APPENDIX C PRELIMINARY BIODIVERSITY ASSESSMENT

Keri Keri Solar Farm

Preliminary Biodiversity Assessment

Project No.: 0617753

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Document details	
Document title	Keri Keri Solar Farm
Document subtitle	Preliminary Biodiversity Assessment
Project No.	0617753
Date	30 March 2022
Version	1.0
Author	Lorena Boyle, Kelsie Youman
Client Name	Acciona

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
Draft 1.0	00	Lorena Boyle	Matt Davis	Murray Curtis	11.02.2022	
Final	00	Kelsie Youman	Matt Davis	Murray Curtis	04.03.22	
Final	01	Kelsie Youman	Matt Davis	Murray Curtis	30.03.22	

Signature Page

30 March 2022

Keri Keri Solar Farm

Preliminary Biodiversity Assessment

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Acronyms and Abbreviations

Name	Description
ALA	Atlas of Living Australia
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BAM-C	BAM Calculator
BC Act	NSW Biodiversity Conservation Act 2016
BDAR	Biodiversity development assessment report
BESS	Battery Energy Storage System
BOS	Biodiversity Offsets Scheme
BOSET	Biodiversity Offsets Scheme Entry Threshold
BUS	Bird Utilisation Surveys
DAWE	Department of Agriculture, Water and the Environment
DEWHA	Department of the Environment, Water, Heritage and the Arts
DPI	Department of Primary Industries
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERM	Environmental Resources Management
IBRA	Interim Biographic Regionalisation of Australia
LGA	Local Government Area
LLS Act	Local Land Services Act 2013
MNES	Matters of National Environmental Significance
NA	Nature Advisory
NEM	National Electricity Market
NSW	New South Wales
ºC	Degrees Celsius
OEH	Office of Environment and Heritage
PCT	Plant Community Types
PMST	Protected Matters Search Tool
PPE	Personal Protection Equipment
Project Area	The area of land corresponding to property boundaries on which the Project is located

Name	Description
RSA	Rotor Swept Area
SAII	serious and irreversible impacts
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SIG 1.1	Significant Impact Guidelines 1.1- Matters of National Environmental Significance
SSD	State Significant Development
Subject land	Land subject to a development, activity, clearing defined as a 100m buffer to all project infrastructure
TBDC	Threatened Biodiversity Data Collection
TECs	threatened ecological communities
the Project	The Keri Keri Wind Farm
VIC	Victoria
VIS	Vegetation Information System
WoNS	Weeds of National Significance

1. INTRODUCTION

Acciona Energy Australia Global Pty Ltd (the Proponent) proposes to develop the Keri Keri Renewable Energy Project near the town of Balranald, in the Riverina Murray Region of NSW. The Keri Keri Renewable Energy Project is proposed to include wind and solar electricity generation and battery storage. This Biodiversity Assessment relates to the Keri Keri Solar Farm component (the Project) only.

The Project Area is situated approximately 820 kilometres (km) (by road) west of Sydney, and 31 km east of Balranald across a total area of approximately 1,322 hectares. The Project Area is situated within the Murray River Local Government Area (LGA), which formed in 2016 through the amalgamation of the former Murray Shire and Wakool Shire councils, on land that is currently used for seasonal farming. The western boundary of the Project Area adjoins the Yanga State Conservation Area (separated by Keri Keri Road) and the ephemeral watercourse of Abercrombie Creek runs along the southern boundary.

A Preliminary Biodiversity Assessment was completed in November 2020 by NGH across the Project Area. The NGH (2020) assessment was based on desktop analysis of publically available datasets, NGH field surveys conducted in September and October of 2020, and Nature Advisory Pty Ltd surveys conducted in autumn and spring of 2020. This Preliminary Biodiversity Assessment aims to further refine the biodiversity constraints on the Project Area through updated desktop analysis and Spring 2021 field surveys conducted by ERM. The information gained from all survey efforts would support the development of a Biodiversity Development Assessment Report (BDAR).

1.1 Project Overview

The Project is a proposed solar farm consisting of solar photovoltaic (PV) panels with a maximum installed capacity of up to 500 MWp and an alternating current (AC) capacity of up to 400 MWn. The solar arrays will be mounted to steel structures which are pile driven or screwed into the ground, with a maximum height of 3 metres when horizontal. The Project will involve the use of a single axis tracking system.

In addition, the Project will include the following Project infrastructure and associated works:

- underground and overhead electrical reticulation network;
- substation;
- switchyard or expansion of the wind farm switching station;
- power conversion units (power station, inverter, DC-AC transformer);
- internal access tracks and road upgrades along the haulage route (Keri Keri Road) (as required);
- a potential temporary construction accommodation camp;
- construction compound, temporary laydown areas and car parking;
- security fencing and landscaping;
- operations and maintenance building (O&M); and
- concrete batching plants.

The broader Keri Keri Renewable Energy Project also includes a proposed wind farm and battery energy storage system (BESS) that will consist of up to 176 wind turbine generators (WTGs) with a maximum installed capacity of up to approximately 1003 MW. The Keri Keri Wind Farm is subject to a separate state significant development application and EPBC referral, and will include ancillary infrastructure including substations, concrete batch plants, road access and internal road network.

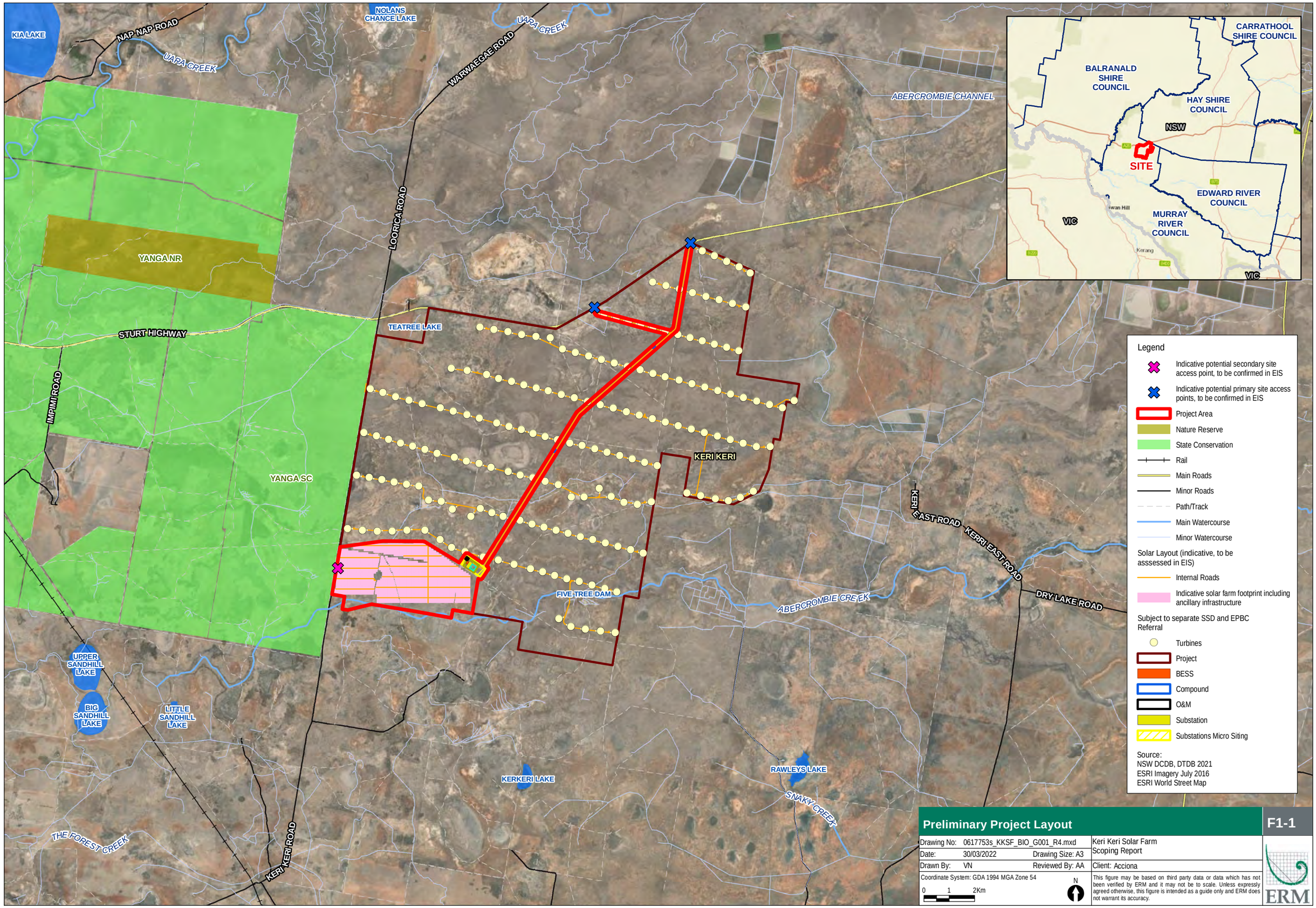
Subject to the timing of the construction of the Project, the Project may utilise shared infrastructure proposed as part of the Keri Keri Wind Farm. This includes:

- temporary construction compounds;
- construction offices;
- concrete batching plants;
- one operation and maintenance facility and building;
- wind farm substation;
- wind farm switching station;
- security fencing and landscaping; and
- access off the Sturt Highway and internal access tracks.

This is detailed further in **Section 3.2** and in the Keri Keri Wind Farm Scoping Report.

A map of the Project Area is provided in **Figure 1-1**, which also shows the proposed indicative development footprint for the solar farm as the subject land, which includes panels and associated ancillary infrastructure. The solar farm layout and development footprint, including permanent and temporary construction footprint will be further refined and assessed during EIS preparation. The adjacent Keri Keri Wind Farm Project Area and layout is also shown for context.

The Project Area has a total area of 1,751 hectares. Within this Project Area, an area of land designated the subject land has been and will continue to be assessed for biodiversity values, including matters of national environmental significance. The subject land is 1,751 ha in size. For the purpose of defining a development footprint for this referral it is assumed that approximately 20% of the subject land required for access tracks and internal transmission lines will be directly impacted. For impacts associated with solar arrays, substation, switching station, BESS and O&M facilities it is assumed that 100% of the subject land will be impacted for these elements. Using these assumptions the Project will result in a development footprint of 1,074ha.



Preliminary Project Layout

F1-1

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Date:	30/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

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1.2 Objectives

The objective of this assessment is to provide an indication of potential ecological constraints that are known to or have the potential to occur within the Project Area. The results of this assessment will build upon updated desktop reviews, the preliminary constraints assessment completed by NGH on behalf of Acciona in 2020 (NGH 2020) and the spring 2021 field survey completed by ERM. This assessment allows for the identification of significant biodiversity values associated with the Project Area and preliminary recommendations to be provided in terms of avoidance, mitigation and/or additional assessment for biodiversity values.

For the purpose of this preliminary assessment, biodiversity values include:

- native species and communities with a particular focus on those listed as migratory, vulnerable, endangered or critically endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Biodiversity Conservation Act 2016* (BC Act);
- fauna species susceptible to turbine strikes such as resident raptors, migratory birds and microbats; and
- important habitat components (e.g. hollow-bearing trees) and landscape features.

The preliminary assessment includes:

- identification and mapping of threatened flora and fauna species records, important habitat components and landscape features;
- preliminary mapping of the extent and type of native Plant Community Types (PCT) and Threatened Ecological Communities (TEC) listed under the BC Act and/or EPBC Act;
- preliminary survey design including likely target species and seasonal survey techniques;
- preliminary significant impact assessment for impacts to matters of national environmental significance (MNES) to support an EPBC Referral submission; and
- a description of outcomes and recommendations to support the ongoing project design and assessment process.

This preliminary biodiversity assessment will be presented as an Appendix in the Scoping Report to facilitate the issue of the Secretary's Environmental Assessment Requirements (SEARs), a critical requirement prior to the development of the Environmental Impact Statement (EIS). It will also be used to support an EPBC Act referral for the Project and includes a summary section on applicable MNES.

2. LEGISLATION

Table 2-1 below provides a description of the relevant legislative context. This report addresses the objectives and requirements of the legislation as it relates to the identification of biodiversity and ecological values. Impacts to these values will be addressed separately if required as part of the EIS to be prepared.

Table 2-1 Legislation applicable to this Preliminary Biodiversity Assessment

Commonwealth Legislation
Commonwealth Environment Protection and Biodiversity Conservation Act 1999
The EPBC Act requires approval of the Commonwealth Minister for the Environment for actions that are likely to have a significant impact on Matters of National Environmental Significance (MNES) as assessed in accordance with the EPBC Significant Impact Guidelines 1.1. The EPBC Act is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) and lists threatened species, ecological communities and other MNES. Any proposed action that is expected to have an impact on MNES must be referred to the Minister for assessment under the EPBC Act, or assessed under the existing bilateral agreement, or accredited process between the Commonwealth and the State of New South Wales (NSW). The ecological desktop review and field studies undertaken to date have identified MNES likely to occur within the Project Area. A Significant Impact Assessment has been undertaken for MNES likely to be present (0), and will be further assessed within the EIS. The Project will need to be referred to the Australian Government Minister for the Environment.

NSW Statutory Legislation and Guidelines
Biodiversity Conservation Act 2016 (BC Act)
The BC Act came into effect on 25 August 2017. The BC Act replaced the NSW Threatened Species Conservation Act 1995, the NSW Nature Conservation Trust Act 2001 and parts of the NSW National Parks and Wildlife Act 1974. The BC Act establishes mechanisms for: The management and protection of listed threatened species of native flora and fauna (excluding fish and marine vegetation) and threatened ecological communities (TECs). ■ The listing of threatened species, TECs and key threatening processes; ■ The development and implementation of recovery and threat abatement plans; ■ The declaration of critical habitat; ■ The consideration and assessment of threatened species impacts in development assessment process; and ■ Biodiversity Offsets Scheme (BOS), including the Biodiversity Values Map and Biodiversity Assessment Method (BAM) to identify serious and irreversible impacts (SAII). The BC Act establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments. Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the Biodiversity Assessment Method (BAM). A Biodiversity Values Map and Biodiversity Offsets Scheme Entry Threshold (BOSET) tool are available to identify the presence of mapped biodiversity values within land proposed for development as well as the clearing thresholds that would trigger application of the BAM. A review of the BOSET was undertaken on 20th December 2021 and determined that areas within the Project area are mapped as Areas of Biodiversity Values. These areas are associated with the ephemeral Abercrombie Creek which is located on the southern border of the Project Area. The Biodiversity Offsets Scheme applies to state significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning, Industry and Environment (now Department of Planning and Environment) determines that the Proposal is not likely to have a significant impact. As this is an SSD development and there are recorded biodiversity values within the Project Area, application of the BAM and the preparation of a Biodiversity Development Assessment Report (BDAR) will be required.

Local Land Act 2013 Services

The Local Land Services Act 2013 (LLS Act) regulates the management of vegetation on rural land. The amendments to the LLS Act have resulted in a change to the criteria for native vegetation clearing. There are now three different land categories for clearing on rural land:

- Category 1 – 'Exempt land' which will not be subject to clearing approval;
- Category 2 – 'Regulated Land' on which clearing of native vegetation may be carried out with or without approval in accordance with an 'allowable activity' or 'code' under the LLS Act, and
- 'Excluded Land' – Land not categorised in the Regulatory Maps and to which the LLS Act does not apply.

Native Vegetation Regulatory Map (Regulatory Map) confirms that the areas of Category 2 – Vulnerable Regulated Land is present within the Project Area in associated with the ephemeral Abercrombie Creek that is located on the southern border of the Project Area. This will be further explored as part of the EIS process.

