The Plains Wind Farm

Preliminary Biodiversity Assessment

29 September 2022

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The business of sustainability

ERM

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The Plains Wind Farm

Preliminary Biodiversity Assessment

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CONTENTS

List of Tables

List of Figures

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
CCEEW	Department of Climate Change, Energy, the Environment and Water
DPI	Department of Primary Industries
EEC	Endangered Ecological Community
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
NSW	New South Wales
ºC	Degrees Celsius
PCT	Plant Community Types
PMST	Protected Matters Search Tool
Project Area	The term Project Area refers to all affected lots where the Project may be located.
PV	Photovoltaic
SAII	serious and irreversible impacts
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental
SSD	State Significant Development
Study Area	Areas within the Project Area subject to biodiversity field surveys.
Subject Land	The biodiversity study area targeted during the ERM field surveys, defined as a 100m buffer to turbines, and 50m to all remaining project infrastructure, including access tracks, overhead transmission line, substation and crane hard stands. It is the area in which Stage 1 of the BAM has been applied.
TBDC	Threatened Biodiversity Data Collection
TECs	threatened ecological communities
The Project	In this report, the Project refers to the proposal by the proponent (ENGIE) to construct and operate The Plains Wind Farm as described in this Scoping report.
The Proponent	ENGIE
VIS	Vegetation Information System
WoNS	Weeds of National Significance

1. INTRODUCTION

ENGIE (The Proponent) proposes to construct and operate The Plains Wind Farm (the Project) as part of the Plains Renewable Energy Park Project, a renewable energy development located south of Hay in the Riverina Murray region of New South Wales (NSW). The Project is a proposed wind farm that will include up to 226 wind turbines with a total capacity of up to approximately 1800 MW. The Proponent is seeking State Significant Development (SSD) Consent for the Project under Division 4.7, Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The initial Project area covered four sites for closer investigation. Landcover modelling and field surveys were completed by ERM to verify vegetation communities to identify areas of high biodiversity constraint. As a result, the Project area was reduced to two properties, Mungadal West and Mungadal East (also known as 'Rosevale'). The Project area and indicative Project layout for the wind farm turbines are identified in Figure 1.1.

A Preliminary Constraints assessment was completed in 2019 by NGH, assessing the four original Project area sites. The NGH (2019) assessment was based on desktop analysis of publicly available datasets and information. This Preliminary Biodiversity Assessment will refine the biodiversity constraints within the current Project area through updated desktop analysis and field surveys conducted by ERM.

This Preliminary Biodiversity Assessment Report will be appended to the Scoping Report to support an application of the Secretary of the NSW Department of Planning and Environment (DPE) for Secretary's Environmental Assessment Requirements (SEARs). The SEARs will guide the preparation of an Environmental Impact Statement (EIS) for the Project as part of a broader Development Application (DA). The information gained from all survey efforts would support the development of a Biodiversity Development Assessment Report (BDAR).

Due to the early stage of design development, it is not possible to assess impacts based on a development footprint or clearing footprint for this assessment. Biodiversity values have been identified across a broader Project Area, consisting of the landholding boundaries and a more defined area referred to as the subject land. The subject land consists of the preliminary Project layout, with a 100m buffer applied. This subject land has been the area across which detailed ecological fieldwork has been completed. For the purpose of this biodiversity assessment report, it has been assumed that up to 20% of the subject land will be directly impacted as a result of a development footprint associated with the Project.

1.1 Project Overview

ENGIE proposes to develop The Plains Wind Farm near the town of Hay, in the Riverina Murray Region of NSW. The Project Area covers a total area of 59,275 hectares and is situated on Mungadal Station and neighbouring properties to the east and west of the Cobb Highway.

The Project is a proposed wind farm that will consist of up to 226 wind turbine generators (WTGs) after consultation with boundary neighbours identified opportunity for 6 additional landowners to host infrastructure. The project has an estimated maximum installed capacity of up to approximately 1,800 MW. The wind turbines will have a proposed hub height of 165 m and tip height of up to 280 m.

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

- One (1) Operations and Maintenance Building;
- One (1) primary 330 kV substation including a control room and switchyard facilitating connection to the National Electricity Market (NEM) includes transformers, voltage controls, storage units and potentially power quality controls;

- At least two (2) 132 kV collector substations including a control room within each, located at selected locations within the wind farm. Collector groups will be connected with predominately 33kV underground cabling;
- At least two (2) permanent Meteorological Masts;
- High-voltage overhead lines connecting collector groups, main substation and connection to the NEM infrastructure;
- A construction compound and temporary construction infrastructure including concrete batching facilities;
- Electrical connections between wind turbines and site substations. The grid (a tee-connection within the Project Area is assumed), which will primarily be underground though may include overhead lines;
- Internal access tracks and upgrades to existing access roads where required;
- Upgrades to existing minor roads along the haulage route to the Project Area:
- Wind turbine hardstands;
- Installing maintenance and environmental managements processes and equipment;
- On-site quarries, security fencing and landscaping;
- Ancillary activities including gravel pits, water sourcing, visual screening (as required); and
- Temporary workers accommodation.

The broader Plains Renewable Energy Park project also includes a proposed 400 MWn (ac)/500 MWp (dc) solar farm, and Battery Energy Storage System (BESS) with a capacity of up to 400 MW located in the south of the Project Area. The Plains Solar Farm and BESS is subject to a separate SSD application, however it may share ancillary infrastructure to be constructed and operated collectively under Plains Renewable Energy Park Project. Subject to the timing of the construction of the Project, the Project may utilise shared infrastructure proposed as part of The Plains Solar Farm including:

- Internal access roads to connect the solar panels and ancillary infrastructure;
- Operations and Maintenance (O&M) Building;
- Substations;
- Switchyard; and
- Access to the Project Area off the Cobb Highway to the east and west.

The indicative preliminary Project layout is shown in Figure 1.1. The layout and development footprint will be further refined and assessed during EIS preparation.

STURT HIGHWAY
CLENCOE ROAD
JERILDERIE ROAD
TELEGRAPH CREEK
COBB HIGHWAY
ABERCROMBIE CREEK
SIXTEEN MILE GUMS
ROMANI ROAD
COBB HIGHWAY
CURTAWS CREEK
EUROLIE CREEK
NYANGAY CREEK

Legend

- Locality
- Watercourse
- Main Road
- Local Road
- 220kV Transmission Line
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Turbine
- Access Track
- Substation/ O+M

Data Source:
Layout - Client Provided (WTG_Layout_Rev10.shp)
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Preliminary Project Layout

1-1

Drawing No:	0606253m_PREHWF_Bio_G001_R04.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

1.2 Objectives

The objective of this assessment is to describe the biodiversity constraints that are known or may occur within the Project Area. The results of this assessment will build upon updated desktop reviews, field surveys undertaken in Spring 2021, Summer 2022, Autumn 2022 and Winter 2022 completed by ERM, and the preliminary constraints assessment completed by NGH on behalf of ENGIE in 2019 (NGH 2019). 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 (e.g. raptors); 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, and fauna species susceptible to turbine strikes;
- Preliminary mapping of the extent and type of native Plant Community Types (PCT) and Threatened Ecological Communities (TEC);
- Preliminary survey design including likely target species and seasonal survey techniques;
- Identification of potential for 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 Annex to 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).

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 Climate Change, Energy, the Environment and Water (CCEEW) 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 determined the presence of MNES within the Project Area. A Significant Impact Assessment has been undertaken for MNES known or likely to be present (Appendix E), 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 31st August 2022 and determined that areas within the Project area are mapped as Areas of Biodiversity Values. These areas are associated with creek lines across both Sites, and Plains Wanderer habitat within the Mungadal East Site. 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 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 Services Act 2013

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.

A review of the Native Vegetation Regulatory Map (Regulatory Map) confirms that the areas of Category 2 - Regulated Land and Category 2 – Sensitive Land exist within 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 Abercrombie Creek running through the Project Area provides habitat for the threatened Flathead Galaxias and Silver Perch.

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".

3. METHODOLOGY

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 27th July 2021 and 31 August 2022;
- Commonwealth Department of Climate Change, Energy, the Environment and Water (CCEEW) Protected Matters Search Tool (PMST) identifying threatened species and communities with potential to occur within the locality (10 km buffer around the Project Area). Accessed 20th July 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 (2019) Preliminary Biodiversity Constraints assessment. Report Prepared for ENGIE;
- Atlas of Living Australia (ALA) Database; and
- Local government databases.

The results of the Protected Matters Search Tool database search is included in Appendix A.

3.2 ERM Field Surveys

For the Preliminary Biodiversity Assessment, the areas targeted during the ERM field surveys has been defined as a 100m buffer to turbines, and 50m to all remaining project infrastructure, including access tracks, overhead transmission line, substation and crane hard stands. This area is defined as the 'Subject Land' in accordance with the definition in the Biodiversity Assessment Method (BAM) 2020, which includes land that is subject to a development, activity or clearing. It is noted that the Study Area presented on Figure 3.1, Figure 3.2, Figure 3.3 and Figure 3.4 was subject to field surveys. Areas outside of this boundary were not visited or targeted during survey events. This is a result of recent Project Area boundary changes, providing further landowners and properties to the Project.

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 ERM field survey effort undertaken in Spring 2021, Summer 2022, Autumn 2022 and Winter 2022 is provided Table 3.5, with the location of field survey efforts undertaken shown in Figure 3.1, Figure 3.2, Figure 3.3 and Figure 3.4. It is noted that the Subject Land was updated as a result of the field survey efforts to date. This has resulted in survey efforts presented in the aforementioned figures being completed in areas that are now excluded from the current Subject Land. Further surveys efforts are scheduled to continue to inform the EIS.

3.2.1 Spring 2021 Field Survey

Spring biodiversity field surveys were completed from Tuesday 26th October to Friday 12th November 2021 by six (6) ecologists. During the survey event, the following was undertaken:

- Rapid data points for Plant Community Types (PCTs) / Threatened Ecological Communities (TECs) and vegetation zone mapping;
- Vegetation integrity plots (BAM plots);
- Targeted threatened flora surveys;
- Targeted threatened fauna surveys; and
- Bird Utilisation Surveys (BUS).

The survey period was at the end of the spring survey period and majority of the small paper daisy, yellow heads and other herbaceous species, were reduced in cover due to being at the end of the dry season. These species, while dominant on most BAM plot sites, did not record high cover estimates or abundance scores, simply because they were technically 'dead'.

Table 3.1 details the daily weather observations that were recorded for the Hay Airport weather station (located approx. 10 km north of the Project) during the field survey.

Conditions were fine for the majority of the survey period, temperatures ranged from a minimum of 3.2ºC to a maximum of 33.2ºC. These were optimal conditions for the detection of targeted fauna species. Winds were generally low and conditions clear, optimal for bird surveys and spotlighting.

Rainfall occurred on site on the 4th November and 7th November, resulting in field work being temporarily postponed until conditions cleared.

Table 3.1 Daily Weather Observations for Hay Airport Weather Station (Spring)

Date	Minimum Temperature (°C)	Maximum Temperature (°C)	Rainfall (mm)
26/10/2021	3.2	25.9	0
27/10/2021	7.8	32.9	0
28/10/2021	4.4	31.1	0.2
29/10/2021	3.5	22.7	0
30/10/2021	3.5	20.6	0
31/10/2021	3.7	24.6	0
01/11/2021	8.4	28.3	0
02/11/2021	9.7	33.2	0
03/11/2021	21.6	24.2	0
04/11/2021	4.8	28.7	4.2
05/11/2021	4.0	29.7	0
06/112021	17.2	33.1	0
07/11/2021	14.0	29.2	2.8
08/11/2021	0.5	26.4	0.2
09/11/2021	7.2	28.3	0
10/11/2021	17.4	24.6	0
11/11/2021	7.5	19.5	0
12/11/2021	10.7	14.6	24.8

3.2.2 Summer 2022 Field Survey

Summer 2022 biodiversity field surveys were completed from Monday 14th February to Friday 25th February 2022 with four (4) ecologists in the field. During the survey event, the following was undertaken:

- Vegetation integrity plots (BAM plots);
- Targeted threatened fauna surveys;
- Bat detection surveys;
- Koala Spot Assessment Technique (Koala SAT); and
- Bird Utilisation Surveys (BUS).

Threatened fauna targeted during the Summer 2022 survey effort included the Australian Bustard, Glossy Black Cockatoo, Southern Myotis, Koala and Growling Grass Frog. The survey efforts required for these species were met during this survey effort, although Koala call playback surveys are planned to be undertaken in future efforts.

Table 3.2 details the daily weather observations that were recorded for the Hay Airport weather station (located approx. 10 km north of the Project) during the field survey. Prior to field survey efforts the region experienced substantial rainfall, as a result of La Niña weather systems. This increased rainfall provided ideal conditions across the site for the identification of ground cover species.

Conditions remained clear throughout the survey period however, extreme temperatures, around 40ºC, impeded species detectability on three days, particularly during BUS surveys.

Minimal rainfall of 0.6mm occurred on site on the 23rd February, this had no impact on field survey efforts.

Table 3.2 Daily Weather Observations for Hay Weather Station (Summer)

Date	Minimum Temperature (°C)	Maximum Temperature (°C)	Rainfall (mm)
14/02/2022	21.9	37.5	0
15/02/2022	20.4	38.9	0
16/02/2022	22.0	39.5	0
17/02/2022	20.7	30.8	0
18/02/2022	14.7	29.1	0
19/02/2022	11.2	31.5	0
20/02/2022	13.9	33.5	0
21/02/2022	13.0	29.0	0
22/02/2022	11.8	34.1	0
23/02/2022	17.7	34.6	0.6
24/02/2022	24.3	32.8	0
25/02/2022	22.6	34.6	0

3.2.3 Autumn 2022 Field Survey

Autumn 2022 biodiversity field surveys were completed from Monday 16th May to Friday 20th May 2022 with two (2) ERM ecologists in the field. During the survey event, the following was undertaken:

- Targeted threatened flora surveys;
- Hollow Bearing Tree search; and
- Bird Utilisation Surveys (BUS).

Threatened flora targeted during the Autumn 2022 survey effort included searches for the Yellow Gum. Hollow Bearing Trees identified within the Subject Land situated higher than 3m above ground and with a diameter of 5cm or greater were recorded.

Table 3.5 details the daily weather observations that were recorded for the Hay Airport weather station (located approx. 10 km north of the Project) during the field survey.

The site experienced rain in the week leading up to the survey event, however minimal rainfall occurred during the survey period. Conditions were mostly clear, however cloud cover was present, and slight to moderate winds occurred.

Table 3.3 Daily Weather Observations for Hay Weather Station (Autumn)

Date	Minimum Temperature (°C)	Maximum Temperature (°C)	Rainfall (mm)
16/05/2022	8.7	20.1	0
17/05/2022	5.1	18.3	0
18/05/2022	9.6	17.3	0.2
19/05/2022	1.9	15.5	0
20/05/2022	2.1	15.2	0

3.2.4 Winter 2022 Field Survey

Winter 2022 biodiversity field surveys were undertaken 8th – 18th August 2022 with two (2) ERM ecologists in the field. Surveys undertaken included the following:

- Targeted threatened fauna surveys; and
- BUS Surveys.

Surveys were undertaken to target threatened owl species, the Barking Owl and Masked Owl, in areas where suitable hollow bearing trees were identified during the autumn survey event.

During the field surveys conditions were clear with light to moderate winds occurring, however the site received rainfall prior to and during the survey period. Weather conditions are presented in Table 3.4, noting rainfall is presented as precipitation recorded in the 24 hours to 9am.

On the 15th August, surveys were undertaken until 3:15pm when rainfall resulted in unsafe driving conditions on site, subsequently night surveys were not completed and the site was not accessed on the 16th August. Additionally, rainfall affected surveys on the final survey night, 18th August, surveys were concluded at 7:00pm when conditions resulted in access restrictions.

Table 3.4 Daily Weather Observations for Hay Weather Station (Winter)

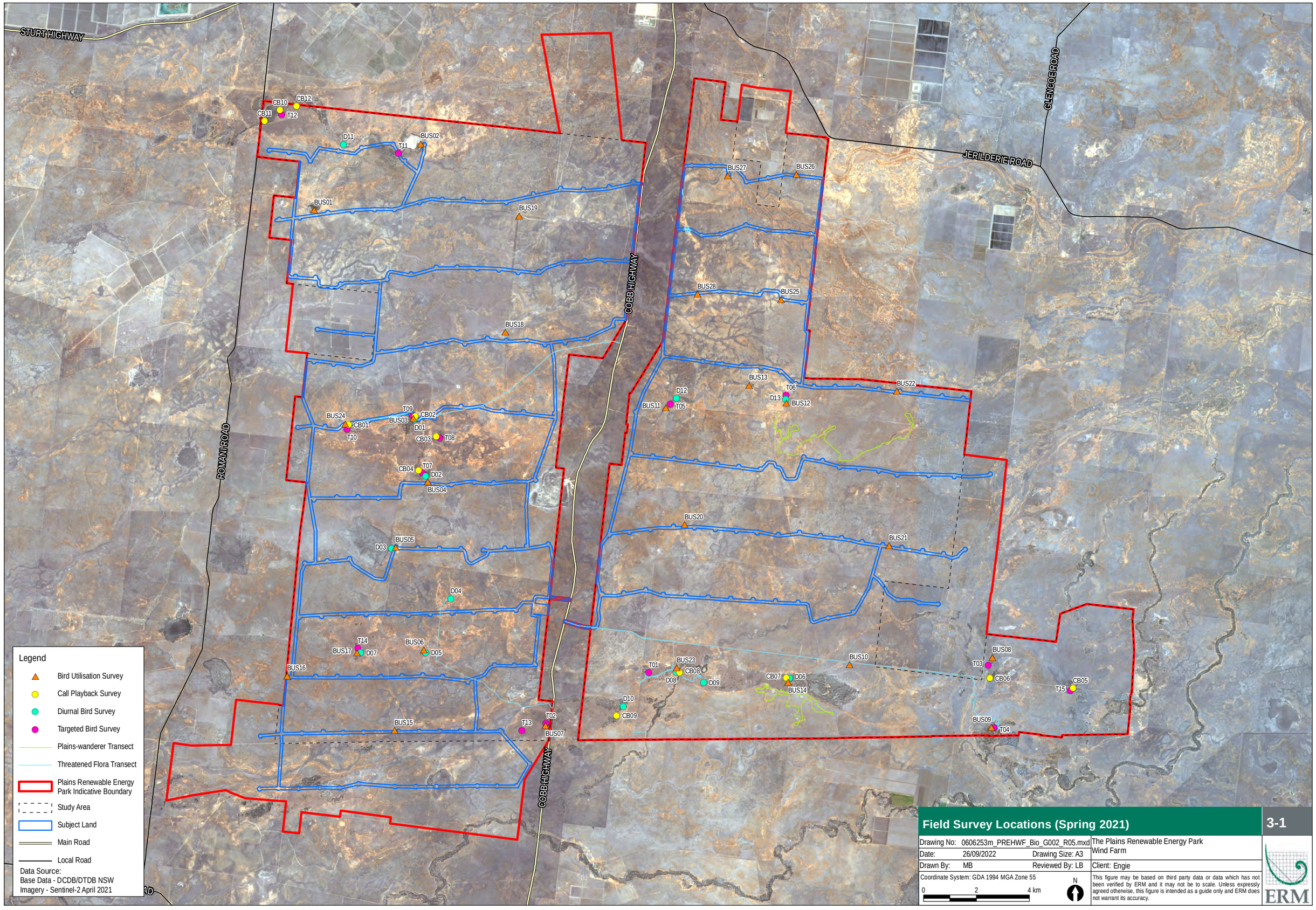
Date	Minimum Temperature (°C)	Maximum Temperature (°C)	Rainfall (mm)
08/082022	0.5	16.4	4.8
09/08/2022	-1.1	16.3	0.2
10/08/2022	-2.2	17.0	0
11/08/2022	7.4	12.4	0.2
12/08/2022	7.1	18.9	2.6
13/08/2022	8.1	14.9	0.2
14/08/2022	4.1	17.1	0
15/08/2022	4.1	15.0	0
1608/2022	5.0	16.9	7.2
17/08/2022	1.2	18.3	0.6
18/08/2022	8.0	19.9	0
19/08/2022	7.0	15.6	8.6

Table 3.5 Summary of Survey Methods and Effort

Survey Method	Methodology	Effort Required	Effort Completed to date	Targeted species	Season	Timing	Habitat
Fauna							
Targeted Surveys	Targeted area searches for detection of the target species by sight or call conducted in suitable habitat. Observations of signs of species presence (bark stripping, scratches, pellets), suitable roosting and nesting sites recorded within each survey site location.	40 hours across 10 days	40.25 hours across 10 days	Glossy-black Cockatoo	Summer 2022	Morning/ afternoon.	Search for signs of feeding or nests.
		40 hours across 10 days	43 hours across 10 days	Regent Parrot	Spring 2021	Morning/ afternoon.	Hollow bearing trees Living or dead *E. camaldulensis* with hollows greater than 5 cm diameter, greater than 5 m above the ground OR trees with DBH of greater than 40cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of mallee.
		40 hours across 10 days	43 hours across 10 days	Superb Parrot	Spring 2021	Morning/ afternoon.	Hollow bearing trees Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5cm diameter greater than 4m above ground or trees with a DBH of greater than 30cm.
Diurnal Area Searches	Diurnal area searches conducted in suitable habitat in and around the survey area for the detection of targeted avian species by sight, call or indirectly by a range of signs (eg. Raptor nests, prey remains, white wash)	40 hours across 10 days in spring 40 hours across 10 days in winter	35 hours across 10 days in Spring	Bush Stone-curlew White-Bellied Sea-eagle Little Eagle Square-tailed Kite Glossy Black-cockatoo Major Mitchell's Cockatoo	Spring 2021	Morning and evening	Alluvial plains and plains
		40 hours across 10 days	26.5 hrs across 10 days	Australian Bustard	Summer 2022	Morning and evening	
Call Playback	At each survey location species call is played for 30 seconds, followed by 4.5 minutes of listening and spotlighting. This is repeated in 5 minute cycles 3 times.	6 sites, each visited a minimum of five times. 15 min per site	13 sites, visited once, 15 minutes at each sites	Bush Stone-curlew	Spring 2021	Dusk/dawn	Fallen/standing dead timber including logs *Not windy or wet evening
	Five-minute listening period, followed by call playback session of five minutes of intermittent calls for each of the targeted species, followed by 20-minute period of listening during which spotlighting is conducted. Sites located at least 1km apart.	6 sites, each visited a minimum of five times. 15 min per site	6 sites, each visited 5 times. 15 min per site	Barking Owl	Winter 2022	Night	Eucalypt forests and woodlands
		40 hours across 10 days	Proposed Spring 2022	Koala	Proposed Spring 2022	Dusk/dawn	Eucalypt forests and woodlands
		6 sites, each visited a minimum of five times. 15 min per site	6 sites: 2 x visited 8 times 4 x visited 7 times 15 min per site	Masked Owl	Winter 2022	Night	Eucalypt forests and woodlands Hollow bearing trees Living or dead trees with hollows greater than 20cm diameter. *Not windy or wet evening
Aural-visual survey	The NSW survey guidelines for threatened frogs (DPE 2020) recommends aural-visual transect surveys be undertaken along the edges of suitable breeding habitat	Two ecologists 8 hours x nine survey efforts	Two ecologists – 4 hours across 4 nights. 2 x sites, 30 minutes at each site per night.	Growling Grass Frog	Summer 2022	Night	Waterbodies with emergent aquatic vegetation and connected vegetation

Survey Method	Methodology	Effort Required	Effort Completed to date	Targeted species	Season	Timing	Habitat
Anabats	Anabats are to be deployed in accordance with the 'Survey Guidelines for Australia's Threatened Bats' (Reardon, 2010). The guidelines require Anabats to be positioned approximately 2 m above ground level and directed toward open areas considered likely flight paths for microcheroptera.	12 detectors for 10 nights	8 detectors: - 7x11 nights - 1x 9 nights	Southern Myotis	Summer 2022, Proposed Spring 2022	Night	Habitat within 200m of a waterbody with pools 3m or wider
		10 detectors for 9 nights	8 detectors: - 7x11 nights - 1x 9 nights	Microcheropteran species	Summer 2021. Proposed Spring 2022	Night	
Night Transect Searches (Spotlighting)	Driven transects undertaken in suitable grassland habitat within the subject area. These surveys are conducted at night from a very slow moving vehicle (<5km/h). Spotlights are used to search for the species.	24 hours across 6 days (in areas less than 50 km)	2 nights of surveys	Plains-wanderer	Spring 2021	Night	Favours grasslands typically with the following conditions: about 50 per cent bare ground and 10 per cent fallen litter, with the remaining 40 per cent made up of short herbs and grasses; grass tussocks spaced 10–20 cm apart; most of the vegetation below 5 cm high but some up to a maximum of 30 cm (important for concealment).
Spot Assessment Technique (SAT)	SAT surveys involve a point-based, tree sampling methodology that utilises the presence/absence of koala faecal pellets at the base of trees within a prescribed search area. Each search area includes thirty trees surrounding a central point, with each tree sampled being one of live woody stem (except palms, cycads, tree ferns and grass trees) of minimum 200mm diameter at breadth height (DBH).	30 SAT sites, with 30 minutes per SAT sampling site	26 SAT sites	Koala	Summer 2022	Daytime	Eucalypt open forest and woodland
BUS Surveys	The methods adopted for the Bird Utilisation Survey (BUS) were consistent with the requirements for a 'Level One' bird risk assessment (AusWEA 2005). This approach has been endorsed in the AusWEA Best Practice Guidelines (2007). The BUS method involved observers stationed at a fixed survey point for 20 minutes, recording abundance of all large bird species observed within 800m and all small birds within 100m. For each observation, flight height was documented. All birds are identified to the species level, either through direct observation or identification of calls	20 minutes per location, allowance for 100 locations across the Project Area	28 BUS in Spring 27 BUS in Summer 28 BUS is Autumn 28 Bus in Winter = Total 111 Completed	All threatened and non-threatened birds	Spring 2021, summer 2022, autumn 2022 and winter 2022	Dusk/dawn	On or nearby wind turbine locations
Flora							
Vegetation Integrity Plots (BAM Plots)	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 m^2 (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 m^2 sub-plots to assess average litter cover (and other groundcover components).	-	15 x BAM Plots in Spring 2021 80 x BAM Plots in Summer 2022 = Total 95	N/A	N/A	N/A	All PCTs

