endangered under the BC Act and Endangered under the EPBC Act. However, assessment of these PCTs against the listing criteria for these TECs determined that these PCTs did not meet the criteria required for being considered as TECs, and therefore no TECs are present within the study area.

The Project will involve clearing 42 m^2 of PCT 39 and 2,137m^2 of PCT 40 (total clearing of native vegetation 2,179 m^2). The clearing of native vegetation associated with the Project is below the clearing threshold for the minimum lot size associated with the Project (the minimum lot size is 800 m^2 which has an associated clearing threshold of > 0.25 ha) and, as such, does not trigger entry into the Biodiversity Offsets Scheme under the BC Act. Additionally, the Project will not impact on any areas mapped on the Biodiversity Values Map.

A total of 19 threatened species listed under the BC Act and 15 threatened species listed under the EPBC Act were identified from the data review as being recorded or having potential habitat within a 10 km radius of the study area. A likelihood of occurrence was undertaken for these species which determined that potential habitat is present for ten (10) threatened fauna species and one (1) threatened flora species listed under the BC Act and one (1) threatened fauna species and one (1) threatened flora species listed under the EPBC Act. Assessments of significance were undertaken for these species under BC Act and EPBC Act provisions. No threatened flora or fauna species were recorded within the study area during field survey. Given this, and the small size of the proposed area of impact, assessments of significance concluded that the Project will not result in a significant impact to threatened fauna or flora species.

Five (5) threatened entities listed under the NSW *Fisheries Management Act 1995* (FM Act) have the potential to occur in the adjacent Darling River. The study area is mapped as Key Fish Habitat under the FM Act (DPI 2020). However, the implementation of impact mitigation measures will result in no impact to these threatened entities.

Mitigation measures have been proposed to ensure that potential impacts associated with the Project are avoided, minimised and contained. This flora and fauna assessment should be read in conjunction with the Aboriginal Due Diligence (ADD) report also undertaken by ELA for the Project (ELA 2021).

The Project is not likely to significantly affect the environment, including threatened species or ecological communities, or their habitats. Additionally, the Project is not likely to have a significant impact on any matters of national environmental significance or the environment on Commonwealth land for the purposes of the EPBC Act.

1. Introduction

1.1. Project description

Eco Logical Australia (ELA) was engaged by Barnson Pty Ltd (Barnson) to undertake a Flora and Fauna Impact Assessment (FFIA) for the proposed Maari Ma Wellbeing Centre located south west of Bonney Street, Wilcannia, NSW. The works involve the construction of buildings, roads and associated landscaping on Lot 2 DP 1201089, Lot 111 DP 1201028, Lot 4 DP 1201089 and Lot 3 DP 1201089 (the study area) as shown in **Figure 1** below.

Works associated with the construction of the Maari Ma Wellbeing Centre are hereafter referred to as the Project. Based on preliminary designs, the proposed impact area for the Project is approximately 2,701 m^2 consisting of 521 m^2 of existing vehicle tracks and 2,179 m^2 of native vegetation. Existing vehicle tracks will be upgraded as part of the Project with these tracks incorporated within the total impact area calculations. A larger study area of approximately 5,000 m^2 was surveyed to allow for finalisation of construction plans as shown in Figure 2 below.

1.2. Study area

The study area comprises of previously cleared vehicle tracks, a section of riparian vegetation along the Darling River and remnant floodplain vegetation as shown in **Figure 2** below. The study area is located within the Darling Central Shire Council Local Government Area (LGA) in the Far West of NSW. The study area is also located within the Darling Riverine Plains Interim Biogeographic Regionalisation for Australia (IBRA) Region and Wilcannia Plains IBRA Subregion.

Figure 1: Study area context

Figure 2: Impact area

1.3. Report objectives

The key objectives of this report are to:

- Provide a description of the ecological values present within the study area, including the identification of threatened species, populations (or their habitat) and ecological communities that have the potential to occur in the study area.
- Determine and assess the significance of any impacts associated with the proposed Project upon threatened species, populations and ecological communities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and / or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EBPC Act), in accordance with Section 7.3 of the BC Act and / or the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* under the EPBC Act (DPIE 2013).
- Provide a series of impact mitigation strategies for implementation as part of the proposed Project.

1.4. Legislative context

Relevant legislation is outlined in **Table 1**.

Table 1: Legislative context

Legislation	Outline
Environment Protection and Biodiversity Conservation Act 1999	The EPBC Act aims to protect MNES including wetlands of international importance, threatened species and communities, and listed migratory species. An action that may or is likely to have a significant impact on MNES should be referred to the Commonwealth to determine whether it is a Controlled Action that requires approval from the Commonwealth. Two (2) MNES have the potential to occur on or near the study area. This report has assessed impacts to MNES and concludes that the development is not likely to have a significant impact on MNES.
Environmental Planning and Assessment Act 1979 (EP&A Act)	Part 5 of the EP&A Act applies to activities requiring consent. A determining authority must consider to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. Where relevant, assessments of significance for impacts to threatened species and endangered ecological communities (EECs) must be prepared in accordance with Part 5 of the Act and the report addresses the relevant requirements of s228 of the *Environmental Planning and Assessment Regulation 2000*.
Biodiversity Conservation Act 2016	The purpose of the BC Act is to Maintain a healthy and productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. Ten (10) threatened entities listed under the BC Act have the potential to occur on or near the study area. This report has assessed impacts to these species and concludes that the development is not likely to have an impact upon these species or their habitat.
Biodiversity Conservation Regulation 2017	Section 7.2 of the *Biodiversity Conservation Regulation 2017* sets out threshold levels for when the Biodiversity Offsets Scheme will be triggered. The threshold has two elements: • whether the amount of native vegetation being cleared exceeds an area threshold • whether the impacts occur on an area mapped on the Biodiversity Values Map published by the Environment Agency Head. • Whether significant impacts are likely.

Legislation	Outline
	The Project will involve clearing a maximum of 2,179 m^2 of native vegetation (**Section 3.1;** 42m^2 of PCT 39 and 2,137 m^2 of PCT 40) which is below the clearing threshold for the minimum lot size associated with the Project (the minimum lot size is 800 m^2 which has an associated clearing threshold of > 2,500 m^2). The Project will not impact on any areas mapped on the Biodiversity Values Map (**Appendix D**). No significant impacts are likely.
Fisheries Management Act 1995 (FM Act)	The FM Act provides for the protection, conservation, and recovery of threatened species defined under the Act. It also makes provision for the management of threats to aquatic threatened species, populations and ecological communities defined under the FM Act, as well as the protection of fish and fish habitat in general. Five (5) threatened entities listed under the FM Act have the potential to occur in the adjacent Darling River. The study area is mapped as Key Fish Habitat under the FM Act (DPI 2020; **Appendix D**). However, the implementation of impact mitigation measures will result in no impact to these threatened entities.
Biosecurity Act 2015 (BS Act)	The BS Act provides a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers. Whilst the Act provides for all biosecurity risks, implementation of the Act for weeds is supported by Regional Strategic Weed Management Plans developed for each region in NSW. Appendix 1 of the *Western Regional Strategic Weed Management Plan* (LLS 2017) identifies the priority weeds for control at a regional scale. One (1) priority weed, *Lycium ferocissimum* (African Boxthorn) was identified within the study area.
State Environment Planning Policy (Koala Habitat Protection) 2021	The *State Environment Planning Policy (Koala Habitat Protection) 2021* does not apply to the project as the Central Darling Shire LGA is not listed in Schedule 1 of the *State Environment Planning Policy (Koala Habitat Protection) 2021*.

2. Methodology

2.1. Literature and data review

The following documents and database searches were reviewed in conjunction with data collected during the field survey:

- Commonwealth EPBC Act Protected Matters Search Tool (PMST) (DAWE 2021a)
- NSW BioNet (Wildlife Atlas) Search for threatened species, populations and ecological communities that may have previously been recorded and are listed under the NSW BC Act (DPIE 2021a)
- NSW Biodiversity Values Map (DPIE 2021b)
- NSW BioNet Vegetation Classification database (DPIE 2021c)
- Threatened Species Profiles (OEH 2021)
- Atlas of Living Australia online database (ALA 2021)
- Department of Primary Industries (DPI) Key Fish Habitat Mapping (DPI 2021)
- Aerial imagery
- *Central Darling Shire Council Local Environment Plan* (LEP) 2012 (NSW Government 2012)

Appendix A identifies the threatened flora, fauna and threatened ecological communities (TECs) returned by the database searches. A likelihood of occurrence table is also provided.