Biosecurity Act 2015

The NSW *Biosecurity Act 2015* came into effect on 1 July 2017, effectively replacing the *Noxious Weeds Act 1993*, and 13 other Acts, with a single Act. Under the Noxious Weeds Act all landowners had a responsibility to control noxious weeds on their property. Under the Biosecurity Act broadly the same responsibility will apply and will be known as a General Biosecurity Duty.

The General Biosecurity Duty states "*Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised*." The general biosecurity duty applies to all weeds listed in Schedule 3 of the Biosecurity Act. Primary weeds have been identified in different Local Government Areas (LGA) due to the level of threat infestation they represent, some of the Weeds of National Significance (WoNS) are also listed as Primary Weeds in LGAs.

A strategic plan for each weed will be required at each site to define responsibilities and identify strategies and actions to control the weed species. These can be downloaded from: http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html

Fisheries Management Act 1994

The *Fisheries Management Act 1994* provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. Similar to the BC Act, the *Fisheries Management Act 1994* lists threatened species, populations and ecological communities of fish and marine vegetation. Consideration of likely occurrence of threatened fish in the waterways in the Project Area will be provided within the EIS although it is noted that the ephemeral Abercrombie Creek running along the southern border of the Project Area provides habitat for the threatened Flathead Galaxias (*Galaxias rostratus*). During field surveys undertaken during 2020 and 2021 it was noted that all mapped watercourses and hydro lines did not contain water despite good rainfall.

Schedule 6 of the *Fisheries Management Act 1994* also lists the following key threatening process that may be relevant to this Proposal and will be addressed within the EIS:

- Degradation of native riparian vegetation along New South Wales water courses;
- Human-caused climate change; and
- Removal of large woody debris from New South Wales rivers and streams.

Any waterway crossings will need to consider an appropriately designed structure that does not obstruct fish passage and will be designed in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management and the Policy and Guidelines for Fish Friendly Waterway Crossings. Notwithstanding this, it is noted that a permit under section 219 would not be required for waterway crossings as Section 5.23 of the EP&A Act excludes SSD projects from requiring "a permit under section 201, 205 or 219 of the Fisheries Management Act 1994".

SEPP (Koala Habitat Protection) 2019

The State Environmental Planning Policy (Koala Habitat Protection) 2021 was made and commenced on 17 March 2021. The Koala SEPP 2021 reinstates the policy framework of SEPP Koala Habitat Protection 2019 to 83 Local Government Areas (LGA) in NSW. The Project Area is located wholly within the Murray River LGA (formerly Wakool LGA). Koala SEPP 2021 and 2020 do not currently apply to the Murray River Shire Council, however Koala SEPP 2019 will apply. The Project would, as far as practicable, aim to be consistent with the objectives of the relevant Koala Habitat Protection SEPP and will be addressed within any BDAR prepared to support the EIS.

3. METHODOLOGY

This Preliminary Biodiversity Assessment identifies and describes key biodiversity values within the Project Area and to provide preliminary recommendations in terms of avoidance, mitigation and/or additional assessment required. A combination of desktop and field methods were utilised in the preparation of this report.

3.1 Desktop Review

The desktop review included the following resources:

- Online Threatened Biodiversity Data Collection (TBDC), including NSW BioNet Atlas, Vegetation Information System (VIS) Database and threatened biodiversity profiles. Accessed 20th December 2021;
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) identifying threatened species and communities with potential to occur within the locality (10 km buffer around the Project boundary). Accessed 20th December 2021;
- NSW SEED Portal to identify Plant Community Types (PCT), threatened species or communities known or likely to occur; Mitchell Landscapes, map of Interim Biographic Regionalisation of Australia (IBRA) version 7;
- NSW eSPADE Soils and Land Mapping;
- NSW DPI Fisheries key fish habitat mapping;
- Bureau of Meteorology Groundwater Dependent Ecosystem Atlas;
- Weeds of National Significance and Priority Weeds within the LGA;
- NGH (2020) Preliminary Biodiversity Constraints assessment. Report Prepared for Acciona;
- Atlas of Living Australia (ALA) Database; and
- local government databases.

The results of the database searches are included in Appendix A.

3.2 Field Surveys

3.2.1 2020 Field Surveys

A preliminary field assessment of the Keri Keri Renewable Energy Project Areas was conducted on the 30th – 31st March 2020 by two NGH Ecologists. Site evaluation utilised rapid assessment to determine key vegetation types and potential for vegetation and habitat of conservation significance. Biodiversity features such as hollow bearing trees, natural and artificial water sources, woodland stands, large (eagle) stick nests and habitat presence, quality, and connectivity. Rapid assessment was utilised to determine the likelihood of threatened ecological community occurrence. Targeted surveys were undertaken for Candidate Species during September and October 2020. A summary of the field survey effort and methods is provided in Table 3-2 with the location of field surveys shown in Figure 3-1.

3.2.2 Spring 2021 Field Surveys

Spring 2021 biodiversity field surveys were completed from Tuesday 26th October to Friday 12th November 2021 across the Keri Keri Renewable Energy Project Areas with two ecologists in the field. During the survey event, the following was undertaken within the Keri Keri Solar Farm Project Area:

- rapid data points for Plant Community Types (PCTs) / Threatened Ecological Communities (TECs) and vegetation zone mapping;

- vegetation integrity plots (BAM plots); and
- targeted threatened flora surveys.

The Biodiversity Assessment Method (BAM) requires targeted surveys to be completed when suitable habitat is identified for species credit species to inform the BDAR. These are species whose presence cannot be reliably predicted through PCTs or habitat types, and their presence or absence on a site must be confirmed through field survey.

A summary of the field survey effort is provided in Table 3-2 with the location of field surveys shown in Figure 3-1. The 2021 winter season has been an above average rainfall period and the entire Project Area received excellent spring rainfall. The Project Area received significant rainfall, restricting field work between 24th to 28th November, and the nights of 1st and 2nd of December. Conditions were fine for the remaining survey days.

Additional surveys are scheduled to be undertaken in accordance with the BAM to inform the EIS.

3.2.2.1 Spring Field Survey Conditions

Table 3-1 details the daily weather observations that were recorded during the spring field survey period for the nearest weather station, Swan Hill, located approx. 70 km south west of the Project. It is noted that these records do not accurately represent the rainfall which occurred on the Project Area during the survey period.

The Project Area received significant rainfall overnight on Tuesday, 23rd November, and patchy rain for the remainder of the week. This restricted access, as advised by landowner, and as such the Project Area was not accessed between 24th November and 28th November. In addition, rainfall occurred on the evening of Wednesday 1st December and Thursday 2nd December which further restricted night works.

Table 3-1 Daily Weather Observations for Swan Hill Weather Station

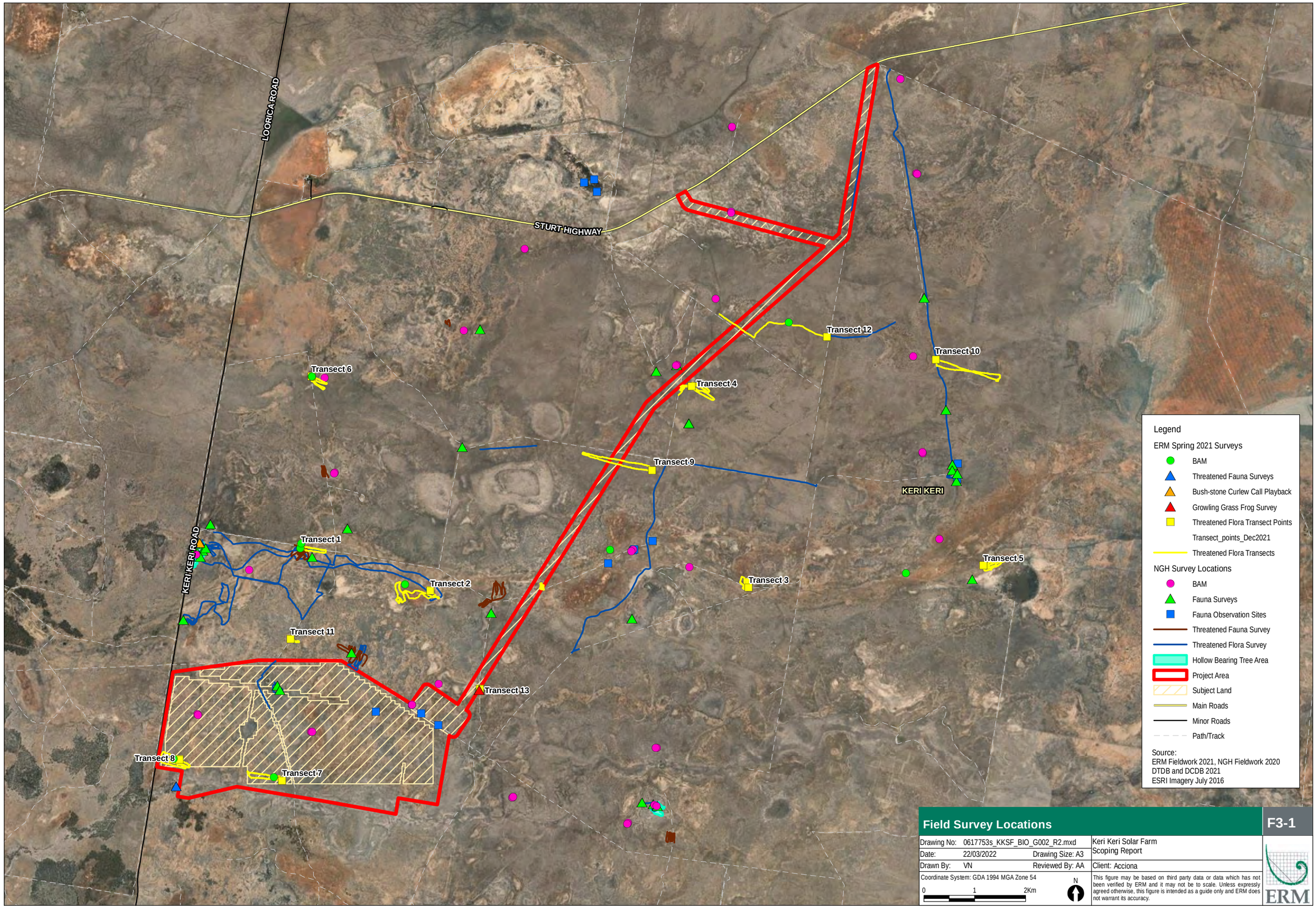
Date	Minimum Temperature (°C)	Maximum Temperature (°C)
Spring Surveys		
22/11/2021	8.8	29.2
23/11/2021	16.2	26.5
24/11/2021	17.6	30.4
25/11/2021	18.9	28.5
26/11/2021	11.4	27.2
27/11/2021	10.8	26.5
28/11/2021	11.9	27.9
29/11/2021	12.4	30.7
30/11/2021	15.2	34.3
01/12/2021	9.1	36.3
02/12/2021	18.4	36.2

Table 3-2 Summary of Survey Methods and Effort during Field Surveys

Target	Method	Effort
Candidate Species		
Fauna		
Australian Bustard	Six evening and six morning diurnal transects were conducted across the Keri Keri Renewable Energy Project (wind and solar) Project Areas. Diurnal: Surveys were conducted using the point count method over 500 m, stopping every 100 m to record for 10 minutes, noting all bird species observed (12 hours). Five 1 km vehicle transects, taking 1 hour each. Nocturnal: Three x 1 hour nocturnal surveys Solar Farm: one 1 km vehicle transect for 1 hour, one nocturnal survey for 1 hour	Total 2 survey hours within Keri Keri Solar Farm development footprint
Plains-wanderer	Diurnal: Surveys were conducted across the Keri Keri Renewable Energy Project (wind and solar) Project Areas using the point count method over 500m, stopping every 100m to record for 10 minutes, noting all bird species observed (12 hours). Five 1 km vehicle transects, taking 1 hour each. Nocturnal: Three 1 hour nocturnal surveys Solar Farm footprint: one 1 km vehicle transect for 1 hour, one nocturnal survey for 1 hour	Total 2 survey hours within Keri Keri Solar Farm development footprint
Major Mitchell's Cockatoo and Superb Parrot	Surveys were conducted using the point count method over 500 m, stopping every 100 m to record for 10 minutes, noting all bird species observed (12 hours). 2 x targeted area searches for detection of the species by sight or call were conducted in suitable habitat (woodland with hollow bearing trees). All area searches were undertaken in the early morning (sunrise to 10 am) and evening (4 pm to sunset). Note was made of the presence of suitable hollow bearing trees within each survey site location.	Total 20 survey hours
Raptors: Square-tailed Kite, Little Eagle	Surveys were conducted using the point count method over 500 m, stopping every 100 m to record for 10 minutes, noting all bird species observed (12 hours). Two diurnal stick nest surveys, including observation of nest occupation and usage were conducted. All sticknests were inspected for signs of use. Stick nests found to be in use were selected for further survey which involved observation of three sticknests for 30 minutes each.	Total 13.5 survey hours
Microbats: Corben's Long-eared Bat	Two passive Anabat detectors (Anabat Swift from Titley Scientific) were situated near dams and treed areas for 4 nights from 12 – 16 October. The weather was considered suitable for adequate data collection within this timeframe.	4 nights

Target	Method	Effort
Candidate Species		
Flora		
Austrostipa wakoolica A spear-grass	Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	No surveys completed to date and suitable habitat will be targeted in future field surveys
Brachyscome papillosa Mossgiel Daisy	Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	4 hours
Caladenia arenaria Sand-hill Spider Orchid	Survey effort for threatened flora included eight parallel field traverses Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	No surveys completed to date and suitable habitat will be targeted in future field surveys
Convolvulus tedmoorei Bindweed	Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	4 hours
Lepidium monoplocoides Winged Peppercress	Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	4 hours
Maireana cheelii Chariot Wheels	Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	No surveys completed to date and suitable habitat will be targeted in future field surveys
Solanum karsense Menindee Nightshade	Survey effort for threatened flora included eight parallel field traverses conducted across the site within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020.	2 hours

Target	Method	Effort
	Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	
Swainsona murrayana Slender Darling Pea	Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	2 hours
Swainsona sericea Silky Swainson-pea	Survey effort for threatened flora included eight parallel field traverses conducted across the Project Area within the draft development footprint in varying PCTs. Each parallel of the transect was conducted at 10-15 m intervals due to chenopod and shrub vegetation types as per DPIE 2020. Each parallel field traverse was conducted for 1 person hours which equates to covering 4 ha (as per table 4.3 DPIE 2020).	No surveys completed to date and suitable habitat will be targeted in future field surveys
Vegetation community surveys and plots		
Plant Community Types – Rapid Data Points	Rapid Data Points - Plant Community Types (PCTs) were identified according to the NSW PCT classification as described in the NSW BioNet Vegetation Information System (BioNet VIS) using a combination of API, a review of regional vegetation mapping and ground-truthing dominant structural / floristic attributes.	Traverses across the study area
Plant Community Types – Vegetation integrity plots/ BAM plots	A total of 2 plot-based floristic surveys were conducted in accordance with s.5.2.1.9 of the BAM. Survey plots were established around a central 50 m transect and each included: A 20 m x 20 m plot sampled for the presence of flora species. The plots were carefully examined to identify all flora species present. This search continued until it was confident that all flora species within the plots were detected. One 1000 m² (20 m x 50 m) plot to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs. Five 1 m² sub-plots to assess average litter cover (and other groundcover components).	Two BAM Plots completed



Field Survey Locations

F3-1

Drawing No:	0617753s_KKSF_BIO_G002_R2.mxd		Keri Keri Solar Farm Scoping Report
Date:	22/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

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3.3 Likelihood of Occurrence

Consistent with the accepted approach for biodiversity assessment, a preliminary likelihood of occurrence assessment was undertaken for the Project Area, informed by desktop sources and the field survey results. Desktop sources identified a number of fauna and flora species listed under the EPBC Act and BC Act that have been recorded previously or are predicted to occur within a 10 kilometre buffer of the project boundary. The likelihood of occurrence approach refines the desktop generated list using site-specific and specific-species habitat information.