Survey Method	Methodology	Effort Required	Effort Completed to date	Targeted species	Season	Timing	Habitat
Parallel field traverses	Parallel field traverses involved searching across areas of suitable habitat for each targeted plant species. Transects are walked in high quality habitat, and occasionally driven transects are undertaken in low-moderate habitat.	*Note survey effort will need to be focused on the development footprint to support the BDAR. Additional survey effort will be required utilising the Two-phased Grid Based or transect sampling methodology to supplement locations surveyed in Spring 2021. This survey will inform the BDAR..	Parrellel transects were undertaken over 6 hours	*Austrostipa wakoolica* A spear-grass *Brachyscome muelleroides* Claypan Daisy *Brachyscome papillosa* Mossgiel Daisy *Caladenia arenaria* Sand-hill Spider Orchid *Convolvulus tedmoorei* Bindweed *Diuris tricolor* Pine Donkey Orchid *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	Spring 2021, Proposed Spring 2022	N/A	All PCTs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JERILDERIE ROAD
COBB HIGHWAY
ROWANTI ROAD
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Legend
Bird Utilisation Survey
Call Playback Survey
Diurnal Bird Survey
Targeted Bird Survey
Plains-wanderer Transect
Threatened Flora Transect
Plains Renewable Energy Park Indicative Boundary
Study Area
Subject Land
Main Road
Local Road
Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021
Field Survey Locations (Spring 2021)
3-1
Drawing No: 0606253m_PREHWF_Bio_G002_R05.mxd
The Plains Renewable Energy Park Wind Farm
Date: 26/09/2022
Drawing Size: A3
Drawn By: MB
Reviewed By: LB
Client: Engie
Coordinate System: GDA 1994 MGA Zone 55
0
2
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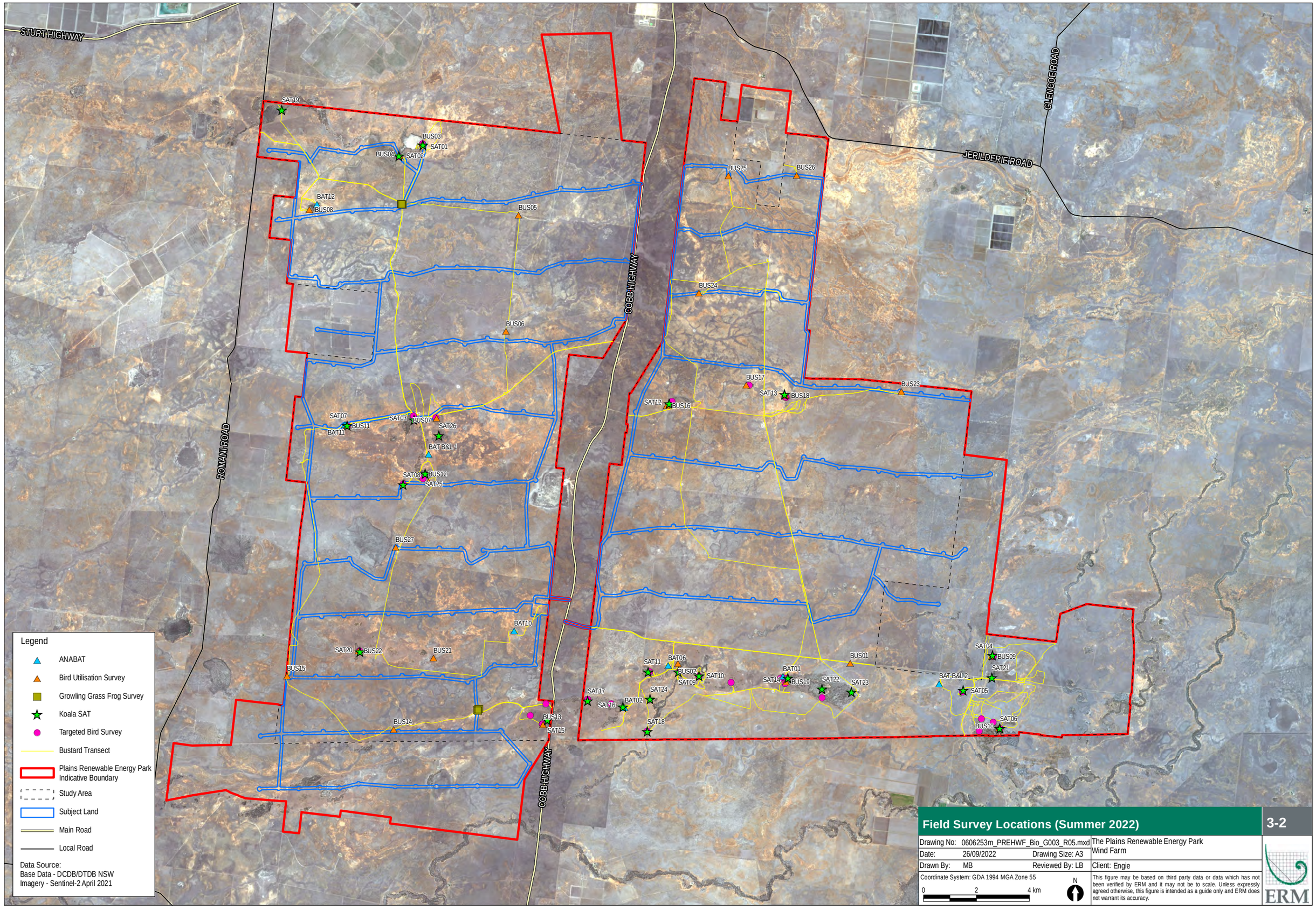
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
ERM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SAT19
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SAT24
SAT18
SAT04
BUS09
SAT21
BAT B&L 2
SAT05
SAT06
BUS10
Legend
ANABAT
Bird Utilisation Survey
Growling Grass Frog Survey
Koala SAT
Targeted Bird Survey
Bustard Transect
Plains Renewable Energy Park Indicative Boundary
Study Area
Subject Land
Main Road
Local Road
Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021
Field Survey Locations (Summer 2022)
3-2
Drawing No: 0606253m_PREHWF_Bio_G003_R05.mxd
The Plains Renewable Energy Park Wind Farm
Date: 26/09/2022
Drawing Size: A3
Drawn By: MB
Reviewed By: LB
Client: Engie
Coordinate System: GDA 1994 MGA Zone 55
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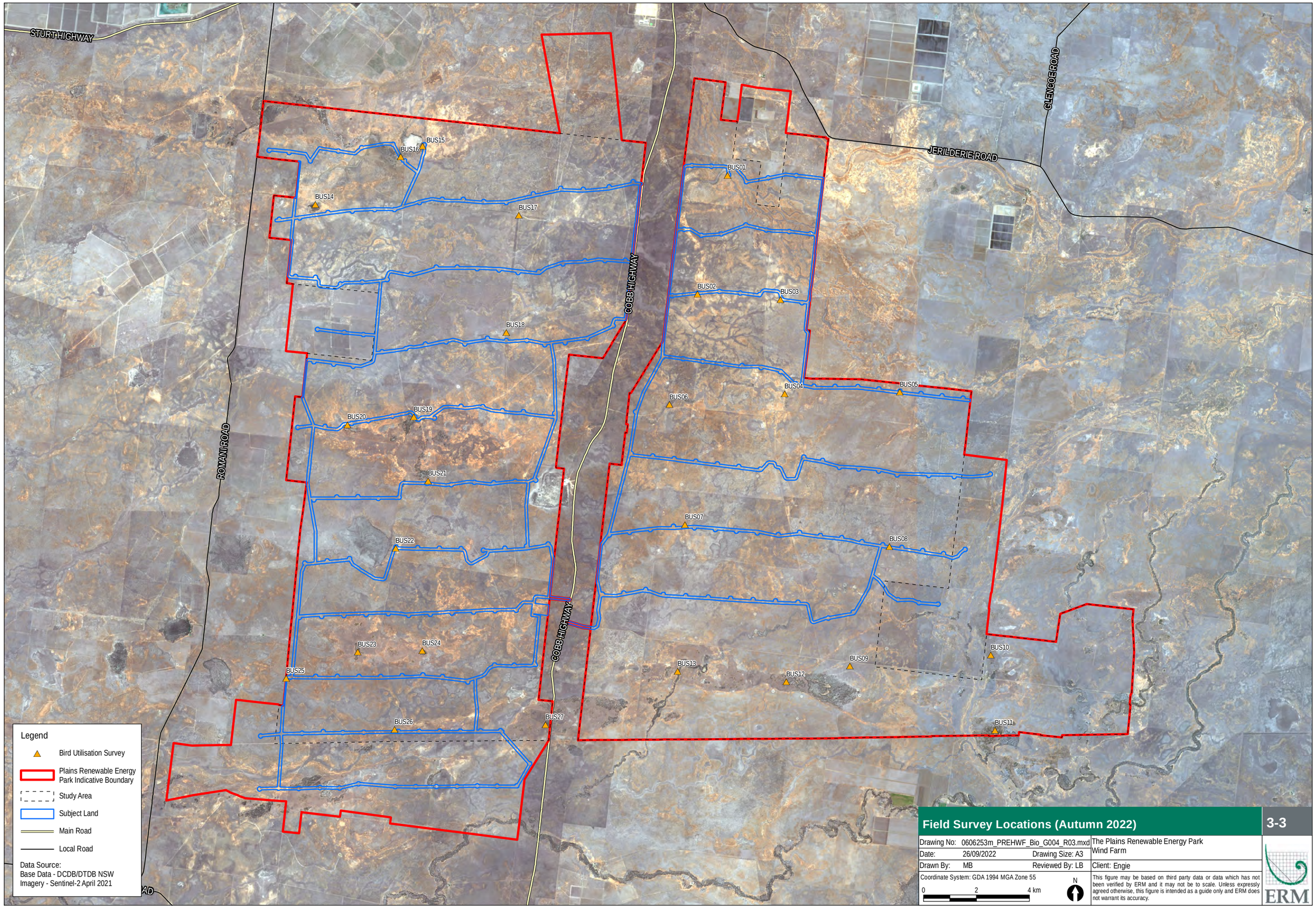
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BUS24
BUS25
BUS26
BUS27
Legend
Bird Utilisation Survey
Plains Renewable Energy Park Indicative Boundary
Study Area
Subject Land
Main Road
Local Road
Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021
Field Survey Locations (Autumn 2022)
3-3
Drawing No: 0606253m_PREHWF_Bio_G004_R03.mxd
Date: 26/09/2022
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Drawn By: MB
Reviewed By: LB
The Plains Renewable Energy Park Wind Farm
Client: Engie
Coordinate System: GDA 1994 MGA Zone 55
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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.
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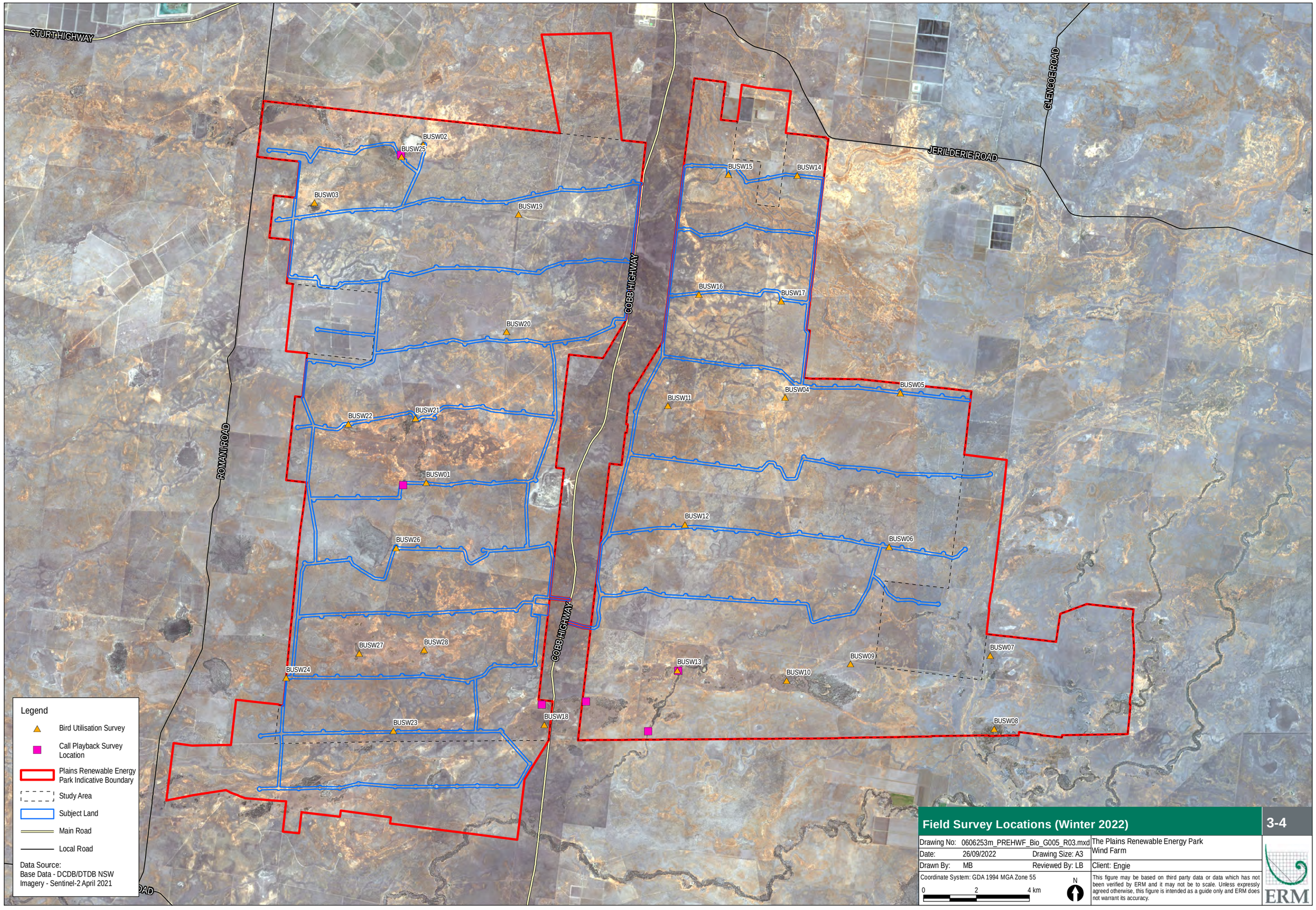
STURT HIGHWAY
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BUSW28
Legend
Bird Utilisation Survey
Call Playback Survey Location
Plains Renewable Energy Park Indicative Boundary
Study Area
Subject Land
Main Road
Local Road
Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021
Field Survey Locations (Winter 2022)
3-4
Drawing No: 0606253m_PREHWF_Bio_G005_R03.mxd
Date: 26/09/2022
Drawing Size: A3
Drawn By: MB
Reviewed By: LB
The Plains Renewable Energy Park Wind Farm
Client: Engie
Coordinate System: GDA 1994 MGA Zone 55
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4 km
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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

3.3 Likelihood of Occurrence

A preliminary likelihood of occurrence assessment was undertaken for the Project Area, informed by desktop sources (PMST and BioNet search results within 10 km) 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 km buffer of the Project Area. The likelihood of occurrence approach refines the desktop generated list using site-specific and species-specific habitat information.

The assessment ranks the likelihood of the species occurring within the Project Area 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 3.6. The preliminary likelihood of occurrence assessment is provided in Appendix C of this report.

Table 3.6 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 Limitation

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 survey. It is also noted that wet weather conditions during survey events prevented safe access to the site.

The absence of a species from a database list or observational studies 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. Future targeted biodiversity surveys will be completed to inform the 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 Area. 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 Features

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. Small to medium vegetation patches are present across the site. These include intact and remnant vegetation, and riparian vegetation associated with old creek beds.
Vegetation	The Project Area is characterised by a mix of disturbed and intact shrublands, improved pasture and small to medium intact and remnant patches of grasslands and woodlands. Based on the results of the field surveys, 13 Plant Community Types (PCT) have been recorded within the Subject Land (PCTs 13, 15, 17, 28, 46, 70, 153, 157, 159, 160, 163, 164, and 216). Of these vegetation communities, four (4) have association with BC Act listed TECs (PCTs 28, 153, 160 and 163). During field surveys two (2) TECs were identified as occurring within the Project Area: ■ Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South (Listed as endangered under the BC Act); and ■ Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Listed as endangered under the BC Act and EPBC Act). During the design process, the Myall Woodlands TEC has been completed avoided and is not present within the Subject Land. Large areas of Sandhill Pine Woodland TEC have also been avoided, with the Subject Land only intersecting 19.85 ha of the TEC.
Threatened species	Thirteen threatened species were identified within the Project Area during the field surveys. These include: ■ White-fronted Chat (*Epthianura albifrons*), listed as vulnerable under the BC Act; ■ Spotted Harrier (*Circus assimilis*), listed as vulnerable under the BC Act; ■ Black Falcon (*Falco subniger*), listed as vulnerable under the BC 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; ■ Winged Peppercress (*Lepidium monoplocoides),* listed as endangered under the BC Act and EPBC Act; ■ Mossgiel Daisy (*Brachyscome papillosa*), listed as vulnerable under the BC Act and EPBC Act; ■ Slender Darling-pea (*Swainsona murrayana*), listed as vulnerable under the BC Act and EPBC Act; ■ Corben's Long-eared Bat* (*Nyctophilus corbeni*), listed as vulnerable under the BC Act and EPBC Act; ■ Southern Myotis* (*Myotis macropus*), listed as vulnerable under the BC Act; ■ Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Listed as vulnerable under the BC Act;

Landscape feature	Summary notes
	■ Little Eagle (*Hieraaetus morphnoides*), listed as vulnerable under the BC Act; and ■ Plains-wanderer (*Pedionomus torquatus*) listed as endangered under the BC Act and critically endangered under the EPBC Act. **species presence 'possible' from call recording* The following species were identified to be likely to occur within the Project Area based on the Likelihood of Occurrence Assessment: ■ Grey Falcon (*Falco hypoleucos*), listed as endangered under the BC Act; and ■ Growling Grass Frog (*Litoria raniformis*), listed as endangered under the BC Act and vulnerable under the EPBC 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 associated with creek lines which run through the Project Area and Plains-wanderer habitat mapped within the Project Area. During Spring 2021 and Summer 2022 field surveys, all creek lines were observed to be dry, despite substantial rainfall during the winter, spring and summer seasons.
Aquatic habitat	NSW Hydrography mapping shows the Project Area consisting of creek lines, drainage lines and natural waterbodies. Farm dams and irrigation drains are also present across the agricultural landscape. Creeks on site include: ■ Telegraph Creek; ■ Abercrombie Creek; and ■ Curtains Creek. During all field surveys it was observed that creek lines were presented only as dried creek beds, despite significant rainfall surrounding all survey seasons due to La Niña experienced during 2021 and 2022. Indirect impacts and sensitive creek crossing designs will be considered as part of the EIS.
Habitat Values	The Project Area consists of patches of remnant treed vegetation which provides important refuge, foraging, and nesting habitat for fauna in an otherwise open landscape. All areas of Black Box and River Red Gum within the Project Area were observed to contain high abundance of mature hollow-bearing trees. The site provides high quality shrub and grassland habitat important for avian and reptile species including the EPBC Act listed critically endangered Plains-wanderer. Artificial watered dams and drainage lines are present across the landscape and provide an important water resource for fauna.

4.1 Vegetation Communities

The Riverina Bioregion is characterised by extensive riverine floodplains, and is often dominated by chenopod shrublands and 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 vegetation clearing and livestock grazing.

A review of the state vegetation type mapping (SVTM) for the Riverina region (Version v1.2 - VIS_ID 4469) was undertaken to access existing vegetation mapping information within the Project Area. This mapping was further refined based on the ERM Spring 2021 and Summer 2021 survey observations and BAM plot data recorded within the Project Area.

Vegetation outside the Project Area are yet to be ground-truthed, this is scheduled to be undertaken in the proposed Spring 2022 field survey event. In the interim, the SVTM (Version v1.2 - VIS_ID 4469) has been used for these areas. Field survey data and SVTM has resulted in a total of 16 PCTs being identified across the Project Area, with 14 of these being identified within the Subject Land. Table 4.2 below lists these PCTs and their area (ha), and Figure 4.1 presents vegetation mapping within the total Project Area and 20% of the Subject Land.

During field surveys two (2) areas were observed to be fenced off with revegetation being undertaken, one making up PCT 28 and PCT 15 and the other a mix of planted local native vegetation. These areas are presented in Figure 4.1.

The dominant vegetation type across the Project Area has been identified as PCT 164, 'Cotton Bush open shrubland of the semi-arid (warm) zone', which covers 34463.70 Ha, 58% of the Project Area. The second most dominant community identified is PCT 163, 'Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones' this PCT makes up 19% of the Project Area.

Stands of woodland vegetation across the Project Area and Subject Land provide important refuge, foraging, and nesting habitat for fauna in an otherwise open landscape. All areas of Black Box (*Eucalyptus largiflorens*) and River Red Gums (*Eucalyptus camaldulensis*) were observed to contain high abundance of mature hollow-bearing trees.

Ninety-five vegetation integrity plots (BAM plots) have been completed across the current Project Area (Figure 4.1) to collect floristic data to identify and map PCTs. Further collection of BAM plots 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.

4.2 Threatened Ecological Communities

Four (4) EPBC Act Threatened Ecological Communities (TECs) were identified as part of the desktop assessment in 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.

Six (6) TECs listed under either the BC Act and/or EPBC Act have the potential to occur based on their association with PCTs recorded on site, as presented in Table 4.3.

Based on the ERM field surveys, two (2) TECs were confirmed to occur within the Project Area and are presented in Figure 4.3 and Figure 4.4:

- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions, listed as endangered under the BC Act and EPBC Act; and
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions, listed as endangered under the BC Act.

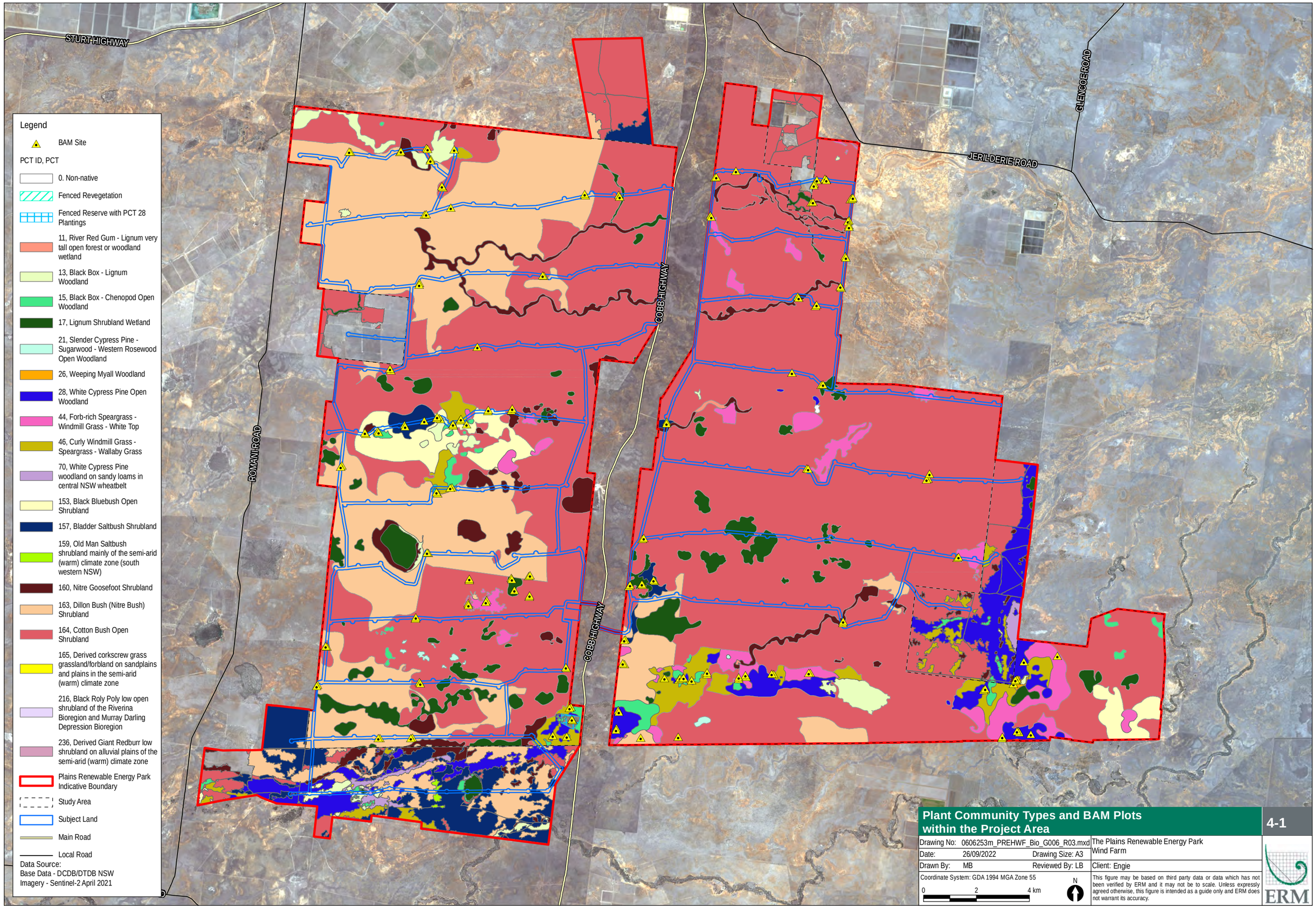
Table 4.2 Plant Community Types within the Project Area and Subject Land

PCT No.	PCT Name	Vegetation Class	BAM Plots completed	Project Area (ha)	20% of Subject Land (ha)
0	Non Native Vegetation	-	0	1018.48	6.10
11	River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Inland Riverine Forest	0	20.26	-
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	3	645.04	3.70
15	Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Inland Floodplain Woodlands	6	407.77	1.26
17	Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Inland Floodplain Shrublands	6	1904.27	13.05
21	Slender Cypress Pine - Sugarwood - Western Rosewood open woodland on sandy rises mainly in the Riverina Bioregion and Murray Darling Depression Bioregion	Riverine Sandhill Woodlands	0	39.74	-
26	Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Riverine Plain Woodlands	2	15.67	-
28	White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	Riverine Sandhill Woodlands	9	2003.57	3.97
44	Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	Riverine Plain Grassland	10	1175.11	5.68
46	Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	Riverine Plain Grasslands	7	175.23	4.14
70	White Cypress Pine woodland on sandy loams in central NSW wheatbelt	Floodplain Transition Woodlands	0	1,041.09	0.44

PCT No.	PCT Name	Vegetation Class	BAM Plots completed	Project Area (ha)	20% of Subject Land (ha)
153	Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	Aeolian Chenopod Shrubland	4	1,698.74	7.69
157	Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion	Riverine Chenopod Shrublands	6	18.92	16.41
159	Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	Riverine Chenopod Shrublands	0	1,672.93	0.09
160	Nitre Goosefoot shrubland wetland on clays of the inland floodplains	Inland Floodplain Shrublands	5	11,322.10	10.50
163	Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones	Riverine Chenopod Shrubland	13	34,202.61	155.12
164	Cotton Bush open shrubland of the semi-arid (warm) zone	Riverine Chenopod Shrubland	24	1,175.11	329.68
165	Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone	Riverine Plain Grasslands	0	1.48	-
216	Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion	Riverine Chenopod Shrubland	0	4.48	0.39
236	Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone	Riverine Chenopod Shrubland	0	0.01	-
Total			**95**	**58,732.79**	**558.22**

Table 4.3 Known and Potential Threatened Ecological Communities

TEC	BC Act	EPBC Act	Associated PCTs	Recorded within the Project Area
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered	Endangered	PCT 26, PCT 159 (Areas of PCT 26 only are confirmed to represent TEC)	✓
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Endangered	-	PCT 28, PCT 21 (Areas of PCT 28 only are confirmed to represent TEC)	✓
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Endangered	-	PCT 28	No
Natural Grasslands of the Murray Valley Plains	-	Critically Endangered	PCT 44, PCT 46	No
Acacia loderi shrublands	Endangered	-	PCT 153, PCT 21	No
Artesian Springs Ecological Community in the Great Artesian Basin	Critically Endangered	-	PCT 160, PCT 163	No



Plant Community Types and BAM Plots within the Project Area

4-1

Drawing No:	0606253m_PREHWF_Bio_G006_R03.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

JERILDERIE ROAD

GLENGOE ROAD

Legend

PCT ID, PCT Name

- 26, Weeping Myall Woodland TEC
- 28, White Cypress Pine Open Woodland TEC
- Plains Renewable Energy Park Indicative Boundary
- Study Area
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Known Threatened Ecological Communities within the Project Area

4-2

Drawing No:	0606253m_PREHWF_Bio_G007_R03.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

4.2.1 Weeping Myall Woodlands TEC

The Weeping Myall Woodlands within the Riverina are listed as 'Endangered' under the BC Act and EPBC Act. The central Riverina district historically supported extensive stands of Weeping Myall Woodlands. It is clear that woody vegetation has declined significantly across the plains, particularly in the eastern Riverina (TSCC 2009). The Weeping Myall Woodlands have declined from an original extent of between 1 900 000 ha and 3 300 000 ha to a current extent of between 190 000 ha and 330 000 ha. This represents a considerable decline of extent within the range 83% to 94% (TSSC 2009).