Likelihood of occurrence was determined by reviewing records of the area returned by the database searches, consideration of habitat available and habitat quality and using expert knowledge of species' ecology.

Five (5) terms for the likelihood of occurrence of species are used, as defined below:

- 'yes' = the species was or has been previously recorded within the study area
- 'likely' = medium to high probability that a species utilises the study area
- 'potential' = suitable habitat exists for a species, but there is insufficient information to categorise the species as likely or unlikely to occur
- 'unlikely'= a very low to low probability that a species utilises the study area
- 'no' = habitat within the study area and immediately adjacent to the study area is non-existent or otherwise unsuitable for a species

2.2. Field survey

The field survey was undertaken by ELA Ecologist Rebecca Croake on 7 April 2021. A range of methodologies were implemented during the field survey to both identify and assess the impact of the Project on ecological values within the study area.

2.2.1. Vegetation mapping

Native vegetation occurring within the study area was mapped to NSW Plant Community Types (PCTs) using the dominant species within each stratum present at the time of survey and data pertaining to landscape position, soil type and geology.

Vegetation within the study area was mapped during the field survey using Collector for ArcGIS. Data was collected to make an assessment on the following:

- Vegetation condition
- PCT number and description using BioNet Vegetation Classification database (DPIE 2021)
- Assessment against the listing criteria for TECs listed under the BC Act and / or the EPBC Act.

2.2.2. Threatened flora surveys

A total of four (4) threatened flora species were identified from the data review as being recorded or having potential habitat within a 10km radius of the study area. These species include:

- *Calotis moorei* (a Burr-daisy)
- *Atriplex infrequens* (A saltbush)
- *Austrostipa metatoris*
- *Solanum karsense* (Menindee Nightshade)

The entire study area was traversed on foot, with opportunistic searches undertaken for these species. A full list of flora species recorded within the study area during the field survey is provided in **Appendix B.**

2.2.3. Threatened fauna surveys

A total of 21 threatened fauna species listed under the BC Act and / or the EPBC Act were identified from the data review as being recorded within or having potential to occur within a 10 km radius of the study area. These species are presented in **Appendix A**. A further five (5) aquatic species listed under the FM Act were identified from the data review as recorded or having potential habitat within the section of the Darling River adjacent to the study area (DPI 2021) (**Appendix A**).

Habitat for potentially occurring threatened fauna species was assessed across the entire study area, with incidental observations of all fauna species recorded during the field survey. A list of all fauna species recorded during the field survey is provided in **Appendix B**.

2.3. Impact assessment – FM Act listed species

The FM Act provides for the protection, conservation, and recovery of threatened species defined under the Act. It also makes provision for the management of threats to aquatic threatened species, populations and ecological communities defined under the FM Act, as well as the protection of fish and fish habitat in general.

The study area is mapped as Key Fish Habitat under the FM Act (DPI 2020). The extent of Key Fish Habitat within the study area is provided in **Appendix D**.

Four (4) aquatic species and one (1) aquatic species population listed under the FM Act were identified during the data review as being recorded or having potential habitat with 10 km of the study area. These species included:

- Western population of Olive Perchlet (*Ambassis agassizii*)
- Silver Perch (*Bidyanus bidyanus*)
- Trout Cod (*Maccullochella macquariensis*)

- Murray Cod (*Maccullochella peelii*)
- Darling River Snail (*Notopala sublineata*)

A likelihood of occurrence assessment was undertaken for these species. Due to the absence of aquatic habitat within the study area, it was determined that these species do not have potential to occur within the study area; however, potential habitat is present immediately adjacent to the study area within the Darling River.

Implementation of impact mitigation measures detailed in **Section 4.3** below will allow for no impacts to occur to these species during the construction or operational stages of the Project.

2.4. Impact assessment – BC Act listed species

Under Section 7.3 of the BC Act, an assessment of significance of impacts is required for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species, TECs or their habitat.

A total of 21 BC Act listed threatened entities were identified from the data review as being previously recorded or having potential habitat within 10 km from the study area. This included four (4) threatened flora species, 15 threatened fauna species and two (2) TECs.

A likelihood of occurrence assessment was undertaken for these threatened entities (**Appendix A**) which determined that ten (10) threatened fauna species, one (1) threatened flora species and two (2) TECs listed under the BC Act have potential to occur within the study area. An assessment of significance was undertaken for these threatened entities in accordance with Section 7.3 of the BC Act. The BC Act assessment of significance is provided in **Appendix E**.

2.5. Impact assessment – EPBC Act listed species

The EPBC Act Administrative Guidelines on Significance sets out 'Significant Impact Criteria' that area to be used to assist in determining whether a proposed action is likely to have a significant impact on MNES (DPE 2013). Matters listed under the EPBC Act as being of national environmental significance are as follows:

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

Specific 'Significant Impact Criteria' are provided for each MNES above, and with separate criteria provided for species listed as endangered, vulnerable and migratory (within the 'listed threatened species and ecological communities' matter).

A total of 15 threatened entities listed under the EPBC Act were identified from the data review as being previously recorded or having potential habitat within 10 km from the study area. This included three (3) threatened flora species, 12 threatened fauna species and two (2) TECs.

A Likelihood of Occurrence assessment was undertaken for these listed species and ecological communities and is detailed in **Appendix A** and determined that one (1) threatened flora species and (1) threatened fauna species listed under the EPBC Act have potential to occur within the study area. An assessment of significance was undertaken for these threatened entities and is detailed in **Appendix F**.

3. Results

3.1. Vegetation communities

Aerial imagery and regional vegetation mapping assessed as part of the data review indicated that the study area consisted of shrubland / open woodland present within the north of the study area and riparian vegetation present along the Darling River, with existing vehicular tracks present throughout the study area. This vegetation pattern was confirmed during the field survey which identified two (2) PCTs, as shown in **Table 2** and **Figure 3** below. These PCTs are discussed further in **Sections 3.1.1** and **3.1.2** below.

Table 2: PCTs mapped within the study area

PCT number	PCT name	Vegetation formation and class	Area (m^2) within study area	Area (m^2) within impact area
39	*Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains Manly in the Darling Riverine Plains Bioregion*	Semi-arid Woodlands (Grassy sub-formation) – North-west Floodplain Woodlands	1,833	42
40	*Coolabah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*	Semi-arid Woodlands (Grassy sub-formation) – North-west Floodplain Woodlands	2,608	2,137
Total native vegetation			**4,441**	**2,179**
Vehicular tracks			521	521
Total area			**4,962**	**2,700**

Both PCT 39 and PCT 40 are associated, in part, with the *Coolabah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions* listed as Endangered under the BC Act and EPBC Act and the *Artesian Springs Ecological Community in the Great Artesian Basin* which is listed as Critically Endangered under the BC Act and Endangered under the EPBC Act. Assessments against the listing criteria undertaken in **Sections 3.1.1** and **3.1.2** below determined that the areas of PCT 39 and PCT 40 within the study area do not meet the listing criteria, and as such, no TECs are present within the study area.

Figure 3: PCT mapping

3.1.1. PCT 39 *Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains Manly in the Darling Riverine Plains Bioregion*

The study area contains 1,833 m^2 and the impact area, 42 m^2 of *PCT 39 Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains Manly in the Darling Riverine Plains Bioregion* which occurs as riparian vegetation adjacent to the Darling River and extend along a drainage line present in the south west of the study area.

Consistent with the PCT description, the overstorey consists of *Eucalyptus coolabah* (Coolabah) and *Eucalyptus camaldulensis* (River Red Gum). The midstorey species consist of *Acacia stenophylla* (River Cooba), *Duma florulenta* (syn. *Muehlenbeckia florulenta*; Lignum) and *Geijera parviflora* (Wilga). Groundcover species consisted of *Paspalidium jubiflorum* (Warrego Grass) and *Einadia nutans* subsp. *nutans* (Climbing Saltbush). Site photos of PCT 39 are provided in Figure 4 and Figure 5 below.