The assessment ranks the likelihood of the species occurring within the project boundary through analysis of species distribution information and the presence of specific habitat attributes as identified through the desktop analysis and field survey.

The criteria applied are outlined in **Table 3-3.** The preliminary likelihood of occurrence assessment is provided in Appendix C of this report.

Table 3-3 Likelihood of Occurrence Criteria

Factor	Preferred habitat exists	Suitable habitat exists[1]	Habitat does not exist[2]
Records within Project Area	Known	Known	Known
Records in the locality[3]	Likely	Potential	Unlikely
No records in the locality, but Project Area is within known distribution	Potential	Unlikely	Unlikely
No records in the locality, and Project Area is outside of distribution	Unlikely	Unlikely	Unlikely

1. *Habitat may be considered suitable, but not preferred.*
2. *Based on sources reviewed and/or field survey results.*
3. *'Locality' refers to a 10 km buffer of the Project Area.*

3.4 Assumptions and Limitations

The field and desktop assessments provide an overview of the biodiversity values that exist within the Project Area. Surveys were undertaken at discrete locations to gain a general understanding of the types of species and habitat features that occur. Not all portions within the Project Area could be visited during the field surveys.

The absence of a species from a database list or observational study does not confirm its absence within the Project Area. The lack of existing records from databases is more likely to indicate a low historic sampling effort in the region, as opposed to an absence of species. Similarly, the timing of the surveys and survey methods undertaken to date precludes the detection of a number of species. Future targeted biodiversity surveys will be completed to inform an EIS.

To overcome these limitations, the likelihood of occurrence is based on the precautionary approach and identifies species that have the potential to occur rather than relying on species sightings alone.

4. BIODIVERSITY VALUES

This chapter summarises the results of the desktop review and field investigations used to understand and assess the potential biodiversity values present within the project boundary. Key landscape features and a summary of biodiversity values within the Project Area are summarised in **Table 4-1**.

Table 4-1 Summary of Landscape Features and Biodiversity Values

Landscape feature	Summary notes
IBRA Bioregion IBRA Sub-region	Riverina (RIV) Bioregion Murrumbidgee (RIV02) Sub-region
Landuse and history of disturbance	Areas within the Project Area have been subject to extensive clearing for agricultural purposes including cropping, and modified pastures for livestock grazing. As a result, minimal treed vegetation remains on the Project Area, with few sparsely distributed paddock trees and shrubs.
Vegetation	The Biodiversity Project Area was characterised by a mix of improved pasture and high quality native grasslands, with small remnant patches of woodlands. Based on the results of the Spring field survey, four Plant Community Types (PCT) have been recorded within the Project Area. Of these vegetation communities, three have association with BC Act listed TECs, and none have association with EPBC Act listed TECs
Threatened species	Based on the field survey effort described in Section 3 of this report, two (2) threatened species are known to occur within the Project Area. These include: ■ White-fronted Chat (*Epthianura albifrons*) listed as vulnerable under the BC Act; and ■ Little Eagle (*Hieraaetus morphnoides*), listed as vulnerable under the BC Act. Nine (9) threatened species are considered likely to occur within the Project Area based on the Likelihood of Occurrence Assessment: ■ Spotted Harrier (*Circus assimilis*) listed as vulnerable under the BC Act; ■ Growling Grass Frog (*Litoria raniformis*) listed as endangered under the BC Act and vulnerable under the EPBC Act; ■ Mossgiel Daisy (*Brachyscome papillosa*) listed as vulnerable under the BC Act and EPBC Act; ■ Winged Pepper-cress (*Lepidium monoplocoides*) listed as endangered under the BC Act and EPBC Act; ■ Black Falcon (*Falco subniger*), listed as vulnerable under the BC Act; ■ Plains-wanderer (*Pedionomus torquatus*), listed as endangered under the BC Act and critically endangered under the EPBC Act; ■ Grey-crowned Babbler (*Pomatostomus temporalis*), listed as vulnerable under the BC Act; ■ Chariot Wheels (*Maireana cheelii*), listed as vulnerable under the BC Act and EPBC Act; and ■ Major Mitchell's Cockatoo (*Lophochroa leadbeateri*), listed as vulnerable under the BC Act. Further field surveys will be conducted in accordance with the BAM to inform an EIS.
Areas of Geological Significance	There are no karst, caves, crevices, cliffs or other areas of geological significance within the Project Area.
Areas of Outstanding Biodiversity Value (AOBV)	There are Areas of Outstanding Biodiversity Value (AOBV) within the Project Area. These areas are on the southern border, associated with the ephemeral Abercrombie Creek which is located along the southern boundary of the Project Area. During the NGH (2020) and ERM 2021 field surveys all watercourses and hydro lines were observed to be dry, despite substantial rainfall during the winter and spring seasons.

Landscape feature	Summary notes
Aquatic habitat	NSW Hydrography mapping shows the Project Area boundary intersects the ephemeral Abercrombie Creek through the southern portion, and contains drainage lines. Farm dams are also common across the agricultural landscape. Indirect impacts and sensitive creek crossing designs will be considered as part of the EIS
Habitat Values	The key habitat types likely to occur within the Project area are: ■ Native grasslands; and ■ Waterways and dams.

4.1 Vegetation Communities

The Riverina Bioregion is characterised by extensive riverine floodplains, and is dominated by chenopod shrublands and native grasslands. The climate is semiarid with low, winter-dominant rainfall, hot summers and cool winters. Large portions of land within the Project Area have been disturbed, and are characterised by grazed native and modified grasslands resulting from livestock grazing.

The western boundary of the Project Area is located immediately adjacent to the Yanga State Conservation Area (Yanga SCA), managed by NSW National Parks and Wildlife Service (NPWS). This area was initially reserved in 2007 and covers an area of 34,557.39 ha. The Yanga SCA has connectivity to the Yanga National Park and Yanga Nature Reserve. The creation of the parks initiated the first large-scale protection and conservation of River Red Gum (*Eucalyptus camaldulensis*) in NSW. The River Red Gum forests are an iconic value of the parks and are part of the third-largest contiguous stand of River Red Gum forest in Australia. Other significant vegetation protected by the parks includes Black Box woodland, Lignum shrubland, Nitre Goosefoot shrubland and three endangered ecological communities. In addition, the parks are one of the most biologically diverse areas in the NSW Riverina Bioregion. They provide habitat for 24 threatened animals and contain one of the largest known populations of the nationally endangered Growling Grass Frog (*Litoria raniformis*). The location of the Parks in relation to the Project Area are presented in **Figure 1-1.**

A review of the state vegetation type mapping for the Riverina region (Version v1.2 - VIS_ID 4469) and NGH (2020) reports was undertaken to assess existing vegetation mapping information within the Study Area. This mapping was further refined based on the Spring 2021 survey observations and BAM plot data, resulting in a total of five PCTs being identified across the Project Area. **Table 4-2** below lists these PCTs and the area (ha) of each within the Project Area.

The dominant vegetation type across the Project Area has been identified as PCT 163, Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones which covers 1,245 ha, 71% of the Project Area.

Fourteen vegetation integrity plots (BAM plots) have been completed across the current Project Area and surrounding properties (Table 4.2) to collect floristic data to identify and map PCTs. Further collection of BAM plot will be undertaken to meet the BAM requirements and will be completed in subsequent survey periods to inform the BDAR and EIS to inform the designation of vegetation zones.

Table 4-2 Plant Community Types within the Project Area and Development Footprint

PCT No.	PCT Name	Vegetation Class	BAM Plots Completed	Project Area (ha)	Subject land (ha)
13	Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Inland Floodplain Woodlands	2 (outside subject land)	0.2	0
28	White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	Riverine Sandhill Woodlands	0	4.1	1.7
44	Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	Riverine Plain Grassland	2 (outside subject land)	36.2	36.2
153	Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	Aeolian Chenopod Shrubland	5 (outside subject land)	0.2	0.2
159	Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	Riverine Chenopod Shrubland	1 (outside subject land)	0.3	0.3
160	Nitre Goosefoot shrubland wetland on clays of the inland floodplains	Inland Floodplain Shrublands	1	37.5	30.2
163	Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones	Riverine Chenopod Shrublands	3	1,245.1	928.4
164	Cotton Bush open shrubland of the semi-arid (warm) zone	Riverine Chenopod Shrublands	0	417.6	378.4

LOORICA ROAD

STURT HIGHWAY

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Legend

Project Area

Subject Land

Main Roads

Minor Roads

Path/Track

PCT

28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone

44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion

153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones

159 - Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)

160 - Nitre Goosefoot shrubland wetland on clays of the inland floodplains

163 - Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones

164 - Cotton Bush open shrubland of the semi-arid (warm) zone

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

Plant Community Types within the Project Area

F4-1

Drawing No:	0617753s_KKSF_BIO_G003_R2.mxd		Keri Keri Solar Farm Scoping Report
Date:	22/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

0 1 2Km

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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM

4.2 Threatened Ecological Communities

Four (4) EPBC Act TECs were identified within the Protected Matters Search Tool as having the potential to occur within the Project Area. These TECs include:

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of Southeastern Australia;
- Weeping Myall Woodlands;
- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions; and
- Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions.

Based on field surveys, one (1) TEC has been confirmed to occur within the Project Area:

- Natural Grasslands of the Murray Valley Plains

A further six TECs listed under either the BC Act or EPBC Act have the potential to occur based on their association with PCTs identified in **Table 4-3** as known to occur within the Project Area. Additional field survey and analysis of vegetation plot data will be used to refine the extent and presence of these TECs within the Project Area.

Table 4-3 Known and Potential Threatened Ecological Communities

TEC	EPBC Act	BC Act	Associated PCTs	Recorded within the Project Area
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions		Endangered	PCT 28, White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregion		Endangered	PCT 28, White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	
Natural Grasslands of the Murray Valley Plains	Critically Endangered		PCT 44, Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	✓
Acacia loderi shrublands		Endangered	PCT 153, Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions		Endangered	PCT 159, Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	
Artesian Springs Ecological Community in the Great Artesian Basin		Critically Endangered	PCT 160, Nitre Goosefoot shrubland wetland on clays of the inland floodplains, and PCT 163, Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones	

The field surveys undertaken to date have not identified Mallee Box species, Grey Box or Weeping Myall woodlands within the Study Area. A small grove of Buloke (*Allocasuarina luehmannii*) was allocated to PCT 28, this community is representative of the Buloke Woodlands TEC. However, vegetation integrity plots (BAM Plots) have identified species consistent with the critically endangered TEC Natural Grasslands of the Murray Valley Plains associated with PCT 44. This is further detailed in the below section.

4.2.1 Natural Grasslands of the Murray Valley Plains TEC

The Natural Grasslands of the Murray Valley Plains are listed as Critically Endangered under the EPBC Act. BAM plots were undertaken in PCTs associated with the *Natural Grasslands of the Murray Valley Plains*, the species observed were compared to the indicator species for the TEC detailed in the EPBC Listing Advice (TSCC, 2012). A description of the TEC including details of 13 indicator species identified across the Project Area is provided in **Table 4-4**.

Table 4-4 Natural Grasslands of the Murray Valley Plains TEC

TEC	Natural Grasslands of the Murray Valley Plains
Description	The Natural Grasslands of the Murray Valley Plains ecological community is a type of natural temperate grassland that has semi-arid characteristics, due to the lower rainfall where it occurs. The structure is an open grassland to forbland in which trees and tall shrubs are sparse to absent. This grassland may be dominated or co-dominated by a range of forb species, depending on seasonal conditions and management history. Hence, the ecological community ranges from open to closed tussock grassland dominated by one or more of *Rytidosperma spp.* (wallaby-grasses), *Austrostipa spp.* (spear-grasses) *and Enteropogon ramosus* (curly windmill grass, spider grass). In areas where grasses are sparse it may be a herbland/forbland. At other sites, the grassland may grade into an open grassy shrubland where low chenopod shrubs become co-dominant with the grass component. The composition of the ecological community also will vary depending on factors such as past and present grazing pressure as well as drought and rainfall patterns. Additionally, some species may not always be evident above-ground, but instead exist in the seedbank, or as dormant structures such as bulbs, corms, rhizomes or rootstocks in some seasons or under certain conditions.
Canopy and mid layers (trees and large woody shrubs)	Trees and large shrubs are generally absent to sparse, amounting to less than 10% projective foliage cover for emergent trees or shrubs. Tree and large shrub species that may be present include *Eucalyptus spp., Acacia oswaldii* (umbrella wattle) and larger chenopods, such *Nitraria billardierei* (nitre-bush), across the range of the ecological community and *A. pendula* (weeping myall, boree) in NSW. Scattered occurrences/copses of *Allocasuarina luehmannii* (buloke) also may occur within the ecological community, especially in the Wimmera.
Species:	The ecological community is usually dominated by a range of species, typically perennial grasses, forbs or small shrubs (generally <1m tall). Although the dominant species may vary, the species that characterise the ecological community occur in most patches. The Listing Advice for this TEC identified 67 indicator species which are typically indicative of high quality remnants with little to no history of cultivation. Of these, 13 were identified within BAM plots conducted on the Project Area. *Austrostipa sp., Leiocarpa panaetioides, Lepidium phlebopetalum, Linum marginale, Maireana aphylla, Maireana pentagona, Minuria leptophylla, Plantago drummondi, Thysanotus tuberosus, Rhodanthe pygmaea, Bulbine bulbosa, Myriocephalus rhizocephalus, Ptilotus spathulatus.* One vegetation integrity plot (BAM Plot) is confirmed to make up part of the TEC, with seven (7) indicator species present.
Fauna	The structural complexity of the Natural Grasslands of the Murray Valley Plains, with its well-developed grass tussocks, open inter-tussock spaces, variety of forbs, and occasional emergent trees and shrubs, provides vital habitat for a wide range of fauna, including BC Act listed threatened species and EPBC Act listed marine, migratory and threatened species. Threatened species known to commonly occur in the ecological community are listed below: ■ Plains-wanderer; ■ Black Falcon; and ■ Striped Legless-lizard. The Project Area is outside the range of the Striped Legless-lizard, however provides good quality habitat for the Plains-wanderer and Black Falcon.

One BAM plot site is confirmed to form part of the TEC, meeting the following diagnostic features:

- Distribution within the Riverina Bioregion;
- Occurs on alluvial plains with heavy textured soils present on the Project Area;
- Trees and large shrubs (>1m tall) are absent;
- The site contains as many of the species listed in Table 1 (A) than Table 1 (B) presented within the Listing Advice (TSCC, 2012). The plot site contains 7 species from each list;
- The percentage cover of native vascular plains in the patch is greater than the percentage cover of perennial exotic species;
- 15 or more native vascular plant species are present within the patch; and
- The patch contains one or more indicator species.

An action that may have detrimental impacts to patches that meet the key diagnostic characteristics and condition thresholds may constitute a “significant” action under the EBPC Act and should be referred to the Minister before any activity within or adjacent to the ecological community takes place.