The vegetation characteristics of the community are detailed in the Listing Advice for the TEC (TSCC 2009) and is provided in Table 4.4.

The Weeping Myall Woodlands TEC was confirmed within the Project Area in association with PCT 26 and covers an area of 15.67 ha within the Project Area and has been avoided in the design process of the project, therefore is not present within the Subject Land. The community present on site is dominated by Weeping Myall (*Acacia pendula*) and contains descriptive species *Rhagodia spinescens, Calotis scabiosifolia, Einadia nutans, Enteropogon acicularis* and *Maireana aphylla*.

Table 4.4 Weeping Myall Woodland Description

TEC	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
Description	This ecological community is scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. The community is also known as Boree, particularly in the southern part of its distribution. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs. The structure and composition of the community varies, particularly with latitude, as chenopod shrubs are more prominent south of the Lachlan River district, while other woody species and summer grasses are more common further north. In some areas the shrub and canopy stratum may have been reduced or eliminated by clearing or heavy grazing, leaving derived grassland that may still constitute this community.
Upper Stratum Species:	***Acacia pendula**; Alectryon oleifolius subsp. canescens; Alectryon oleifolius subsp. elongatus; Atalaya hemiglauca; Capparis mitchellii; Casuarina cristata; Eucalyptus camaldulensis subsp. camaldulensis; Eucalyptus largiflorens; Eucalyptus melliodora; Eucalyptus populnea subsp. bimbil.*
Mid Stratum Species:	*Acacia farnesiana; Acacia salicina; Acacia stenophylla; Acacia oswaldii; Amyema quandang var. quandang; Atriplex nummularia; Atriplex versicaria; Chenopodium nitrariaceum; Hakea tephrosperma; Pimelea neo-anglica; **Maireana aphylla**; Maireana decalvans; Maireana pentagona; Muehlenbeckia florulenta; Myoporum montanum; **Rhagodia spinescens**; Santalum lanceolatum; Sclerolaena muricata var. muricata.*

TEC	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions
Ground Stratum Species:	*Alternanthera denticulata; Astrebla lappacea; Astrebla pectinata; Atriplex leptocarpa; Atriplex semibaccata; Atriplex spinibractea; Atriplex stipitata; Aristida leptopoda; Austrodanthonia bipartita; Austrodanthonia caespitosa; Austrodanthonia setacea; Austrostipa aristiglumis; Austrostipa blackii; Austrostipa nodosa; Austrostipa verticillata; Calotis cuneifolia;* ***Calotis scabiosifolia var. integrifolia****; Centipeda cunninghamii; Chloris truncata; Convolvulus clementii; Craspedia variabilis; Crinum flaccidum; Crotalaria dissitiflora subsp. dissitiflora; Cullen tenax; Daucus glochidiatus sens. lat.; Dichanthium sericeum subsp. sericeum;* ***Einadia nutans subsp. nutans****; Enchylaena tomentosa;* ***Enteropogon acicularis****; Eragrostis leptostachya; Eragrostis parviflora; Eriochloa pseudoacrotricha; Eryngium paludosum; Goodenia fascicularis; Goodenia glauca; Iseilema membranaceum; Leiocarpa leptolepis; Leiocarpa panaetioides; Leiocarpa tomentosa; Lepidium pseudohyssopifolium; Marsilea hirsuta; Myriocephalus rhizocephalus; Oxalis perennans; Plantago varia; Pycnosorus thompsonianus; Rhodanthe corymbiflora; Rostellularia adscendens subsp. adscendens; Sclerolaena brachyptera; Sclerolaena limbata; Sida corrugata; Solanum esuriale; Sporobolus actinocladus; Sporobolus caroli; Sclerolaena stelligera; Swainsona galegifolia; Themeda avenacea; Verbena gaudichaudii; Vittadinia cuneata var. cuneata f. cuneata; Vittadinia cuneata var. cuneata f. minor; Wahlenbergia gracilis; Walwhalleya proluta.*
Fauna	The Weeping Myall Woodlands provide important habitat for a range of animals, including the following listed threatened species: • Superb Parrot (*Polytelis swainsonii*); • Painted Honeyeater (*Grantiella picta*); and • Bush Stone-curlew (*Burhinus grallarius*).

*Species in **bold** were recorded in PCT 26 BAM plots.

Figure 4.3 Weeping Myall Woodland community confirmed within Project Area

4.2.2 Sandhill Pine Woodlands TEC

Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions is the name given to the ecological community dominated by White Cypress Pine (*Callitris glaucophylla*). Sandhill Pine Woodland description is provided in Table 4.5 below. The community is characterised by an open tree stratum, which may be reduced to isolated individuals or may be absent as a result of past clearing (NSW OEH, 2022e). The tree layer is dominated by *C. glaucophylla*, either in pure stands or with a range of other less abundant trees or tall shrubs. The structure and species composition of the community varies depending on disturbance history and temporal variability in rainfall (DECCW, 2010).

The Sandhill Pine Woodlands EEC has been confirmed to be present within the Subject Land in association with PCT 28, covering an area of 19.85 ha. Areas of PCT 28 are dominated by *C.glaucophylla*, with many in a disturbed state, with historically cleared stands still visible via remaining stumps (Figure 4.4).

Table 4.5 Sandhill Pine Woodlands Description

TEC	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions
Description	Sandhill Pine Woodland is an open woodland, or a derived grassland with no or scattered trees, that typically occupies red-brown loamy sands with alkaline sub-soils on prior streams, rises, source-bordering dunes, sandhills and lunettes of the alluvial plain of the Murray River and its tributaries, and on parts of the sandplain in south-western NSW. It is characterised by an open tree canopy up to 15 m high, although it may be less tall or even absent in sites where there has been past clearing or thinning. The dominant tree species, when a tree layer is present, is white cypress pine (*Callitris glaucophylla*), either in pure stands or with a range of other less abundant trees or tall shrubs. It sometimes has scattered to frequent smaller shrubs and a sparse to moderately dense and variable ground layer dominated by grasses and herbs. The structure of the community varies depending on past and current disturbances, particularly clearing, logging/silvicultural practices, grazing and soil erosion, as well as variability in rainfall over time. Sandhill Pine Woodland may occur adjacent to, and mix with, the *Allocasuarina luehmannii* (Buloke) Woodland in the Riverina and Murray–Darling Depression bioregions EEC. Vegetation with characteristics that are intermediate between Sandhill Pine Woodland and Buloke Woodland are covered collectively under the two communities
Upper Stratum Species:	The tree layer, when present, is dominated by **white cypress pine *(Callitris glaucophylla)***, either in pure stands or with a range of other less abundant trees or tall shrubs such as yarran *(Acacia melvillei), Acacia oswaldii,* **buloke *(Allocasuarina luehmannii),*** slender cypress pine *(C. gracilis subsp. murrayensis),* drooping sheoak *(A. verticillata)*, **needlewood *(Hakea leucoptera)***, hooked needlewood *(H. tephrosperma),* sugarwood *(Myoporum platycarpum),* **western rosewood *(Alectryon oleifolius subsp. canescens),*** emu bush *(Eremophila longifolia),* **wilga *(Geijera parviflora)*** and butterbush or **berrigan *(Pittosporum angustifolium).***
Mid Stratum Species:	A scattered shrub layer is sometimes present and may include *Dodonaea viscosa subsp. angustifolia,* **ruby saltbush (*Enchylaena tomentosa***), black rolypoly (*Sclerolaena muricata*) and/or bluebush (*Maireana enchylaenoides*), black bluebush (*M. pyramidata*), **thorny saltbush (*Rhagodia spinescens*),** copperburr (*Sclerolaena diacantha* and *S. obliquicuspis*) *Calytrix tetragona* and *Banksia marginata.*

TEC	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions
Ground Stratum Species:	The ground cover is highly variable in structure and composition. It may be sparse or more continuous, depending on the history of disturbance, grazing and rainfall events. It comprises grasses, such as ringed wallaby grass (*Austrodanthonia caespitosa*), small-flowered wallaby grass (*A. setacea*), a speargrass (*Austrostipa nodosa*), **rough speargrass (*A. scabra*), curly windmill grass (*Enteropogon acicularis*)**, *Panicum effusum* and ***Paspalidium constrictum***; and forbs including **creeping saltbush (*Atriplex semibaccata*),** climbing saltbush (*Einadia nutans*), blue storksbill (*Erodium crinitum*), *Oxalis perennans*, **corrugated sida (*Sida corrugata*)** and bluebells (*Wahlenbergia* species).
Fauna	The Sandhill Pine Woodlands provide important habitat for a range of animals, including the following listed threatened species: • *Austrostipa metatoris* • Grey Falcon • Major Mitchell's Cockatoo • Western Blue-tongued Lizard

Species in **bold were recorded in PCT 28 BAM plots.*

Figure 4.4 Sandhill Pine Woodland community confirmed within Project Area

4.3 Candidate Threatened 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 Area. 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 4.6.

Table 4.6 Preliminary List of Candidate Species

Scientific Name	Common Name
Fauna	
Ardeotis australis	Australian Bustard
Burhinus grallarius	Bush Stone-curlew
Calidris ferruginea	Curlew Sandpiper (breeding)
Haliaeetus leucogaster	White-bellied Sea-Eagle (breeding)
Hieraaetus morphnoides	Little Eagle (breeding)
Litoria raniformis	Growling Grass Frog (Southern Bell Frog)
Lophochroa leadbeateri	Major Mitchell's Cockatoo (breeding)
Lophoictinia isura	Square-tailed Kite (breeding)
Phascolarctos cinereus	Koala
Pedionomus torquatus	Plains-wanderer (breeding)
Polytelis anthopeplus monarchoides	Regent Parrot (eastern subspecies) (breeding)
Polytelis swainsonii	Superb Parrot (breeding)
Tyto novaehollandiae	Masked Owl (breeding)
Ninox connivens	Barking Owl (breeding)
Flora	
Austrostipa wakoolica	A spear-grass
Brachyscome muelleroides	Claypan Daisy
Brachyscome papillosa	Mossgiel Daisy
Caladenia arenaria	Sand-hill Spider Orchid
Calotis moorei	A burr-daisy
Convolvulus tedmoorei	Bindweed
Cullen parvum	Small Scurf-pea
Diuris tricolor	Pine Donkey Orchid
Eucalyptus leucoxylon subsp. pruinosa	Yellow Gum
Lepidium monoplocoides	Winged Peppercress

Scientific Name	Common Name
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

Based on the habitat present within the Project Area, a wader species presented in the Candidate Species list has been excluded from further assessment. The habitat on site is not suitable for the Curlew Sandpiper, the species prefers habitat of intertidal mudflats in sheltered coastal areas and is considered unlikely to occur.

The following survey efforts have been undertaken during the Spring 2021, Summer 2022, Autumn 2022 and Winter 2022 field surveys to target the above preliminary Candidate Species.

Table 4.7 Candidate Species Survey Effort

Candidate Species	Survey Effort
Australian Bustard	Survey efforts for the Australian Bustard (*Ardeotis australis*) were met during the Summer 2022 field surveys where ecologists undertook 13.25 hours of targeted driven transects, in addition to the two field teams searching for the species during all driving activity across the Project Area during the 14 day survey period. The species was not recorded.
Bush Stone-curlew	Habitat suitable for the Bush Stone-curlew (*Burhinus grallar*ius) was observed within the Subject Land in the form of fallen dead timber, abundant in Black Box (*E.largiflorens*) vegetation. Nocturnal call playback surveys targeting the Bush Stone-curlew were completed at a suitable effort to detect this species, with no recorded observations made.
White-bellied Sea-Eagle Little Eagle Square-tailed Kite	Area searches were undertaken over 35 hours across 10 days in Spring 2021 targeting the Little Eagle (*Hieraaetus morphnoides*), White Bellied Sea-eagle (*Haliaeetus leucogaster*) and Square-tailed Kite (*Lophoictinia isura*). Bird Utilisation Surveys undertaken to date (111 surveys) also recorded all raptors observed. As a result of these surveys the Little Eagle was confirmed to be present and nesting within the Subject Land, however no White-Bellied Sea-eagles or Square-tailed Kites were recorded.
Growling Grass Frog	Audio visual surveys were undertaken targeting the Growling Grass Frog in accordance with the Survey Guidelines for Australia's Threatened Frogs during the summer 2022 survey effort. Two (2) sites where waterbodies with emergent vegetation was identified were visited 4 nights, for 30 minutes per site. No individuals were recorded.
Major Mitchell's Cockatoo Superb Parrot Regent Parrot	The field survey effort undertaken for Major Mitchell's Cockatoo (*Lophochroa leadbeateri),* Regent Parrot (*Polytelis anthopeplus monarchoides*) and Superb Parrot (*Polytelis swainsonii*) in areas of preferred habitat associated with woodland PCTs was sufficient to meet the required effort in accordance with the BAM. There were no threatened cockatoos or parrots identified during the field surveys, despite potential habitat and abundance of suitable breeding hollows. During targeted searches, other Cockatoo and Parrot species were regularly observed, including Galahs, Red-rumped Parrots and Blue Bonnets. In addition, evidence of bark stripping often caused by cockatoos was observed throughout the site.

Candidate Species	Survey Effort
Koala	Koala (*Phascolarctos cinereus*) surveys were conducted at 26 sites during the Summer 2022 field surveys. A search for Koala scats and markings were undertaken at each site in accordance with the Koala SAT method. No Koala scats or evidence of the species were recorded.
Plains-wanderer	Areas of PCT 44 and PCT 46 that met the structure requirements for the Plains-wanderer and areas mapped as Core Mapping for the species were targeted during the Spring 2021 field surveys with nocturnal spotlighting undertaken from a slow moving vehicle for two nights. As a result, sightings of two Plains-wanderer adults and one offspring were recorded. Further survey effort was not undertaken to reduce disturbance to the breeding species.
Masked Owl Barking Owl	Hollow bearing tree searches were conducted during Autumn 2022 field survey, which identified hollows suitable for the Masked Owl and Barking Owl. Six survey sites were established for the Winter 2022 survey event, with each being visited 5 nights targeting the Barking Owl and Masked Owl. Additional Masked Owl surveys were completed, making up to 7 visits to 4 sites, and 8 visits to 2 sites targeting the species.
Yellow Gum	Searches for Yellow Gum have been undertaken in all suitable habitat and stands of isolated trees across the Project Area. No Yellow Gum has been identified on site.
Spring threatened flora	6 hours of flora transects were undertaken during the Spring 2021 field survey event targeting Spring threatened flora species including the Chariot Wheels, Slender Darling-pea, Winged Pepper-cress, A Speargrass, Claypan Daisy, Mossgiel Daisy, Bindweed, Lanky Buttons, Turnip Copperburr and Menindee Nightshade. Additional surveys are needed to meet the requirements for these and additional species.

Further field surveys will be undertaken in accordance with the BAM to confirm presence or absence of threatened flora and fauna species to inform an EIS.

4.4 Threatened Species

A review of the NSW BioNet records and the ERM Spring 2021, Summer 2022, Autumn 2022, and Winter 2022 field surveys resulted in the known presence of thirteen (13) threatened species within the Project Area, these include:

- White-fronted Chat (Epthianura albifrons), listed as vulnerable under the BC Act;
- Spotted Harrier (Circus assimilis), listed as vulnerable under the BC Act;
- Black Falcon (Falco subniger), listed as vulnerable under the BC 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;
- Winged Peppercress (Lepidium monoplocoides), listed as endangered under the BC Act and EPBC Act;
- Mossgiel Daisy (Brachyscome papillosa), listed as vulnerable under the BC Act and EPBC Act;
- Slender Darling-pea (Swainsona murrayana), listed as vulnerable under the BC Act and EPBC Act;
- Corben's Long-eared Bat* (Nyctophilus corbeni), listed as vulnerable under the BC Act and EPBC Act;
- Southern Myotis* (Myotis macropus), listed as vulnerable under the BC Act;
- Yellow-bellied Sheathtail-bat (Saccolaimus flaviventris), Listed as vulnerable under the BC Act;

- Little Eagle (Hieraaetus morphnoides), listed as vulnerable under the BC Act; and
- Plains-wanderer (Pedionomus torquatus) listed as endangered under the BC Act and critically endangered under the EPBC Act.

**species presence 'possible' from call recordings. Assumed presence.*

The location of these records in association with the Subject Land is presented in Figure 4.5.

Based on the Likelihood of Occurrence Assessment presented in Appendix C, the following two (2) threatened species are considered likely to occur within the Project Area:

- Grey Falcon (Falco hypoleucos), listed as endangered under the BC Act and vulnerable under the EPBC Act; and
- Growling Grass Frog (Litoria raniformis), listed as endangered under the BC Act and vulnerable under the EPBC Act.

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

Further field surveys will be conducted in accordance with the BAM to inform an EIS.

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

JERILDERIE ROAD

GLENCOE ROAD

Legend

Bat Species

- Southern Myotis*
- Southern Myotis*, Corben's Long-eared Bat*
- Southern Myotis*, Yellow-bellied Sheathtail-bat
- Southern Myotis*, Corben's Long-eared Bat*, Yellow-bellied Sheathtail-bat

Significant Raptor

- Black Kite
- Black Kite (nest)
- Brown Falcon (nest)
- Nankeen Kestrel
- Nankeen Kestrel (nest)
- Spotted Harrier
- Wedge-tailed Eagle
- Wedge-tailed Eagle (nest)
- Whistling Kite
- Whistling Kite (nest)
- Raptor (nest)

Ecosystem Credit Species

- Black Falcon
- Black Falcon (dead)
- Grey-crowned Babbler
- White-Fronted Chat

Species Credit Species (Fauna)

- Little Eagle
- Little Eagle (nest)
- Plains-wanderer
- Plains-wanderer (adult and chick)

Species Credit Species (Flora)

- Chariot Wheels
- Mossgiel Daisy
- Slender Darling Pea
- Winged Peppercress

- 500m Threatened Plant Buffer
- Plains-wanderer Important Area Mapping
- Plains-wanderer PCT Habitat Mapping (PCT44 and PCT46)
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

* Species possible based on call recording

Threatened Species known within the Project Area

4-5

Drawing No:	0606253m_PREHWF_Bio_G008_R03.mxd	The Plains Renewable Energy Park Wind Farm	
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

4.4.1 Threatened Flora

A review of the NSW BioNet databases identified one (1) threatened flora species within the Project Area, the Winged Pepper-cress (*Lepidium monoplocoides*).

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

As a result, the Winged Pepper-cress was observed within the Subject Land, along with three additional threatened flora species. Threatened flora species identified are provided in Table 4.8 below, and presented in Figure 4.5 and Figure 4.6. Additional records of Chariot Wheels were made during the Winter 2022 field survey. All four threatened flora species identified are considered Candidate Species under the BAM and will require additional targeted flora surveys in future survey efforts to cover areas of suitable habitat and to refine species polygon mapping.

Table 4.8 Threatened Flora Identified During Spring Surveys

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Associated PCTs
Chariot Wheels	*Maireana cheelii*	V	V	44, 46, 157, and 164.
Mossgiel Daisy	*Brachyscome papillosa*	V	V	13, 15, 26, 46, 44, 160, and 163.
Slender Darling Pea	*Swainsona murrayana*	V	V	13, 15, 44, 46, 153, 157, 160, 163, and 164.
Winged Pepper-cress	*Lepidium monoplocoides*	E	E	15, 26, 28, 44, 46, 157, and 163

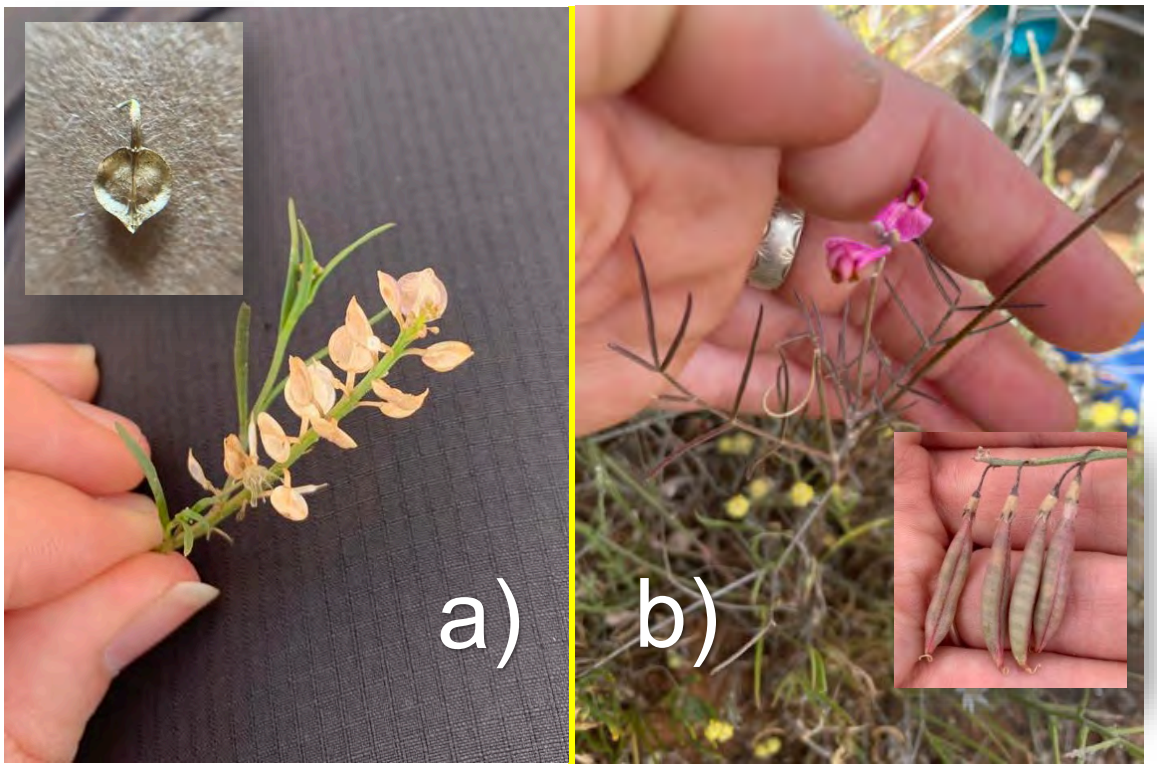


Figure 4.6 Threatened Flora Identified within Subject Land: a) Winged Pepper-cress b) Slender Darling Pea c) Chariot Wheels d) Mossgiel Daisy (large seed)

4.4.2 Threatened Fauna

A review of the NSW BioNet database and results of field surveys identified that two (2) threatened fauna species, the White-fronted Chat and Plains-wanderer have been recorded within the Project Area in the last 50 years. These species were subsequently identified during field surveys. There were multiple BioNet records of additional threatened species within 10 km of the site, these have been considered within the Likelihood of Occurrence Assessment in Appendix C. The Likelihood of Occurrence Assessment identified two (2) fauna species that are considered likely to occur within the Project Area based on records in the locality and the presence of preferred habitat, however these species were not observed during survey efforts. These species are detailed in Table 4.9.

Table 4.9 Threatened Fauna Species Likely to Occur in Project Area

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood to Occur on the Project Area	Recorded during Field Surveys
Falco hypoleucos	Grey Falcon	E	V	Likely	No
Litoria raniformis	Growling Grass Frog	E	V	Likely	No

During the ERM Spring 2021, Summer 2022, Autumn 2022 and Winter 2022 surveys, ecologists undertook targeted fauna surveys and Bird Utilisation Surveys. As a result, direct observations of six (6) threatened bird species were recorded, and call recordings were made of three (3) threatened microbat species. Of these, three (3) are Species Credit Species, which will require habitat polygons to be developed during the preparation of the BDAR. These species are detailed in Table 4.10 and record locations shown in Figure 4.5. Microbat call analysis details are provided in Appendix D and discussed in Section 4.6. Photographs of the Grey-crowned Babbler and White-fronted Chat observed within the Project Area are provided in Figure 4.7.

Table 4.10 Threatened Fauna Identified within Project Area During Field Surveys

Scientific Name	Common Name	BC Act Status	EPBC Act Status
Species Credit Species			
Pedionomus torquatus	Plains-wanderer	E	CE
Hieraaetus morphnoides	Little Eagle	V	-
*Myotis macropus**	Southern Myotis	V	-
Ecosystem Species			
Pomatostomus temporalis temporalis	Grey-crowned Babbler	V	-
Circus assimilis	Spotted Harrier	V	-
Epthianura albifrons	White-fronted Chat	V	-
Falco subniger	Black Falcon	V	-
*Nyctophilus corbeni**	Corben's Long-eared Bat	V	V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-

*Species recording possible (The species calls from *Nyctophilus* genus cannot be distinguished from each other. There are 3 species that are known to occur in the project area)

Figure 4.7 Grey-crowned Babblers (Left) and White-fronted Chat (Right)

Hollow bearing tree searches were conducted in areas of Black Box habitat (PCT 13 and PCT 15) within the Subject Land during the Autumn 2022 field survey effort. Due to the change in Subject Land location post surveys, there are areas of vegetation that require additional survey effort. As a result of the original surveys, 305 hollow bearing trees were recorded as presented in Figure 4.8. A point was taken for each tree within the with a hollow higher than 4m above ground and greater than 5cm in diameter with notes made on tree diameter at breast height (DBH), hollow height and hollow diameter. Data recorded is presented in Appendix F. It is noted that majority of Black Box vegetation identified across the Project Area is older than 100 years of age, and present a high proportion of trees containing hollows.

Further field surveys will be undertaken in accordance with the BAM to confirm presence or absence of threatened fauna species.

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

COBB HIGHWAY

JERILDERIE ROAD

GLENCOE ROAD

Legend

- Holow Bearing Tree
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Hollow Bearing Trees Recorded within Project Area

4-8

Drawing No:	0606253m_PREHWF_Bio_G009_R03.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

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ERM

4.4.2.1 Plains-wanderer

The Plains-wanderer is considered Critically Endangered under the EPBC Act and Endangered under the BC Act. 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 (DoE, 2015). Increased habitat loss and degradation remain current threats, exacerbated by climate change and small population size. In 2015, there was estimated to be between 250-1000 of these small, ground-dwelling grassland birds left in the wild (DoE, 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 (NSW OEH, 2022f).