At the time of survey, exotic species richness and associated groundcover was very low. The exotic herb species *Tribulus terrestris* (Cathead) contributed less than 5% to overall groundcover. Signs of disturbance including vehicular tracks and rubbish were present throughout PCT 39 within the study area. PCT 39 within the study area is in moderate condition. *Lycium ferocissimum* (African Boxthorn), which is listed as a priority weed in the *Western Regional Strategic Weed Management Plan 2017-2022* (LLS 2017) was present throughout PCT 39.

Figure 4: *Acacia stenophylla, Duma florulenta* and *Geijera parviflora* midstorey within PCT 39 with *Eucalyptus coolabah* canopy (right background).

Figure 5: *Eucalyptus coolabah* and *Eucalyptus camaldulensis* canopy within PCT 39 (background; PCT 40 in foreground).

PCT 39 is associated with the BC Act and EPBC Act TEC *Coolabah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions*. In accordance with the NSW Scientific Committee final determination and the Commonwealth EPBC Act Conservation Advice, this TEC occurs characteristically on grey, self-mulching clays (DPIE 2021d; DAWE 2011). Soil within the study area is comprised of red brown earths. Given the absence of grey, self-mulching clays, the area of PCT 39 within the study area does not meet the listing criteria for *Coolabah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions*.

PCT 39 is also associated with the BC Act and EPBC Act listed TEC *Artesian Springs Ecological Community in the Great Artesian Basin.* This TEC occurs where artesian water emerges at the surface through fault-lines in the overlying rock and produce mounds from the salts and sediments as the water evaporates (DPIE 2021e, NSW Scientific Committee 2001). No artesian springs were identified during the field survey. As such, no areas of PCT 39 within the study area meet the listing criteria for this TEC.

3.1.2. PCT 40 *Coolabah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains*

The study area contains 2,608m^2 and the impact area, 2,137m^2 of *PCT 40 Coolabah open woodland wetland with chenopod/grassy ground cover on grey and brown clay floodplains* which occurs on the alluvial clay floodplain in the north east of the study area.

Consistent with the PCT description, the overstorey consists of widely spaced *Eucalyptus coolabah*. Midstorey consists of *Atriplex nummularia* (Old Man Saltbush), *Rhagodia spinescens* (Thorny Saltbush) and *Myoporum montanum* (Western Boobialla). Midstorey cover was variable across PCT 40; however, was generally less than 30% projected foliage cover. Groundcover consists of species *Enteropogon acicularis* (Curly Windmill Grass), *Cynodon dactylon* (Couch) and *Sporobolus caroli* (Fairy Grass). Site photos of PCT 40 are provided in Figure 6 and Figure 7 below.

At the time of survey, exotic species richness and associated groundcover was very low. The exotic herb species *Tribulus terrestris* (Cathead) contributed less than 5% to overall groundcover. Signs of disturbance including vehicular tracks, rubbish and a small area of building ruins were present throughout PCT 40 within the study area. PCT 40 within the study area is in moderate condition. The priority weed species *Lycium ferocissimum* was also present throughout PCT 40.

Figure 6: *Rhagodia spinescens* and *Atriplex nummularia* midstorey within PCT 40, with *Eucalyptus coolabah* in background

Figure 7: *Enteropogon acicularis, Cynodon dactylon* and *Sporobolus caroli* groundcover within PCT 40, with scattered *Rhagodia spinescens* and *Atriplex nummularia* and *Eucalyptus coolabah* in background

PCT 40 is associated with the BC Act and EPBC Act EEC *Coolabah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions*. In accordance with the NSW Scientific Committee final determination, this EEC occurs on grey, self-mulching clays (DPIE 2021d, DAWE 2011). Soil within the study area is comprised of red brown earths. Given the absence of

grey, self-mulching clays, the area of PCT 40 within the study area does not meet the listing criteria for *Coolabah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions*.

PCT 40 is also associated with the BC Act and EPBC Act listed TEC *Artesian Springs Ecological Community in the Great Artesian Basin.* This TEC occurs where artesian water emerges at the surface through fault-lines in the overlying rock and produce mounds from the salts and sediments as the water evaporates (DPIE 2021e, NSW Scientific Committee 2001). No artesian springs were identified during the field survey. As such, no areas of PCT 40 within the study area meet the listing criteria for this TEC.

3.2. Threatened flora

No threatened flora species listed under the BC Act and / or the EPBC Act were identified during the field survey. A summary of habitat suitability for threatened flora within the study area is provided in Table 3. A likelihood of occurrence assessment (**Appendix A**) for threatened flora species within the study area determined that *Atriplex infrequens* has potential to occur within the study area. An assessment of significance was undertaken for this species.

Table 3: Flora habitat suitability summary

Threatened species	Suitable habitat present	Habitat assessment
Atriplex infrequens	Yes	*Atriplex infrequens* is associated with broad drainage tracts, clay flats and possibly occasionally inundated habitats, similar to those within the study area. Very little is ecological information is available for this species. *Atriplex infrequens* is associated with PCT 39 and PCT 40 (OEH 2021). The field survey was undertaken outside the recommended survey period for this species (November to February).
Austrostipa metatoris	No	*Austrostipa metatoris* grows in association with *Eucalyptus populneus, Eucalyptus intertexta* and *Callitris glaucophylla* all of which were not recorded within the study area. Furthermore, *Austrostipa metatoris* is not associated with PCT 39 or PCT 40 (OEH 2021).
Calotis moorei	No	The study area contains unsuitable soil type for *Calotis moorei* which grows in sandy soil. Furthermore, *Calotis moorei* is not associated with PCT 39 or PCT 40 (OEH 2021).
Solanum karsense	No	*Solanum karsense* grows in occasionally flooded depressions on heavy grey clays with a high self-mulching surface. The study area contains unsuitable habitat for *Solanum karsense* as soil within the study area was not self-mulching. Furthermore, *Solanum karsense* is not associated with PCT 39 or PCT 40 (OEH 2021).

A full list of flora species identified in the study area during the field survey is provided in **Appendix B**. Threatened flora species records returned by the database search within a 10 km radius of the study area is provided in **Figure 8**.

Figure 8: Threatened flora

3.3. Threatened fauna

A total of 24 threatened fauna species were identified from the data review as being recorded or having potential habitat within a 10 km radius of the study area.

Upon review of the literature and historical records for these species, as well as field habitat assessment, ten (10) of these species were deemed as potentially occurring within the study area, and included:

- Stimson's Python (*Antaresia stimsoni*)
- Red-tailed Black-Cockatoo (inland subspecies; *Calyptorhynchus banksii samueli*)
- Spotted Harrier (*Circus assimilis*)
- Brown Treecreeper (eastern subspecies; *Climacteris picumnus*)
- Grey Falcon (*Falco hypoleucos*)
- Painted Honeyeater (*Grantiella picta*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*)
- Black-breasted Buzzard (*Hamirostra melanosternon*)
- Little Eagle (*Hieraaetus morphnoides*)
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)

Potential habitat for these species within the study area is of low to moderate quality, due to the high level of disturbance and the absence of records both within the study area and within higher quality habitat present in areas immediate outside of Wilcannia, such as the Paroo – Darling National Park, and continuous remnant riparian and floodplain woodland along the Darling River to the north and south of the study area.

No threatened fauna species were recorded during the field survey.

Habitat features recorded within the study area and the associated threatened fauna groups which have potential to utilise this habitat is detailed in Table 4.

Table 4: Habitat features present within the study area and associated threatened fauna usage

Threatened fauna group	Habitat feature	Usage type
Diurnal and nocturnal birds, microbats, reptiles and arboreal mammals	Hollow bearing tree	Shelter and nesting / roosting
	Groundcover	Shelter, nesting and foraging habitat
	Midstorey and overstorey	Shelter, nesting and foraging habitat
Diurnal birds	*Lysiana exocarpi* (Mistletoe)	Shelter, nesting and foraging habitat
Aquatic fauna	Darling River	Shelter, spawning and foraging habitat

The field survey identified one hollow bearing tree within the study area, which contains three small hollows (50 to 100mm in diameter) and two (2) medium hollows (100 – 200 mm in diameter) (Figure 9). No nests were identified within the study area. This hollow bearing tree is not proposed to be removed.

Lysiana exocarpi (Mistletoe) was recorded on *Acacia stenophylla* at a density of approximately 10 individuals per hectare within PCT 39; however, no mistletoe species of the Loranthaceae genus *Amyema,* which are the preferred feeding feed source for the Painted Honeyeater were recorded.