Minimum patch size for the *Natural Grasslands of the Murray Valley Plains* was determined by analysis of known patch sizes across the ecological community. The ecological community now occurs in a highly fragmented state and patches are generally small in size, with most being less than 100 ha in area. Consequently, impacts to patches of the ecological community that are 0.04 ha in size and of high diversity are likely to be significant.

To assist in the preservation of the ecological community, it is recommended that a buffer zone of at least 30 metres be maintained from the outer edge of an identified patch.

An Assessment of Significance was completed for the TEC and is presented in Appendix D.

4.3 Candidate Species

In accordance with the requirements of Section 5.2 of the BAM, the BDAR will identify the habitat suitability for threatened species within the project boundary (refer to Appendix C for a preliminary likelihood of occurrence). Species that meet all the relevant criteria will be automatically populated in the BAM-C to be assessed either for ecosystem credits or species credits. No further assessment is required for those species that are unlikely to occur or where the Project Area is considered as unsuitable habitat.

- **ecosystem credit species** are considered likely to have suitable habitat on the subject land and must be assessed for impacts, including measures taken to avoid, minimise and mitigate impacts. These species are referred to as ‘predicted species’ in the BAM-C and the assessor must calculate ecosystem credits to offset any residual impacts
- **species credit species** are likely to have suitable habitat on the subject land. They are referred to as ‘candidate species’ in the BAM-C and will require further assessment.

A preliminary list of candidate species is provided in **Table 4-5**.

Table 4-5 Preliminary List of Candidate Species that will require Assessment under the BAM

Scientific Name	Common Name
Fauna	
Ardeotis australis	Australian Bustard
Burhinus grallarius	Bush Stone-curlew
Haliaeetus leucogaster	White-bellied Sea-Eagle
Hieraaetus morphnoides	Little Eagle
Litoria raniformis	Southern Bell Frog
Lophochroa leadbeateri	Major Mitchell's Cockatoo
Lophoictinia isura	Square-tailed Kite
Pedionomus torquatus	Plains-wanderer
Phascolarctos cinereus	Koala
Polytelis anthopeplus monarchoides	Regent Parrot (eastern subspecies)
Polytelis swainsonii	Superb Parrot
Ninox connivens	Barking Owl
Tyto novaehollandiae	Masked Owl
Flora	
Austrostipa wakoolica	A spear-grass
Brachyscome muelleroides	Claypan Daisy
Brachyscome papillosa	Mossgiel Daisy
Caladenia arenaria	Sand-hill Spider Orchid
Convolvulus tedmoorei	Bindweed
Eucalyptus leucoxylon subsp. pruinosa	Yellow Gum
Lepidium monoplocoides	Winged Peppercress
Leptorhynchos orientalis	Lanky Buttons
Maireana cheelii	Chariot Wheels
Pilularia novae-hollandiae	Austral Pillwort
Sclerolaena napiformis	Turnip Copperburr
Solanum karsense	Menindee Nightshade
Swainsona murrayana	Slender Darling Pea
Swainsona plagiotropis	Red Darling Pea
Swainsona sericea	Silky Swainson-pea

Where suitable habitat was not present within the Project Area, or where the Project Area was outside the species known distribution, candidate species were excluded from the survey effort. **Table 4-6** details these species.

Table 4-6 Candidate Species Excluded from Survey Effort

Species	Reason for Exclusion
Claypan Daisy	No suitable habitat of damp areas on the margins of claypans in moist grassland is present on the Project Area. There is an absence of associated plant communities and open water areas or associated plant communities and species.
Sand-hill spider Orchid	The Project Area is outside the known distribution for the species. The species is only known to currently occur in five fragmented locations in the Riverina between Urana and Narranderra. The preferred habitat, woodland dominated by Cypress Pine (Callitris glaucophylla), is not present.
White-bellied Sea Eagle	The inland habitat of the species is characterized by the presence of large areas of open water. The Project Area is more than 10km from any large open water surface.
Koala	The Project Area is within the known distribution for the Koala, although there are minimal treed areas within the Project Area, presented as isolated woodland patches. These areas are not mapped as areas of breeding habitat for the species.
Curlew Sandpiper	This is a wader species which prefer habitat of intertidal mudflats in sheltered coastal areas and are considered unlikely to occur
Black-tailed Godwit	This is a wader species which prefer habitat of intertidal mudflats in sheltered coastal areas and are considered unlikely to occur
Austral Pilwort	The Project Area lacks suitable habitat for the Austral Pillwort, known to grow in shallow swamps and waterways.

4.4 Threatened Species

Threatened species records obtained from the NSW BioNET Atlas, NGH (2020) field surveys and ERM 2021 field surveys are presented in **Figure 4-2**.

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Legend

Bionet Records

- Black Falcon
- Grey-crowned Babbler (eastern subspecies)
- Major Mitchell's Cockatoo
- Plains-wanderer
- White-fronted Chat
- Chariot Wheels

ERM Records (2021)

- Chariot wheels
- Major Mitchell's cockatoo
- Wedge-tailed Eagle
- White-fronted chat

NGH Records (2020)

- Little Eagle
- Wedge-tailed Eagle
- White fronted chat
- Project Area
- Subject Land
- Main Roads
- Minor Roads
- Path/Track

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

Threatened Flora and Fauna Records

F4-2

Drawing No:	0617753s_KKSF_BIO_G004_R2.mxd		Keri Keri Solar Farm Scoping Report
Date:	22/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

0 1 2Km

N

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM

4.4.1 Flora

A review of the NSW BioNet and ALA databases identified no records of threatened flora species within the Project Area. The likelihood of occurrence assessment (Appendix C) considered three (3) flora species, the Chariot Wheels (*Maireana cheelii*), Winged Pepper-cress (*Lepidium Monoplocoides*) and Mossgiel Daisy (*Brachyscome papillosa*), as likely to occur based on records in the locality, and suitable habitat present within the Project Area. All three species are considered threatened under the EPBC Act and BC Act. An Assessment of Significant Impact has been completed for the three EPBC Act listed species and is presented in 0.

During the NGH (2020) field surveys and ERM 2021 Spring field surveys, field traverses where undertaken targeting candidate species within areas of suitable habitat, as well as during the general traverses and BAM plot survey work.

The survey effort for threatened flora will be continued during upcoming field surveys to meet the requirements of the BAM, and to inform the EIS.

4.4.2 Fauna

A review of the online databases and the NGH (2020) report identified that two (2) threatened fauna species have been recorded within the Project Area. There were multiple records of additional threatened species within approximately 10 km of the Project Area, these have been considered within the Likelihood of Occurrence Assessment in Appendix C. The Likelihood of Occurrence Assessment identified a further five (5) fauna species that are considered likely to occur within the Project Area based on records in the locality and the presence of preferred habitat. These species are detailed in **Table 4-7**.

An Assessment of Significant Impact has been completed for EPBC Act listed species considered known or likely to occur on the Project Area and is presented in **Appendix D.**

Table 4-7 Threatened Fauna Species Known or Likely to Occur within the Project Area

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of occurrence	Recorded during Spring 2021 Survey
Species credit Species					
Lophochroa leadbeateri	Major Mitchell's Cockatoo	V	-	Known	No
Litoria raniformis	Growling Grass Frog	E	V	Likely	No
Pedionomus torquatus	Plains-wanderer	E	CE	Likely	No
Ecosystem species					
Epthianura albifrons	White-fronted Chat	V	-	Known	Yes
Hieraaetus morphniodes	Little Eagle	V	-	Known	No
Falco subniger	Black Falcon	V	-	Known	No
Circus assimilis	Spotted Harrier	V	-	Likely	No
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	Likely	No

5. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Based on the results of the desktop assessment and the Spring 2021 field surveys undertaken in August 2021, a preliminary assessment of Matters of National Environmental Significance (MNES) within the Project area has been provided in **Table 5-1**.

Table 5-1 Preliminary assessment of Matters of National Environmental Significance (MNES)

MNES	Relevance to the Project Boundary
World Heritage Properties	Not identified within the project boundary or within 50 km radius
National heritage properties	Not identified within the project boundary or within 50 km radius
Wetlands of international importance	There are no wetlands of international importance within the Project Area. The closest records are greater than 100 km from the Project Area (as identified within the Protected Matters Search Tool (PMST)) and include: ■ Banrock station wetland complex - 300-400 km upstream ■ Hattah-kulkyne lakes - 100-150 km upstream ■ Riverland – 200-300 km upstream ■ The Coorong, and Lakes Alexandrina and Albert Wetland – 400-500 km upstream
Threatened Ecological Communities	One (1) EPBC Act listed TECs has been identified within the Project Area: ■ Natural Grasslands of the Murray Valley Plains (Critically Endangered) The PMST identified a further four (4) EPBC Act listed TECs as likely or with the potential to occur within the Project Area: ■ Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions ■ Grey Box (*Eucalyptus microcarpa*) Grassy Woodland and Derived Native Grasslands of South-eastern Australia ■ Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ■ Weeping Myall Woodlands Further assessment and analysis within the BDAR will confirm TECs within the Project area.
Threatened species	Five (5) EPBC Act listed species are considered likely to occur based on records in the locality and the presence of preferred habitat: ■ Chariot Wheels (Vulnerable) ■ Winged Pepper-cress (Endangered) ■ Mossgiel Daisy (Vulnerable) ■ Plains-wanderer (Critically Endangered) ■ Growling Grass Frog (Vulnerable) An Assessment of Significant Impact has been completed for the EPBC Act listed species considered likely to occur on the Project Area, and is presented in 0.
Migratory species	No birds listed as Migratory under the EPBC Act have been identified on the Project Area, nor been considered known or likely to occur within the Project Area based on the Likelihood of Occurrence Assessment.
Commonwealth Land area	One commonwealth area was listed on the PMST: ■ Commonwealth Land - Australian Telecommunications Corporation
The Great Barrier Reef Marine Park	Not identified within the project boundary or within 50 km radius
Nuclear actions	Not Applicable
Water resources as they relate to Nuclear Power	Not Applicable

Under the EPBC Act a referral is required to the Australian Government DAWE for projects, or 'actions', that are likely to have a significant impact on a MNES or the environment on Commonwealth land. The Australian Government Minister for the Environment determines whether or not the Proposal will need formal assessment and approval under the EPBC Act. If so, that Proposal is a controlled action under the EPBC Act.

The findings of biodiversity values assessment carried out to date have not confirmed the presence of threatened species listed under the EPBC Act in the Project Area, however five (5) EPBC Act listed species are considered likely to occur. Therefore, the proposal will need to be referred to the Australian Government Minister for the Environment and Energy through the preparation of a separate referral.

Preliminary impact assessments under the *Significant Impact Guidelines 1.1- Matters of National Environmental Significance* have been completed in **Appendix D** for the following MNES considered known, likely or potential to occur within the Project Area:

- Chariot Wheels (Vulnerable);
- Plains-wanderer (Critically Endangered);
- Winged Pepper-cress (Endangered);
- Mossgiel Daisy (Vulnerable);
- Growling Grass Frog (Vulnerable); and
- Natural Grasslands of the Murray Valley Plains TEC (Critically Endangered).

6. PRELIMINARY IMPACT ASSESSMENT

The construction and operation of the Project has the potential to cause impacts to threatened species and TECs listed under the BC Act and EPBC Act. These will need to be considered as part of the EIS to be prepared under Part 5 of the NSW EP&A Act. Additionally, the proposal will need to be referred to the Australian Government Minister for the Environment and Energy through the preparation of a separate referral.

As there are recorded Biodiversity values within the Project Area, application of the BAM and the preparation of a BDAR will be required.

Candidate species will be selected for further assessment by considering how they and their habitat might be affected by the project. A preliminary list has been presented in **Table 4-5**. In this instance the main potential impacts of the Project (during construction and operation) that would need to be assessed include:

- Clearing of TECs;
- Loss of extant native vegetation communities and associated fauna habitat and the subsequent impacts to local population of native species, particularly threatened and migratory species;
- Increased habitat fragmentation; and
- Mortality and injury from vehicle strikes and vegetation clearing.

Mitigation measures relevant to threatened species, TECs, native vegetation communities, hydrology and construction impacts will be addressed within the EIS. There is also a risk that weeds may be transported within and off-site. Mitigation measures to reduce the chance of the spread of weeds will be considered within the EIS.

6.1 Recommended Mitigation Measures and Next Steps

The desktop assessment and field surveys undertaken to date have highlighted a range of known and potential biodiversity constraints. To effectively avoid and minimise impacts associated with the Project, the following management recommendations have been suggested for each identified impact:

- Loss of existing native vegetation:
  - Areas of remnant and regrowth vegetation to be avoided at the design and micro siting stages, where practicable.
  - Areas of threatened flora and fauna habitat will be avoided at design and micro siting stages, where practicable.
  - If vegetation clearing is required, a Vegetation Management Plan will be implemented to ensure that clearing is undertaken in accordance with legislative standards and requirements.
- Weed and pest control
  - A Pest Management Plan will be developed and implemented for the Project. This will include measures such as vehicle wash downs, weed certification and obligations to stick to access tracks throughout the Project Area.
  - Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements
  - Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds

  - WONS and Invasive species will be identified and monitoring in the Project Area. Appropriate weed monitoring will occur to ensure new weed species are identified, recorded and managed appropriately.

- Mortality or injury to native fauna
  - No driving will occur in unauthorised areas, and in other areas will be carried out at safe speeds adopted to the road conditions.
  - During vegetation clearing activities fauna management will be implemented that includes pre-clearing surveys, fauna spotter-catcher supervision and methods to reduce impacts as set out in a Fauna Management Plan.
  - Injured, sick or dead fauna will be recorded and reported during construction. This can be carried out by a fauna spotter-catcher.

The following steps are considered essential in ensuring an adequate assessment of biodiversity values is continued throughout future stages of the project:

- Prepare and submit a BDAR in accordance with the BAM;
- Prepare and submit EPBC referral to the Australian Government Minister for the Environment and Energy
- Prepare a detailed assessment of MNES; and
- Conduct further targeted seasonal fauna and flora surveys for species considered likely or potentially occurring within the project boundary in accordance with relevant federal or State survey guidelines.