The National Recovery Plan for the Plains-wanderer (DoE & SA DEWNR, 2016) states that habitat critical to the survival of the species includes any regions where the species is likely to occur and any newly discovered locations that extend the likely range of the Plains-wanderer. The Plains-wanderer is known to associate with the following PCTs mapped within the Project Area:

- PCT 44: Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion; and
- PCT 46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion.

The structure of the grassland is more important than the species composition in determining its suitability for the Plains-wanderer (DoE, 2015). The species inhabits sparse, treeless, species-rich, lowland native grasslands with approximately 50% bare ground, 40% herbs and grasses and 10% fallen litter, with grass tussocks spaced around 10-20 cm apart and most vegetation less than 5 cm in height and some widely-spaced plants up to 30 cm high, which provide shelter and concealment from predators (DoE, 2015). Habitat mapping has been conducted for the species and includes areas within the Project Area (DCEEW, 2010). These habitat areas, as defined through PCT mapping and field verification, for the Plains-wanderer have been mapped in Figure 7.2.

Areas of PCT 44 and PCT 46 that met the structure requirements and areas mapped as Important Areas for the species were targeted during the Spring 2021 field surveys with nocturnal spotlighting undertaken from a slow moving vehicle for two nights. As a result, sightings of two Plains-wanderer adults and one offspring were recorded (Figure 4.5 and Figure 4.9). This confirms the species presence within the Project Area, in addition to the site supporting reproductive efforts for the species. Further survey effort was not undertaken to reduce disturbance to the breeding species.

The BioNet database identifies the species is a dual credit species. Mapped important areas are a species credit, any impact from development could be potentially serious and irreversible and on this basis is unlikely to be approved. These mapped important areas are provided by the NSW Government and are also shown on Figure 4.5.

Figure 4.9 Plains-wanderers (chick left, adult right) observed during Spring 2021 Field Surveys

4.5 Preliminary Bird Utilisation results

Prescribed impacts related to wind farm development apply not only to threatened species but also to any resident raptor species and nomadic or migratory species whose flight paths are likely to cross the subject land (Paragraph 6.7.1.5 of the BAM).

During the field surveys, the following was recorded:

- 57 bird species were recorded from 28 Bird Utilisation Surveys (BUS) in Spring 2021;
- 40 bird species were recorded from 27 BUS in Summer 2022;
- 56 bird species were recorded from 28 BUS in Autumn 2022; and
- 57 bird species were recorded from 28 BUS in Winter 2022.

The most abundant bird species across the survey efforts were the Nankeen Kestral, Galah, Australian Magpie, Crested Pigeon, Little Raven, and Brown Songlark. The majority of birds were observed flying short distances between trees.

Thirteen avian species were observed to utilise the rotor sweep height (RSH) of between 50 m to 250 m. All species are native, with two (2) species, the Little Eagle and Black Falcon, being considered threatened in NSW. Zero (0) species are considered threatened under the EPBC Act. The observed species include:

- Wedge-tailed Eagle (Aquila audax);
- Straw-necked Ibis (Threskiornis spinicollis);
- Little Eagle (Hieraaetus morphnoides);
- Black Kite (Milvus migrans);
- Brown Falcon (Falco berigora);
- Black Falcon (Falco subniger);
- Nankeen Kestrel (Falco cenchroides);
- Spotted Harrier (Circus assimilis);

- Little Raven (Corvus mellori);
- Australian Magpie (Gymnorhina tibicen);
- Fairy Martin (Petrochelidon ariel);
- White-necked Heron (Ardea pacifica); and
- Masked Woodswallow (Artamus personatus).

During the field survey, opportunistic observations were made of large flocks of up to 100 Banded Lapwings (*Vanellus tricolor*) utilising the RSH (Figure 4.10). No species considered Migratory under the EPBC Act were identified on site.

Figure 4.10 Flock of Banded Lapwings

During the field survey events it was observed that the Project Area supported a very high number of breeding raptors (Figure 4.11 and Figure 4.12), with the following stick nests recorded for resident raptors:

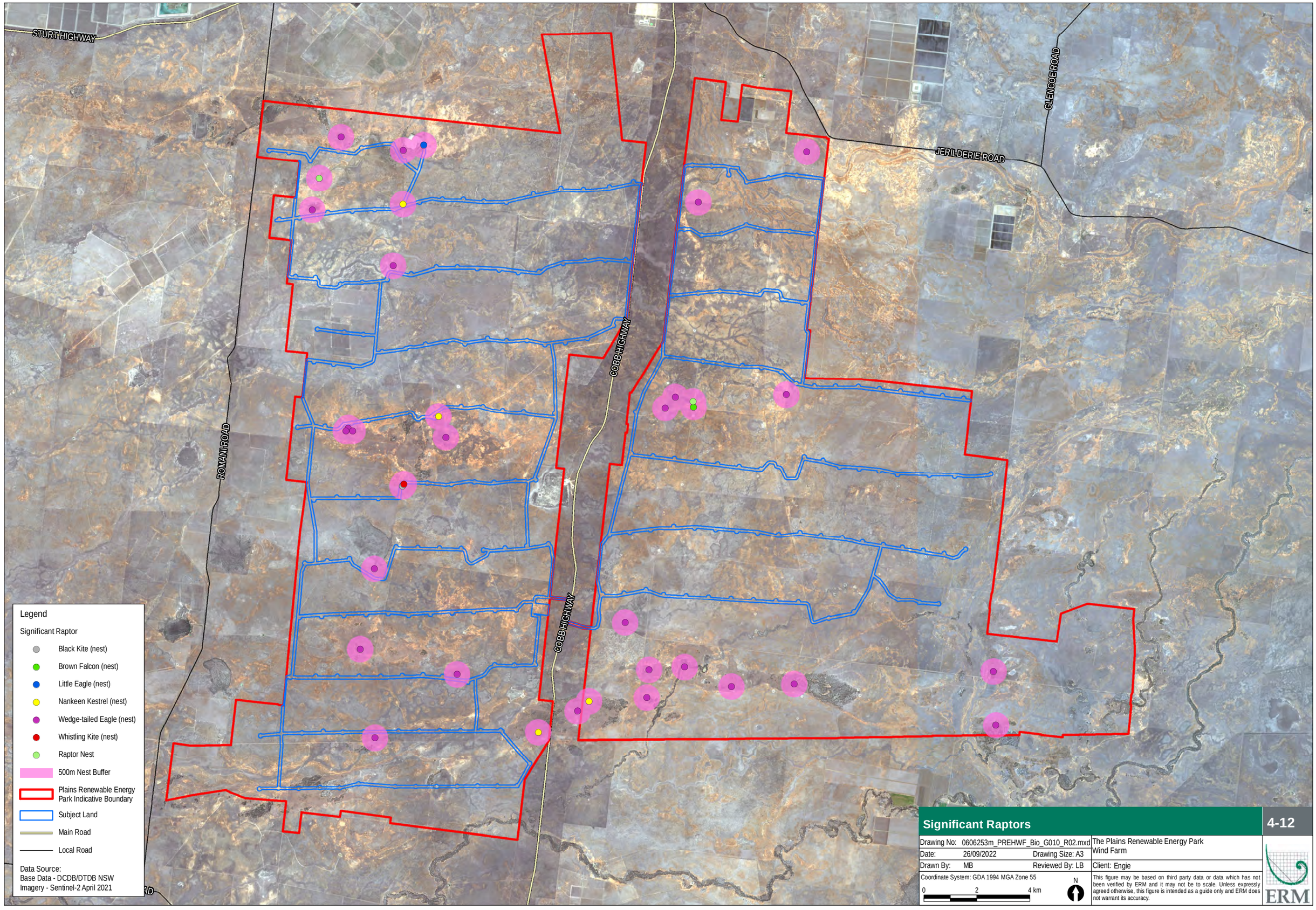
- 21 nests recorded for Wedge-tailed Eagle (*Aquila audax)*;
- three (3) Nankeen Kestrel (*Falco cenchroides)* nest;
- one (1) Little Eagle (*Hieraaetus morphnoides*);
- two (2) unidentified raptor nests; and
- one (1) Whistling Kite (*Haliastur sphenurus)* nest.

One (1) of these resident raptors, the Little Eagle (*Hieraaetus morphnoides),* is considered Vulnerable under the BC Act. A further in flight observation of the Little Eagle was made, flying in the north-west of the Subject Land.

There was a high number of additional large stick nests observed across the site, although vacant at the time of sighting, these nests are likely to support further resident raptor species.

Operational wind farms pose a collision risk to birds and bats where rotor strike can cause injury or death. Fatalities and injuries are usually caused by a collision with the moving blades (blade strike), or with the turbine infrastructure. The EIS and BDAR will assess potential collision risks to both birds and bats.

Figure 4.11 Wedge-tailed Eagle Fledglings Observed During Spring 2021 Field Surveys



Significant Raptors

4-12

Drawing No:	0606253m_PREHWF_Bio_G010_R02.mxd	The Plains Renewable Energy Park Wind Farm	
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

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ERM

4.6 Microchiropteran Bat Survey Results

Wind farm developments have potential to impact Microcheropteran bats, due to the risk of mortality by collision, decompression, or pulmonary baratrauma.

Microbat calls were sampled using eight (8) Anabat Swift detectors (Titley Electronics). Passive monitoring was undertaken during the Summer 2022 field survey event. Monitoring commenced at dusk (approximately 1800 hours) and continued until dawn (approximately 0530 hours). The data was analysed by Green Tape Solutions and results are presented in Appendix D.

Based on a total of 91,171 files, thirteen calls sequences were assigned to species or genus. The reliability of identification is as follows:

- **Definite** - one or more calls where there is no doubt about the identification of the species;
- **Probable** - most likely to be the species named, low probability of confusion with species that use similar calls; and,
- **Possible** - call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls.

Table 4.11 Microchiropteran Bat Survey Results

Scientific Name	Common Name	Reliability	BC Act status	EPBC Act Status
Austronomus australis	White-striped free-tailed bat	Definite	-	-
Chalinolobus gouldii	Gould's wattled bat	Definite	-	-
Chalinolobus morio	Chocolate wattled bat	Definite	-	-
Myotis macropus	Southern Myotis	Possible	V	-
Nyctophilus sp	-	Definite	V (*N. Coberni*)	V (*N. Coberni*)
Ozimops planiceps	South-Eastern Free-Tailed Bat	Definite	-	-
Ozimops ridei	Eastern Free-tailed Bat	Definite	-	-
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Definite	V	-
Scotorepens balstoni	Scotorepens balstoni	Definite	-	-
Scotorepens greyi	Little broad-nosed bat	Definite	-	-
Vespadelus darlingtoni	Large forest bat	Definite	-	-
Vespadelus regulus	Southern Forest Bat	Possible	-	-
Vespadelus vulturnus	Little forest bat	Possible	-	-

It is noted that species from genus *Nyctophilus* cannot be distinguished from each other by call. There are three (3) species that are known to occur in the project area; *N.corbeni, N.geoffroyi* and *N. gouldi*. For the purpose of this assessment, the BC Act and EPBC Act listed threatened species, *N. corbeni,* is assumed and known to be present.

5. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Based on the results of the desktop assessment and ERM field surveys undertaken across 2021 and 2022 to date, 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 Area
World Heritage Properties	Not identified within the Project Area or within 50 km radius
National heritage properties	Not identified within the Project Area or within 50 km radius
Wetlands of international importance	There are no wetlands of international importance within the Project Area. The closest records (as identified within the Protected Matters Search Tool (PMST)) are: ■ Banrock station wetland complex; ■ Hattah-kulkyne Lakes; ■ Riverland; and ■ The Coorong, and Lakes Alexandrina and Albert Wetland. It is unlikely the Project will impact any wetlands of international importance.
Threatened Ecological Communities	The following EPBC Act listed Threatened Ecological Communities are known to occur within the Project Area: ■ Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Endangered) The PMST identified the following Threatened Ecological Communities as likely to occur within the area, however have not been observed: ■ Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions ■ Grey Box (Eucalyptus microcarpa) Grassy Woodland and Derived Native Grasslands of South-eastern Australia ■ White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Further assessment and analysis within the BDAR will confirm areas of TECs within the Project Area.
Threatened species	Six (6) EPBC Act listed species are known to occur within the Project Area based on observations and recordings during field survey efforts: ■ Plains-wanderer (Critically Endangered); ■ Corben's Long-eared Bat* (Vulnerable); ■ Winged Pepper-cress (Endangered); ■ Mossgiel Daisy (Vulnerable); ■ Chariot Wheels (Vulnerable); and ■ Slender Darling Pea (Vulnerable). **call recording* A further two (2) species are considered likely to occur within the Project Area based on records in the locality and the presence of preferred habitat: ■ Grey Falcon (Vulnerable); and ■ Growling Grass Frog (Vulnerable). An Assessment of Significant Impact has been completed for EPBC Act listed species considered known or likely to occur on site and is presented in Appendix E.

MNES	Relevance to the Project Area
	The Assessment of Significant Impact identified the Project as having the potential to cause Significant Impact to the following three (3) EPBC Act listed species: ■ Plains-wanderer (Critically Endangered); ■ Winged Pepper-cress (Endangered); and ■ Chariot Wheels (Vulnerable). Significant impact to the remaining species is considered unlikely.
Migratory species	No birds listed as Migratory under the EPBC Act were identified during the field surveys, or were considered known or likely to occur within the Project Area based on the Likelihood of Occurrence Assessment presented in Appendix C.
Commonwealth marine area	Not identified within the Project Area or within 50 km radius
The Great Barrier Reef Marine Park	Not identified within the Project Area or within 50 km radius
Nuclear actions	Not Applicable
Water resources in relation to Nuclear Power	Not Applicable

Under the EPBC Act a referral is required to the Australian Government CCEEW 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 considered a controlled action under the EPBC Act.

The findings of the Preliminary Biodiversity Assessment to date has confirmed the presence of MNES listed under the EPBC Act within the Project Area. 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.

6. PRELIMINARY IMPACT ASSESSMENT

The construction and operation of the Project has the potential to cause impacts to threatened species, raptors and TECs listed under the BC Act and/or the 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. 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 Section 4.3. 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;
- Loss of and impact to resident raptor nesting sites;
- Increased habitat fragmentation;
- Mortality and injury of avian and microchiropteran species from turbine strike;
- Mortality and injury from vehicle strikes and vegetation clearing; and
- Mortality and injury from baratrauma.

Mitigation measures relevant to threatened species, TECs, native vegetation communities, species vulnerable to turbine strikes, 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 Recommendations and Next Steps

The desktop assessment and field surveys undertaken to date have highlighted a range of known and potential biodiversity constraints. 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 an EPBC Act referral to the Australian Government CCEEW for projects;
- Prepare a detailed assessment of MNES; and
- Conduct further targeted seasonal fauna and flora surveys in 2022 (Spring) for candidate species considered likely or potentially occurring within the Project Area in accordance with relevant Federal or State survey guidelines.

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 to 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; and

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

- 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; and
  - WONS and Invasive species will be identified and monitored 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; and
  - If vegetation clearing is required, injured, sick or dead fauna will be recorded and reported during construction. This can be carried out by a fauna spotter-catcher.
- Impacts from turbine collision to bats and birds:
  - Areas of bird habitat including known nests will be avoided in the design and then further avoided when micro siting occurs, where practicable ;
  - Development of a Bird and Bat Management Plan that considers the impacts that will occur to birds and mitigation measures to address these; and
  - Additional measures could include locating turbines away from key bird and bat habitats (waterways and drainage lines) where practicable.

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APPENDIX A PROTECTED MATTERS SEARCH TOOL 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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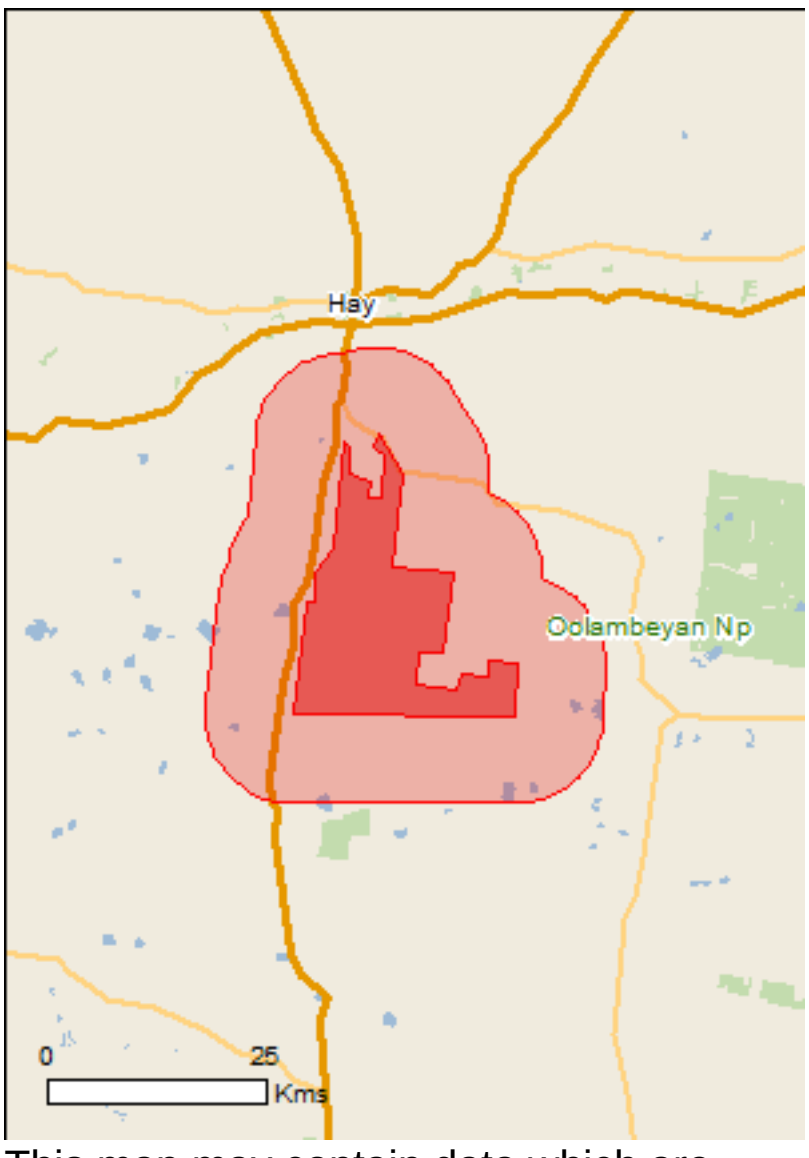

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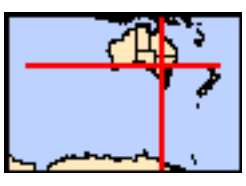

Summary

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:	21
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:	15
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:	1
Regional Forest Agreements:	None
Invasive Species:	20
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	400 - 500km upstream
Hattah-kulkyne lakes	200 - 300km upstream
Riverland	300 - 400km upstream
The coorong, and lakes alexandrina and albert wetland	400 - 500km 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 likely to occur within area
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to 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 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 known to occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Extinct within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat known 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
Macquaria australasica		
Macquarie Perch [66632]	Endangered	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 known 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 wakoolica		
[66623]	Endangered	Species or species habitat may occur within area
Brachyscome papillosa		
Mossgiel Daisy [6625]	Vulnerable	Species or species habitat may occur within area
Lepidium monoplocoides		
Winged Pepper-cress [9190]	Endangered	Species or species habitat known to occur within area
Maireana cheelii		
Chariot Wheels [8008]	Vulnerable	Species or species habitat likely to occur within area
Swainsona murrayana		
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to 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		
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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 may 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
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
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
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 known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
South West Woodland	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		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
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
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

Name	Status	Type of Presence
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

-34.620031 144.831955,-34.624763 144.839251,-34.647503 144.838135,-34.65301 144.859163,-34.667765 144.85779,-34.668118 144.87015,-34.632108 144.872467,-34.625893 144.863026,-34.614663 144.867146,-34.646655 144.891865,-34.726407 144.880621,-34.731345 144.945852,-34.79847 144.934608,-34.796779 144.908001,-34.825249 144.90534,-34.829547 144.946882,-34.815032 144.951946,-34.818273 144.979498,-34.805518 144.97924,-34.806998 145.010826,-34.85061 145.008595,-34.850328 144.780457,-34.75476 144.794704,-34.754196 144.803288,-34.730922 144.802944,-34.71004 144.820969,-34.620031 144.831955

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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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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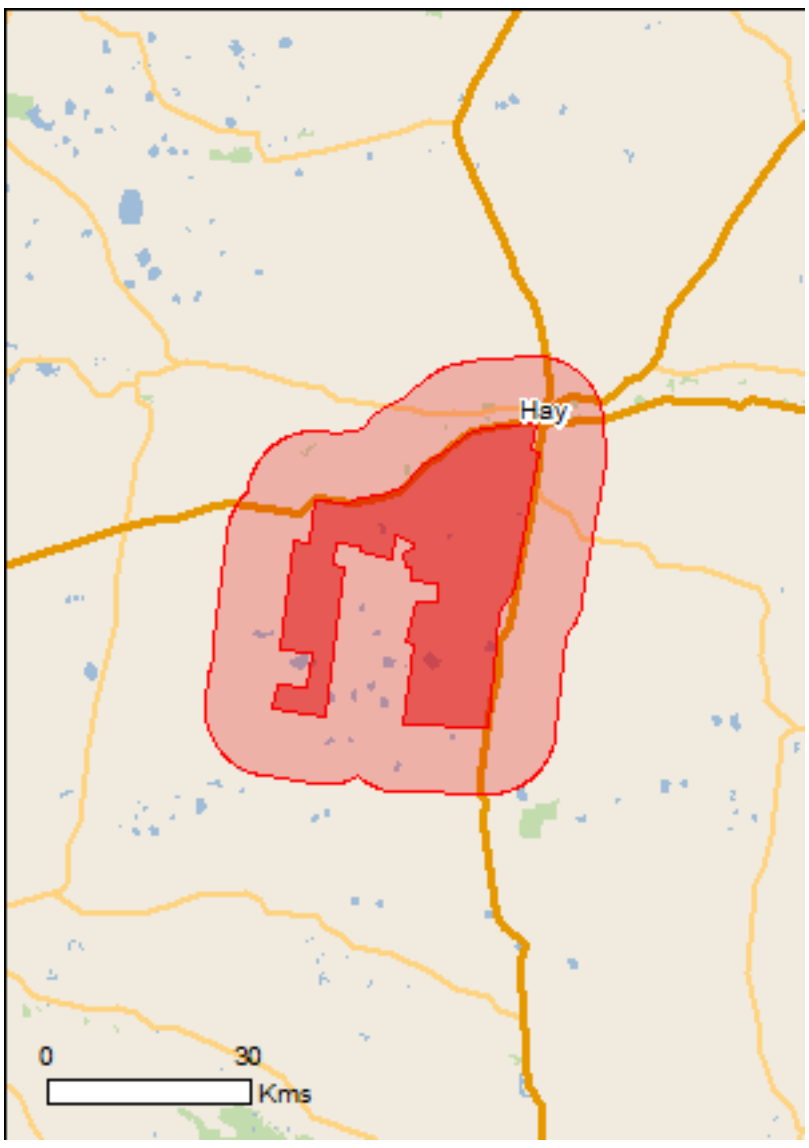
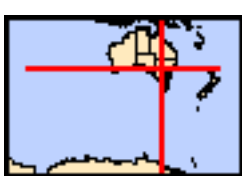


Coordinates

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:	25
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:	7
Commonwealth Heritage Places:	1
Listed Marine Species:	15
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:	20
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	150 - 200km upstream
Riverland	300 - 400km upstream
The coorong, and lakes alexandrina and albert wetland	400 - 500km 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 likely to occur within area
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to 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 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 known to occur within area
Pezoporus occidentalis		
Night Parrot [59350]	Endangered	Extinct within area
Polytelis swainsonii		
Superb Parrot [738]	Vulnerable	Species or species habitat known to occur

Name	Status	Type of Presence
		within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat known 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 known to occur within area
Macquaria australasica		
Macquarie Perch [66632]	Endangered	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 known 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
Austrostipa wakoolica		
[66623]	Endangered	Species or species habitat may occur within area
Brachyscome papillosa		
Mossgiel Daisy [6625]	Vulnerable	Species or species habitat known to occur within area
Eleocharis obicis		
a spike rush [15320]	Vulnerable	Species or species habitat may occur within area
Lepidium monoplocoides		
Winged Pepper-cress [9190]	Endangered	Species or species habitat known to occur within area
Maireana cheelii		
Chariot Wheels [8008]	Vulnerable	Species or species habitat likely 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
Reptiles		
Delma impar		
Striped Legless Lizard, Striped Snake-lizard	Vulnerable	Species or species

Name	Status	Type of Presence
[1649]		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		
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 may 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 Postal Commission
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Commonwealth Bank of Australia
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Telstra Corporation Limited

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Hay Post Office	NSW	Listed place

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
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 known 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
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 known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Murrumbidgee Valley	NSW
Toogimbie	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		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
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

Name	Status	Type of Presence
		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
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

-34.602185 144.537983,-34.606044 144.584277,-34.600393 144.59904,-34.598132 144.626849,-34.589088 144.655001,-34.564495 144.678004,-34.552619 144.70856,-34.527167 144.744265,-34.522924 144.784434,-34.52052 144.829066,-34.548095 144.8222,-34.551206 144.832671,-34.700796 144.803489,-34.725208 144.782889,-34.84909 144.766983,-34.847537 144.653339,-34.760851 144.667587,-34.758595 144.657974,-34.714864 144.670506,-34.71303 144.698315,-34.694401 144.700546,-34.690731 144.664927,-34.676192 144.665012,-34.675345 144.656086,-34.662215 144.655914,-34.656708 144.667416,-34.649506 144.66836,-34.642798 144.643898,-34.667863 144.641495,-34.65925 144.598751,-34.651907 144.597206,-34.64993 144.566822,-34.672522 144.562359,-34.675063 144.577465,-34.838661 144.551029,-34.829925 144.482708,-34.802867 144.486485,-34.807095 144.52734,-34.769313 144.53249,-34.766774 144.491634,-34.648236 144.50983,-34.651342 144.531803,-34.602185 144.537983

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-Department of Environment and Primary Industries, Victoria
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-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 OBSERVED FLORA AND FAUNA

Appendix B Observed Flora and Fauna

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Birds			
Australian Magpie	*Gymnorhina tibicen*	-	-
Australian Owlet-nightjar	*Aegotheles cristatus*	-	-
Australasian Grebe	*Tachybaptus novaehollandiae*	-	-
Australian Hobby	*Falco longipennis*	-	-
Australian Ringneck	*Barnadius zonarius var. barnardi*	-	-
Australian Wood Duck	*Chenonetta jubata*	-	-
Banded Lapwing	*Vanellus tricolor*	-	-
Black-eared Cuckoo	*Chrysococcyx osculans*	-	-
Black Falcon	*Falco subniger*	V	-
Black Kite	*Milvus migrans*	-	-
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	-	-
Black-faced Woodswallow	*Artamus cinereus*	-	-
Black-shouldered Kite	*Elanus axillaris*	-	-
Black-tailed Native-hen	*Gallinula ventralis*	-	-
Blue Bonnet	*Northiella haematogaster*	-	-
Brown Falcon	*Falco berigora*	-	-
Brown Songlark	*Cincloramphus cruralis*	-	-
Budgerigar	*Melopsittacus undulatus*	-	-
Chestnut-crowned Babbler	*Pomatostomus ruficeps*	-	-
Chestnut-rumped Thornbill	*Acanthiza uropygialis*	-	-
Cockatiel	*Nymphicus hollandicus*	-	-
Common Bronzewing	*Phaps chalcoptera*	-	-
Common Starling*	*Sturnus vulgaris*	-	-
Crested Pigeon	*Ocyphaps lophotes*	-	-
Eastern Barn Owl	*Tyto javanica*	-	-
Emu	*Dromaius novaehollandiae*	-	-
Galah	*Eolophus roseicapilla*	-	-
Grey Butcherbird	*Cracticus torquatus*	-	-
Grey-crowned Babbler	*Pomatostomus temporalis*	V	-