A full list of fauna species opportunistically recorded in the study area during the field survey are presented in **Appendix B**. Historical threatened fauna species records returned by the database search within 10 km of the study area is shown in **Figure 10** below.

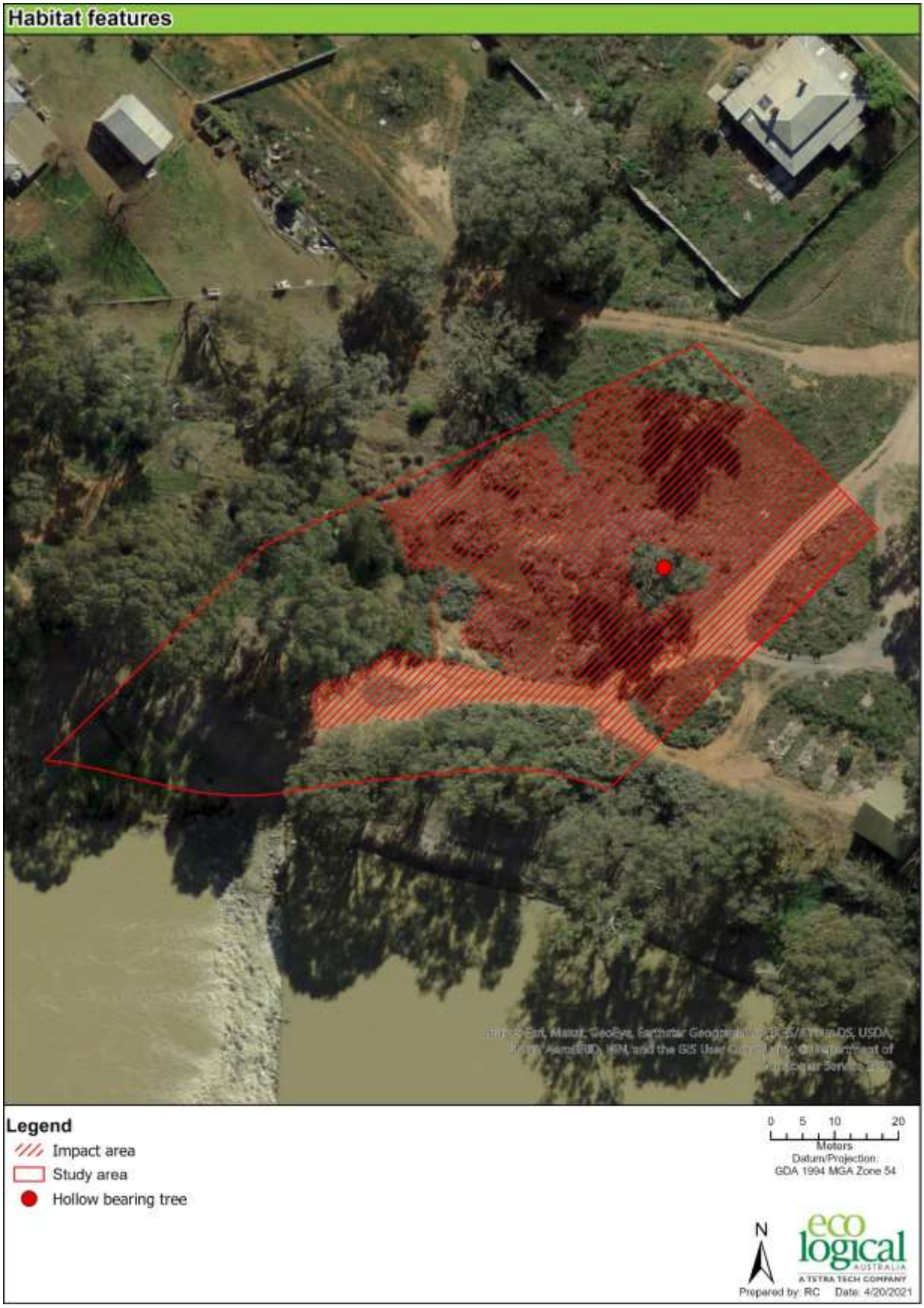

Figure 9: Habitat features

Figure 10: Threatened fauna

4. Impact assessment

4.1. Impacts to vegetation and threatened flora

The proposed Project will result in the removal of approximately 2,179 m^2 of native vegetation (Table 2 above). The proposed Project will not impact upon any TECs or threatened flora species. No mature trees are proposed to be removed as part of the Project.

The likelihood of occurrence determined that *Atriplex infrequens* has potential to occur within the study area; however, assessments of significance under both the BC Act (**Appendix E**) and EPBC Act (**Appendix F**) determined that the Project will not result in a significant impact to this species.

4.2. Impacts to threatened fauna

No threatened fauna species have been recorded historically or during field surveys within the study area. Despite this, potential low-quality habitat for ten (10) threatened fauna species occurs within the study area.

Assessments of Significance were carried out for each of these species under both the BC Act (**Appendix E**) and EPBC Act (**Appendix F**) provisions. Given the absence of records and the low quality of potential habitat present at the site, along with the large areas of higher quality habitat present within the surrounding area and immediately adjacent to the site (i.e. upstream and downstream of the Darling River), these assessments concluded that the Project will not result in a significant impact to threatened fauna species.

4.3. Impact mitigation

Recommended mitigation measures to ensure potential impacts of the proposed works are contained and avoided include the following:

- The disturbance limit for the Project should be clearly delineated using temporary fencing, ropes and/or flagging tape
- Sediment fences should be installed prior to construction to mitigate against the effects of sedimentation into the Darling River and to minimise erosion.
- Minimise the potential for the establishment and spread of weeds within and adjacent to the proposed Project area through the restriction of vehicle access and requirements for the washdown of vehicles, machinery and footwear. All equipment, footwear and clothing should be free from mud, dirt and vegetation debris prior to entry and leaving the proposed work area.
- Consult the Aboriginal Heritage Due Diligence Assessment (ELA 2021) prepared in conjunction with this flora and fauna impact assessment report, prior to and during the proposed works.

5. Conclusion

This flora and fauna impact assessment was undertaken in accordance with Part 5 of the EP&A Act and in accordance with Part 7 of the BC Act. Relevant MNES listed under the EPBC Act were also assessed within this report. The biodiversity values of the study area were identified through a comprehensive data review and ecological field surveys. The data review included searches of the relevant threatened species databases, whilst the field survey included vegetation validation, vegetation mapping, targeted flora surveys, opportunistic fauna surveys and threatened fauna habitat mapping.

The study area (approximately 5,000 m^2) is comprised of 4,441m^2 of native vegetation (1,833m^2 of PCT 39 and 2,608m^2 of PCT 40) and 521 m^2 of existing vehicle tracks. Based on preliminary designs, the proposed impact area for the Project is approximately 2,701 m^2 consisting of 521 m^2 of existing vehicle tracks and 2,179 m^2 of native vegetation (42m^2 of PCT 39 and 2,137m^2 of PCT 40).

Assessments of significance were undertaken for ten (10) fauna species and one (1) species listed as threatened under the BC Act and undertaken for one (1) fauna species and one (1) flora species listed under the EPBC Act (**Appendix E** and **Appendix F**). Due to the absence of records within the study area, and the proposed impact area, and the presence of suitable habitat for these species upstream and downstream of the Darling River, as well as in areas surrounding the study area, the assessments of significance concluded that the Project will not result in a significant impact to these threatened fauna or flora species.

Additionally, the Project will not impact on any area mapped on the NSW Biodiversity Values Map (DPIE 2020). No TECs listed under the BC Act and / or the EPBC Act were identified during the field survey.

The total impacts to native vegetation will be approximately 2,179 m^2. As such, the Project is below the associated clearing threshold and does not trigger entry into the NSW Biodiversity Offsets Scheme.

Mitigation measures have been proposed to ensure that potential impacts associated with the Project are avoided, minimised and contained.