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APPENDIX A DATABASE SEARCH RESULTS

Australian Government

Department of Agriculture, Water and the Environment

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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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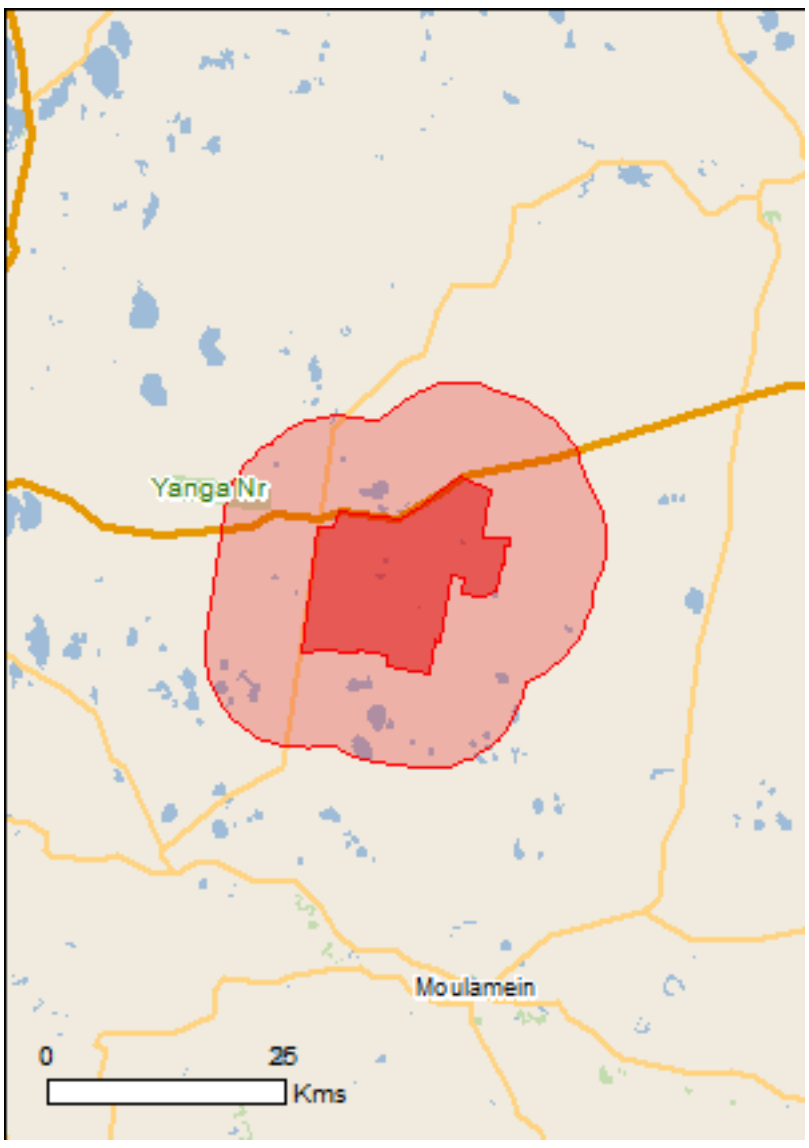
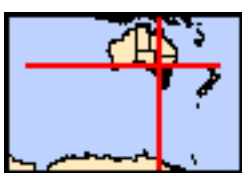


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental 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:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	22
Listed Migratory Species:	10

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 http://www.environment.gov.au/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 Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	19
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	300 - 400km upstream
Hattah-kulkyne lakes	100 - 150km upstream
Riverland	200 - 300km upstream
The coorong, and lakes alexandrina and albert wetland	300 - 400km upstream

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.

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Pezoporus occidentalis](#) Night Parrot [59350]	Endangered	Extinct within area
[Rostratula australis](#) Australian Painted Snipe [77037]	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
[Maccullochella macquariensis](#) Trout Cod [26171]	Endangered	Species or species habitat may occur within area
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Frogs		
[Litoria raniformis](#) Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
[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]	Vulnerable	Species or species habitat may occur within area
Plants		
[Austrostipa metatoris](#) [66704]	Vulnerable	Species or species habitat may occur within area
[Brachyscome papillosa](#) Mossgiel Daisy [6625]	Vulnerable	Species or species habitat likely to occur within area
[Lepidium monoplocoides](#) Winged Pepper-cress [9190]	Endangered	Species or species habitat likely to occur within area
[Maireana cheelii](#) Chariot Wheels [8008]	Vulnerable	Species or species habitat known to occur within area
[Solanum karsense](#) Menindee Nightshade [7776]	Vulnerable	Species or species habitat may occur within area
[Swainsona murrayana](#) Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
[Swainsona pyrophila](#) Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat may 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]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land - Australian Telecommunications Corporation

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
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
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Yanga	NSW
Yanga	NSW

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-34.721247 143.905511,-34.721247 143.905511,-34.727173 143.963532,-34.717861 143.984818,-34.695282 144.020181,-34.705161 144.048333,-34.740998 144.042497,-34.741844 144.067903,-34.747486 144.067559,-34.747204 144.062409,-34.761872 144.061036,-34.76159 144.058976,-34.77541 144.05726,-34.782741 144.053826,-34.787535 144.04181,-34.785279 144.021211,-34.772589 144.023271,-34.771179 144.011254,-34.821927 144.002328,-34.821363 143.997178,-34.846444 143.992715,-34.841654 143.950829,-34.832073 143.952203,-34.828691 143.923707,-34.831509 143.92302,-34.828127 143.887315,-34.830664 143.877702,-34.8301 143.869805,-34.733098 143.886285,-34.734227 143.902078,-34.721247 143.905511

Acknowledgements

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

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

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

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

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APPENDIX B FLORA AND FAUNA OBSERVED DURING FIELD SURVEYS

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Birds			
Australian magpie	*Gymnorhina tibicen*	-	-
Banded lapwing	*Vanellus tricolor*	-	-
Black kite	*Milvus migrans*	-	-
Blue Bonnet	*Northiella haematogaster*	-	-
Red-rumped Parrot	Psephotus haematonotus		
Brown songlark	*Cincloramphus cruralis*	-	-
Brown Falcon	Falco berigora		
Common Bronzewing	*Phaps chalcoptera*	-	-
Common Starling	Sturnus vulgaris		
Horsefields Bronze Cuckoo	Chrysococcyx basalis		
Emu	*Dromaius novaehollandiae*	-	-
Galah	*Eolophus roseicapilla*	-	-
Grey butcherbird	*Cracticus torquatus*	-	-
Magpie-lark	*Grallina cyanoleuca*	-	-
Nankeen kestrel	*Falco cenchroides*	-	-
Noisy miner	*Manorina melanocephala*	-	-
Straw-necked Ibis	*Threskiornis spinicollis*	-	-
Torresian crow	*Corvus Orru*	-	-
Wedge-tailed eagle	*Aquila audux*	-	-
White-fronted Chat	*Epthianura albifrons*	V	-
White-winged fairy-wren	*Malurus leucopterus*	-	-
Willie wagtail	*Rhipidura leucophrys*	-	-
Mammals			
Eastern Grey Kangaroo	*Macropus giganteus*	-	-
Red Kangaroo	*Macropus rufus*	-	-
European Rabbit*	*Oryctolagus cuniculus*	-	-
Sheep*	*Ovis aries*	-	-
Cow*	*Bos taurus*	-	-
Reptiles			
Shingleback	*Tiliqua rugosa*	-	-

FLORA SPECIES OBSERVED

Common Name	Scientific Name	BC Act Status	EPBC Act Status
mustard bush	*Arabidella nasturtium*	-	-
Small Saltbush	*Atriplex eardleyae*	-	-
	Austrodanthonia caespitosa	-	-
Plains Grass	*Austrostipa aristiglumis*	-	-
Speargrass	*Austrostipa scabra*	-	-
	Austrostipa sp.	-	-
Cut-Leaf Daisy	*Brachyscome multifida*	-	-
Prairie Grass	*Bromus catharticus*	-	-
Wild Onion	*Bulbine semibarbata*	-	-
Small Purslane	*Calandrinia eremaea*	-	-
Twining Purslane	*Calandrinia volubilis*	-	-
Bogan Flea	*Calotis hispidula*	-	-
Rough Burr Daisy	*Calotis scabiosifolia*	-	-
	Centaurea spp.	-	-
Blow-Away Grass	*Chloris truncata*	-	-
	Convolvulus angustissimus	-	-
	Duma florulenta	-	-
Paterson's Curse	*Echium plantagineum*	-	-
Berry Saltbush	*Enchylaena tomentosa*	-	-
Brown's Lovegrass	*Eragrostis brownii*	-	-
Crowfoot	*Erodium crinitum*	-	-
	Euphorbia drummondii	-	-
Cotton Bush	*Gomphocarpus fruticosus*	-	-
Silky Goodenia	*Goodenia fascicularis*	-	-
Smallflowered Goodenia	*Goodenia pusilliflora*	-	-
	Hordeum leporinim	-	-
Dandelion	*Hypochaeris radicata*	-	-
	Leiocarpa panaetioides	-	-
Woolly Buttons	*Leptorhynchos baileyi*		
Winged Sea-Lavender	*Limonium lobatum*	-	-
Native Flax	*Linum marginale*	V	V
Cotton Bush	*Maireana aphylla*	-	-
Shrubby Bluebush	*Maireana pyramidata*	-	-
Woolly Burr Medic	*Medicago minima*		
Small-Leaved Burr Medic	*Medicago praecox*	-	-
	Medicago truncatula	-	-
Minnie Daisy	*Minuria leptophylla*	-	-
Woolly-heads	*Myriocephalus rhizoceph*	-	-

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Dillon Bush	*Nitraria billardierei*	-	-
	Oxalis perennans	-	-
	Panicum decompositum	-	-
Dark Sago-weed	*Plantago drummondii*	-	-
Small Copper-wire Daisy	*Podolepis muelleri*	-	-
Jersey Cudweed	*Pseudognaphalium luteoalbum*	-	-
	Rhagodia nutans	-	-
Berry Saltbush	*Rhagodia spinescens*	-	-
Small White Sunray	*Rhodanthe corymbiflora*	-	-
	Rhodanthe floribunda	-	-
Pigmy Sunray	*Rhodanthe pygmaea*	-	-
	Rhodanthe stuartiana	-	-
	Rytidosperma caespitosum	-	-
Prickly Saltwort	*Salsola australis*		
Purple Goosefoot	*Scleroblitum atriplicinum*	-	-
Galvanised Burr	*Sclerolaena birchii*	-	-
Short-winged Copperburr	*Sclerolaena brachyptera*	-	-
Grey Copper-Burr	*Sclerolaena diacantha*	-	-
	Sclerolaena muricata	-	-
Giant Redburr	*Sclerolaena tricuspis*	-	-
Corrugated Sida	*Sida corrugata*	-	-
Pin Sida	*Sida fibulifera*		
Twiggy Sida	*Sida intricata*		
Mallee Catchfly	*Silene apetala*		
	Sisymbrium erysimoides		
Oondoroo	*Solanum esuriale*		
	Sonchus spp.		
Grey Germander	*Teucrium racemosum*		
	Thysanotus tuberosus		
A Fuzzweed	*Vittadinia cuneata*		
Rat's Tail Fescue	*Vulpia myuros*		
Sand Twinleaf	*Zygophyllum ammophilu*		
	Zygophyllum glaucum		
	Zygophyllum spp.		

APPENDIX C LIKELIHOOD OF OCCURRENCE ASSESSMENT

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Birds						
Botaurus poiciloptilus	Australasian Bittern	E	E	In New South Wales, it occurs along the coast and is also frequently recorded in the Murray Darling Basin, notably in floodplain wetlands of the Murray, Murrumbidgee, Lachlan, Macquarie and Gwydir Rivers. The species occurs mainly in freshwater wetlands and, rarely, in estuaries or tidal wetlands. It favours wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or cutting grass (Gahnia) growing over a muddy or peaty substrate.	**Unlikely:** The Project Area is within the known distribution, there is one record of the species from 2010 within the locality, and this record was made at an artificial water storage point with open water and Typha species. However, there is a lack of suitable habitat present on the Project Area.	No
Calidris ferruginea	Curlew Sandpiper	E	CE	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 salt works 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.	**Unlikely –** the Project Area is within the distribution for the species and contains suitable habitat however there are no records of the species in the locality	No
Circus assimilis	Spotted Harrier	V	-	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	**Likely:** There are two records of this species in the locality, along the Sturt Highway from 2015, another within Yanga National Park from 1974. The site contains preferred habitat for the species.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Epthianura albifrons	White-fronted Chat	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state.	**Known:** Species has been recorded within the Project Area during the NGH 2020 surveys and was recorded during the Spring field surveys.	Yes
Falco hypoleucos	Grey Falcon	E	V	The species occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia. The species frequents timbered lowland plains, particularly acacia shrub lands that are crossed by tree-lined watercourses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter. Eggs are laid in the old nests of other birds, particularly those of other raptors or corvids. The nests chosen are usually in the tallest trees along watercourses, particularly River Red Gum (*Eucalyptus camaldulensis*) and Coolibah (E. coolabah).	**Potential:** Lack of records within the locality, however project area is within the distribution for the species and contain preferred habitat	No
Falco subniger	Black Falcon	V	-	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.	**Likely:** The Black Falcon was recorded during the NGH 2020 field surveys approximately 11km north east from the Project Area.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Grantiella picta	Painted Honeyeater	V	V	The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower, although it breeds in quite narrow roadside strips if ample mistletoe fruit is available. The species appears to prefer mistletoe as a nest substrate and selects nest sites in habitats where mistletoe prevalence and parasitism rates are high.	**Unlikely:** There is a lack of records in the locality however and the Project Area lacks preferred habitat	No
Leipoa ocellata	Malleefowl	E	V	The Malleefowl is found in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or acacias. A sandy substrate and abundance of leaf litter are required for breeding. Densities of the birds are generally greatest in areas of higher rainfall and on more fertile soils where habitats tend to be thicker and there is an abundance of food plants. Much of the best habitat for Malleefowl has already been cleared or has been modified by grazing by sheep, cattle, rabbits and goats.	**Unlikely:** there is a lack of records in the locality and the Project Area does not contain preferred habitat.	No
Numenius madagascariensis	Eastern Curlew	-	CE, Mi	Within Australia, the species is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (Zosteraceae). Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes within the mangroves. The birds are also found in coastal salt works and sewage farms.	**Unlikely:** No records within the locality, the Project Area is within the distribution for the species however suitable habitat is not present within Project area.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Limosa	Black-tailed Godwit	V	Ma, Mi	Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sand flats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works.	**Unlikely:** There is one record of the species in the locality from 1989. The Project Area doesn't contain suitable habitat.	
Pedionomus torquatus	Plains-wanderer	E	CE	Plains-wanderers inhabit sparse grasslands with c.50% bare ground, with most vegetation less than 5 cm in height and some widely spaced plants up to 30 cm high. The species may occasionally use lower-quality habitat including cereal stubble, but cannot persist in an agricultural landscape. Plains-wanderers are sedentary for as long as the habitat remains suitable.	**Potential:** The species has been recorded 7.16 km NE of the Project boundary from as recently as 2020. This record is from a Songmeter audio recording within the Yanga State Conservation Area, located immediately adjacent to the Project Area boundary. However, the site does not contain suitable habitat for the species.	No
Stictonetta naevosa	Freckled Duck	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Generally rest in dense cover during the day, usually in deep water. Feed at dawn and dusk and at night on algae, seeds and vegetative parts of aquatic grasses and sedges and small invertebrates.	**Potential:** There are multiple records of the species in the locality, with the most recent records being from 2017. Suitable habitat in the form of farm dams is present within the Project Area.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Oxyura australis	Blue-billed Duck	V	-	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes, where a bowl-shaped nest is constructed.	**Unlikely:** There are numerous records of the species in the Uaru Creek, north of the Project Area. The Project Area itself does not contain suitable habitat for the species.	No
Lophochroa leadbeateri	Major Mitchell's Cockatoo	V	-	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.	**Likely:** There are multiple records of this species in the locality, NGH (2020) observed the species approximately 6.5km west of the Project Area.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	**Unlikely**: There is one record in the locality from 1989. However, the Project Area is outside the known distribution for the species.	No
Pezoporus occidentalis	Night Parrot	Ex	E	Most habitat records are of Triodia (Spinifex) grasslands and/or chenopod shrublands in the arid and semi-arid zones, and listed Astrebla spp. (Mitchell grass), shrubby samphire and chenopod associations, scattered trees and shrubs, Acacia aneura (Mulga) woodland, treeless areas and bare gibber as associated with sightings of the species. Roosting and nesting sites are consistently reported as within clumps of dense vegetation, primarily old and large Spinifex clumps, but sometimes other vegetation types	**Unlikely:** This species is recorded as extinct within NSW.	No
Pomatostomus temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses.	**Unlikely:** There is one record of the species in the locality from 1992, within Yanga National Park. However, the Project Area does not contain suitable habitat.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Rostratula australis	Australian Painted Snipe	E	E	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (Melaleuca). The Australian Painted Snipe sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber. Australian Painted Snipe breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby.	**Unlikely:** there are no records of the species in the locality and only suitable habitat if present on the Project Area.	No
Fish						
Galaxias rostratus	Flathead Galaxias	CE	CE	The flathead galaxias is only known from the southern half of the Murray-Darling Basin system. The flathead galaxias inhabits a variety of habitats including billabongs, lakes, swamps and rivers, with a preference for still or slow flowing waters. The species has a preference for schooling in midwater.	**Potential:** Lack of records within the locality, however the Abercrombie creek running through the Project Area is mapped as habitat for the species.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Maccullochella macquariensis	Trout Cod	E	E	Trout Cod inhabit a large (60—100 m wide), deep (>3 m) flowing river section with a sand, silt and clay substrate that contains abundant snags and woody debris. Trout Cod are often angled from within, under or adjacent to snags, branch piles, and steep clay banks, usually in areas of relatively fast current. In the Murray and Murrumbidgee Rivers Trout Cod occupy stream positions characterised by a high abundance of large woody debris (or 'snags') in water that is comparatively deep and close to riverbanks. However, midstream snags are also an important habitat component. As a large proportion of the streams that the Trout Cod originally inhabited are now degraded, it is difficult to accurately determine the habitat requirements of the species.	**Unlikely**: There are a lack of records in the locality, and the Project Area is outside the known distribution for the species.	No
Maccullochella peelii	Murray Cod	-	V	The Murray Cod utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs. Murray Cod are frequently found in the main channels of rivers and larger tributaries. Murray Cod tend to occur in floodplain channels and anabranches when they are inundated, but the species' use of these floodplain habitats appears limited. Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures.	**Unlikely**: There are a lack of records in the locality, and the Project Area is outside the known distribution for the species.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Frogs						
Litoria raniformis	Growling Grass Frog	E	V	This species is found mostly amongst emergent vegetation, including Typha sp. (bullrush), Phragmites sp. (reeds) and Eleocharis sp. (sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams. The Growling Grass Frog can be found floating in warmer waters in temperatures between 18–25°C. Additionally, this species occurs in clays or well-watered sandy soils; open grassland, open forest, and ephemeral and permanent non-saline marshes and swamps; montane eucalypt forest, dry schlerophyll forest in coastal Victoria; steep-banked water edges (like ditches and drains) and gently graded edges containing fringing plants; and formerly, areas of high altitudes. The Growling Grass Frog can also inhabit agricultural and higher rainfall pastoral lands so long as permanent and non-permanent water sites are available with dense emergent or fringing vegetation	**Likely:** there is one record of the species in the locality in 2011 in an area with artificial water storage. The Project Area contains preferred habitat in the form of farm dams.	No
Mammals						
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	The species is found in a wide range of inland woodland vegetation types. These include box / ironbark / cypress pine woodlands, Buloke woodlands, Brigalow woodland, Belah woodland, smooth-barked apple woodland, river red gum forest, black box woodland, and various types of tree mallee. The species inhabits a variety of vegetation types 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 New South Wales and southern Queensland.	**Unlikely:** There are a lack of records of the species in the locality of the Project Area and suitable habitat is not present.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn.	**Unlikely:** There are a lack of records of the species in the locality of the Project Area and suitable habitat is not present.	
Phascolarctos cinereus	Koala	-	V	Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species. Koala habitat can be broadly defined as any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees. The distribution of this habitat is largely influenced by land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility. Preferred food and shelter trees are naturally abundant on fertile clay soils.	**Unlikely:** There are a lack of records of the species within the locality. The Project Area is located nearby the western boundary of the species distribution. Suitable habitat is not present.	No
Flora						
Austrostipa metatoris		V	V	Austrostipa metatoris grows in sandy mallee areas of the Murray Valley. Habitat includes sandhills, sand ridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils. Associated species include the trees and shrubs Bimble Box (Eucalyptus populnea), Gum Coolibah (E. intertexta), White Cypress Pine (Callitris glaucophylla), Belah (Casuarina cristata), Sweet Quandong (Santalum acuminatum), Sticky Hopbush (Dodonaea viscosa), Hakea ivoryi, and the grasses Austrostipa drummondii and A. eremophila.	**Potential:** There is a lack of records of the species in the locality, however preferred habitat is present on the Project Area.	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Brachyscome papillosa	Mossgiel Daisy	V	V	The species is found primarily in clay soils on Bladder Saltbush (Atriplex vesicaria) and Maireana aphylla plains but also in grassland and in Grey Box (Eucalyptus macrocarpa)–Cypress Pine (Callitris spp.) woodland. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: • Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions, and • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.	**Likely:** The species was potentially observed during the ERM Spring 2021 field surveys, samples have been submitted to the herbarium for confirmation and are yet to be received.	Yes
Lepidium monoplocoides	Winged Pepper-cress	E	E	Winged Pepper-cress occurs predominantly in mallee scrub in semi-arid areas. Sites are seasonally moist to water-logged with heavy, fertile soils and a mean annual rainfall of around 300 to 500 mm. The predominant vegetation is usually an open-woodland dominated by Allocasuarina leuhmannii and/or eucalypts, particularly Eucalyptus largiflorens (Black Box) or Eucalyptus populnea (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses (notably Danthonia spp. and Stipa spp.), but the seasonally waterlogged sites preferred by Winged Pepper-cress also support a number of moisture dependent herbs, such as Marsilea spp. (Nardoo). Also known from riparian woodland.	**Likely:** There are records in the locality, and the site contains preferred habitat for the species	No