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Ground Cuckoo-shrike	*Coracina maxima*	-	-
Grey Teal	*Anas gracilis*	-	-
Horsfields Bushlark	*Mirafra javanica*	-	-
Inland Thornbill	*Acanthiza apicalis*	-	-
Little Eagle	*Hieraaetus morphnoides*	V	-
Magpie-lark	*Grallina cyanoleuca*	-	-
Masked Woodswallow	*Artamus personatus*	-	-
Nankeen Kestrel	*Falco cenchroides*	-	-
Noisy Miner	*Manorina melanocephala*	-	-
Pallid Cuckoo	*Cacomantis pallidus*	-	-
Pied Butcherbird	*Cracticus nigrogularis*	-	-
Plains-wanderer	*Pedionomus torquatus*	E	CE
Plum-headed Finch	*Neochmia modesta*	-	-
Rainbow Bee-eater	*Merops ornatus*	-	-
Red-capped Robin	*Petroica goodenovii*	-	-
Red-rumped Parrot	*Psephotus heamatonotus*	-	-
Rufous Whistler	*Pachycephala rufiventrus*	-	-
Sacred Kingfisher	*Todiramphus sanctus*	-	-
Singing Honeyeater	*Lichenostomus virescens*	-	-
Southern Whiteface	*Aphelocephala leucopsis*	-	-
Splendid Fairy-wren	*Malurus splendens*	-	-
Spotted Harrier	*Circus assimilis*	-	-
Straw-necked Ibis	*Threskiornis spinicollis*	-	-
Striated Pardalote	*Pardalotus striatus*	-	-
Superb Fairy-wren	*Malurus cyaneus*	-	-
Tawny Frogmouth	*Podargus strigoides*	-	-
Tree Martin	*Petrochelidon nigricans*	-	-
Variegated Fairy-wren	*Malurus lamberti*	-	-
Wedge-tailed Eagle	*Aquila audux*	-	-
Welcome Swallow	*Hirundo neoxana*	-	-
Whistling Kite	*Haliastur sphenurus*	-	-

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Western Gerygone	*Gerygone fusca*	-	-
White-backed Swallow	*Cheramoeca leucosternus*	-	-
White-breasted Woodswallow	*Artamus leucorynchus*	-	-
White-faced Heron	*Egretta novaehollandiae*	-	-
White-fronted Chat	*Epthianura albifrons*	V	-
White-winged Fairy-wren	*Malurus leucopterus*	-	-
White-winged Chough	*Corcorax melanorhamphos*	-	-
White-winged Triller	*Lalage tricolor*	-	-
Willie Wagtail	*Rhipidura leucophrys*	-	-
Yellow-throated Miner	*Manorina flavigula*	-	-
Zebra Finch	*Taeniopygia guttata*	-	-
Mammals			
Western Grey Kangaroo	*Macropus fuliginosus*	-	-
Red Kangaroo	*Macropus rufus*	-	-
European Rabbit*	*Oryctolagus cuniculus*	-	-
Feral Cat*	*Felis Catus*	-	-
European Red Fox*	*Vulpes vulpes*	-	-
Sheep*	*Ovis aries*	-	-
Cow*	*Bos taurus*	-	-
Reptiles			
Shingleback	*Tiliqua rugosa*	-	-
Eastern Blue-tongue Lizard	*Tiliqua scinoides*	-	-
Brown Snake		-	-
Bearded Dragon		-	-
Amphibians			
Spotted Marsh Frog	*Limnodynastes tasmaniensis*	-	-
Flora			
Sandalwood	*Myoporum platycarpum*	-	-
Emu Bush	*Ereomphila longifolia*	-	-
Weeping Myall	*Acacia pendula*	-	-

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Kurrajong	*Brachychiton populneus*	-	-
Wilga	*Geijera parviflora*	-	-
Western Rosewood	*Alectryon oleifolius*	-	-
Black Box	*Eucalyptus largiflorens*	-	-
River Red Gum	*Eucalyptus camaldulensis*	-	-
White Cypress Pine	*Callitris glaucophylla*	-	-
Mulga	*Acacia aneura*	-	-
Gidgee	*Acacia cambagei*	-	-
Boxthorn	*Lycium ferocissium*	-	-
Dillon Bush	*Nitraria billardierei*	-	-
Nitre Goosefoot	*Chenopodium nitrariaceum*	-	-
Old Man Saltbush	*Atriplex nummularia*	-	-
Bladder Saltbush	*Atriplex versicaria*	-	-
Mealy Saltbush	*Atriplex pseudocampanulata*	-	-
Eastern Flat-top Saltbush	*Atriplex lindleyi*	-	-
Thorny Saltbush	*Rhagodia spinescens*	-	-
Cottony Saltbush	*Rhagodia gaudichichaudiana*	-	-
Climbing Saltbush	*Rhagodia nutans*	-	-
Short-winged Copperburr	*Sclerolaena brachyptera*	-	-
Galvanised Burr	*Sclerolaena birchii*	-	-
Grey Copperburr	*Sclerolaena dicantha*	-	-
Pale Poverty Bush	*Sclerolaena divaricate*	-	-
Streaked Poverty Bush	*Sclerolaena tricuspis*	-	-
Black Roly Poly	*Sclerolaena muricata*	-	-
Silky Copperburr	*Sclerolaena eriacantha*	-	-
Cotton Bush	*Maireana aphylla*	-	-
Slender Fissure Weed	*Maireana pentagona*	-	-
Black Bluebush	*Maireana pyramidata*	-	-
Pearl Bluebush	*Maireana sedifolia*	-	-
Chariot Wheels	*Maireana cheelii*	V	V
Soft Horns	*Malacocera tricornis*	-	-

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Prickly Salwort	*Salsola australis*	-	-
Ruby Saltbush	*Enchylaena tomentosa*	-	-
Water Weed	*Osteocarpum*	-	-
Mossgiel Daisy	*Brachyscome papillosa*	V	V
Grey Sunray	*Helipterum corymbiflorum*	-	-
	Helipterum sp.	-	-
Weak Daisy	*Brachycomb debilis*	-	-
Fern-leaf Cotula	*Cotula sp.*	-	-
Desert Sneeze Weed	*Centipeda thespidioides*	-	-
Bush Minuria	*Minuria cunninghamii*	-	-
Rough Burr Daisy	*Calotis scabiosifolia*	-	-
Fuzz Weed	*Vittadinnia cunneata/triloba*	-	-
Tall Groundsel	*Senecio runcinifolius*	-	-
Pale Beauty Heads	*Calocephalus sonderi*	-	-
Yellow Drumsticks	*Craspedia chrysantha*	-	-
Wooly Heads	*Myriocephalus rhizocephalus*	-	-
Silky Goodenia	*Goodenia fascicularis*	-	-
Common Fringe Lily	*Thysanotus tuberosus*	-	-
Blue Crowsfoot	*Erodium crinitim*	-	-
Blue Bells	*Wahlenbergia sp.*	-	-
Hairy Pod-cress	*Harmsiodoxa blennodioides*	-	-
Winged Peppercress	*Lepidium monoplocoides*	E	E
Wild Mustard	*Sinapis arvensis*	-	-
Sand Twinleaf	*Zygophyllum ammophila*	-	-
Twinleaf	*Zygophyllum sp. (glaucum)*	-	-
Ice Plant	*Mesembryanthemum crystallinum*	-	-
Quena	*Solanum esuriale*	-	-
Paterson's Curse	*Echium plantagineum*	-	-
Caustic Weed	*Euphorbia drummondii*	-	-
Mulla Mulla	*Ptilotus sp.*	-	-
Plains Lantern Bush	*Abutilon halophilum*	-	-

Common Name	Scientific Name	BC Act Status	EPBC Act Status
Sand Sida	*Sida ammophila*	-	-
Ridge Sida	*Sida cunninghamii*	-	-
Hare's Foot Clover	*Trifolium arvense*	-	-
Slender Darling Pea	*Swainsona murrayana*	V	V
Small-leaf Burr Medic	*Medicago praecox*	-	-
Barrel Medic	*Medicago truncatula*	-	-
-	*Plantago sp. (hispidula)*	-	-
Common Nardoo	*Marsilea drummondii*	-	-
-	*Calendrinnia eremaea*	-	-
Lignum	*Duma florulenta*	-	-
Shiny Dock	*Rumex tenax*	-	-
Rye Grass	*Lolium rigidum*	-	-
Barley Grass	*Hordeum leporinim*	-	-
Brome	*Bromus sp.*	-	-
Oats	*Avena sp.*	-	-
Rat's Tail Fescue	*Vulpia myuros*	-	-
Mulga Grass	*Schismus barbatus*	-	-
Paradoxa Grass	*Phalaris paradoxa*	-	-
False Hair Grass	*Pentaschistis airoides*	-	-
Wild Oat	*Avena sp.*	-	-
Golden Top	*Lamarckia aurea*	-	-
Variable Speargrass	*Austrostipa*	-	-
White Top	*Rytidosperma caespitosum*	-	-
Curly Windmill Grass	*Enteropogon acicularis*	-	-
Windmill Grass	*Chloris truncata*	-	-
Cane Grass	*Eragrostis australasica*	-	-
Native Millet	*Panicum decompositum*	-	-
Fairy Grass	*Sporobolus caroli*	-	-
Purple love grass	*Eragrostis lacunaria*	-	-
Knob Sedge	*Carex inversa*	-	-

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
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 for the species, however there is a lack of suitable habitat of wetlands with tall dense vegetation within the site.
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 in the form of farm dams, however there are no records of the species in the locality
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.	**Known:** There are records of this species within the locality from 1979 and more recently 2001. The site contains preferred habitat in the form of native grasslands, shrub steppe, and agricultural land. The species was recorded during the Winter 2022 survey event.
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 in 2008 and was recorded during the ERM Spring 2021 and Summer 2022 field surveys. The species was observed near farm dams, and within shrub and grassland habitat.

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
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 water courses. 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*).	**Likely:** The species has been recorded in the locality of the Project Area, and preferred habitat is present in the form of timbered lowland plains and tussock grasslands.
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.	**Known:** The Black Falcon was recorded on the Project Area during the ERM Spring 2021 and Summer 2022 field surveys.
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.	**Potential:** the Project Area contains preferred habitat and is inside the distribution for the species. However, there are no records of the species in the locality.
Hirundapus caudacutus	White-throated Needletail	-	V,Mi	White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable. They occur over most types of habitat, however they are recorded more often over wooded areas, including open forest and rainforest.	**Unlikely:** The Project Area is within the distribution for the species and suitable habitat exists, however no records have been made in the locality
Lathamus discolor	Swift Parrot	E	CE	The swift parrot breeds in Tasmania during the summer and the entire population migrates north to mainland Australia for the winter. Whilst on the mainland the swift parrot disperses widely to forage on flowers and psyllid lerps in Eucalyptus species. In New	**Unlikely:** The Project Area is within the distribution for the species, however preferred habitat

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
				South Wales, swift parrots forage in forests and woodlands throughout the coastal and western slopes regions each year.	is not present and no known records exist in the locality.
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:** The Project Area is outside the distribution for the species and no known records exist in the locality.
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	**Unlikely:** The Project Area is within the distribution for the species. Preferred habitat is not present, with suitable habitat present as areas of disturbed River Red Gum woodland. No known records exist in the locality.
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:** There are no records within the locality. The Project Area is within the distribution for the species, however suitable habitat is not present.
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.	**Known:** The species was recorded on site during the ERM Spring 2021 field surveys
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 no records of the species within the locality of the Project Area. The Project Area contains preferred habitat in the drier seasons in the form of farm dams and is within the species distribution.

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
Petroica phoenicea	Flame Robin	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following regeneration. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other shrublands in coastal areas.	**Unlikely:** the Project Area is within the known distribution for the species. There are a lack of records in the locality and suitable habitat is not present within the Project Area.
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.
Polytelis swainsonii	Superb Parrot	V	V	The Superb Parrot mainly inhabits forests and woodlands dominated by eucalypts, especially River Red Gums (*Eucalyptus camaldulensis*) and box eucalypts such as Yellow Box (*Eucalyptus melliodora*) or Grey Box (*E. microcarpa*). The species also seasonally occurs in box-pine (*Callitris*) and Boree *(Acacia pendula)* woodlands. The Superb Parrot uses a number of habitats for different activities. Superb Parrots breed in either River Red Gum forests and woodlands or box woodlands. In the Riverina Region of NSW and adjacent areas of Victoria, the Superb Parrot usually breeds in forests dominated by large mature River Red Gums, typically close to watercourses, though nests are also occasionally located in Blakely's Red Gum (*E. blakelyi*), Grey Box (*E. microcarpa*), Red Box *(E. polyanthemos*) and Inland Red Box (*E. intertexta*). In the Murray-Riverina, nest sites are usually located no further than 10 km from foraging habitat, and in the South-west Slope Region, breeding and foraging habitats may coincide at some sites, and	**Potential:** The Project Area is within the known distribution for the species. There are no records in the locality. However, preferred habitat of River Red Gums and *Acacia pendula* is present across the Project Area.

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
				are no further than 10 km away at other sites. The Superb Parrot forages in box eucalypt woodland, particularly that dominated by Yellow Box or Grey Box, and occasionally Black Box (*E. largiflorens*)	
Pomatostomus temporalis 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.	**Known:** The species was observed during the ERM Spring 2021 field surveys. The Project Area is within the known distribution for the species. Preferred habitat of Black Box and cypress pine woodlands are present.
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.	**Potential:** There are no known records of the species in the locality of the Project Area. The Project area contains preferred habitat and is within the species distribution.
Stagonopleura guttata	Diamond Firetail	V	-	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).	**Unlikely:** Within species distribution and suitable habitat exists however no records have been made in the vicinity of the Project Area.
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 Project Area contains habitat mapped for the threatened species in the form of the Abercrombie Creek in the north western portion of the site. This area was observed to be dry

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
					at the time of Spring 2021 and Summer 2022 field surveys.
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.
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.
Macquaria australasica	Macquarie Perch	E	E	The Macquarie Perch is a riverine, schooling species. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above riffles (shallow running water). Populations may survive in impoundments if able to access suitable spawning sites	**Unlikely**: There are a lack of records in the locality, and the Project Area is outside the known distribution for the species.
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.	**Likely:** There are known records within the locality of the Project Area, and preferred habitat for the species is present.

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
				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	
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.	**Potential:** There are a lack of records of the species in the locality of the Project Area. However the site is within the potential distribution for the species and preferred habitat is present in the form of Black Box and Cypress Pine woodlands and River Red Gum.
Phascolarctos cinereus	Koala	V	E	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.	**Potential:** There are a lack of records of the species within the locality of the Project Area. The Mungadal East site is outside the distribution and preferred habitat is not present. Koala Management Plan for the Far West and Riverina regions provides koala use trees, including those identified on site; the River Red Gum as preferred, Black Box as high use, and White Cypress Pine as significant use.
Flora					
Amphibromus fluitans	River Swamp Wallaby-grass	V	V	River Swamp Wallaby-grass grows mostly in permanent swamps and also lagoons, billabongs, dams and roadside ditches. The species requires moderately fertile soils with some bare ground; conditions that are caused by seasonally-fluctuating water levels. The species has some resistance to salinisation of habitat in experimental tests. Habitats in south-western New South Wales include swamp margins in mud, dam and tank beds in hard clay and in semi-dry mud of lagoons with *Potamogeton spp.* and *Chamaeraphis spp.*	**Unlikely:** There is a lack of records within the locality of the Project Area. The site is outside the distribution for the species.

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
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*.	**Unlikely:** The Project Area is outside the known distribution for the species and there are a lack of records in the locality.
Austrostipa wakoolica		E	E	*Austrostipa wakoolica* grows in open woodland, on grey silty clay or sandy loam soils. Recorded habitats include the edge of a lignum swamp in brown loamith box and mallee, creek banks in grey silty clay, mallee and lignum sandy loam flat, open cypress pine forest on low range in sandy soil and a low rock rise fenced-off from stock for about 18 months. Associated species include *Callitris glaucophylla, Eucalyptus microcarpa, Eucalyptus populnea, Austrostipa eremophila, Austrostipa drummondii, Austrodanthonia eriantha, Einadia nutans, Hyalosperma glutinosum subsp. glutinosum* and *Crassula* species.	**Potential:** The Project area is within the NSW distribution for the species. Preferred habitat is present in the form of lignum swampland, and open cypress pine forest. Associated species including *Callitris laucophylla, Astrostipa drummondii,* and *Einadia nutans* have been identified on site. However, there is a lack of records in the locality.
Brachyscome muelleroides	Mueller Daisy	V	V	*Brachyscome muelleroides* occurs in seasonally damp situations such as shallow depressions and around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland, grassy woodland and open forest habitats, growing in association with various grasses and seasonal aquatic plants such as *Marsilea* species. Where trees are present, these are typically River Red Gum (*Eucalyptus camuldulensis)* or, less commonly, Grey Box *(E. microcarpa)*	**Potential**: The Project Area is within the NSW distribution for the species. Preferred habitat is present in the form of claypans on grey and lighter cracking soils. *Marsilea sp.* And River Red Gum are also present. However, there is a lack of records in the locality.
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.	**Known:** The species was observed during the Spring 2021 field surveys.

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
Eleocharis obicis	a spike rush	V	V	The species grows in ephemerally wet locations, such as roadside mitre drains and depressions, usually in low-lying grasslands. In NSW, the species is known to occur in heavy clay soils on floodplains, claypans and red sandy soil over clay.	**Unlikely:** The Project Area is outside the known distribution for the species and there are a lack of records in the locality.
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 *eucalypt*s, 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.	**Known:** The species was recorded during the Spring 2021 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.	**Known:** Observations of the species were made during the Spring 2021 field surveys.
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.	**Potential:** the Project Area is within the NSW distribution for the species. Preferred habitat is present in form of Black Box, Saltbush and Bluebush plains. However, there is a lack of records in the locality.
Sclerolaena napiformis	Turnip Copperburr	E	E	The Turnip Copperburr grows in native grasslands and grassy woodlands on relatively fertile clay-loam soils. In NSW, the species occurs in Knotty Spear-Grass *Austrostipa nodosa* and Windmill Grass *Chloris truncata* tussock grasslands on grey to red-brown cracking clays and clay loams. Other common species in these habitats include wallaby-grasses *Austrodanthonia* species, Spider Grass *Enteropogon acicularis*, Paper Sunray *Rhodanthe corymbiflora*, several Swainson-peas *Swainsona* species and several chenopod species.	**Potential:** The Project Area is inside the NSW distribution for the species, and preferred habitat in the form of Windmill Grass communities is present, with Paper Sunray and chenopod species common across the Project area. However, there are a lack of records in the locality.

Scientific Name	Common Name	Status (BC Act)	Status (EPBC Act)	Habitat Summary: *Summarised from DPIE Threatened Species Profiles* *	Likelihood of Occurrence
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.	**Known:** Observations of this species were recorded during the Spring 2021 field surveys.
Reptiles					
Delma impar	Striped Legless Lizard	V	V	The Striped Legless Lizard is a grassland specialist. Potential habitat for the Striped Legless Lizard includes all areas which have, or once had, native grasslands or grassy woodlands (including derived grasslands) across the historical range of the species, provided that area retains suitable tussock structure, the soil is of appropriate type and structure, and the site has not had major disturbance such as ploughing. All occupied sites have a grassy ground cover, often with a mixture of native and exotic perennial and annual species of tussock-forming grasses (often >20–50% cover).	**Unlikely:** the Project Area is outside the known distribution for the species and there are a lack of records in the locality.

APPENDIX D BAT CALL ANALYSIS REPORT (GREEN TAPE SOLUTIONS)

Bat Call Analysis Report

The Plains Project

Prepared for ERM

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Document Records - Quality

TITLE	Bat Analysis for the site at Biggenden
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Version A	25/04/2022	Kelly Matthews, Principal Ecologist	ERM	Client

Table of Content

TABLES

FIGURES

1.0 Introduction

1.1 Background

Green Tape Solutions were commissioned to undertake bat call analysis for The Plains project located north of Deniliquin in New South Wales.

1.2 Scope of Work

The specific scope of works for this report includes the following:

- Outline the methodology used to analyse the microbat call within the subject site; and,
- Present the findings of all of the bat call surveys conducted at the project site;

2.0 Methodology

2.1 Capture Technique

Microbat calls were sampled using eight (8) Anabat Swift detectors (Titley Electronics). Passive monitoring was undertaken from 13 to 24 February 2022. The original call files display Australian Eastern Standard Time. The data was analysed using Anabat Insight.

Monitoring commenced at dusk (approximately 1800 hours) and continued until dawn (approximately 0530 hours). Ultrasonic call monitoring surveys on anabat detectors were conducted using full-spectrum fitted with omnidirectional ultrasonic microphone.

2.2 Call Identification

Anabat recordings were analysed using Anabat software (Anabat Insight). Identifications were made by categorising call shape and frequency, with a species match given in consideration to region, known bat distributions, and habitats present. The focus of the bat surveys was to assess the presence of bat species found within the Project Area, and to assess the potential for rare and threatened species to occur.

Call identification for this dataset was based on call keys and descriptions published for Queensland (Reinhold *et al.*, 2001) and New South Wales (Pennay *et al.*, 2004).

Species' identification was further refined using the probability of occurrence of each species based on their geographic distribution (Churchill, 2008, Van Dyck and Strahan, 2008). Species nomenclature used in this report follows Churchill (2008).

The reliability of identification is as follows:

- **Definite** - one or more calls where there is no doubt about the identification of the species;
- **Probable** - most likely to be the species named, low probability of confusion with species that use similar calls; and,
- **Possible -** call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls.

2.3 National Standard

The format and content of this report complies with the nationally accepted standards for the interpretation and reporting of Anabat and Songmeter data (Reardon, 2003), which is currently available from the Australasian Bat Society at www.ausbats.org.au.

3.0 Results

3.1 Total Species Recorded

The majority of calls were considered to be of medium to good quality calls.

A total of 91,171 sequence files were analysed. A proportion of these files (20,836) in this dataset contained background noise or resulted in poor quality calls that did not provide bat calls for analysis. While some call sequences were recognised as bat calls, the quality was not sufficient to assign species identification.

A summary of the species identified through bat call analysis is provided in **Table 1**.

Table 1: Summary of bat call analysis (QLD)

Species	Biodiversity Act	EPBC Act	SD1	SD2	Anabat 1	Anabat 2	Anabat 6	Anabat 10	Anabat 11	Anabat 12
Austronomus australis	LC	NOC	Definite	Definite						
Chalinolobus gouldii	LC	NOC	Definite	Definite	Definite		Definite		Definite	Definite
Chalinolobus morio	LC	NOC	Definite	Definite			Definite		Definite	
Myotis macropus	V	NOC	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible
Nyctophilus sp	V (*N. Coberni and N bifax)*	V (*N. Coberni and N bifax)*	Possible				Possible			
Ozimops planiceps	LC	NOC	Probable	Probable					Definite	
Ozimops ridei	LC	NOC	Probable	Definite			Definite		Definite	
Saccolaimus flaviventris	V	NOC	Definite	Definite						
Scotorepens balstoni	LC	NOC	Definite	Definite			Definite			Probable
Scotorepens greyi	LC	NOC	Definite	Definite			Definite			Probable
Vespadelus darlingtoni	LC	NOC	Probable	Definite		Definite				Definite
Vespadelus regulus	LC	NOC	Possible	Possible	Possible	Probable	Possible	Possible	Possible	Possible
Vespadelus vulturnus	LC	NOC	Possible	Possible	Possible	Possible	Possible	Possible	Possible	Possible

LC: Least Concern, NOC: Not of Concern, V: Vulnerable

3.2 Samples of Calls / Sequences Files

Samples of call extracted from the dataset for each species identified is provided in the following figures

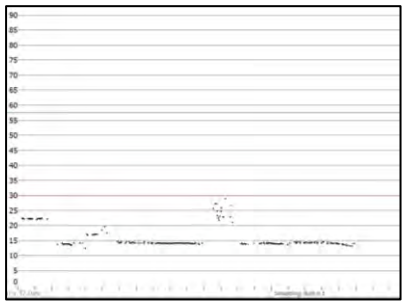
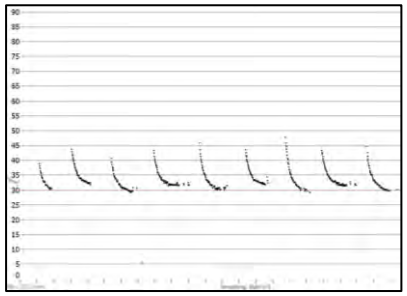
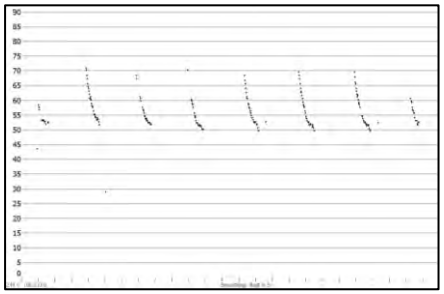
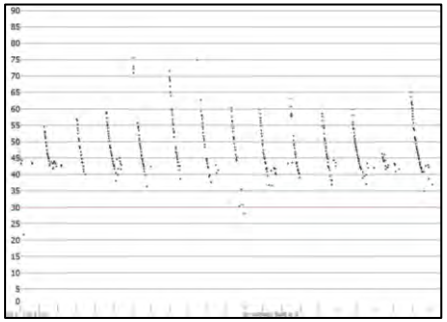
Species	Calls	Known distribution (Extract from Ausbats maps from Australian Bat Society)
Figure 1: *Austronomus australis* This bat is easily recognised by its constant frequency calls range in bandwidth from 10.5 to 15 kHz (Pennay *et al.*, 2004).		
Figure 2: *Chalinolobus gouldii* This species has a curved shape call with characteristic frequency 28 to 34kHz. Pulse alternates in frequency and mostly down-sweeping tail or no tail.		

Figure 3: *Chalinolobus morio*



C. morio has a down-sweeping tail curved pulse with characteristic frequency 47.5 to 53 kHz. It has often a very brief characteristic section. Species that overlap in frequency (*V. vulturnus*) but all have up-sweeping tails.

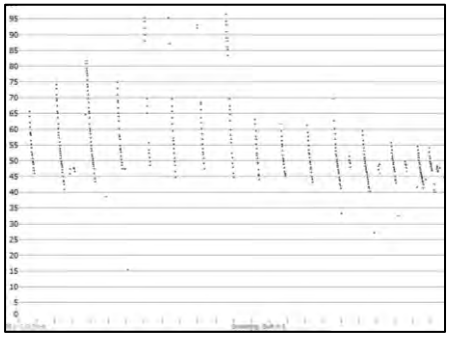
Figure 4: *Myotis macropus*



Near-vertical pulse dropping to about 30 to 35-50kHz. *M. macropus* mostly have a pulse interval of less than 75ms and usually have one kink close to the middle so that the second part has a lesser slope than the first (Reinhold, 2001).