6. References

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Appendix A Likelihood of occurrence

Table 5: Likelihood of occurrence – terrestrial fauna

Class	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution, habitat and ecology	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
Aves	*Actitis hypoleucos*	Common Sandpiper		M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves. Breeds in Eurasia, uncommon summer migrant to Australia (August to May). Some overwinter.	Yes	None	Yes	No	No		No
Aves	*Amytornis modestus*	Thick-billed Grasswren (eastern subspecies)	E4A	V	In NSW, known only from the Packsaddle area. May still occur at other locations in Upper Western Region. Saltbush, cottonbush, bluebush and nitre-bush areas on sandy plains or depressions in gibber; also along watercourses in clumps of cane grass The nest is deep and loosely-made, shaped either like a cup, half-dome or dome; located on or near the ground in a clump of cane grass, within the foliage of low shrub or in flood debris, and constructed of dead grasses, twigs and dry bark strips. Forages on the ground and under or around bushes for a wide variety of seeds, berries and invertebrates	No	Marginal	No	No	No		No
Aves	*Apus pacificus*	Fork-tailed Swift		M	Recorded in all regions of NSW. Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes. Non-breeding visitor to all states and territories of Australia, arriving from its breeding grounds in Siberia around October, and departing in April. The species is thought to be highly mobile within Australia, moving across the country in search of food. They probably roost aerially.	Yes	None	Yes	No	Unlikely	No	No
Aves	*Ardea alba*	Great Egret		M	Widespread, occurring across all states/territories and a vagrant on Lord Howe and Norfolk Island. Swamps and marshes, grasslands, margins of rivers and lakes, salt pans, estuarine mudflats and other wetland habitats. Mostly forages in shallow to moderately deep water for fish, insects, crustaceans, molluscs, frogs, lizards, snakes and small birds and mammals. In NSW, most breeding colonies are located in the Darling Riverine Plains region and the Riverina region. Breeding sites are located in wooded and shrubby swamp. The breeding season generally extends from November to April.	Yes	Marginal	Yes	No	No	-	No
Aves	*Ardea ibis*	Cattle Egret			Widespread and common across NSW. Grasslands, wooded lands and terrestrial wetlands. Uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. The Cattle Egret often forages away from water on low lying grasslands, improved pastures and croplands. It is commonly found amongst livestock.	Yes	None	Yes	No	No		No
Aves	*Calidris acuminata*	Sharp-tailed Sandpiper		M	Summer migrant. Widespread in most regions of NSW, especially in coastal areas, but sparse in the south-central Western Plain and east Lower Western Regions. Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. Breeds Arctic Siberia, summer migrant to Australia August-April. Some overwinter. Forage in wetlands or intertidal mudflats, inundated vegetation of saltmarsh, grass or sedges, sewage ponds. Roosting occurs at the edges of wetlands, on sandy beaches, stony shores or on rocks in water.	Yes	None	Yes	No	No		No
Aves	*Calidris melanotos*	Pectoral Sandpiper		M	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands	Yes	None	Yes	No	No		No

Class	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution, habitat and ecology	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
					Breeds in northern Russia and North America, migrates to non-breeding areas in South America. Recorded in Australia from September to June.							
Aves	*Calyptorhynchus banksii samueli*	Red-tailed Black-Cockatoo (inland subspecies)	V		Watercourses and overflows of the Darling, Paroo, Bogan, Macquarie and Barwon Rivers extending along the Darling River from Wentworth in the south to Bourke and thence through to Brewarrina in the north. It extends east to Walgett and perhaps Boggabilla on the Barwon and south through to the Macquarie Marshes. Eucalyptus forest and woodlands, especially along watercourses. Also grasslands, scrublands, wetlands and vegetation on floodplains.	Yes	Marginal	Yes	No	Potential	Yes	Yes
Aves	*Circus assimilis*	Spotted Harrier	V		Found throughout the Australian Mainland, except in densely forested or wooded habitats, and rarely in Tasmania. Grassy open woodland, inland riparian woodland, grassland, shrub steppe, agricultural land and edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months. Preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion.	Yes	Marginal	Yes	No	Potential	Yes	Yes
Aves	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V		From eastern through central NSW, west to Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. Eucalypt woodlands and dry open forest. Up to 80% of the diet is comprised of ants. Also feeds on other invertebrates (including spiders, insects larvae, moths, beetles, flies, hemipteran bugs, cockroaches, termites and lacewings), nectar from Mugga Ironbark (Eucalyptus sideroxylon) and paperbarks, and sap, along with lizards and food scraps. Hollows in standing dead or live trees and tree stumps are essential for nesting. The species breeds in pairs or co-operatively in territories which range in size from 1.1 to 10.7 ha.	No	None	Yes	No	Potential	Yes	No
Aves	*Falco hypoleucos*	Grey Falcon	E1		Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands. Preys primarily on birds, especially parrots and pigeons; reptiles and mammals are also taken. 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.	Yes	Marginal	Yes	No	Potential	Yes	Yes
Aves	*Gallinago hardwickii*	Latham's Snipe		M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands. Non-breeding migrant to Australia, arriving between July-November from its breeding grounds in Japan and far-eastern Russia, and departing by late February. It feeds in mud or in very shallow water with low, dense vegetation. Roosting occurs on the ground near or in foraging areas beside or under clumps of vegetation, among dense tea-tree, in forests, in drainage ditches or plough marks, among boulders, or in shallow water if cover is unavailable.	Yes	None	Yes	No	No		No
Aves	*Grantiella picta*	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema. Insects and nectar from mistletoe or eucalypts are occasionally eaten. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Yes	Marginal	Yes	No	Potential	Yes	Yes

Class	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution, habitat and ecology	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V		Distributed along the coastline of Mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas. The breeding season extends from June to January (or sometimes February) in southern Australia. Breeding habitat is usually close to water but may occur up to a kilometre away. Nests are Manly located in tall open forest or woodland, but sometimes in other habitats such as dense forest, closed scrub or in remnant trees on cleared land. The White-bellied Sea-Eagle feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans, and on carrion and offal.	Yes	Marginal	Yes	No	Potential	Yes	Yes
Aves	*Hamirostra melanosternon*	Black-breasted Buzzard	V		Areas receiving less than 500 mm rainfall from north-western NSW and north-eastern SA to the east coast at about Rockhampton, then across northern Australia south almost to Perth. Inland habitats, including timbered watercourses, grasslands and sparsely timbered woodlands. Mostly preys on reptiles, small mammals, birds, including nestlings, carrion and large eggs. Breeds from August to October near water in a tall tree. The stick nest is large and flat and lined with green leaves. Normally two eggs are laid.	Yes	Marginal	Yes	No	Potential	Yes	Yes
Aves	*Hieraaetus morphnoides*	Little Eagle	V		Throughout the Australian Mainland, with the exception of the most densely forested parts of the Dividing Range escarpment. Open eucalypt forest, woodland or open woodland, including she-oak or Acacia woodlands and riparian woodlands of interior NSW. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Yes	Marginal	Yes	No	Potential	Yes	Yes
Aves	*Lophochroa leadbeateri*	Major Mitchell's Cockatoo	V		In NSW, occurs across the arid and semi-arid inland, as far east as Bourke and Griffith, and sporadically even further east. 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.	Yes	Marginal	Yes	No	Potential	Yes	Yes
Aves	*Motacilla flava*	Yellow Wagtail		M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns. Breeds Europe to Siberia and west Alaska, Regular summer migrant to Australia (November-April).	No	None	No	No	No		No
Aves	*Oxyura australis*	Blue-billed Duck	V		Widespread in NSW but is most concentrated in the southern Murray-Darling Basin area. Coastal and inland wetlands and swamps. Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February. Young birds disperse in April-May from their breeding swamps in inland NSW to non-breeding areas on the Murray River system and coastal lakes. They feed on the bottom of swamps eating seeds, buds, stems, leaves, fruit and small aquatic insects such as the larvae of midges, caddisflies and dragonflies.	Yes	None	Yes	No	No		No
Aves	*Pezoporus occidentalis*	Night Parrot	E4	E	Presumed extinct	No	None	No	No	No	-	No