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence	Recorded in Project Area during Field Survey
Maireana cheelii	Chariot Wheels	V	V	Chariot Wheels is usually found on floodplains in chenopod shrubland and grassland communities on heavy clay soils, dominated by various native shrubs, grasses and herbs, notably Hairy Bluebush (Maireana pentagona), Bottle Bluebush (Maireana excavata), Nitre-bush (Nitraria billardierei), Austrostipa nodosa, A. scabra, Erodium crinitum, Rhodanthe corymbiflorum, Hyalosperma semisterile and H. glutinosa. In NSW the species appears to favour on heavy brown to red-brown clay-loams, hard cracking red clay, other heavy texture-contrast soils that support Bladder Saltbush (Atriplex vesicaria), Maireana aphylla and Acacia homalophylla shrubland communities.	**Likely:** Observations of the species were made during the ERM 2021 field surveys and NGH 2020 field surveys nearby the Project Area, the closest record located 120 m north of the Project Area	No
Solanum karsense	Menindee Nightshade	V	V	The Menindee Nightshade is largely confined to floodplain lakes, depressions and Black Box (Eucalyptus largiflorens). This species is found in heavy grey clays with a highly self-mulching surface and also on sandy floodplains and ridges and in calcareous soil, red sands, red-brown earths and loamy soils. The vegetation associated with this species includes Saltbush and Bluebush plains and Mallee associations.	**Unlikely:** there are no records of the species in the locality and suitable habitat is present.	No
Swainsona murrayana	Slender Darling-pea,	V	V	The Slender Darling-pea often grows in heavy soils, especially depressions, and is also found on grey and red to brown clay and clay-loam soils in Atriplex vesicaria (Bladder Saltbush) herbland, Eucalyptus largiflorens (Black Box) woodland and grassland communities and is frequently associated with Maireana species.	**Potential:** There is a lack of records in the locality, however the Project Area contains preferred habitat for the species.	No

APPENDIX D MNES SIGNIFICANT IMPACT ASSESSMENTS

Growling Grass Frog (*Litoria raniformis)* - Vulnerable

The proposed development in the Project Area is unlikely to lead to a significant impact to the Growling Grass Frog.

The Growling Grass Frog (*Litoria raniformis*) is listed as 'Vulnerable' under the EPBC Act and is considered likely to occur within the Project Area. The Project Area is situated within the range of the species, which extends throughout eastern NSW and VIC. Historically, the species was distributed across a large area of south-eastern Australia, including Tasmania (Osborne et al. 1996; Mahony 1999). The Growling Grass Frog population has since been isolated or fragmented, with the most pronounced decline evident in NSW (Mahony 1999; Clemann & Gillespie 2012). The species is currently widespread throughout the Murray River valley, and has been recorded from six Catchment Management Areas in NSW, including the Murrumbidgee. The nearby Yanga National Park provides critical habitat for one of the largest known populations of the Growling Grass Frog (*Litoria raniformis*) (DPIE, 2020). The Yanga National Park has connectivity to the Project Area through the adjacent Yanga State Conservation Area.

Reviews of ALA and BioNET show no recent records within the Project Area. There are no records of the species within the vicinity (10 km), however records are common from approximately 22 km to 50 km north of the Project Area in the Yanga National Park. During the NGH (2020) field surveys no amphibian surveys were undertaken. During the ERM Spring 2021 field surveys one night of amphibian surveys was undertaken, however these were conducted 1.16 km north west of the Project Area. No records of the species were made. The Growling Grass Frog survey effort was reduced due to weather conditions impacting site access. The survey effort was subsequently insufficient to meet survey guidelines, therefore presence of the species has been assumed.

The Growling Grass Frog is found mostly amongst emergent vegetation, including *Typha sp*. (bullrush), *Phragmites sp*. (reeds) and *Eleocharis sp*. (sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams (Robinson 1993; Celmann & Gillespie 2012). Submerged vegetation is important habitat for breeding success as it provides egg-laying sites, calling stages for males, and food and shelter for tadpoles. Grassland provides habitat for foraging, dispersal and shelter, and may also provide overwintering sites for the species. The species is also known to occur in lignum shrublands (S. Wassens undated, pers. comm. cited in NSW DEC 2005a).

Suitable habitat has been identified within the Project Area. Such suitable habitat is associated with lignum shrublands (PCT 17), artificial dams with emergent vegetation and drainage lines. The total area of potential Growling Grass Frog habitat within the Project Area is mapped as under 1.5 ha and presented in Figure D-1.

The significant impact guidance for 'vulnerable' species in SIG 1.1, refers to impacts to 'important populations' of a species (DoE, 2013). An important population is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or are:

- 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 (DoE, 2013).

Due to the pronounced decline of the species in NSW, any viable population is considered as an important population for the persistence and recovery of the species. For this species, a viable population is one which is not isolated from other populations or water bodies, such that it has the opportunity to interact with other nearby populations or has the ability to establish new populations when water bodies fill and become available (DEWHA 2009). Interaction with nearby populations and colonisation of newly available water bodies occurs via the dispersal of individual frogs across suitable movement habitat (DEWHA 2009).

The presumed population of Growling Grass Frogs within the Project Area is located approximately 22 km south of known populations of the species, and is connected through the Yanga National Park and Yanga State Conservation Area. However, the main population is located on the northern side of the Sturt Highway, which may act as a barrier to species dispersal. There are mapped watercourses and drainage lines within the Project Area which would allow for connectivity to waterbodies. The Abercrombie Creek is ephemeral, and was observed to be dried during all survey efforts, despite significant rainfall. It is unlikely that the presumed population of Grass Growling Frogs within the Project Area would be considered an important population of the species.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table with **no significant** impact for Growling Grass Frog as a result of the Project.

Table D-1 Significant Impact Assessment for Growling Grass Frog.

Criteria	Description	Criteria Triggered?
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,	The amount of Growling Grass Frog habitat within the Project Area to be disturbed is 1ha. The impact will be limited to the removal of artificial farm dams which were observed to be dry during field surveys. The removal of a small amount of habitat is unlikely to lead to a long-term decrease in the size of the population.	No
Reduce the area of occupancy of an important population,	The proposed development will not lead to a reduced area of occupancy of the species, as only 1 ha of Growling Grass Frog habitat within the Project Area will be impacted. The disturbance of such a small area across the landscape, which will not remove suitable habitat patches altogether, will ensure that the area of occupancy remains the same.	No
Fragment an existing important population into two or more populations,	The proposed development will result in the removal of 1 ha of Growling Grass Frog habitat. This impact will only remove small fragments of habitat in the form of artificial farm dams within the Project Area, which were observed to be dry during the survey visits despite heavy rainfall. The Project is unlikely to fragment an existing important population.	No
Adversely affect habitat critical to the survival of a species,	The habitat for the Growling Grass Frog within the Project Area is not considered habitat critical to the survival of the species due to the distance and barriers to dispersal from known populations of the species, 22-50 km north of the Project boundary. Nonetheless, the impact will not adversely affect the habitat critical to the survival of the species. This is because disturbance will occur in such small proportions of the larger landscape.	No
Disrupt the breeding cycle of an important population,	The impacts of clearing will only occur within an artificial dam within the Project Area. The small habitat removal throughout the Project Area, will not result in reducing the home range of the species. Thus, the species ability to breed within remaining habitat will not be disrupted.	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The disturbance has been calculated as 1 ha, of Growling Grass Frog habitat within the Project Area. The habitat within the Project Area to be removed is an artificial farm dam and is not considered high quality habitat for the species. The small amount of habitat to be removed will not result in a decline in the species.	No

Criteria	Description	Criteria Triggered?
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat,	Invasive species such as the introduced Eastern Gambusia (*Gambusia holbrooki*) has been implicated in the decline of the closely-related Green and Golden Bell Frog (*Litoria aurea*) (Morgan and Buttemer 1996; Pyke and White 2001). However, the implicated impact of Eastern Gambusia on the Growling Grass from is based on circumstantial evidence. Regardless, the Project activities during construction and operation will adopt and follow biosecurity measures that ensure that further invasive species are not introduced into the Project Area.	No
Introduce disease that may cause the species to decline, or	Chytrid fungus, a water-borne pathogen responsible for the Chytridiomycosis, is widespread in frog populations in eastern Australia and has been detected in the Growling Grass Frog (Berger et al. 1999). Chytridiomycosis disease is believed to be a significant cause of death in some frog species in recent years (Berger et al. 1999). Precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by construction workers.	No
Interfere with the recovery of the species.	The Recovery Plan for *Litoria raniformis* was published in 2021 (Clemann & Gillespie, 2012) and detail four main objectives: ■ Secure extant populations of Southern Bell Frogs (aka Growling Grass Frogs), particularly those occurring in known breeding habitats, and improve their viability through increases in size and / or area of occurrence. ■ Determine distribution, biology and ecology of the Southern Bell Frog (aka Growling Grass Frogs), and identify causes of the decline of the species across its geographic range. ■ Address known or predicted threatening processes, and implement appropriate management practices where possible to ensure that land use activities do not threaten the survival of the Southern Bell Frog (aka Growling Grass Frogs). ■ Increase community awareness of and support for Southern Bell Frog (aka Growling Grass Frogs) conservation. The disturbance to artificial farm dam and minimal disturbance to natural water sources on the Project Area, will not interfere with the objectives of the recovery plan for this species.	No

LOORICA ROAD

STURT HIGHWAY

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Legend

- Project Area
- Subject Land
- Main Roads
- Path/Track
- Growling Grass Frog Habitat

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

MNES Habitat Areas for Growling Grass Frog

D-1

Drawing No:	0617753s_KKSF_BIO_G005_R2.mxd		Keri Keri Solar Farm Scoping Report
Date:	22/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

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ERM

Winged Pepper-cress (*Lepidium monoplocoides*) – Endangered

The proposed development in the Project Area is likely to lead to a significant impact to Winged Pepper-cress.