This call can be confused with *Nyctophilus spp* calls. The latest have usually a pulse interval greater than 95ms and are slightly more complicated structure with two kinks instead of one.

Figure 5: *Nyctophilus spp*



N. Corbeni

This species displays a near-vertical pulse, characteristic frequency between 80 and 35KHz (Pennay *et al*, 2004).

The species from this genus cannot be distinguished from each other. There are 3 species that are known to occur in the project area.

N. geoffroyi

N. gouldi

Figure 6: *Ozimops planiceps*

This bat calls between 24 and 29 kHz. These search calls have their energy max around 25-26 kHz.

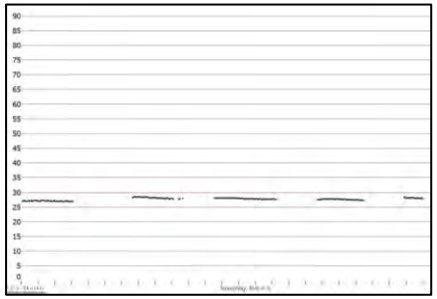


Figure 7: *Ozimops ridei*

O. ridei calls are flat. Characteristic frequency of this species is between 28 to 36 kHz.

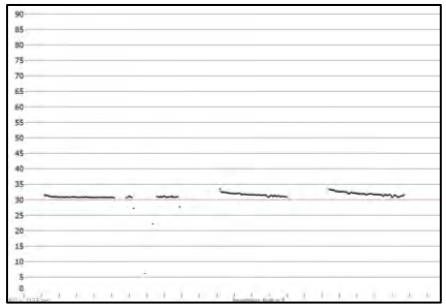


Figure 8: *Saccolaimus flaviventris*

Curved, characteristic frequency 18 to 21.5 kHz. The characteristic frequency does not go above 22 kHz. Other species that could overlap do not occur in this area.

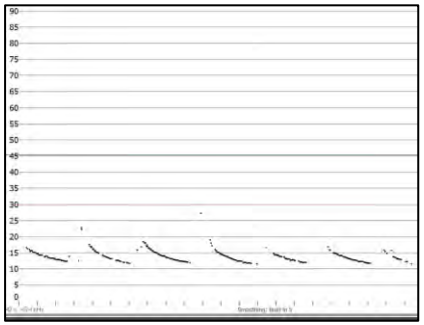


Figure 9: *Scotorepens balstoni*

Pulse of this species is curved with tail variable, but an up-sweeping tail is often more prominent with greater duration. Characteristic frequency 31 to 35 kHz and the frequency of the knee 33 to 37 kHz.

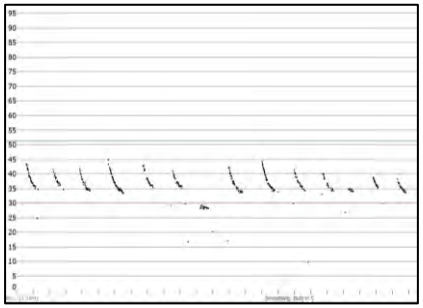


Figure 10: *Scotorepens greyii*

S. greyii has a curved and up-sweeping tail pulse. Its characteristic frequency is between 36 to 41.5 kHz.

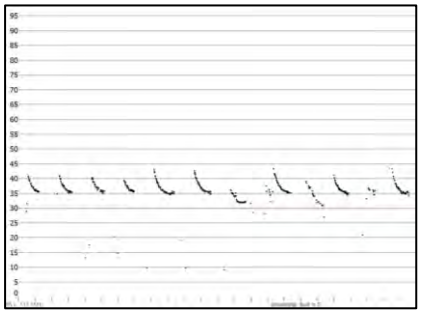


Figure 11: *Vespadelus darlingtoni*

This species call has a curved call with no tail or sometime an up-sweeping tail. The call's characteristic frequency is between 42.5 to 48.5 kHz. Characteristic section is often, but not always, relatively long.

Shorter duration with up-sweeping tails and higher frequencies, cannot be distinguished from *V. regulus* or *V. vulturnus*.

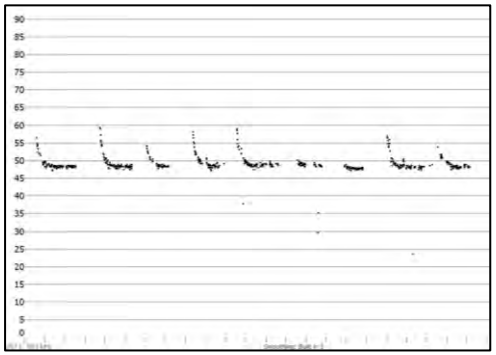
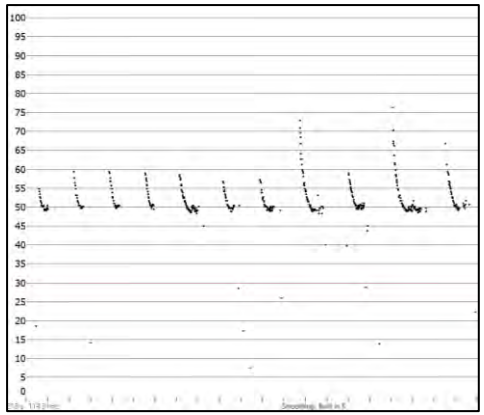


Figure 12: *Vespadelus regulus or Vespadelus vulturnus*

Characteristic frequency varies significantly over distribution from 40 to 55 kHz (n = 95). Call shape also varies between regions (see regional information).



Vespadelus regulus

Vespadelus vulturnus

4.0 References

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APPENDIX E MNES SIGNIFICANT IMPACT ASSESSMENTS

It is noted that due to the early stage of design development, it is not possible to assess impacts based on a development footprint or clearing footprint for this assessment. Biodiversity values have been identified across a broader Project Area, consisting of the landholding boundaries and a more defined area referred to as the subject land. The subject land consists of the preliminary Project layout, with a 100m buffer applied. This subject land has been the area across which detailed ecological fieldwork has been completed. For the purpose of the following Significant Impact Assessments, it has been assumed that up to 20% of the subject land will be directly impacted as a result of a development footprint associated with the Project.

Winged Pepper-cress (*Lepidium monoplocoides*)

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

The Winged Pepper-cress is considered 'Endangered' under the EPBC Act and as a result of targeted flora transects, has been confirmed 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.

The Winged Pepper-cress has experienced widespread decline in both range and abundance since European settlement. The species was once widely distributed and probably reasonably abundant on floodplains across the inland plains of the Murray-Darling Basin regions of Victoria, New South Wales and South Australia. Currently there are estimated to be fewer than 6,000 plants occurring in around 13 wild populations in Victoria and New South Wales (Mavromihalis, 2010b).

The 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 Hay NSW is 367 mm (Bureau of Meteorology (BOM) 2015). 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, 2010b).

Suitable habitat is present within the Project Area in the form of PCTs 153, 157, 163, 17, 216, 160, 46, 13, and 15. Additional surveys are required to cover further areas of suitable habitat and to refine species mapping for the species. Conservatively, all areas of the aforementioned have been considered suitable habitat within the Project Area and Subject Land and are presented in **Figure 7.1**. These PCTs make up 21,184.03 ha of suitable habitat within the Project Area. Based on this preliminary assessment, the total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 213.42 ha, this makes up 1.01% of the total suitable habitat within the Project Area. Areas of suitable habitat will be further avoided during detailed project design.

Thirteen populations of the Winged Pepper-cress, with seven (7) in NSW, are identified within the Recovery Plan (Mavromihalis, 2010b), none of which are located within the Project Area.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented in the following table. There is a potential for a **significant impact** to Winged Pepper-cress as a result of the Project although this will be further reduced through detailed design and assessment in the EIS.

Table 7.1 Significant Impact Assessment for Winged Peppercress

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 153, 157, 163, 17, 216, 160, 46, 13, and 15 totals 21,184.03 ha. A single population of the species was identified within the Subject Land within PCT 44, however additional field surveys are required to confirm presence of additional plants and undertake habitat mapping for the species. The area of Winged Pepper-cress habitat based in associated PCTs with the potential to be disturbed as a result of the development is 213.42 ha, the majority of suitable habitat within the Project Area (98.99%) will remain undisturbed. Development in the area where the population was recorded has the potential to have significant impact on this species experiencing decline within the Project Area.	Yes. Assessment and mapping to be refined in the EIS.
Reduce the area of occupancy of the species	Winged Pepper-cress habitat is present within the Project Area associated with PCTs 153, 157, 163, 17, 216, 160, 46, 13, and 15 which totals 21184.03 ha area of occupancy. The area of Winged Pepper-cress habitat with the potential to be disturbed as a result of the development is 213.42 ha, which is 1.01% of the suitable habitat within the Project Area. The disturbance is likely to reduce the area of occupancy of the species, however only at a relatively small scale.	Yes
Fragment an existing population into two or more populations	Complete habitat mapping for the species is yet to be confirmed for the Project Area. As such Winged Pepper-cress habitat is mapped within the Project Area associated with PCTs 153, 157, 163, 17, 216, 160, 46, 13, and 15, which totals 21184.03 ha. The Project results in the potential removal of 213.42 ha of suitable habitat (1.01%). Due to the small scale of habitat disturbance relative to the size of the Project Area the works are unlikely to fragment an existing population.	No
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, 2010b). Winged Pepper-cress habitat is present within the Project Area associated with PCTs 153, 157, 163, 17, 216, 160, 46, 13, and 15. 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 of this updated mapping. 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 213.42 ha. This area of disturbance is a relatively small scale (1.01%), and is unlikely to have an impact on the survival of the species.	No
Disrupt the breeding cycle of a population	The Winged Pepper-cress grows at sites that are seasonally wet, periods of waterlogging is likely to facilitate seed germination (Mavromihalis, 2010b). The alteration of hydrology is a recognised threat to the species. Hydrology and the management of run-off will be addressed within the EIS. 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	The Project Area is inclusive of areas of Winged Pepper-cress habitat associated with PCTs 153, 157, 163, 17, 216, 160, 46, 13, and 15 making up 21184.03 ha. The Project has the potential to disturb 213.42 ha, 1.01%, of the total habitat present within the Project Area. The small scale of disturbance is unlikely to result in	No

Criteria	Description	Criteria Triggered?
that the species is likely to decline	modification, destruction, removal, isolation or a decrease in the availability of habitat to the extent that the species is likely to decline.	
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, 2010b). 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, 2010b). 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, 2010b). 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 objective presented above.	No

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

COBB HIGHWAY

JERILDERIE ROAD

GLENCOE ROAD

Legend

- Winged Pepper-cress Habitat Area
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Winged Pepper-cress (Lepidium monoplocoides) Habitat Mapping

E-1

Drawing No:	0606253m_PREHWF_Bio_G011_R03.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

Plains-wanderer (*Pedionomus torquatus*)

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

The Plains-wanderer is listed as 'Critically Endangered' under the EPBC Act and based on Spring 2021 surveys undertaken by ERM is known 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 (NSW OEH, 2022f). Core habitat mapping has been conducted for the species and includes areas within the Project Area (DCEEW, 2010). ERM undertook two nights of spotlighting surveys, recording two (2) adults and one (1) chick on the second night. No further surveys were undertaken to reduce disturbance to the species.

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. (DoE & SA DEWNR 2016). This habitat is present across the Project Area associated with PCT 44 and PCT 46. All areas of PCT 44 and PCT 46, and the core habitat mapping for the species are mapped as habitat for the species in **Figure 7.2** and makes up 4525.32 ha of habitat**.** Habitat for the Plains-wanderer was avoided where possible during the design process to date, resulting in only 72.25 ha of suitable habitat within the Subject Land. The total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 18.06 ha, this makes up 0.34% of the total suitable habitat within the Project Area.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table. There is potential that the Project will result in a **significant impact** to Plains-wanderer although this will be further reduced through detailed design and assessment in the EIS. Biodiversity stewardship and conservation options are also being explored to ensure that habitat for this species within the Project Area is protected in perpetuity.

Table 7.2 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 associated with PCT 44, PCT 46 and Core habitat mapping for the species, this totals 4525.32 ha. The area of Plains-wanderer habitat with the potential to be disturbed as a result of the development is 18.06 ha. All suitable habitat is recognised as habitat critical to the survival of the species, therefore the removal of any suitable habitat may subsequently result in the decrease of the size of the population.	Yes Assessment and mapping to be refined in the EIS.
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 area of habitat to be disturbed as a result of the development is 18.06 ha, which is 0.34% of the suitable habitat within the Project Area, and 0.055% of the total area of occupancy for the species (330km^2). Provided the area of occupancy is recognised to be low, the reduction of 18.06 ha has the potential to reduce the area of occupancy of the species.	Yes Assessment and mapping to be refined in the EIS.
Fragment an existing population into two or more populations	The Project has the potential to result in the disturbance of 18.06 ha, due to construction of tracks and infrastructure that is positioned within suitable habitat. The Project has the potential to fragment existing populations. Plains-wanderers have a historically low population size, putting them at increased risk of impact of extinction as chance events may have significant impacts on the population.	Yes Assessment and mapping to be refined in the EIS.
Adversely affect habitat critical to the survival of a species	Plains-wanderer habitat is present within the Project Area associated with PCT 46 and PCT 44 and core habitat mapping, which totals 4525.32 ha. The area of Plains-wanderer habitat to be disturbed as a result of the development is 18.06 ha. All suitable habitat is recognised as habitat critical to the survival of the species, therefore the removal of any habitat may result in an adverse effect on habitat critical to the survival of the species.	Yes Assessment and mapping to be refined in the EIS.
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 (18.06 ha) for the Project has the potential to disrupt the breeding cycle of a population of Plains-wanderers.	Yes Assessment and mapping to be refined in the EIS.
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, PCT 46 and Core habitat mapping. The area of disturbance currently includes areas of suitable habitat for the species, totalling 18.06 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 Assessment and mapping to be refined in the EIS.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or	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.	No

Criteria	Description	Criteria Triggered?
critically endangered species' habitat	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.	
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 Plan 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, albiet negative impact on 18.06 ha. Therefore, the Project may interfere with the objective of enhancing the condition of habitat across the Plains-wanderers' range.	Yes Assessment and mapping to be refined in the EIS.

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

COBB HIGHWAY

JERILDERIE ROAD

GLENCOE ROAD

Legend

- Plains-wanderer Habitat Area
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Plains-wanderer (Pedionomus torquatus) Habitat Mapping

E-2

Drawing No:	0606253m_PREHWF_Bio_G012_R02.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

Mossgiel Daisy (*Brachyscome papillosa*)

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

The Mossgiel Daisy is listed as 'Vulnerable' under the EPBC Act and is known to occur within the Project Area based on observations during field surveys. The Mossgiel Daisy is a multi-stemmed perennial herb that grows to 40 cm high. It has sessile leaves up to 7 cm long growing on its stems, with leaf edges varying from smooth to deeply dissected (NSW OEH, 2022c). The Mossgiel Daisy is endemic to NSW and chiefly occurs within the Riverina Bioregion, the species 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 (NSW OEH 2022c, DEWHA 2008a). The Project Area is within the known distribution for the species.

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 (DECC, 2005a). Eleven Plant Community Types associated with the species have been mapped within the Project Area; PCTs 153, 157,165, 216, 163, 160, 44, 46, 164, 13, and 15. This habitat covers majority of the Project Area (55319.22 ha). The total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 535.72 ha, this makes up 0.97% of the total suitable habitat within the Project Area. Flora transects were undertaken targeting this species in Spring 2021, and as a result the species was confirmed to be present. Further surveys are required to confirm the species polygon, in the interim habitat for the species is mapped as all areas of aforementioned associated PCTs and is presented in **Figure 7.3**.

The main identified threat to Mossgiel Daisy is clearing for improved pasture (Ayers et al., 1996), and cropping. The main potential threats to Mossgiel Daisy include changes in agricultural practices, possible habitat disturbance during road maintenance, and grazing by stock as the species is potentially palatable to them (DECC, 2005a).

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 a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- 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.

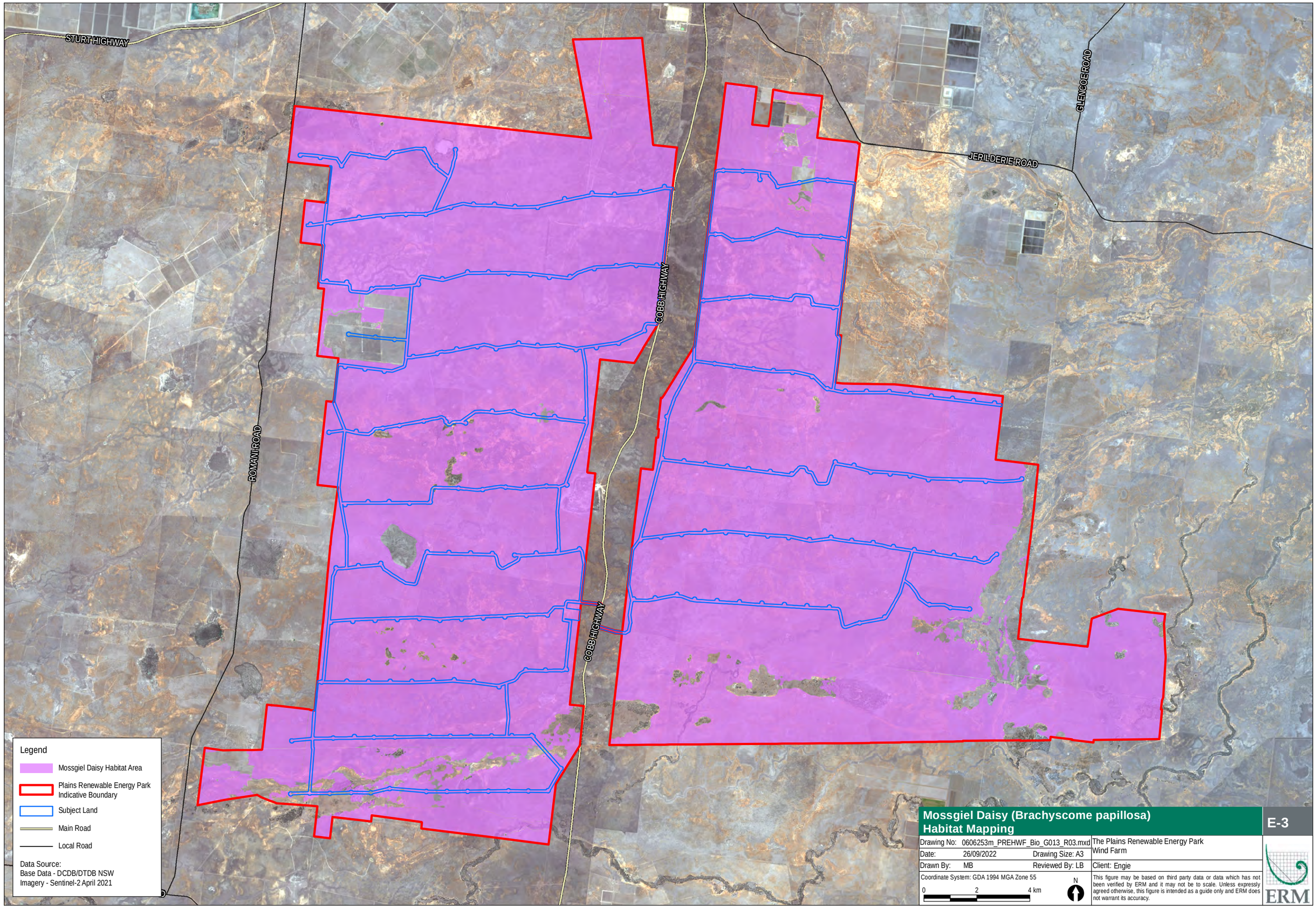
There is no adopted or made recovery plan for the Mossgiel Daisy. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species or a key source population for breeding or dispersal, as larger populations are recorded in surrounding areas. As such, the individuals identified within the Project area are not considered to form part of an 'important population'.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table. It is **unlikely** that the Project will result in a **significant impact** to the Mossgiel Daisy.

Table 7.3 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	There is no adopted or made recovery plan for the Mossgiel Daisy. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. Therefore the Project will not lead to a long-term decrease in the size of an important population.	No
reduce the area of occupancy of an important population	There is no adopted or made recovery plan for the Mossgiel Daisy. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, individuals identified within the Project area are not considered to form part of an 'important population'. Therefore, the Project will not reduce the area of occupancy of an important population.	No
fragment an existing important population into two or more populations	There is no adopted or made recovery plan for the Mossgiel Daisy. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, individuals identified within the Project area are not considered to form part of an 'important population'. Therefore, the Project will not result in fragmenting an existing important population into two or more populations.	No
adversely affect habitat critical to the survival of a species	No critical habitat has been identified for the species. The Project area contains 55319.22 Ha of suitable habitat for the species, with the potential for disturbance of 20% of the Subject Land, 535.72 ha (0.97%). Low to high quality habitat is present across the Project area that will not be disturbed. It is unlikely that the development on 0.97% of the suitable habitat within the Project Area will adversely affect habitat critical to the survival of the Mossgiel Daisy.	No
disrupt the breeding cycle of an important population	There is no adopted or made recovery plan for the Mossgiel Daisy. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. Therefore, the Project will not disrupt the breeding cycle of an important population.	No
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project area contains 55319.22 Ha of suitable habitat for the species, associated with PCTs 153, 157,165, 216, 163, 160, 44, 46, 164, 13, and 15. Development within 20 % of the Subject Land would result in the disturbance of 535.72 ha (0.97% of suitable habitat within the Project Area). This area of disturbance is unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.	No
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive species are not currently listed as a threat for the species, however, 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.	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 Mossgiel Daisy populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. However, 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 substantially with the recovery of the species.	There is no recovery plan adopted or made for the species. The main identified threats to Mossgiel Daisy are habitat loss, disturbance and modification, in addition to trampling, browsing and grazing by livestock. The Project has the potential to result in the disturbance of 535.72 ha, 0.97% of the suitable habitat across the Project area. This habitat has been historically subject to grazing pressures. It is unlikely that the Project will interfere with the recovery of the species.	No


STURT HIGHWAY
ROMANI ROAD
COBB HIGHWAY
COBB HIGHWAY
JERILDERIE ROAD
GLENCOE ROAD
Legend
Mossgiel Daisy Habitat Area
Plains Renewable Energy Park Indicative Boundary
Subject Land
Main Road
Local Road
Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021
Mossgiel Daisy (Brachyscome papillosa) Habitat Mapping
E-3
Drawing No: 0606253m_PREHWF_Bio_G013_R03.mxd
The Plains Renewable Energy Park Wind Farm
Date: 26/09/2022
Drawing Size: A3
Drawn By: MB
Reviewed By: LB
Client: Engie
Coordinate System: GDA 1994 MGA Zone 55
0
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4 km
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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

Slender Darling-pea (*Swainsona murrayana*)

The proposed development in the Project Area is unlikely to lead to a significant impact to the Slender Darling-pea.

The Slender Darling-pea is listed as 'Vulnerable' under the EPBC Act. The Slender Darling-pea is an ascending to erect perennial forb growing to 25 cm high with flowers that are pink or purple and greyish, thin or tapered, stiffly leathery pods (NSW OEH, 2022e). The Slender Darling-pea is found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree (NSW OEH, 2022e).

The species has been recorded in clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. The species grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with *Maireana* species (DEWHA, 2008b). Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated (DEWHA, 2008b). Suitable habitat for the species is present within the Project Areas associated with Plant Community Types 157, 163, 17, 44, 46, 164, 165, 216, 15, 26, and 28. Suitable habitat is presented in **Figure** 7.4**.** The total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 515.69ha, this makes up 0.97% of the total suitable habitat within the Project Area.

Targeted flora transects were undertaken for the Slender Darling-pea in associated PCTs during the Spring 2021 survey effort. As a result, the species was confirmed within the Project Area. Further surveys are required to confirm the species polygon, in the interim habitat for the species is mapped as all areas of aforementioned associated PCTs.

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- 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.

There is no adopted or made recovery plan for the Slender Darling-pea. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, the individuals identified within the Project area are not considered to form part of an 'important population'.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table. It is **unlikely** that the Project will result in a significant impact to the Slender Darling-pea.

Table 7.4 Significant Impact Assessment for Slender Darling-pea

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	There is no adopted or made recovery plan for the Slender Darling-pea. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. Therefore the Project will not lead to a long-term decrease in the size of an important population.	No
reduce the area of occupancy of an important population	There is no adopted or made recovery plan for the Slender Darling-pea. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, individuals identified within the Project area are not considered to form part of an 'important population'. Therefore, the Project will not reduce the area of occupancy of an important population.	No
fragment an existing important population into two or more populations	There is no adopted or made recovery plan for the Slender Darling-pea. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, individuals identified within the Project area are not considered to form part of an 'important population'. Therefore, the Project will not result in fragmenting an existing important population into two or more populations.	No
adversely affect habitat critical to the survival of a species	No critical habitat has been identified for the Slender Darling-pea. The Project area contains 52948.79 Ha of suitable habitat for the species associated with PCTs 157, 163, 17, 44, 46, 164, 165, 216, 15, 26, and 28. The Project would result in the potential disturbance of 515.69 Ha (0.97%). Low to high quality habitat is present across the Project area that will not be disturbed. It is unlikely that the development on 0.97% of the Project area will adversely affect habitat critical to the survival of the Slender Darling-pea.	No
disrupt the breeding cycle of an important population	There is no adopted or made recovery plan for the Slender Darling-pea. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, as larger populations are recorded in surrounding areas. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. Therefore, the Project will not disrupt the breeding cycle of an important population.	No
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project area contains 52948.79 Ha of suitable habitat for the species, associated with PCTs 157, 163, 17, 44, 46, 164, 165, 216, 15, 26, and 28. The Subject Land would result in the disturbance of 515.69 ha (0.97%). This area of disturbance is unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.	No
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable	Some of the main threats identified for the Slender Darling-pea include grazing from rabbits (*Oryctolagus cuniculus*) and weed invasion. With additional potential threats to habitat from Feral Goats (*Capra hircus*) and Feral Pigs (*Sus scrofa*).	No

Criteria	Description	Criteria Triggered?
species' habitat	Project activities during construction and operation will adopt and follow Biosecurity measures that will aim to ensure that invasive species are not introduced or exacerbated in the Project Area.	
introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on Slender Darling-pea populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. However, 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 substantially with the recovery of the species.	There is no recovery plan adopted or made for the species. The Project has the potential to result in the disturbance of 515.69 ha (0.97%) of the suitable habitat across the Project area. This habitat has been historically subject to grazing pressures. It is unlikely that the Project will interfere with the recovery of the species.	No

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

COBB HIGHWAY

JERILDERIE ROAD

GLENCOE ROAD

Legend

- Slender Darling-pea Habitat Area
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Slender Darling-pea (Swainsona murrayana) Habitat Mapping

E-4

Drawing No:	0606253m_PREHWF_Bio_G014_R03.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

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ERM

Chariot Wheels (*Maireana cheelii*)

The proposed development in the Project Area has potential to lead to a significant impact to the Chariot Wheels.