Class	Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution, habitat and ecology	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
Aves	*Rostratula australis*	Australian Painted Snipe	E1	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. Breeding is often in response to local conditions; generally, occurs from September to December. Forages nocturnally on mudflats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	Yes	None	Yes	No	No		No
Mammalia	*Nyctophilus corbeni*	Corben's Long-eared Bat	V	V	Distribution coincides approximately with the Murray Darling Basin; the Pilliga Scrub region is the distinct stronghold for this species. Mallee, *Allocasuarina luehmannii* (bulloke) and box eucalypt- dominated communities, especially box/ironbark/cypress-pine vegetation. Roosts in tree hollows, crevices, and under loose bark. Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground. Mating takes place in autumn with one or two young born in late spring to early summer.	No	Marginal	No	No	No		No
Reptilia	*Antaresia stimsoni*	Stimson's Python	V		In NSW, occurs in north-west from Bourke and Gundabooka National Park in the east to Broken Hill and Wilcannia in the south. Arid and semi-arid environments including rock outcrops, sandy plains and dune fields, woodlands, shrublands and hummock grasslands. Rocky outcrops provide caves and deep crevices, and tree-lined watercourses provide numerous low hollows and fallen trees. They forage at night with adults feeding on small mammals (especially bats), birds, geckoes and other lizards, whilst juveniles take geckoes and skinks.	Yes	Marginal	Yes	No	Potential	Yes	Yes

Table 6: Likelihood of occurrence - flora

Scientific Name	Common Name	BC Act Status	EPBC Act Status	Distribution, habitat and ecology	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
Atriplex infrequens	A saltbush	V	V	Confined to the NSW far western plains. Broad drainage tracts, clay flats and possibly occasionally inundated habitats. Flowering time has not been recorded; however, seeding is recorded in December. Very little ecological information is available for this species so it's critical habitat components can only be speculated.	Yes	Good	Yes	No	Likely	Yes	Yes
Austrostipa metatoris	A spear-grass	V	V	Most records occur in the Murray Valley. Scattered records also occur in central NSW including Lake Cargelligo, east of Goolgowi, Condobolin and south west of Nymagee. Sandhills, sand ridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils. Associated species *include Eucalyptus populnea, E. intertexta, Callitris glaucophylla, Casuarina cristata, Santalum acuminatum* and *Dodonaea viscosa*. Flowers in response to rain. It is not known if fire plays a role in the ecology of this species.	Yes	None	No	No	No. Not found during field assessment	No	No
Calotis moorei	A burr-daisy	E		The species is confined to NSW and is known from only four populations in NSW, the type locality north-west of Louth near the homestead of Mt Mulyan sheep station, west of Wilcannia, around the Menindee area and an old record at Zara Station near Deniliquin. *Calotis moorei* grows in sandy soil and appears to be associated with *Acacia* woodlands and chenopod shrublands.	Yes	None	No	No	No. Not found during field assessment	No	No
Solanum karsense	Menindee Nightshade	V	V	Endemic to NSW and restricted to the far south-western plains, extending up the Darling River to the Menindee and Wilcannia districts. Manly restricted to the area between the Darling and Lachlan Rivers Occasionally flooded depressions with heavy soil. Also sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils. Flowers chiefly in spring. This species is ephemeral in nature, appearing following rainfall events. It also tolerates disturbance and will often appear after such activities as grading, ploughing and flooding for irrigation. A clonal species recorded as common to locally abundant in most populations. It can form small colonies of several hundred plants, to large spreading colonies found over an area of 8-12000 hectares	Yes	None	No	No	No Not found during field assessment	No	No

Table 7: Likelihood of occurrence – aquatic fauna

Class	Scientific Name	Common Name	FM Act Status	EPBC Act Status	Distribution	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
Actinopterygii	*Ambassis agassizii*	Western population of Olive Perchlet	E2		This population is now found only at a few sites in the Darling River drainage. Rivers, creeks, ponds, and swamps. They are usually found in slow-flowing or still waters, often near overhanging vegetation or amongst logs, dead branches, and boulders. Often congregate around large woody debris (snags) and vegetation during the day but disperse during the night to feed on micro-crustaceans and insects, including larvae. Males and females reach sexual maturity in one year. Spawning occurs in November and December, when water temperatures reach about 23°C. Females release adhesive eggs about 0.7mm in diameter amongst aquatic vegetation.	Yes	None	Yes	No	No		No
Actinopterygii	*Bidyanus bidyanus*	Silver Perch	V	CE	Murray-Darling basin; now mostly stocked fish which generally have not established reproducing populations. The most abundant remaining natural population occurs in the central Murray River downstream of Yarrawonga Weir as well as several of its anabranches and tributaries. Other self-sustaining populations reported from the McIntyre and Macquarie Rivers in northern NSW. Fast-flowing, open waters, especially where there are rapids and races; however, will also inhabit warm, sluggish water with cover provided by large woody debris and reeds. They are omnivorous, feeding on small aquatic insects, molluscs, earthworms, and green algae. Males reach sexual maturity at three years of age, when around 25 cm in length, and females at five years, when around 29 cm. Adults migrate upstream in spring and summer to spawn. Juveniles also sometimes move upstream in response to rising water temperatures and levels. Females can shed 300,000 or more semi-buoyant eggs of about 2.75 mm in diameter. The eggs develop in a few days to become feeding larvae that drift downstream.	Yes	None	Yes	No	No		No
Actinopterygii	*Maccullochella macquariensis*	Trout Cod	E1	E	Endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers, and the Macquarie River in central NSW. Found in relatively fast currents, especially in fairly deep water close to the bank, and often congregate around large woody debris (snags). They are carnivores, preying Manly on other fishes as well as crustaceans and aquatic insects. Trout cod reach sexual maturity at 3-5 years, when approximately 35cm (males) or 43cm (females) in length, and 0.75 to 1.5kg in weight. They form pairs and spawn during spring and early summer.	Yes	None	Yes	No	No		No
Actinopterygii	*Maccullochella peelii*	Murray Cod		V	Throughout most of the Murray Darling Basin with the exception of some localised extinctions. Some translocated populations exist outside the species' natural distribution in impoundments and waterways (Cataract Dam and the Nepean River system in NSW). Clear rocky streams to slow flowing, turbid rivers and billabongs. Frequently found in the Man river channel and larger tributaries; also, in floodplain channels when they contain water. The Murray Cod reaches sexual maturity at 4 to 5 years of age and at 2 to 3 kg in weight. The species migrates upstream prior to spawning in late spring and early summer when the water reaches a temperature of between 16-21°C. The Murray Cod is the top predator of Australia's inland rivers. Cod are carnivorous, typically feeding on spiny crayfish, yabbies and shrimps.	Yes	None	Yes	No	No		No
Gastropoda	*Notopala sublineata*	Darling River Snail	E4A		The Darling River Snail was once common and widely distributed in the Darling River and its tributaries. The species is now restricted to a few populations in irrigation pipes near Bourke, Brewarrina and Walgett. The Darling River Snail is a medium-sized (20-25mm) freshwater snail with a round shell that ends in a conical spire.	Yes	None	Yes	No	No		No
Actinopterygii	*Ambassis agassizii*	Western Olive Perchlet	E2		Olive Perchlets are a small native fish that occur in both eastern (coastal) and western (Murray-Darling) drainages, but these populations may be genetically distinct. The western population of the Olive Perchlet was once widespread throughout the Murray-Darling system of South Australia, Victoria, western New South Wales	Yes	None	Yes	No	No		No

Class	Scientific Name	Common Name	FM Act Status	EPBC Act Status	Distribution	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
					and southern Queensland. This population has suffered a serious decline and is now found only at a few sites in the Darling River drainage.							