The Winged Pepper-cress (*Lepidium monoplocoides*) is considered Endangered under the EPBC Act and has been identified as 'likely' to occur within the Project Area. This species is an erect annual herb or perennial forb, 15-20 cm high, with angular and striped stems roughened with small warts. This species was not recorded during the NGH (2020) or Spring 2021 field surveys, and there are no records within the vicinity (10 km). The closest record of the species is 15 km north west of the Project Area from 2001.

Winged Pepper-cress occurs in open, sparsely vegetated sites in a range of habitats on heavy clay or clay-loam soils. Sites are seasonally flooded or prone to waterlogging, in arid to semi-arid areas with an average rainfall range of 200–450mm per year. The mean average annual rainfall for Keri Keri NSW is 209.1mm. The predominant vegetation is usually grasslands, wetlands and floodplain woodlands dominated by *Eucalyptus coolabah* and *Eucalyptus largiflorens*, and chenopod shrublands dominated by *Atriplex*, *Maireana* and/or *Nitraria* species, but the seasonally waterlogged sites preferred by Winged Pepper-cress also support a number of moisture dependent herbs, such as *Marsilea spp.* (Nardoo) (Mavromihalis, 2010a).

Suitable habitat is present on the Project Area in the form of PCTs 13, 159, 153 and 163, with 1,246ha of potential habitat within the Project Area . Further surveys are required to determine if all areas of these PCTs are likely to be seasonally flooded, if not these areas will be excluded from the suitable habitat mapping as they would no longer meet the habitat preference for the species. 2 flora transects making up 4 person hours of survey effort were undertaken for the species during the ERM Spring 2021 survey period. No Winged Pepper-cress were observed despite significant rainfall during the winter season. Further flora transects will be undertaken targeting the species during summer surveys to meet survey requirements. Prior to these surveys it is assumed the species is present within the Project Area.

Thirteen populations of the Winged Pepper-cress, with seven in NSW, are identified within the Recovery Plan (Mavromihalis, 2010), none of which are located within the Project Area.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table with a potential for a **significant impact** to Winged Pepper-cress as a result of the Project

Table D-2 Significant Impact Assessment for Winged Pepper-cress

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population	Winged Pepper-cress habitat is present within the Project Area associated with PCTs 13, 159, 153 and 163 which totals 1,246 ha. The area of Winged Pepper-cress habitat to be disturbed as a result of the development is currently mapped as 925 ha. There is high quality suitable habitat in areas surrounding the Project Area, within the Yanga SCA and the remainder of the Energy Hub Study Area. The disturbance to this portion of habitat is likely to lead to a long-term decrease in the size of the presumed population within the Project Area.	Yes
Reduce the area of occupancy of the species	Winged Pepper-cress habitat is present within the Project Area associated with PCT 13, 159, 153 and 163 which totals 1,246 ha area of occupancy. The area of Winged Pepper-cress habitat to be disturbed as a result of the development is 925 ha, which is 75% of the suitable habitat within the Project Area. This large percentage of disturbance is likely to result in the reduction in the area of occupancy of the species.	Yes
Fragment an existing population into two or more populations	Due to the field surveys conducted to date not yet meeting the BAM requirements, presence of the Winged Pepper-cress on the Project Area is presumed. As such, the disturbance of 925 ha of suitable habitat has potential to fragment existing populations of the species.	Yes
Adversely affect habitat critical to the survival of a species	Critical habitat for the species is yet to be mapped and is part of the objectives presented within the Recovery Plan (Mavromihalis, 2010). Winged Pepper-cress habitat is present within the Project Area associated with PCT 13, 159, 153 and 163. The suitability of this habitat will be further assessed in future field surveys to confirm the presence of low lying, waterlogged sites. It is predicted that the area of suitable habitat will be reduced as a result. In the absence of critical habitat mapping, all suitable PCTs will be conservatively considered habitat critical to the survival of the species. The potential area of disturbance of critical habitat is 925 ha. This area of disturbance could potentially have an impact on the survival of the species.	Yes
Disrupt the breeding cycle of a population	The Winged Pepper-cress grows at sites that are seasonally wet, with periods of waterlogging being likely to facilitate seed germination (Mavromihalis, 2010). The alteration of hydrology is a recognised threat to the species. Hydrology and the management of run-off will be addressed within the EIS. As such, it is unlikely the construction and operation of the Project will disrupt the breeding cycle of the Winged Pepper-cress.	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project Area is inclusive of areas of Winged Pepper-cress habitat associated with PCT 13, 159, 153 and 163 making up 1,246 ha. The Project has the potential to disturb 925 ha, 75% of the total habitat present within the Project Area. The scale of disturbance is likely to result in modification, destruction, removal, isolation or a decrease in the availability of habitat to the extent that the species is likely to decline.	Yes

Criteria	Description	Criteria Triggered?
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Weed invasion and grazing by rabbits and kangaroos are recognised threats for the Winged Pepper-cress. Weed invasion includes from exotic annual grass species such as *Vulpia, Bromus, Lolium* and *Avena* species, with Patterson's Curse, Horehound and African Boxthorn being problems at a few known Winged Pepper-cress population sites (Mavromihalis, 2010). Grazing may threaten the species by reducing the amount of seed produced by individuals through defoliation, prior to critical periods of flowering and seed production (Mavromihalis, 2010). Project activities during construction and operation will adopt and follow Biosecurity measures that will aim to ensure that invasive species are not introduced and are controlled within the Project Area.	No
Introduce disease that may cause the species to decline	There is currently limited evidence of diseases causing detrimental effects on Winged Pepper-cress populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by construction workers.	No
Interfere with the recovery of the species	There is a National Recovery Plain for the Winged Pepper-cress published in 2010 (Mavromihalis, 2010). The overall objective of recovery is to minimise the probability of extinction of the Winged Pepper-cress in the wild and to increase the probability of populations becoming self-sustaining in the long term. Within the duration of the Recovery Plan, the specific objectives for the recovery of the Winged Pepper-cress are to: 1. Determine distribution, abundance and population structure 2. Determine habitat requirements 3. Manage threats to populations 4. Identify key biological functions 5. Determine growth rates and viability of populations 6. Establish a seed bank 7. Build community support for conservation. The Project is unlikely to interfere with the objectives presented above.	No

LOORICA ROAD

STURT HIGHWAY

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KERI KERI

Legend

- Project Area
- Subject Land
- Main Roads
- Minor Roads
- Path/Track
- Winged Pepper-cress Habitat

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

MNES Habitat Areas for Winged Pepper-cress

D-2

Drawing No:	0617753s_KKSF_BIO_G006_R2.mxd		Keri Keri Solar Farm Scoping Report
Date:	22/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

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ERM

Chariot Wheels (*Maireana cheelii*) - Vulnerable

The proposed development in the Project Area is likely to lead to a significant impact to Chariot Wheels.

Chariot Wheels (Maireana cheelii) are listed as 'Vulnerable' under the EPBC Act. The species is a perennial forb to about 20 cm high, the fruiting body has 5 distinctly wheel-like wings. Chariot Wheels were recorded adjacent to the Project Area during the NGH (2020) and ERM 2021 field surveys and is highly likely to be present within the Project Area. The closest record was made 120 m north of the Project Area.

Chariot Wheels were once widely distributed on the inland plains of south-eastern Australia, from south-western Queensland through western New South Wales to north-western Victoria (Mavromihalis, 2010b). The species is apparently extinct in the northern part of its former range, and survives only in a number of highly fragmented and tenuous locations in the southern part of its range (Mavromihalis, 2010b). In New South Wales, extant populations of the species only occur in the western Riverina IBRA bioregion, mostly between Hay and Deniliquin but extending as far west as Moulamein (Mavromihalis, 2010b).

Chariot Wheels are usually found in chenopod shrubland and grassland communities on heavy clay soils, dominated by various native shrubs, grasses and herbs (OEH, 2022b). In NSW, the species appears to favour heavier grey clay soils that support Bladder Saltbush (*Atriplex vesicaria*) communities (OEH 2022b). Chariot Wheels typically occupies sparsely vegetated sites, with a high proportion of bare ground, often as a result of over-grazing and subsequent wind erosion (OEH 2022b). It often occurs in low-lying sites that become waterlogged during the winter months, and may be slightly saline. The Project Area consists of potential habitat for the species, presented as PCT 164.

Walked field traverses were undertaken within suitable habitat during the NGH (2020) and ERM spring 2021 field surveys which targeted the species. As aforementioned, records of the species were made during both survey efforts within close proximity to the Project boundary. Further surveys will be undertaken in subsequent field surveys to inform an EIS.

The significant impact guidance for 'vulnerable' species in SIG 1.1, refers to impacts to 'important populations' of a species (DoE, 2013). Important population is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or are:

- 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 (DoE, 2013).

The Chariot Wheels Recovery Plan (Mavromihalis, 2010b) states that since the year 2000, plants have been recorded in about 15 populations, with most plants occurring in just six populations, five in Victoria and one in New South Wales, with four on private property and two along roadsides. The Recovery Plan (Mavromihalis, 2010b) also states that it is likely that more populations exist, particularly on roadsides and private properties. The Project Area is near the limit of the species range, and has been conservatively concluded to be an important population.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table with a potential for a **significant impact** to Chariot Wheels as a result of the Project.

Table D-3 Significant Impact Assessment for Chariot Wheels

Criteria	Description	Criteria Triggered?
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,	Field surveys identified Chariot Wheels 120 m north of the Project Area. Within the Project Area PCT 164 are associated with the species as suitable habitat. These PCTs make up 418 ha in the Project Area, with a potential impact to 159ha of suitable habitat for Chariot Wheels. Further field surveys will be undertaken within the Project Area boundary to confirm presence or absence, however it is predicted the small decrease in habitat has the potential to cause a long term decrease in the size of the population.	Yes
Reduce the area of occupancy of an important population,	The total area of suitable habitat that has potential to make up the area of occupancy of Chariot Wheels across the Project Area is 159 ha (based on presence of associated PCTs). Based on the determination that the presumed population present within the Project Area is considered an important population, the Project will subsequently result in the small reduction of an important population.	Yes
Fragment an existing important population into two or more populations,	Field surveys identified Chariot Wheels 120 m north of the Project Area. Within the Project Area boundary, there is potential for the species to occur within PCT 164 and are associated with the species as suitable habitat. PCT 164 makes up 159 ha within the Project Area. The proposed development has the potential to fragment an important population of the species.	Yes
Adversely affect habitat critical to the survival of a species,	The suitable habitat for Chariot Wheels within the Project Area has been conservatively concluded to be habitat critical to the survival of the species. This is due to the known presence of the species 120m north of the Project Area, and the location of the Project Area being near the edge of the species range. The impact will not adversely affect the habitat critical to the survival of the species..	No
Disrupt the breeding cycle of an important population,	The species enters a dormancy phase in late summer and autumn. In late autumn or winter, adult plants resprout from ground level or aerially, and seeds germinate in response to the first significant rainfall (VIC DSE, 2009). Vegetative growth is rapid and is followed by flowering in spring. Seeds are dispersed by wind or ants in the early summer. The Project is unlikely to disrupt this cycle. The Project will result in a small reduction to the habitat of the species (83 ha), however the species will still be able to reproduce within suitable habitat within the Project Area.	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The disturbance to Chariot Wheel habitat has been calculated as 159 ha, or 38% of the total suitable habitat present within the Project Area. The species range currently covers areas within NSW, VIC and QLD, and is relatively large in comparison the Project Area. Thus, only a very small amount of habitat will be removed in relation to the larger context of the species range. The small amount of disturbance in the larger context of the landscape will not remove/isolate or decrease the quality of habitat that would result in species decline.	No
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat,	Problematic weed species identified for Chariot Wheels include pasture grasses such as Avena sp. and Vulpia sp. Weed invasion is likely to inhibit regeneration (Mavromihalis, 2010b). The Project activities during construction and operation will adopt and follow Biosecurity measures that ensure that further invasive species are not introduced into the Project Area.	No

Criteria	Description	Criteria Triggered?
Introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on Chariot Wheels. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by construction workers.	No
Interfere with the recovery of the species.	The National Recovery Plan for the Chariot Wheels (*Maireana cheelii*) (Mavromihalis, 2010b) has seven objectives, including: ■ Determine distribution, abundance and population structure ■ Determine habitat requirements ■ Ensure that important populations and their habitat are protected and managed ■ Manage threats to populations ■ Identify key biological functions ■ Determine the growth rates and viability of populations ■ Build community support for conservation The Project Area is inclusive of a Chariot Wheels population, and suitable habitat for the species. Therefore, the projects removal of suitable habitat will have a small, albeit negative impact on the plans goal to protect important populations.	Yes

LOORICA ROAD

STURT HIGHWAY

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Legend

- Project Area
- Subject Land
- Main Roads
- Minor Roads
- Path/Track
- Chariot Wheels Habitat

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

MNES Habitat Areas for Chariot Wheels

D-3

Drawing No:	0617753s_KKSF_BIO_G007_R2.mxd		Keri Keri Solar Farm Scoping Report
Date:	22/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

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This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM

Mossgiel Daisy (*Lepidium monoplocoides*) - Vulnerable

The proposed development in the Project Area is likely to lead to a significant impact to Mossgiel Daisy.

The Mossgiel Daisy (*Brachyscome papillosa)* is listed as 'Vulnerable' under the EPBC Act and based on potential observations during field surveys is presumed as present for the purpose of this assessment. The Mossgiel Daisy is a multi-stemmed, perennial herb that grows to 40 centimetres tall. Its flower-heads are mauve with a yellow centre, and are solitary.

The Mossgiel Daisy is known to occur mainly from Mossgiel to Urana, in south-western NSW with sites around Jerilderie, Hay Plain, Willandra Lakes, and north to Ivanhoe (DEWHA, 2008). The species is found primarily in clay soils on Bladder Saltbush (*Atriplex vesicaria*) and Cotton Bush (*Maireana aphylla)* plains but also in grassland and in Grey Box (*Eucalyptus macrocarpa*)–Cypress Pine (*Callitris* spp.) woodland (DEWHA, 2008). This species occurs within the Lachlan, Lower Murray Darling, Murray, Murrumbidgee and Western (NSW) Natural Resource Management Regions. The closest NSW BioNET record of the species is located 15.1 km north west of the Project boundary and was observed in 2001.

The Project Area is within the known distribution and consists of suitable habitat for the species. Habitat is present on site in the form of PCTs 13, 44, 153, 159, 160 and 164 and make up 492ha of the Project Area as presented in Figure D.4.

Walked field traverses were undertaken within suitable habitat during the ERM spring 2021 field surveys which targeted the species. These surveys presented 4 hours across 2 days. Potential Mossgiel Daisy specimens were observed, samples of which have been submitted to the herbarium for confirmation. Results are yet to be obtained. For the purpose of this assessment the presence of the species is assumed.

The significant impact guidance for 'vulnerable' species in SIG 1.1, refers to impacts to 'important populations' of a species (DoE, 2013). Important population is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or are:

- 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 (DoE, 2013).

There are no current recovery plans developed for the Mossgiel Daisy. This species has been conservatively concluded to be an important population in the Project Area due to the following reasons. Firstly, there is an absence of detailed population data for the Project Area. Additionally, the Mossgiel Daisy was potentially observed during the Spring 2021 field surveys, and records exist from 2014 and 2015 approximately 15.5 km north of the Project Area at the Nimmie-Caira landholding.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table with a potential for a **significant impact** to Mossgiel Daisy as a result of the Project.