Chariot Wheels are listed as 'Vulnerable' under the EPBC Act and based on field surveys is known to occur within the Project Area. Chariot Wheels are a perennial forb growing to about 20 cm high, with slender striped woolly stems and a fleshy swollen taproot. The fruiting body is whitish, often slightly woolly or cottony above, 5-6 mm in diameter, with five distinctly wheel-like wings (NSW OEHa, 2022a).

Chariot Wheels were once widely distributed across the inland plains of south-eastern Australia, occurring from south-western Queensland through western New South Wales to north-western Victoria. However, conversion of much of its former range to agriculture has resulted in an extensive decline in range and abundance (Mavromihalis, 2010a). The species is now extinct in Queensland and northern NSW, and survives only in southern NSW and Victoria, where there are about 17 populations containing perhaps 700,000 plants (Mavromihalis, 2010a). Most of these populations occur on private land or along roadsides, where they are threatened by continued degradation and destruction of habitat from weed invasion, grazing, cropping, clearing and increasing salinity (Mavromihalis, 2010a).

The Chariot Wheels is usually found 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 heavier grey clay soils that support Bladder *Saltbush Atriplex vesicaria* communities (Mavromihalis, 2010a). The Project area contains suitable habitat in the form of five (5) Plant Community Types, PCTs 157, 44, 46, 164, and 26. This habitat is present in **Figure 7.5.** The total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 356.87 ha, this makes up 0.91% of the total suitable habitat within the Project Area. Flora transects were undertaken targeting the species during the Spring 2021 survey effort, and as a result the species is confirmed to be present within the Project area. Further surveys are required to define species polygons for the species, currently all associated PCTs are considered habitat. There is a known population of the species along the Cobb Highway, between Hay and Deniliquin (Mavromihalis, 2010a). Individuals recorded within the Project area are likely to form part of this broader population.

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 a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- 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.

The Chariot Wheels Recovery Plan (Mavromihalis, 2010a) 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. A known population is present along the Cobb Highway between Deniliquin and Hay. The population size is unknown, however it is stated that the population is likely to include roadside and adjacent private land. The Project area is adjacent to the Cobb Highway between Deniliquin and Hay. For the purpose of this assessment, the individuals identified within the Project area are considered part of an important population.

Most of the identified sites within the Recovery Plan were found to contain small isolated populations within degraded and weedy vegetation, with remaining populations being highly fragmented (Mavromihalis, 2010a). Clearance of habitat, weed invasion, damage from road and utilities installation and maintenance, lack of regeneration, fragmentation and isolation of most remaining stands and disruption of ecological processes necessary for regeneration are the main threats for the species (Mavromihalis, 2010a).

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table. There is potential for a **significant impact** to Chariot Wheels as a result of the Project although this will be further reduced through detailed design and assessment in the EIS.

Table 7.5 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	The records of Chariot Wheels within the Project area are considered to form part of an important population. The Project area contains 39348.60 ha of suitable habitat in the forms of PCTs 157, 44, 46, 164, and 26. Of this area, 356.87 ha is within 20% of the Subject Land where disturbance has potential to occur. This would lead to a long-term reduction of the size of the important population by 356.87 ha.	Yes Assessment and mapping to be refined in the EIS.
reduce the area of occupancy of an important population	The records of Chariot Wheels within the Project area are considered to form part of an important population. The Project area contains 39348.60 ha of suitable habitat in the forms of PCTs 157, 44, 46, 164, and 26. Of this area, 356.87 ha is within the Subject Land where disturbance would occur. This would lead to a reduction of the area of occupancy of the important population by 356.87 ha.	Yes Assessment and mapping to be refined in the EIS.
fragment an existing important population into two or more populations	The records of Chariot Wheels within the Project area are considered to form part of an important population. Chariot Wheels seeds are dispersed by wind or ants in the early summer (VIS DSE 2009). The disturbance to 356.87 ha is unlikely to fragment the individuals recorded into two or more populations.	No
adversely affect habitat critical to the survival of a species	Recovery actions within the recovery plan (Mavromihalis, 2010a) includes mapping of habitat critical to the survival of chariot wheels, however this is yet to be completed. The Project has the potential to result in the disturbance to 356.87 ha within the Subject Land.	No
disrupt the breeding cycle of an important population	The records of Chariot Wheels within the Project area are considered to form part of an important population. . Chariot Wheels seeds are dispersed by wind or ants in the early summer (VIS DSE 2009). The disturbance of 356.87 ha in linear areas is unlikely to disrupt the breeding cycle of the population.	No
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project area contains 39348.60 ha of suitable habitat associated with 157, 44, 46, 164, and 26. 356.87 ha within the Subject Land would be disturbed. This disturbance is unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.	No
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable	Weed invasion is a recognised threat for the species, including exotic species; Oat (*Avena spp*.) and Fescue (*Vulpia spp*). These weeds may hinder seedling establishment and compete with Chariot Wheels for local resources such as nutrients, water and space (VIS DSE 2009).	No

species' habitat	Project activities during construction and operation will adopt and follow Biosecurity measures that will aim to ensure that invasive species are not introduced or exacerbated in the Project Area.	
introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on Chariot wheels populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. However, 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 substantially with the recovery of the species.	The recovery plan for the species (Mavromihalis, 2010a), details seven objectives: 1. Determine distribution, abundance and population structure 2. Determine habitat requirements 3. Ensure that important populations and their habitat are protected and managed. 4. Manage threats to populations 5. Identify key biological functions 6. Determine growth rates and viability of populations 7. Build community support for conservation The Project impacts of 356.87 ha of suitable habitat for the species, however is unlikely to interfere with the recovery of the species.	No

STURT HIGHWAY
ROMANI ROAD
COBB HIGHWAY
COBB HIGHWAY
JERILDERIE ROAD
GLENCOE ROAD

Legend
- Chariot Wheels Habitat Area
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Chariot Wheels (Maireana cheelii) Habitat Mapping

E-5

Drawing No:	0606253m_PREHWF_Bio_G015_R02.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

Corben's Long-eared Bat (*Nyctophilus corbeni*)

The proposed development in the Project Area is unlikely to lead to a significant impact to the Corben's Long-eared Bat.

Corben's Long-eared Bat is listed as 'Vulnerable' under the EPBC Act. This nocturnal insectivorous microbat is uniformly dark grey-brown in colour, with ears about 3 cm long, larger than the head. The species was previously included as a distinct form of the Greater Long-eared Bat (*Nyctophilus timoriensis*) however in 2009 was formally described as a separate species (TSSC, 2015).

The Corben's Long-eared Bat was originally considered to be found across temperate southern Australia, however this is most likely incorrect due to the separation of the taxon into three different species; therefore the historic distribution is unclear (TSSC 2015). The Corben's Long-eared Bat is found in southern central Queensland, central western New South Wales, north-western Victoria and eastern South Australia, where it is patchily distributed, with most of its range in the Murray Darling Basin. Most records are from inland of the Great Dividing Range. The species is uncommon within this distribution and is rarely recorded (TSSC 2015).

The species inhabits a variety of vegetation types, including mallee, bulloke (*Allocasuarina leuhmanni)* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland (NSW OEH 2022b). The Project Area contains suitable habitat for the species in the form of PCTs 17, 21, 26, 70 and 28, this habitat is mapped in **Figure 7.6**. The total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 17.46 ha, this makes up 0.41% of the total suitable habitat within the Project Area. During the Summer 2022 survey effort eight Anabat devices were deployed across the Project area to target microchiopteran bat species. During the survey event, call records of *Nyctophilus sp*. were detected. It is noted that the species from genus *Nyctophilus* cannot be distinguished from each other by call (TSSC 2015). There are three (3) species that are known to occur in the Project area; *N.corbeni, N.geoffroyi* and *N. gouldi*. For the purpose of this assessment, *N. corbeni*, is assumed to be recorded. Further surveys will be undertaken during Spring 2022.

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 a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- 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.

There is no adopted or made Recovery Plan for this species. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, or considered a key source population for breeding or dispersal. As such, the individuals identified within the Project area are not considered to form part of an 'important population'.

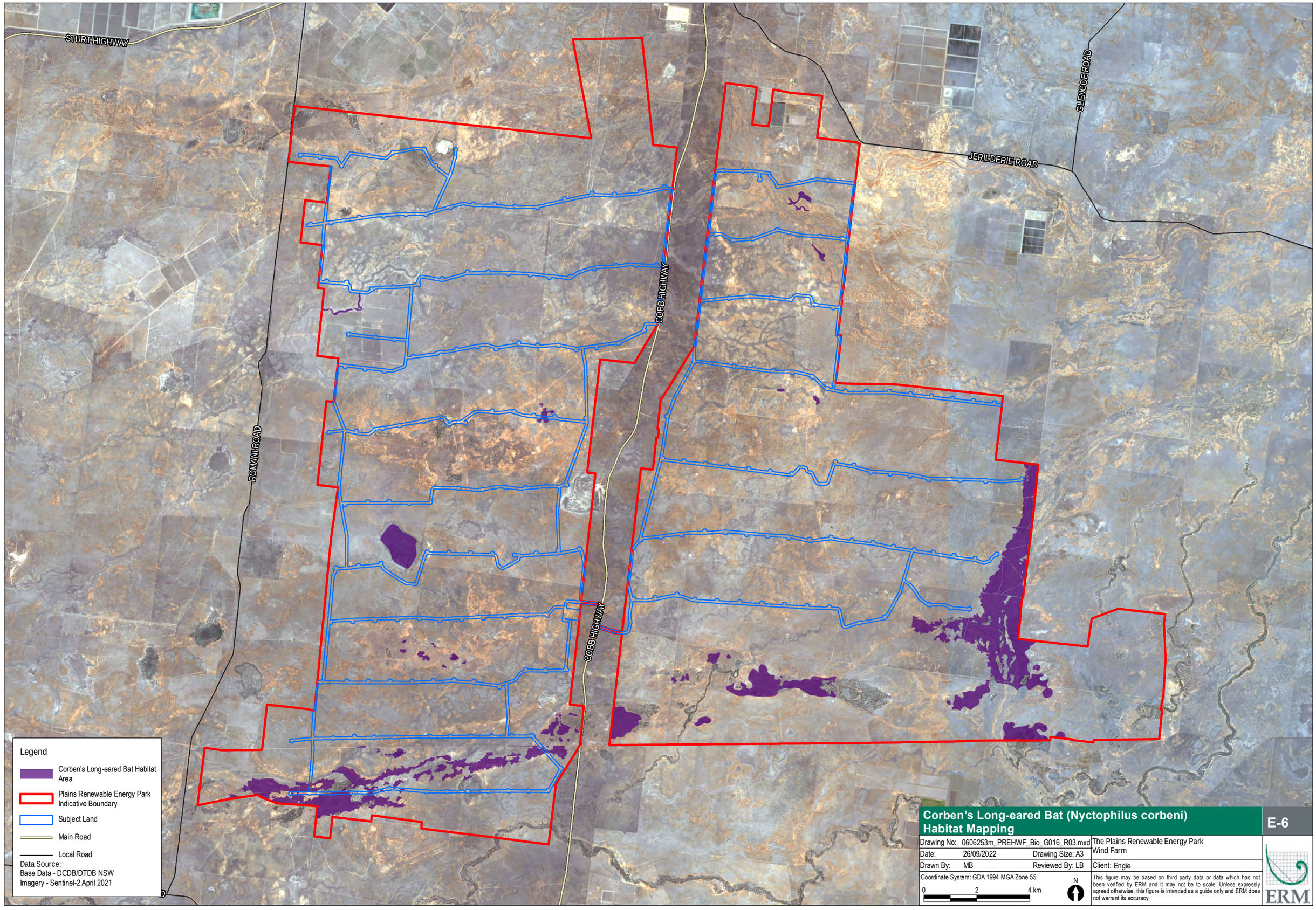
Due to the lack of data available to assess the population decline of the south-eastern long-eared bat, providing a detailed assessment of the current threats to the survival of this species is difficult. However it is likely that area of occupancy is declining due to habitat loss, particularly in New South Wales and Queensland, and to habitat degradation associated with altered fire regimes, timber extraction, mining and other factors. Habitat loss and fragmentation are considered here as known threats, with potential threats discussed following these known threats.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table. It is **unlikely** for a **significant impact** to Corben's Long-eared Bat as a result of the Project.

Table 7.6 Significant Impact Assessment for Corben's Long-eared Bat

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	There is no adopted or made Recovery Plan for this species. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, or considered a key source population for breeding or dispersal. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. The Project will not lead to a long-term decrease in the size of an important population of a species.	No
reduce the area of occupancy of an important population	There is no adopted or made Recovery Plan for this species. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, or considered a key source population for breeding or dispersal. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. The Project will not reduce the area of occupancy of an important population.	No
fragment an existing important population into two or more populations	There is no adopted or made Recovery Plan for this species. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, or considered a key source population for breeding or dispersal. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. The Project will not fragment an existing important population into two or more populations	No
adversely affect habitat critical to the survival of a species	Critical habitat is not defined for the species, however old growth vegetation, inclusive of hollow bearing trees, appear to be a critical habitat component in the Victorian distribution (TSSC 2015). Old Growth vegetation with hollow bearing trees is present within the Subject Land, however not in associated PCTs for the species. It is unlikely the Project will result adversely affecting habitat critical to the survival of a species.	No
disrupt the breeding cycle of an important population	There is no adopted or made Recovery Plan for this species. The Project area is not at the limit of the species range, nor is the population considered necessary for maintaining genetic diversity for the species, or considered a key source population for breeding or dispersal. As such, the individuals identified within the Project area are not considered to form part of an 'important population'. The Project will not disrupt the breeding cycle of an important population.	No
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The area of suitable habitat within the Project area is 4236.48 ha, with 17.46 ha (0.41 %) with potential to be impacted within the Subject Land. This low level of disturbance is unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.	No
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive species are not currently listed as a threat for the species, however, habitat loss leads to increased competition for remaining hollows, with 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.	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 Corben's Long-eared Bat populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. However, 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 substantially with the recovery of the species.	There is no adopted or made Recovery Plan for this species. It is likely that this species' area of occupancy is declining due to habitat loss, and to habitat degradation associated with altered fire regimes, timber extraction, mining and other factors including the loss of hollow availability. The Project is unlikely to interfere substantially with the recovery of the species.	No


STURT HIGHWAY
ROMANI ROAD
COBB HIGHWAY
COBB HIGHWAY
JERILDERIE ROAD
GLENCOE ROAD
Legend
Corben's Long-eared Bat Habitat Area
Plains Renewable Energy Park Indicative Boundary
Subject Land
Main Road
Local Road
Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021
Corben's Long-eared Bat (Nyctophilus corbeni) Habitat Mapping
E-6
Drawing No: 0606253m_PREHWF_Bio_G016_R03.mxd
The Plains Renewable Energy Park Wind Farm
Date: 26/09/2022
Drawing Size: A3
Drawn By: MB
Reviewed By: LB
Client: Engie
Coordinate System: GDA 1994 MGA Zone 55
0
2
4 km
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

Grey Falcon (*Falco hypoleucos*)

The proposed development in the Project Area is unlikely to lead to a significant impact to the Grey Falcon.

The Grey Falcon is listed as 'Vulnerable' under the EPBC Act. The species is considered likely to occur within the Project area based on a Likelihood of Occurrence assessment undertaken, considering records within the locality and presence of habitat. There are two (2) ALA records of the Grey Falcon in the locality with the closest record located approximately 4 km north of the Project area from 2008 (*noting that ALA records are generalised by 10 km).*

The Grey Falcon is an elusive species endemic to mainland Australia and occurs at low densities. It is the rarest of six Australian members of the genus *Falco.* Two members of the Falco genus have been recorded within the Project area during field survey events, the Black Falcon and Brown Falcon. Survey efforts for raptors have been undertaken across three seasonal survey events, with additional surveys to be completed.

The species occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia. The species is mainly found where annual rainfall is less than 500 mm. Hay NSW has an annual mean rainfall of 367 mm (BOM 2015).

The Grey Falcon is associated with all PCTs, with the exception of PCT 159, identified within the Project area, with this habitat mapped in **Figure 7.7**. The total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 559.40 ha. The species frequents timbered lowland plains, particularly *Acacia* shrublands that are crossed by tree-lined water courses (TSSC 2020). The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter (TSSC 2020). The Project area consists of timbered lowland plains, in the form of Black Box, Cypress Pine, Weeping Myall and Rosewood communities, however *Acacia* shrublands are not present. Tussock grasslands in the form of Speargrass and Windmill grass communities are common across the Project area landscape. The Grey Falcon is likely to opportunistically hunt within habitat across the Project area.

Grey Falcon 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*), but they also nest in telecommunication towers. It is unlikely that the species would utilise areas within the Project area for breeding due to a lack of timbered waterways.

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 a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- 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.

There is no adopted or made Recovery Plan for this species. The Grey Falcon has a wide range across mainland Australia, the Project area is not at the limit of the species range. The potential population is not considered necessary for maintaining genetic diversity for the species, nor considered a key source population for breeding or dispersal. As such, the potential population within the Project area is not considered to form part of an 'important population'.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table. It is **unlikely** for there to be a significant impact to Grey Falcon as a result of the Project.

Table 7.7 Significant Impact Assessment for Grey Falcon

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	There is no adopted or made Recovery Plan for this species. The Grey Falcon has a wide range across mainland Australia, the Project area is not at the limit of the species range. The potential population is not considered necessary for maintaining genetic diversity for the species, nor considered a key source population for breeding or dispersal. As such, potential population within the Project area are not considered to form part of an 'important population'. The Project will not lead to a long-term decrease in the size of an important population of a species	No
reduce the area of occupancy of an important population	There is no adopted or made Recovery Plan for this species. The Grey Falcon has a wide range across mainland Australia, the Project area is not at the limit of the species range. The potential population is not considered necessary for maintaining genetic diversity for the species, nor considered a key source population for breeding or dispersal. As such, potential population within the Project area are not considered to form part of an 'important population'. The Project will not reduce the area of occupancy of an important population.	No
fragment an existing important population into two or more populations	There is no adopted or made Recovery Plan for this species. The Grey Falcon has a wide range across mainland Australia, the Project area is not at the limit of the species range. The potential population is not considered necessary for maintaining genetic diversity for the species, nor considered a key source population for breeding or dispersal. As such, potential population within the Project area are not considered to form part of an 'important population'. The Project will not fragment an existing important population into two or more populations.	No
adversely affect habitat critical to the survival of a species	There is no recognised critical habitat for the species. The suitable habitat for the Grey Falcon is associated with all PCTs identified within the Project area, with the exception of PCT 159. 559.40 ha of habitat within the Subject Land has the potential to be disturbed for the Project. No suitable breeding habitat (treed waterways with old raptor nests) will be disturbed. It is unlikely that this low level of disturbance of will adversely affect the habitat critical to the survival of the species.	No
disrupt the breeding cycle of an important population	There is no adopted or made Recovery Plan for this species. The Grey Falcon has a wide range across mainland Australia, the Project area is not at the limit of the species range. The potential population is not considered necessary for maintaining genetic diversity for the species, nor considered a key source population for breeding or dispersal. As such, potential population within the Project area are not considered to form part of an 'important population'. Breeding habitat is not present within the Project area. The Project will not disrupt the breeding cycle of an important population.	No
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The suitable habitat for the Grey Falcon is associated with all PCTs identified within the Project area with the exception of PCT 159. 559.40 ha of habitat within the Subject Land has the potential to be disturbed for the Project. This low level of disturbance top habitat for this wide ranging species is unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.	No
result in invasive species that are harmful to a	Predation by feral cats is recognised as a threat for the species, with studies revealing Grey Falcon present in gut contents of cats	No

Criteria	Description	Criteria Triggered?
vulnerable species becoming established in the vulnerable species' habitat	(TSSC 2020). Feral cats have been observed within the Project area during field surveys undertaken to date. Project activities during construction and operation will adopt and follow Biosecurity measures that will aim to ensure that invasive species are not introduced or exacerbated in the Project Area.	
introduce disease that may cause the species to decline, or	There is currently limited evidence of diseases causing detrimental effects on Grey Falcon populations. There is also no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. However, 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 substantially with the recovery of the species.	A Recovery Plan has not been made or adopted for the Grey Falcon, however the Conservation Advice (TSSC 2020) details conservation actions, including: • Support improved fire and grazing management in areas where Grey Falcons are known to occur. • Protect known nesting trees and include adequate exclusion buffers with regard to proposed developments and land clearing activities. • Support the establishment and survival of replacement nest trees in areas where Grey Falcon in known to breed. • Retain artificial structures with known or potential Grey Falcon nests. • Control invasive cats and camels in areas where Grey Falcons are known to occur, especially in known roosting and nesting areas. In addition to stakeholder engagement, survey and monitoring and information and research priority actions. The Project is unlikely to interfere substantially with these conservation actions, or the recovery of the species.	No

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

JERILDERIE ROAD

GLENCOE ROAD

Legend

- Grey Falcon Habitat Area
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Grey Falcon (Falco hypoleucos) Habitat Mapping

E-7

Drawing No:	0606253m_PREHWF_Bio_G017_R03.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

Growling Grass Frog (*Litoria raniformis*)

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

The Growling Grass Frog is listed as 'Vulnerable' under the EPBC Act and is considered likely to occur within the Project Area. The Project Area occurs within the range for the Growling Grass Frog, which is endemic to south-eastern Australia, including South Australia, Victoria, Tasmania, New South Wales and the Australian Capital Territory. In NSW the species occurs from Bombala in the far south-eastern corner of the state, through the Southern Tablelands, and along the Murrumbidgee and Murray Rivers. It formerly occurred as far north as Bathurst and the Willandra National Park (NSW). Growling Grass Frog population has since been isolated or fragmented, with the most pronounced decline evident in NSW (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.

Habitat critical to the survival of the Southern Bell Frog differs throughout its range. Populations in NSW occur in swamps dominated by River Red Gums (*Eucalyptus camaldulensis)*, Lignum and Typha, and Black Box (*Eucalyptus largiflorens*) / Lignum / Nitre Goosefoot (*Chenopodium nitrariaceum*), and will also occur in irrigated rice crops Clemann & Gillespie 2012. Associated PCTs within the Project area include PCT 11, 13, and 17, along with areas of water pooling surrounding leaking water tanks (creating well established submerged vegetation) the PCTs are mapped in **Figure 7.8**. The total area of habitat within 20% of the Subject Land and subsequently with the potential to be impacted by the Project is 16.75 ha, this makes up 0.65% of the total suitable habitat within the Project Area.

There are multiple BioNet Atlas and ALA records of the species to the south of the Project Area, with the closest being from 2017, 6.9 km from the south east corner. This record is from the Werkenbergal Swamp in Booroorban. Audio visual surveys were undertaken targeting the Growling Grass Frog in accordance with the Survey Guidelines for Australia's Threatened Frogs during the summer 2022 survey effort. No individuals were recorded.

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 a population that is necessary for a species' long-term survival and recovery. DEWHA (2009) define a Growling Grass Frog 'important population' as:

'Any viable population is considered to be 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 waterbodies, such that it has the opportunity to interact with other nearby populations or has the ability to establish new populations when the suitability or availability of waterbodies changes. Interaction with nearby populations and colonisation of newly available waterbodies occurs via the dispersal of individual frogs across suitable habitat. 'In addition, a population of L. raniformis could be considered an important population if it is near the limit of the species' range (for example small isolated populations in South Australia), is well-studied or has a history of monitoring, and hence provides opportunity for greater understanding of the species and its conservation status through the collection of long-term data''.

The Project Area is located approximately 6.9 km south of a known population of the species. There are mapped watercourses and drainage lines within the Project Area, which would allow for connectivity to waterbodies. However, these creek lines were observed to be dried during all survey efforts, despite significant rainfall during the La Nina events during 2021 and 2022. 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. It is **unlikely** the Project will result in a significant impact to Growling Grass Frog.

Table 7.8 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 Project Area is located approximately 6.9 km south of a known population of the species. There are mapped watercourses and drainage lines within the Project Area, which would allow for connectivity to waterbodies. However, these creek lines were observed to be dried during all survey efforts, despite significant rainfall during the La Nina events during 2021 and 2022. It is unlikely that the presumed population of Grass Growling Frogs within the Project Area would be considered an important population of the species. It is unlikely the Project would result in the long-term decrease in size of an important population of the species.	No
reduce the area of occupancy of an important population	The Project Area is located approximately 6.9 km south of a known population of the species. There are mapped watercourses and drainage lines within the Project Area, which would allow for connectivity to waterbodies. However, these creek lines were observed to be dried during all survey efforts, despite significant rainfall during the La Nina events during 2021 and 2022. It is unlikely that the presumed population of Grass Growling Frogs within the Project Area would be considered an important population of the species. The Project is unlikely to result in the reduction of the area of occupancy of an important population.	No
fragment an existing important population into two or more populations	The Project Area is located approximately 6.9 km south of a known population of the species. There are mapped watercourses and drainage lines within the Project Area, which would allow for connectivity to waterbodies. However, these creek lines were observed to be dried during all survey efforts, despite significant rainfall during the La Nina events during 2021 and 2022. It is unlikely that the presumed population of Grass Growling Frogs within the Project Area would be considered an important population of the species. The Project is unlikely to fragment an existing important population into two or more populations.	No
adversely affect habitat critical to the survival of a species	The potential habitat present within the Project Area has poor connectivity, particularly to know populations of the species. This limited habitat is not considered critical to the survival of the species, and therefore the Project will not adversely affect habitat critical to the survival of a species.	No
disrupt the breeding cycle of an important population	The Project Area is located approximately 6.9 km south of a known population of the species. There are mapped watercourses and drainage lines within the Project Area, which would allow for connectivity to waterbodies. However, these creek lines were observed to be dried during all survey efforts, despite significant rainfall during the La Nina events during 2021 and 2022. It is unlikely that the presumed population of Grass Growling Frogs within the Project Area would be considered an important population of the species. The Project is unlikely to disrupt the breeding cycle of an important population.	No
modify, destroy, remove or isolate or decrease the availability or quality of	The suitable habitat within the Project Area is limited to PCTs 11, 13, and 17 and areas of leaking water tanks surrounded by submerged vegetation. The PCTs cover 2582.57 ha, with only 16.75 ha with potential to be disturbed within the Subject Land.The Project is unlikely to disrupt the breeding cycle of an important	No

Criteria	Description	Criteria Triggered?
habitat to the extent that the species is likely to decline	population modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable 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; White and Pyke 1996; Pyke and White 2001, and references therein). However, the implicated impact of Eastern Gambusia on the Growling Grass Frog 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 recently 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 substantially 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 site, will not interfere with the objectives of the recovery plan for this species.	No

STURT HIGHWAY

STURT HIGHWAY

ROMANI ROAD

COBB HIGHWAY

COBB HIGHWAY

JERILDERIE ROAD

GLENCOE ROAD

Legend

- Growling Grass Frog Habitat Area
- Plains Renewable Energy Park Indicative Boundary
- Subject Land
- Main Road
- Local Road

Data Source:
Base Data - DCDB/DTDB NSW
Imagery - Sentinel-2 April 2021

Growling Grass Frog (Litoria raniformis) Habitat Mapping

E-8

Drawing No:	0606253m_PREHWF_Bio_G018_R02.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

Weeping Myall Woodlands TEC

The proposed development in the Project Area is unlikely to lead to a significant impact to the Weeping Myall Woodlands TEC.