Table 8: Likelihood of occurrence - TEC

Community Name	TSC Act Status	EPBC Act Status	Description	TSC listing equivalent	Distribution overlaps	Habitat quality present	Species known to occur in region	Species known to occur on site	Likelihood of occurrence	Habitat on site directly or indirectly impacted	Impact Assessment Required
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	E	Semi-arid to humid subtropical woodland where *Eucalyptus coolabah* subsp. *coolabah* (Coolibah) and/or *Eucalyptus largiflorens* (Black Box) are the dominant canopy species and where the understorey tends to be grassy. Other tree species may occur in the tree canopy but are not dominant, including *Acacia salicina* (Cooba), *Acacia stenophylla* (River Cooba), *Casuarina cristata* (Belah), *Eremophila bignoniiflora* (Eurah), *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus populnea* (Bimble Box). The mid or shrub layer may or may not be present. Ground cover lifeforms typically comprise native graminoids, other herbs, chenopods and other low shrubs that are typically under 50 cm tall. It is associated with the floodplains and drainage areas of the Darling Riverine Plains and the Brigalow Belt South bioregions. Found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, stream levees, drainage depressions and Gilgai.	Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	Yes	Low	Yes	No	No	No	No
Artesian Springs Ecological Community in the Great Artesian Basin	CE	E	Naturally restricted to the artesian springs of the Great Artesian Basin in north-western NSW. The springs occur where artesian water emerges at the surface through fault-lines in the overlying rock and produce mounds from the salts and sediments as the water evaporates. The vegetation within the community frequently consists of sedges or similar vegetation, however, trees and shrubs may be adjacent to the springs or nearby Occurs at the edges of the Great Artesian Basin. Mostly found in Queensland and South Australia, however, a few occur in the Mulga Lands, Darling Riverine Plains and Cobar Peneplain Bioregions of New South Wales.	NA	Yes	Low	Yes	No	No.	No	No

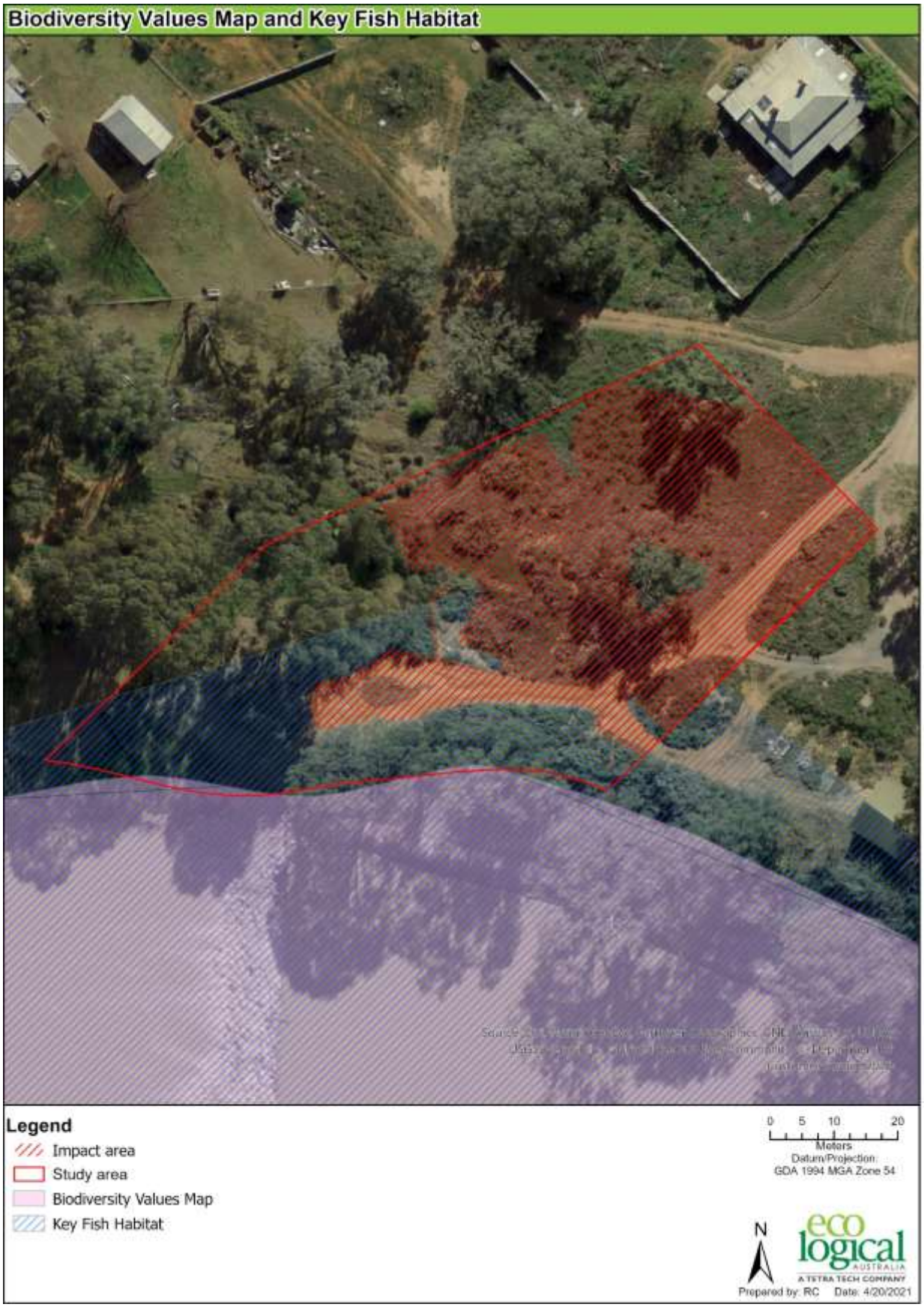
Appendix B Flora species list

Scientific name	Common name
Acacia stenophylla	River Cooba
Atriplex nummularia	Old Man Saltbush
Austrostipa bigeniculata	
Boerhavia dominii	Tar vine
Chloris ventricosa	Tall Windmill Grass
Cynodon dactylon	Couch
Dactyloctenium radulans	Button Grass
Duma florenta	Lignum
Einadia nutans	Climbing Saltbush
Enchylaena tomentosa	Ruby Saltbush
Enteropogon acicularis	Curly Windmill Grass
Eucalyptus camaldulensis	River Red Gum
Eucalyptus coolabah	Coolabah
Geijera parviflorum	Wilga
Lycium ferocissimum	African Boxthorn
Lysiana exocarpi	Mistletoe
Minuria cunninghamii	
Paspalidium jubiflorum	Warrego Grass
Portulaca oleracea	Pigface
Rhagodia spinescens	Thorny Saltbush
Rumex sp.	
Rytidosperma sp.	Wallaby Grass
Salsola australe	
Sclerolaena divaricata	Copper Burr
Senna artemisioides var. *zygophylla*	
Senna artemisioides var. *coriaceae*	
Sida sp.	
Sporobolus caroli	Fairy Grass
Tetragona tetragonioides	Warrigal Greens
Tribulus terrestris	Cathead
Vittadinia cuneata	Fuzzweed

Appendix C Fauna species list

Common name	Scientific name
Australian Magpie	*Gymnorhina tibicen*
Australian Ringneck	*Barnardius zonarius*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Chestnut-rumped Thornbill	*Acanthiza uropygialis*
House Sparrow	*Passer domesticus*
Magpie lark	*Grallina cyanoleuca*
Noisy miner	*Manorina melanocephala*
Superb Fairy Wren	*Malurus cyaneus*
Willy wagtail	*Rhipidura leucophrys*
Yellow-plumed Honeyeater	*Lichenostomus ornatus*

Appendix D Biodiversity Values Map and Key Fish Habitat



Appendix E BC Act assessment of significance

Under Section 7.3 of the NSW BC Act, the test of significance is to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. This test has been applied to species listed under the BC Act that are considered to be potentially impacted by the proposed Project.

Species that have been assessed against the test of significance were identified through the development of the Likelihood of Occurrence (**Appendix A**). The following species have been assessed below:

- Stimson's Python (*Antaresia stimsoni*)
- Red-tailed Black-Cockatoo (inland subspecies; *Calyptorhynchus banksii samueli*)
- Spotted Harrier (*Circus assimilis*)
- Brown Treecreeper (eastern subspecies; *Climacteris picumnus*)
- Grey Falcon (*Falco hypoleucos*)
- Painted Honeyeater (*Grantiella picta*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*)
- Black-breasted Buzzard (*Hamirostra melanosternon*)
- Little Eagle (*Hieraaetus morphnoides*)
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*)
- *Atriplex infrequens*

The following questions are to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened flora and fauna, ecological communities, or their habitats:

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

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

   ii is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction, in relation to the habitat of a threatened species or ecological community:

c. in relation to the habitat of a threatened species or ecological community:

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

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

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

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The BC Act Assessment of Significance is detailed in Table 9. No endangered ecological communities will be impact upon by the proposed Project, so question b. is not applicable. No areas of declared outstanding biodiversity value have been mapped within the study area and the proposed Project will not directly or indirectly impact upon any declared area of outstanding biodiversity value, as such question d. has also been addressed.