Table D-4 Significant Impact Assessment for Mossgiel Daisy

Criteria	Description	Criteria Triggered?
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,	The impact on the Mossgiel Daisy is the removal of habitat within the Project Area. The amount of suitable habitat to be removed is 190 ha, or 73% of the total amount of Mossgiel Daisy habitat within the Project Area. The adjacent Yanga National Park contains high value habitat for the species. Based on the low proportion of habitat within the Project Area to be removed, the Project is unlikely to lead to long-term decrease in the size of an important population.	Yes
Reduce the area of occupancy of an important population,	The proposed development will lead to a reduced area of occupancy of the species, as 190 ha or 38% of total Mossgiel Daisy habitat within the Project Area, will be impacted. The clearing of this area across the landscape, which will not remove habitat patches altogether but may reduce the area of occupancy of the population.	Yes
Fragment an existing important population into two or more populations,	The clearing of 190 ha of Mossgiel Daisy habitat will fragment existing populations. This clearing impact will only remove small fragments of suitable PCTs within the broader context.	Yes
Adversely affect habitat critical to the survival of a species,	The species does not have any registered critical habitat. Suitable habitat is present within the Project Area in the form of PCTs 13, 44, 153, 159, 160 and 164. Based on state vegetation mapping this vegetation is not unique to the locality. This habitat is therefore not considered habitat critical to the survival of the species. Nonetheless, the impact will not adversely affect the habitat within the Project Area as the habitat removal is restricted to clearing of small proportions of the larger landscape.	No
Disrupt the breeding cycle of an important population,	The impacts of clearing will only occur to 190 ha of Mossgiel Daisy habitat. The small clearings throughout the larger context will not reduce the distribution of the species to the point of causing disruption to the breeding cycle. The species will still have the potential to successfully reproduce within the Project Area	No
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,	The disturbance has been calculated as 190 ha within the Project Area. Thus, only a very small amount of habitat will be removed in relation to the larger context of the landscape. The small amounts of clearing in the larger context of the landscape will not remove/isolate or decrease the quality of habitat that would result in species decline.	No
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat,	There are currently no invasive species detailed to have a harmful impact to the Mossgiel Daisy. However, the Project activities during construction and operation will adopt and follow Biosecurity measures that ensure that invasive species including weeds are not introduced into the Project Area.	No
Introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on Mossgiel Daisy populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by construction workers.	No
Interfere with the recovery of the species.	There is no formal adopted, or made, Recovery Plans for this species. However, the small amounts of clearing to be undertaken for the proposed development will not affect the recovery of this species.	No

LOORICA ROAD

STURT HIGHWAY

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Legend

- Project Area
- Subject Land
- Main Roads
- Minor Roads
- Path/Track
- Mossgiel Daisy Habitat

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

MNES Habitat Areas for Mossgiel Daisy

D-4

Drawing No:	0617753s_KKSF_BIO_G008_R2.mxd		Keri Keri Solar Farm Scoping Report
Date:	22/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

0 1 2Km

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ERM

Plains-wanderer (*Pedionomus torquatus*) – Critically Endangered

The proposed development in the Project Area is likely to lead to a significant impact to the Plains-wanderer.

The Plains-wanderer is listed as 'Critically Endangered' under the EPBC Act and is considered likely to occur within the Project Area. The species was once widespread across south-eastern Australia, with declines first observed in the 1960's as a result of overgrazing during droughts and predation by introduced species. Increased habitat loss and degradation remain current threats, exacerbated by climate change and small population size. Recent analysis of monitoring data collected between 2001 and 2014 indicates that there was an overall decline in numbers of 93% across sites in the Riverina region over this time period due to draught followed by increased rainfall (Wilson et al., 2014). In 2015, there was estimated to be between 250-1000 of these small, ground-dwelling grassland birds left in the wild (Baker-Gabb, 2015).

The vast majority of records of Plains Wanderers in NSW over the last 30 years come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west, the Billabong Creek in the south, and Urana in the east (OEH, 2022). There are no known records within the Project Area, however there are records from 6.4km NE of the boundary from 1964, and 3.5km west from as recently as 2020. The 2020 record is from a Songmeter audio recording within the Yanga National Park. NGH (2020) undertook six evening and six morning diurnal transects, and three nights of nocturnal spotlight surveys targeting the Plains-wanderer, making a total of 15 survey hours for the species. This survey effort is not sufficient to meet BAM requirements for the species. No Plains-wanderers were observed during the survey effort, however for the purpose of this assessment are assumed to be present.

The extent of occurrence for the species is estimated to be 930,000 km^2 (Garnett et al., 2011). However Garnett et al. (2011) estimated the actual area of occupancy to be 330 km^2, with a continuing declining trend. Given the historically low population size and the fragmented distribution of the Plains-wanderer, all areas in which birds are found, and any regions where the species is likely to occur, represents habitat critical to the survival of the species (Garnett et al., 2011).

Plains-wanderers inhabit sparse, treeless, lowland native grasslands which usually occur on hard red-brown clay soils. Grassland structure is much more important than floristic composition with the species showing a strong preference for sites with approximately 50% bare ground and most vegetation less than 5 cm in height and some widely-spaced plants up to 30 cm. (Commonwealth of Australia, 2016). This habitat is present within the Project Area associated with PCT 44 which totals 36 ha. As the species has been recently recorded in close proximity, and preferred habitat is present, this species is considered likely to occur within the Project Area. All potential habitat is considered critical to the survival of the species and is mapped in Figure D-5.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table with a potential for a **significant impact** to Plains-wanderer as a result of the Project.

Table D-5 Significant Impact Assessment for Plains-wanderer

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
Lead to a long-term decrease in the size of a population	Plains-wanderer habitat is present within the Project Area and subject land associated with PCT 44 which totals 36 ha. The extent of likely impact to Plains-wanderer habitat as a result of the development footprint will be 7 ha. There is a potential reduction of approximately 19% of available Plains-wanderer habitat in the Project Area. All suitable habitat is recognised as habitat critical to the survival of the species, therefore the removal of any suitable habitat has the potential to subsequently result in the decrease of the size of the population.	Yes
Reduce the area of occupancy of the species	The total area of occupancy for the Plains-wanderer was estimated in 2011 to be only 33,000 ha with a continuing declining trend (Garnett et al., 2011). The potential area of habitat to be disturbed as a result of the development is estimated to be 7 ha, which is 19% of the suitable habitat within the Project Area. The scale of the development, access tracks, transmission lines and associated infrastructure is not considered likely to reduce movements of Plains-wanderers, and due to the low area of impact it is unlikely the Project will reduce the area of occupancy of the species. The Plains-wanderer habitat in the development footprint is associated with the access tracks only, not the solar arrays.	No
Fragment an existing population into two or more populations	Presence of the Plains-wanderer on the Project Area is presumed, however there have been no recorded observations during field surveys completed to date. The construction of tracks and infrastructure that is positioned within areas of suitable habitat and results in the removal of an estimated 7 ha of suitable habitat. The Project infrastructure is not considered likely to cause barriers to movement for Plains-wanderer, with access track corridors being relatively narrow, the ability to retain grasslands under transmission line corridors.	No
Adversely affect habitat critical to the survival of a species	Plains-wanderer habitat is present within the Project Area associated with PCT 44 which totals 36ha. The area of Plains-wanderer habitat to be disturbed as a result of the development is 7 ha. All suitable habitat is recognised as habitat critical to the survival of the species, therefore the removal of any PCT 44 would result in an adverse effect on habitat critical to the survival of the species.	Yes
Disrupt the breeding cycle of a population	In the Riverina region, the home range of individual plains-wanderers vary in size from 7-21 ha (average size is 12 ha) in suitable habitat. As about half of a pairs' home range overlaps, a pair requires about 18 hectares to breed. The Plains-wanderer nest is a hollow or 'scrape' that is scratched into the ground and lined with grass, with nests placed amongst native grasses and herbs within suitable habitat. Therefore, the removal of suitable habitat has the potential to disrupt the breeding cycle of a population of Plains-wanderers.	Yes
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project Area is inclusive of areas of Plains-wanderer habitat associated with PCT 44. The estimated area of disturbance currently includes areas of suitable habitat for the species, totalling 7 ha. As all suitable habitat is determined to be critical habitat for the survival of species, the Project has the potential to remove, isolate and decrease the availability of habitat to the extent that the species has the potential to decline.	Yes

Criteria	Description	Criteria Triggered?
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	A range of invasive species are harmful to the Plains-wanderer, including feral cats and foxes which predate on the species, and invasive rabbits and weeds which can degrade the species habitat. In addition, introduced species such as Boxthorn have been attributed to providing increased perches for raptors that prey on the species. Project activities during construction and operation will adopt and follow Biosecurity measures that will aim to ensure that invasive species are not introduced into the Project Area. It is noted that pesticides, such as fipronil and fenitrothion, have the potential to impact on Plains-wanderer either directly or via their food supply. The use of such pesticide use will not be permitted within or nearby Plains-wanderer habitat.	No
Introduce disease that may cause the species to decline	There is currently limited evidence of diseases causing detrimental effects on Plains-wanderer populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn by construction workers.	No
Interfere with the recovery of the species	There is a National Recovery Plain for the Plains-wanderer published in 2016. The objectives of the recovery plan are: ■ Reverse the long-term population trend of decline and increase the numbers of plains- wanderers to a level where there is a viable, wild breeding population, even in poor breeding years; and to ■ Enhance the condition of habitat across the plains-wanderers' range to maximise survival and reproductive success, and provide refugia during periods of extreme environmental fluctuation. The Project Area is inclusive of Plains-wanderer habitat, and will have a small, area of impact on 52 ha which has the potential to cause a small decline in the population Therefore, the Project will interfere with the objective of enhancing the condition of habitat across the Plains-wanderers' range.	Yes

LOORICA ROAD

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Legend

- Project Area
- Subject Land
- Main Roads
- Minor Roads
- Path/Track
- Plains-wanderer

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

MNES Habitat Areas for Plains-wanderer

D-5

Drawing No:	0617753s_KKSF_BIO_G009_R0.mxd		Keri Keri Solar Farm Scoping Report
Date:	29/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

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ERM

Natural Grasslands of the Murray Valley Plains TEC – Critically Endangered

The proposed development in the Project Area have the potential to lead to a significant impact to the Natural Grasslands of the Murray Valley Plains TEC.

The Natural Grasslands of the Murray Valley Plains TEC is listed as 'Critically Endangered' under the EPBC Act and is known to occur within the Project Area based on vegetation integrity plots (BAM plots) undertaken during field surveys. The Project Area is within the range of the TEC, predominately across the southern parts of the Riverina Bioregion in NSW. Within its range, the TEC occurs predominately on flat, alluvial lowland plains with heavy-textured grey, brown and red clays. Many occurrences are associated with Quaternary alluvial sediments.

One BAM plot site is confirmed to form part of the TEC, meeting the following diagnostic features as outlined within the Conservation Advice (TSCC 2012):

- Distribution within the Riverina Bioregion
- Alluvial plains with heavy textured soils present on the Project Area
- Trees and large shrubs (>1m tall) are absent
- The Project Area contains as many of the species listed in Table 1 (A) than Table 1 (B) presented within the Listing Advice (TSCC, 2012).
- The percentage cover of native vascular plains in the patch is greater than the percentage cover of perennial exotic species
- 15 or more native vascular plant species are present within the patch
- The patch contains one or more indicator species

Minimum patch size for the *Natural Grasslands of the Murray Valley Plains* was determined by analysis of known patch sizes across the ecological community (TSSC, 2012). The ecological community now occurs in a highly fragmented state and patches are generally small in size, with most being less than 100 ha in area. Consequently, impacts to patches of the ecological community that are 0.04 ha in size and of high diversity are likely to be significant. The area of the patch identified within the Project Area is to be determined during future survey efforts. The area of the associated PCT (PCT 44) within the subject land is 259 ha, with potential impacts of up to 52 ha estimated as a results of the Project, therefore, the impact is likely to be significant.

To assist in the preservation of the ecological community, it is recommended that a buffer zone of at least 30 metres be maintained from the outer edge of an identified patch, where practicable.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table.

Table D-6 Significant Impact Assessment for Natural Grasslands of the Murray Valley Plains TEC

Criteria	Description	Criteria Triggered?
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:		
Reduce the extent of an ecological community	The area of the patch identified within the Project Area is to be determined during future survey efforts. The area of the associated PCT (PCT 44) within the subject land is 259 ha. An estimated area of impact associated with the development footprint for the Project is 52 ha. An extent reduction of 0.04 ha is considered significant, therefore the proposed developed is likely to have a significant impact on the extent of the TEC.	Yes
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	An area of the identified TEC Patch is located within the subject land, this area will be disturbed by the Project development, however will not be fragmented from another patch.	No
Adversely affect habitat critical to the survival of an ecological community	Impacts to patches of the ecological community that are 0.04 ha in size and of high diversity are likely to be significant. The area of the patch identified within the Project Area is to be determined during future survey efforts. The area of the associated PCT (PCT 44) within the subject land is 259 ha, with an estimated impact of 52 ha. Based on this, the project is likely to have an adverse effect to habitat critical to the survival of the ecological community.	Yes
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Hydrology impacts as a result of the Project have not been explored as part of this assessment, and will be considered in the EIS. However, given the nature of the project and the limited area of impact to surface water and groundwater, it is not considered likely that there will be a significant impact to this TEC. Mitigation measures will also be included in the design to result in no changes to surface water or groundwater hydrology that could impact on the TEC area.	No
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	The area of the patch identified within the Project Area is to be determined during future survey efforts. The area of the associated PCT (PCT 44) within the subject land is 259 ha. Outside the disturbance area, biosecurity requirements will be implemented to reduce the likelihood of changes to community composition. The proposed developed is unlikely to cause substantial change in the species composition.	No
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:	Impacts to patches of the ecological community that are 0.04 ha in size and of high diversity are likely to be significant. The area of the patch identified within the Project Area is to be determined during future survey efforts. The area of the associated PCT (PCT 44) that is estimated to be impacted within the development footprint is 52 ha. Biosecurity measures will be implemented to reduce the introduction and establishment of invasive species. These	Yes

Criteria	Description	Criteria Triggered?
– assisting invasive species, that are harmful to the listed ecological community, to become established, or – causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community	measures will further explore the mitigation measures to be undertaken to minimise the impacts of chemicals utilised, if any, for weed management within the Project Area and the consideration for native vegetation, inclusive of the TEC.	
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: - Interfere with the recovery of an ecological community.	A recovery plan for the TEC is yet to be developed. Regardless, the proposed development results in the potential disturbance of 52ha (area of associated PCT 44) of a high diversity patch of the TEC, therefore will result in a significant impact to the TEC. This subsequently interferes with the recovery of the ecological community.	Yes

LOORICA ROAD

STURT HIGHWAY

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Legend

- Project Area
- Subject Land
- Main Roads
- Minor Roads
- Path/Track
- Natural Grasslands

Source:
ERM Fieldwork 2021, NGH Fieldwork 2020
DTDB and DCDB 2021
ESRI Imagery July 2016

Natural Grasslands of the Murray Valley Plains TEC

D-6

Drawing No:	0617753s_KKSF_BIO_G010_R0.mxd		Keri Keri Solar Farm Scoping Report
Date:	29/03/2022	Drawing Size: A3	
Drawn By:	VN	Reviewed By: AA	Client: Acciona

Coordinate System: GDA 1994 MGA Zone 54

0 1 2Km

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ERM

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Australia	New Zealand
Belgium	Norway
Brazil	Panama
Canada	Peru
Chile	Poland
China	Portugal
Colombia	Puerto Rico
France	Romania
Germany	Russia
Ghana	Senegal
Guyana	Singapore
Hong Kong	South Africa
India	South Korea
Indonesia	Spain
Ireland	Sweden
Italy	Switzerland
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