Table 9: Assessment of Significance for BC Act listed species

Species	A	C	E	Conclusion
Threatened woodland birds: • Red-tailed Black-Cockatoo (inland subspecies) • Painted Honeyeater • Major Mitchell's Cockatoo • Black-breasted Buzzard • Brown Treecreeper (eastern subspecies)	The study area provides low quality potential habitat for threatened nesting woodland birds. Due to the absence of records and the low quality of potential habitat within the study area, combined with the presence of higher quality habitat in the surrounding area, it is unlikely that the proposed Project will adversely affect the life cycles of these species such that local populations are likely to be placed at risk of extinction.	The proposed Project will likely result in the clearing of a maximum 2,179 m^2 of potential foraging and nesting habitat for these species. Due to the small extent of the proposed disturbance footprint, the already disjunct nature of the potential habitat and the mobile nature of these species, the proposed Project is unlikely to result in habitat fragmentation detrimental to the long-term survival of these species in the locality. The study area provides low quality potential habitat with higher quality habitat present in areas surrounding the study area. Additionally, the absence of records from the study area indicates that the removal of this habitat is unlikely to affect the long-term survival of these species in the locality.	The proposed Project constitutes one key threatening process relevant to these species, Clearing of native vegetation. Due to the small scale (maximum 2,179 m^2) and low quality of potential habitat for these highly mobile species, it is unlikely that the proposed Project will increase the impact of this key threatening process on these species.	After considering the previous questions, it has been determined that the proposed Project is unlikely to have a significant impact on the threatened woodland bird species assessed.
Threatened birds of prey: • Grey Falcon • Little Eagle • Spotted Harrier • White-bellied Sea-Eagle	The study area provides low quality potential habitat for threatened birds of prey. Due to the absence of records and the absence of nests recorded during the field survey within the study area, and the low quality of potential habitat within the study area, combined with the	The proposed Project will likely result in the clearing of a maximum of 2,179 m^2 of potential foraging and breeding habitat for these species. It is highly unlikely that suitable nest for either species will be impacted by the proposed Project	The proposed Project constitutes one key threatening process relevant to these species, Clearing of native vegetation. Due to the small scale (maximum 2,179 m^2) and low quality of potential habitat for these highly mobile species, it is unlikely that the	After considering the previous questions, it has been determined that the proposed Project is unlikely to have a significant impact on the threatened birds of prey species assessed.

Species	A	C	E	Conclusion
	presence of higher quality habitat in the surrounding area, it is unlikely that the proposed Project will adversely affect the life cycles of these species such that local populations are likely to be placed at risk of extinction.	as no nests were recorded during the field survey. Due to the small extent of the proposed disturbance footprint, the already disjunct nature of the potential habitat and the mobile nature of these species, the proposed Project is unlikely to result in habitat fragmentation detrimental to the long-term survival of these species in the locality. The study area provides low quality potential foraging habitat, with higher quality habitat present in areas surrounding the study area. Additionally, the absence of records from the study area indicates that the removal of this habitat is unlikely to affect the long-term survival of these species in the locality	proposed Project will increase the impact of this key threatening process on these species.	
Atriplex infrequens	The study area provides low quality potential habitat for threatened *Atriplex infrequens*. Due to the absence of records and the low quality of potential habitat within the study area, combined with the presence of higher quality habitat in the surrounding area, it is unlikely that the proposed Project will adversely affect the life cycles of this species such that local populations	The proposed Project will likely result in the clearing of a maximum 2,179m^2 of potential habitat for this species. Due to the small extent of the proposed disturbance footprint and the already disjunct nature of the potential habitat, the proposed Project is unlikely to result in habitat fragmentation detrimental to the long-term survival of these species in the	The proposed Project constitutes one key threatening process relevant to these species, Clearing of native vegetation. Due to the small scale (maximum 2,179 m^2) and low quality of potential habitat for this species, it is unlikely that the proposed Project will increase the impact of this key threatening process on these species.	After considering the previous questions, it has been determined that the proposed Project is unlikely to have a significant impact on *Atriplex infrequens.*

Species	A	C	E	Conclusion
	are likely to be placed at risk of extinction.	locality. The study area provides low quality potential habitat with higher quality habitat present in areas surrounding the study area. Additionally, the absence of records from the study area indicates that the removal of this habitat is unlikely to affect the long-term survival of these species in the locality.		

Appendix F EPBC Act Assessment of Significance

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

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

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

The 'vulnerable species' Significant Impact Criteria have been applied to the Painted Honeyeater (*Grantiella picta*) as shown in Table 10 and to *Atriplex infrequens* as shown in **Table 11**.

Table 10: Assessment of Significance for the EPBC Act listed Painted Honeyeater

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of an important population of a species	Due to the absence of records and the low quality of potential habitat within the study area, combined with the presence of higher quality habitat in the surrounding area, it is unlikely that the proposed Project will lead to a long-term decrease in the size of an important population of this species
Reduce the area of occupancy on an important population	Given the absence of records and the low quality of potential habitat within the study area, combined with the small scale of the proposed Project, it is unlikely that the area of occupancy of an important population will be reduced
Fragment an existing important population into two or more populations	The study area provides low quality potential habitat with higher quality habitat present in areas surrounding the study area. Additionally, the absence of records from the study area indicates that the removal of this habitat is unlikely to affect the long-term survival of these species in the locality. Due to the small extent habitat within the study area (2,179 m^2), the already disjunct nature of the potential habitat and the highly mobile nature of these species, it is unlikely that an existing important population will be split into two or more populations.
Adversely affect habitat critical to the survival of the species	No habitat critical to the survival of this species has been declared. Given the absence of records and the low quality of potential habitat within the study area, combined with the small scale of the disturbance footprint, it is unlikely that the

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	proposed Project will adversely impact upon the survival of this species.
Disrupt the breeding cycle on an important population	Given the absence of records and the low quality of potential habitat within the study area, combined with the small scale of the disturbance footprint, it is unlikely that the proposed Project will disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Given the absence of records and the low quality of potential habitat within the study area, combined with the small scale of the disturbance footprint and the presence of large areas of higher quality habitat in the areas surrounding Wilcannia, it is unlikely that the proposed Project will result in a decline of the species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No harmful invasive species are expected to become established in areas of potential habitat for this species as a result of the proposed Project. Mitigation measures have also been proposed to limit the potential spread and/or introduction of invasive species.
Introduce disease that may cause the species to decline, or	No disease that may cause this species to decline is likely to be introduced by the proposed Project
Interfere substantially with the recovery of the species.	After considering the above statements, the proposed Project is unlikely to interfere with the future recovery of the Painted Honeyeater.

Table 11: Assessment of Significance for the EPBC Act listed *Atriplex infrequens*

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of an important population of a species	Due to the absence of records and the low quality of potential habitat within the study area, combined with the presence of higher quality habitat in the surrounding area, it is unlikely that the proposed Project will lead to a long-term decrease in the size of an important population of this species
Reduce the area of occupancy on an important population	Given the absence of records and the low quality of potential habitat within the study area, combined with the small scale of the proposed Project, it is unlikely that the area of occupancy of an important population will be reduced
Fragment an existing important population into two or more populations	The study area provides low quality potential habitat with higher quality habitat present in areas surrounding the study area. Additionally, the absence of records from the study area indicates that the removal of this habitat is unlikely to affect the long-term survival of these species in the locality. Due to the small extent habitat within the study area (2,179m^2) and the already disjunct nature of the potential habitat, it is unlikely that an existing important population will be split into two or more populations.
Adversely affect habitat critical to the survival of the species	No habitat critical to the survival of this species has been declared. Given the absence of records and the low quality of

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	potential habitat within the study area, combined with the small scale of the disturbance footprint, it is unlikely that the proposed Project will adversely impact upon the survival of this species.
Disrupt the breeding cycle on an important population	Given the absence of records and the low quality of potential habitat within the study area, combined with the small scale of the disturbance footprint, it is unlikely that the proposed Project will disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Given the absence of records and the low quality of potential habitat within the study area, combined with the small scale of the disturbance footprint and the presence of large areas of higher quality habitat in the areas surrounding Wilcannia, it is unlikely that the proposed Project will result in a decline of the species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No harmful invasive species are expected to become established in areas of potential habitat for this species as a result of the proposed Project. Mitigation measures have also been proposed to limit the potential spread and/or introduction of invasive species.
Introduce disease that may cause the species to decline, or	No disease that may cause this species to decline is likely to be introduced by the proposed Project
Interfere substantially with the recovery of the species.	After considering the above statements, the proposed Project is unlikely to interfere with the future recovery of the *Atriplex infrequens.*

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