The Weeping Myall Woodland TEC is listed as '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, which occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Brigalow Belt North, Murray-Darling Depression, Nandewar and Cobar Peneplain IBRA Bioregions (DEWHA 2008c).

The central Riverina district historically supported extensive stands of Weeping Myall Woodlands. It is clear that woody vegetation has declined significantly across the plains, particularly in the eastern Riverina (TSCC 2009). The Weeping Myall Woodlands have declined from an original extent of between 1 900 000 ha and 3 300 000 ha to a current extent of between 190 000 ha and 330 000 ha. This represents a considerable decline of extent within the range 83% to 94% (TSSC 2009). The ecological community currently occurs in small pockets throughout its range (DEWHA 2008c).

The Weeping Myall Woodlands TEC was confirmed within the Project Area in association with PCT 26 and covers a Patch of 15.67 ha, this community has been avoided during the design process, with none of the TEC mapped within the Subject Land as presented in **Figure 7.9**.

The confirmed TEC meets diagnostic features including the following:

- Tree canopy is dominated by >50% of living Weeping Myall;
- The overstory has >5% tree canopy cover;
- The area is >0.5 ha in size; and
- The tallest layer of living Weeping Myall in the patch reaches >4m tall, and vegetation cover present in BAM plot is comprised of 100% native species.

The tree canopy of the Patch is dominated by Weeping Myall (*Acacia pendula*), containing additional descriptive mid stratum and ground stratum species; *Rhagodia spinescens, Calotis scabiosifolia, Einadia nutans, Enteropogon acicularis* and *Maireana aphylla.* The ecological community occurs on black, brown, red-brown or grey clay or clay loam soils, of which grey, brown and red clays are present within the Project area.

A significant impact assessment based on guidance provided in the SIG 1.1, is presented the following table. It is **unlikely** for there to be a significant impact to Weeping Myall Woodlands as a result of the Project.

Table 7.9 Significant Impact Assessment for Weeping Myall Woodlands

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	A Patch of the Weeping Myall Woodlands TEC was confirmed within the Project Area in association with PCT 26 and covers an area of 15.67 ha. This community has been avoided during the design process, with none of the TEC mapped within the Subject Land. The Project will not result in the reduction of the extent of the TEC.	No
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	A Patch of the Weeping Myall Woodlands TEC was confirmed within the Project Area in association with PCT 26 and covers an area of 15.67 ha. This community has been avoided during the design process, with none of the TEC mapped within the Subject Land. It is unlikely that the Project will fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	No
Adversely affect habitat critical to the survival of an ecological community	A Patch of the Weeping Myall Woodlands TEC was confirmed within the Project Area in association with PCT 26 and covers an area of 15.67 ha. This community has been avoided during the design process, with none of the TEC mapped within the Subject Land. It is unlikely that the Project will adversely affect habitat critical to the survival of an ecological community	
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.	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	A Patch of the Weeping Myall Woodlands TEC was confirmed within the Project Area in association with PCT 26 and covers an area of 15.67 ha. This community has been avoided during the design process, with none of the TEC mapped within the Subject Land. The proposed developed is unlikely to cause substantial change in the species composition of the TEC.	No
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: ■ assisting invasive species, that are harmful to the listed	A Patch of the Weeping Myall Woodlands TEC was confirmed within the Project Area in association with PCT 26 and covers an area of 15.67 ha. This community has been avoided during the design process, with none of the TEC mapped within the Subject Land. Biosecurity measures will be implemented to reduce the introduction and establishment of invasive species. These 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.	No

Criteria	Description	Criteria Triggered?
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, or		
Interfere with the recovery of an ecological community	A recovery plan for the TEC has not been developed. The TEC has been avoided during the design process, with none of the TEC mapped within the Subject Land. It is unlikely that the Project will interfere with the recovery of an ecological community.	No

Weeping Myall Woodlands TEC Mapping

E-9

Drawing No:	0606253m_PREHWF_Bio_G019_R02.mxd		The Plains Renewable Energy Park Wind Farm
Date:	26/09/2022	Drawing Size: A3	
Drawn By:	MB	Reviewed By: LB	Client: Engie

Coordinate System: GDA 1994 MGA Zone 55

0 2 4 km

N

ERM

APPENDIX F HOLLOW BEARING TREES

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
1	290274	6163517	60	5H15W	-	-	-	-	-	-	-	-
2	290226.8	6163575	80	8H20W	4H10W	5H10W	5H15W	-	-	-	-	-
3	290216.3	6163576	100+	9H10W	10H15W	10H10W	-	-	-	-	-	-
4	290200	6163611	70	6H10W	5H12W	8H10W	7H15W	-	-	-	-	-
5	290208.3	6163611	60	7H15W	-	-	-	-	-	-	-	-
6	290203.3	6163636	100	7H10W	9H10W	6H10W	-	-	-	-	-	-
7	290175.5	6163628	80	6H15W	7H12W	-	-	-	-	-	-	-
8	290159.4	6163658	90	9H10W	-	-	-	-	-	-	-	-
9	291057.1	6164128	80	4H10W	7H12W	-	-	-	-	-	-	-
10	291038.7	6164106	90	7H10W	-	-	-	-	-	-	-	-
11	291051.1	6164083	80	8H10W	-	-	-	-	-	-	-	-
12	291017.6	6164053	80	7H10W	-	-	-	-	-	-	-	-
13	291077.1	6163983	70	6H15W	-	-	-	-	-	-	-	-
14	291090.7	6163970	70	5H 12W	-	-	-	-	-	-	-	-
15	291082.7	6163995	70	5H10W	6H10W	4H10W	-	-	-	-	-	-
16	291068.2	6164006	70	9H12W	8H10W	-	-	-	-	-	-	-
17	291077.9	6163968	60	6H10W	-	-	-	-	-	-	-	-
18	291049.8	6164028	60	6H10W	-	-	-	-	-	-	-	-
19	290664.2	6153902	70	6H10W	6H10W	7H10W	4H10W	-	-	-	-	-
20	290671.7	6153889	50	8H10W	-	-	-	-	-	-	-	-
21	290686.4	6153885	25	6H10W	-	-	-	-	-	-	-	-
22	290687.8	6153880	60	5H15W	6H10W	-	-	-	-	-	-	-
23	290701.3	6153855	70	6H10W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
24	290721.7	6153829	70	5H10W	-	-	-	-	-	-	-	-
25	290725.1	6153820	50	7H10W	6H10W	6H10W	-	-	-	-	-	-
26	290757	6153783	30	4H10W	4H10W	-	-	-	-	-	-	-
27	290757.1	6153761	50	5H10W	4H10W	-	-	-	-	-	-	-
28	290756.7	6153756	70	6H10W	6H10W	6H10W	6H10W	-	-	-	-	-
29	290765.1	6153687	100	6H15W	6H12W	-	-	-	-	-	-	-
30	290843.3	6153777	30	6H10W	6H10W	7H10W	-	-	-	-	-	-
31	290756.5	6153901	50	8H10W	4H10W	6H10W	-	-	-	-	-	-
32	291598.6	6153738	30	6H15W	6H12W	-	-	-	-	-	-	-
33	291602.6	6153738	25	4H10W	-	-	-	-	-	-	-	-
34	290328.1	6151118	80	9H15W	4H10W	4H15W	5H10W	-	-	-	-	-
35	290332.2	6151169	60	7H10W	4H10W	4H10W	-	-	-	-	-	-
36	290338.9	6151214	60	5H15W	6H16W	5H15W	6H20W	-	-	-	-	-
37	290350	6151218	50	4H10W	-	-	-	-	-	-	-	-
38	290340.6	6151227	100	4H10W	6H10W	6H10W	7H20W	6H12W	5H15W	5H10W		
39	290294.6	6151233	80	5H15W	4H10W	-	-	-	-	-	-	-
40	295580.5	6142812	35	6H10W	3H10W	4H12W	-	-	-	-	-	-
41	295575.5	6142835	30	4H10W	5H15W	5H10W	6H10W	-	-	-	-	-
42	295569.8	6142846	30	5H12W	-	-	-	-	-	-	-	-
43	295560.9	6142851	40	4H12W	4H10W	4H10W	-	-	-	-	-	-
44	295566.8	6142859	40	5H12W	6H10W	6H10W	-	-	-	-	-	-
45	295547.5	6142868	30	3H10W	-	-	-	-	-	-	-	-
46	295562.9	6142883	40	4H10W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
47	295556.6	6142890	30	5H12W	4H10W	4H12W	-	-	-	-	-	-
48	295543	6142898	40	7H15W	6H10W	-	-	-	-	-	-	-
49	295573.3	6142892	50	3H10W	-	-	-	-	-	-	-	-
50	295597.3	6142857	40	4H20W	5H10W	-	-	-	-	-	-	-
51	295646.7	6142780	50	3H20W	4H10W	-	-	-	-	-	-	-
52	295616.5	6142818	60	5H10W	5H10W	-	-	-	-	-	-	-
53	295455.3	6141950	30	8H12W	6H10W	7H10W	-	-	-	-	-	-
54	295468.5	6141921	80	5H10W	5H15W	-	-	-	-	-	-	-
55	295480.7	6141916	90	7H12W	6H15W	4H20W	-	-	-	-	-	-
56	295489.1	6141902	40	5H10W	-	-	-	-	-	-	-	-
57	290278.7	6163628	40	4H10W	-	-	-	-	-	-	-	-
58	290280.9	6163622	100	7H15W	6H20W	6H15W	-	-	-	-	-	-
59	290258.3	6163688	70	5H25W	5H20W	-	-	-	-	-	-	-
60	290251.8	6163698	50	6H10W	-	-	-	-	-	-	-	-
61	290239.1	6163685	70	6H15W	10H10W	-	-	-	-	-	-	-
62	290224.2	6163661	60	7H10W	4H20W	5H20W	6H10W	-	-	-	-	-
63	291154.5	6164096	60	6H10W	-	-	-	-	-	-	-	-
64	291132.2	6164067	110	6H15W	-	-	-	-	-	-	-	-
65	291125.6	6164031	50	5H10W	-	-	-	-	-	-	-	-
66	291090.6	6163966	60	5H20W	-	-	-	-	-	-	-	-
67	291070.8	6164021	110	6H15W	-	-	-	-	-	-	-	-
68	290547.8	6153892	40	4H10W	-	-	-	-	-	-	-	-
69	290552.7	6153872	40	4H10W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
70	290569	6153899	60	6H10W	-	-	-	-	-	-	-	-
71	290569.4	6153901	50	7H10W	-	-	-	-	-	-	-	-
72	290601.4	6153897	70	5H10W	-	-	-	-	-	-	-	-
73	291149.4	6153707	50	5H15W	-	-	-	-	-	-	-	-
74	290393.2	6151172	60	7H10W	-	-	-	-	-	-	-	-
75	290405	6151202	70	4H30W	-	-	-	-	-	-	-	-
76	290347	6151331	60	5H15W	-	-	-	-	-	-	-	-
77	295600.2	6142933	90	7H10W	7H10W	7H15W	8H10W	8H20W	-	-	-	-
78	295620.3	6142973	50	6H10W	-	-	-	-	-	-	-	-
79	295631.4	6142884	70	5H10W	-	-	-	-	-	-	-	-
80	295640.5	6142899	40	5H10W	-	-	-	-	-	-	-	-
81	295650.8	6142882	60	6H15W	-	-	-	-	-	-	-	-
82	295646.7	6142858	50	5H15W	5H15W	-	-	-	-	-	-	-
83	295645.9	6142850	70	6H12W	-	-	-	-	-	-	-	-
84	295495.6	6141877	70	6H10W	-	-	-	-	-	-	-	-
85	295491.3	6141851	50	6H10W	-	-	-	-	-	-	-	-
86	295488.1	6141870	70	5H15W	-	-	-	-	-	-	-	-
87	295484.3	6141884	90	5H15W	-	-	-	-	-	-	-	-
88	295475.2	6141883	70	9H15W	-	-	-	-	-	-	-	-
89	295474.1	6141893	70	5H15W	-	-	-	-	-	-	-	-
90	297341.6	6143189	100	5H15W	6H7W	6H20W	6H7W	6H5W	8H10W	8H5W	4H12W	4H5W
91	297368.2	6143181	35	4H10W	4H6W	4H15W	4H12W	-	-	-	-	-
92	297375.8	6143188	60	5H15W	4H5W	4H12W	4H15W	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
93	297387	6143154	50	8H7W	6H15W	-	-	-	-	-	-	-
94	297370.2	6143137	45	7H10W	6H10W	6H5W	6H5W	4H7W	-	-	-	-
95	297330	6143160	70	5H6W	5H10W	5H10W	-	-	-	-	-	-
96	297318.2	6143136	50	4H6W	5H5W	5H10W	5H10W	6H12W	-	-	-	-
97	297311.1	6143119	40	4H5W	-	-	-	-	-	-	-	-
98	297306.2	6143108	40	4H15W	-	-	-	-	-	-	-	-
99	297300.3	6143111	30	4H10W	4H10W	-	-	-	-	-	-	-
100	297333.2	6143094	45	4H5W	-	-	-	-	-	-	-	-
101	297336.6	6143073	60	4H6W	4H10W	-	-	-	-	-	-	-
102	300772.1	6144436	40	4H6W	-	-	-	-	-	-	-	-
103	300770	6144427	80	5H7W	6H15W	6H10W	8H15W	7H18W	7H15W	-	-	-
104	300826.2	6144529	40	4H12W	5H7W	4H12W	-	-	-	-	-	-
105	300727.2	6144191	40	5H5W	-	-	-	-	-	-	-	-
106	300726.1	6144184	40	4H10W	4H10W	5H5W	4H10W	5H12W	-	-	-	-
107	300739.8	6144163	60	4H5W	6H6W	-	-	-	-	-	-	-
108	300751.8	6144169	60	4H5W	4H10W	5H10W	7H5W	-	-	-	-	-
109	300757.4	6144156	30	4H10W	4H5W	-	-	-	-	-	-	-
110	300760	6144156	30	5H10W	-	-	-	-	-	-	-	-
111	300769.4	6144145	20	4H5W	-	-	-	-	-	-	-	-
112	300778.8	6144132	70	8H10W	5H12W	5H15W	7H15W	7H10W	7H5W	-	-	-
113	300770.1	6144129	45	4H13W	6H15W	-	-	-	-	-	-	-
114	300791.7	6144141	60	5H10W	4H5W	-	-	-	-	-	-	-
115	300817.4	6144126	40	6H12W	4H5W	5H15W	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
116	300813.4	6144146	40	4H5W	5H5W	5H10W	5H10W	5H10W	4H5W	-	-	-
117	300796.6	6144120	60	7H5W	7H5W	5H10W	7 H10W	-	-	-	-	-
118	300777.4	6144133	60	7H12W	7H10W	7H15W	8H10W	8H5W	8H10W	6H7W	-	-
119	300771.3	6144130	40	4H10W	6H12W	-	-	-	-	-	-	-
120	300763.6	6144129	35	4H10W	4H8W	4H10W	-	-	-	-	-	-
121	299678.6	6141940	40	5H13W	4H5W	-	-	-	-	-	-	-
122	299673.9	6141940	50	6H5W	-	-	-	-	-	-	-	-
123	299664	6141953	45	5H12W	5H10W	-	-	-	-	-	-	-
124	299672.6	6141925	35	4H10W	5H10W	5H5W	4H5W	-	-	-	-	-
125	299660.9	6141910	50	6H10W	7H10W	6H5W	5H10W	-	-	-	-	-
126	299646.8	6141907	50	6H12W	7H5W	-	-	-	-	-	-	-
127	299636.7	6141907	30	6H5W	6H10W	6H5W	-	-	-	-	-	-
128	299646.3	6141899	30	7H15W	6H10W	5H10W	-	-	-	-	-	-
129	299645.4	6141893	25	4H13W	-	-	-	-	-	-	-	-
130	299639	6141891	30	4H7W	5H10W	-	-	-	-	-	-	-
131	299630.5	6141870	60	5H5W	6H10W	5H5W	-	-	-	-	-	-
132	299627.7	6141875	40	6H15W	6H10W	7H5W	5H5W	-	-	-	-	-
133	299625.6	6141875	40	4H5W	4H5W	6H10W	-	-	-	-	-	-
134	299610.2	6141858	40	5H13W	5H5W	5H10W	6H7W	-	-	-	-	-
135	299604.2	6141848	40	5H15W	40DBH	5H15W	7H5W	-	-	-	-	-
136	299634.1	6141849	80	7H15W	7H10W	4H8W	-	-	-	-	-	-
137	299600.9	6141854	20	5H5W	6H5W	6H5W	-	-	-	-	-	-
138	299554.1	6141851	50	4H7W	4H5W	5H8W	5H10W	5H5W	4H5W	8H5W	7H5W	

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
139	299573.4	6141878	20	4H5W	-	-	-	-	-	-	-	-
140	301633.6	6143999	50	4H5W	5H5W	-	-	-	-	-	-	-
141	301601.9	6144029	50	6H15W	6H20W	5H18W	6H13W	7H5W	6H5W	-	-	-
142	301601.9	6144022	30	4H10W	5H15W	7H10W	-	-	-	-	-	-
143	301603.3	6144012	35	5H5W	6H5W	6H5W	-	-	-	-	-	-
144	301615.1	6144007	70	5H12W	-	-	-	-	-	-	-	-
145	301603.3	6143988	50	5H10W	4H5W	5H5W	-	-	-	-	-	-
146	301594.1	6143982	30	6H5W	6H10W	7H10W	-	-	-	-	-	-
147	301588.7	6143959	30	5H5W	5H10W	4H5W	-	-	-	-	-	-
148	301588.2	6143952	40	7H5W	-	-	-	-	-	-	-	-
149	301548	6143953	40	4H5W	4H10W	5H5W	6H5W	5H10W	-	-	-	-
150	301564.5	6143966	40	5H10W	6H5W	6H15W	7H10W	5H10W	-	-	-	-
151	301569.8	6143984	45	6H18W	5H5W	-	-	-	-	-	-	-
152	301575.3	6144004	100	5H5W	5H5W	6H10W	7H6W	-	-	-	-	-
153	299428.1	6144112	50	4H15W	5H5W	5H5W	7H10W	-	-	-	-	-
154	299448.2	6144101	40	5H10W	6H10W	4H10W	5H15W	-	-	-	-	-
155	299447.2	6144081	35	4H12W	6H8W	4H5W	-	-	-	-	-	-
156	299458.7	6144078	50	5H5W	5H8W	-	-	-	-	-	-	-
157	299468.3	6144093	25	5H13W	5H5W	-	-	-	-	-	-	-
158	299458.2	6144095	25	4H10W	-	-	-	-	-	-	-	-
159	299457.2	6144106	30	5H10W	4H5W	-	-	-	-	-	-	-
160	299456.5	6144119	15	6H8W	-	-	-	-	-	-	-	-
161	299464.5	6144106	20	4H8W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
162	299482.6	6144111	40	6H10W	5H5W	7H5W	6H10W	-	-	-	-	-
163	299486.9	6144121	30	5H10W	6H5W	-	-	-	-	-	-	-
164	299497.9	6144111	25	4H15W	5H8W	-	-	-	-	-	-	-
165	299497.9	6144111	30	4H10W	-	-	-	-	-	-	-	-
166	299498.9	6144097	35	5H7W	4H5W	-	-	-	-	-	-	-
167	299505.4	6144096	35	5H5W	4H5W	-	-	-	-	-	-	-
168	299507.9	6144084	30	6H5W	6H15W	7H15W	-	-	-	-	-	-
169	299509.7	6144105	30	4H5W	5H5W	-	-	-	-	-	-	-
170	299515.3	6144113	20	4H10W	-	-	-	-	-	-	-	-
171	299520.2	6144107	40	4H8W	4H5W	4H12W	-	-	-	-	-	-
172	299518.8	6144104	40	5H20W	5H10W	-	-	-	-	-	-	-
173	299529.6	6144108	35	4H10W	4H6W	4H5W	5H10W	-	-	-	-	-
174	299533.7	6144124	30	4H5W	-	-	-	-	-	-	-	-
175	299541.7	6144118	20	6H8W	-	-	-	-	-	-	-	-
176	299547	6144120	40	4H10W	-	-	-	-	-	-	-	-
177	299555.4	6144129	30	6H5W	-	-	-	-	-	-	-	-
178	299558.1	6144114	50	4H20W	6H10W	-	-	-	-	-	-	-
179	299561	6144117	50	6H10W	6H5W	5H5W	-	-	-	-	-	-
180	299568.6	6144124	15	4H10W	-	-	-	-	-	-	-	-
181	299574.4	6144116	50	5H6W	-	-	-	-	-	-	-	-
182	297305.9	6142991	80	7H10W	6H8W	6H15W	-	-	-	-	-	-
183	297302.5	6143001	70	6H5W	5H10W	-	-	-	-	-	-	-
184	297292.4	6143018	70	5H10W	5H10W	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
185	297284.2	6143019	90	5H15W	5H10W	7H20W	-	-	-	-	-	-
186	297283.2	6143012	90	5H18W	-	-	-	-	-	-	-	-
187	297299	6143029	60	8H10W	-	-	-	-	-	-	-	-
188	297325.6	6143037	60	6H5W	-	-	-	-	-	-	-	-
189	297325.1	6143023	60	5H10W	-	-	-	-	-	-	-	-
190	297336.1	6143008	70	6H5W	5H5W	6H15W	5H10W	-	-	-	-	-
191	297351.5	6143031	70	7H5W	-	-	-	-	-	-	-	-
192	297353.8	6143022	70	6H15W	6H10W	-	-	-	-	-	-	-
193	297380.3	6143025	110	6H10W	7H5W	5H15W1	7H20W	-	-	-	-	-
194	297388.3	6143027	100	5H5W	-	-	-	-	-	-	-	-
195	297373.5	6143056	80	6H10W	-	-	-	-	-	-	-	-
196	297394.9	6143056	80	8H10W	-	-	-	-	-	-	-	-
197	297370.1	6143069	50	5H10W	-	-	-	-	-	-	-	-
198	297360.7	6143077	60	5H5W	-	-	-	-	-	-	-	-
199	297304.9	6143063	60	8H5W	66H15W	8H5W	-	-	-	-	-	-
200	300812.3	6144555	80	6H5W	6H15W	9H15W	-	-	-	-	-	-
201	300852.9	6144578	90	5H15W	-	-	-	-	-	-	-	-
202	300852.4	6144555	80	5H15W	-	-	-	-	-	-	-	-
203	300789.8	6144064	60	6H10W	5H10W	-	-	-	-	-	-	-
204	300789.5	6144075	50	6H10W	-	-	-	-	-	-	-	-
205	300776.8	6144075	70	5H10W	5H15W	-	-	-	-	-	-	-
206	300772.2	6144078	60	6H10W	6H15W	-	-	-	-	-	-	-
207	300767.3	6144060	60	5H15W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
208	300759.6	6144056	60	5H10W	-	-	-	-	-	-	-	-
209	300749.6	6144059	50	7H15W	5H5W	-	-	-	-	-	-	-
210	300730.4	6144058	40	5H10W	-	-	-	-	-	-	-	-
211	300736.6	6144068	70	8H5W	6H15W	-	-	-	-	-	-	-
212	300737.3	6144072	50	7H10W	-	-	-	-	-	-	-	-
213	300689.6	6144071	40	5H15W	-	-	-	-	-	-	-	-
214	300745.2	6144084	70	6H10W	5H10W	-	-	-	-	-	-	-
215	300738.5	6144083	40	5H5W	-	-	-	-	-	-	-	-
216	300772.3	6144096	60	5H15W	-	-	-	-	-	-	-	-
217	300781.6	6144089	40	5H5W	-	-	-	-	-	-	-	-
218	300786.3	6144107	70	6H15W	-	-	-	-	-	-	-	-
219	300774.5	6144110	50	5H5W	-	-	-	-	-	-	-	-
220	300757.9	6144105	60	5H10W	-	-	-	-	-	-	-	-
221	300747	6144107	40	6H10W	-	-	-	-	-	-	-	-
222	300743.8	6144110	50	7H10W	7H10W	-	-	-	-	-	-	-
223	300759.4	6144129	60	5H10W	-	-	-	-	-	-	-	-
224	300753.4	6144135	40	6H10W	-	-	-	-	-	-	-	-
225	299631.1	6141953	80	5H5W	5H10W	5H10W	-	-	-	-	-	-
226	299649.5	6141938	50	5H10W	-	-	-	-	-	-	-	-
227	299627.6	6141940	50	6H15W	-	-	-	-	-	-	-	-
228	299618.8	6141944	50	6H5W	-	-	-	-	-	-	-	-
229	299617.3	6141936	40	5H5W	-	-	-	-	-	-	-	-
230	299611.5	6141917	40	5H10W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
231	299609.7	6141909	30	6H5W	5H10W	5H5W	-	-	-	-	-	-
232	299612.2	6141898	30	5H10W	-	-	-	-	-	-	-	-
233	299605.3	6141902	40	5H20W	-	-	-	-	-	-	-	-
234	299602.7	6141895	30	5H10W	-	-	-	-	-	-	-	-
235	299602.7	6141892	40	7H10W	-	-	-	-	-	-	-	-
236	299603	6141887	50	5H10W	-	-	-	-	-	-	-	-
237	299597	6141897	30	5H10W	-	-	-	-	-	-	-	-
238	299588.3	6141894	20	6H5W	-	-	-	-	-	-	-	-
239	299579.7	6141902	40	5H10W	6H5W	-	-	-	-	-	-	-
240	299572.8	6141906	60	6H10W	-	-	-	-	-	-	-	-
241	299549.8	6141905	50	7H5W	5H10W	7H5W	5H15W	-	-	-	-	-
242	299566.7	6141900	50	5H5W	-	-	-	-	-	-	-	-
243	299572.5	6141898	40	6H5W	6H10W	-	-	-	-	-	-	-
244	299573.5	6141892	30	5H5W	-	-	-	-	-	-	-	-
245	299586.4	6141890	20	5H10W	-	-	-	-	-	-	-	-
246	299591.3	6141886	30	5H10W	7H10W	-	-	-	-	-	-	-
247	299591.9	6141883	40	6H15W	-	-	-	-	-	-	-	-
248	299601	6141875	40	6H10W	-	-	-	-	-	-	-	-
249	299594.4	6141865	40	5H5W	-	-	-	-	-	-	-	-
250	299581.4	6141868	60	5H10W	-	-	-	-	-	-	-	-
251	299581.2	6141868	60	5H5W	-	-	-	-	-	-	-	-
252	299583.4	6141873	60	5H10W	-	-	-	-	-	-	-	-
253	301502.4	6143978	100	5H10W	5H20W	6H10W	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
254	301514.5	6143992	40	5H10W	-	-	-	-	-	-	-	-
255	301525.5	6144014	80	8H5W	-	-	-	-	-	-	-	-
256	301520.2	6144023	80	5H5W	-	-	-	-	-	-	-	-
257	301500.3	6144036	80	7H10W	7H10W8	-	-	-	-	-	-	-
258	301509.2	6144039	80	7H10W	-	-	-	-	-	-	-	-
259	301512.4	6144032	80	7H10W	9H15W8	-	-	-	-	-	-	-
260	301489.6	6144021	80	6H10W	-	-	-	-	-	-	-	-
261	301493	6144006	100	6H10W	9H10W	8H10W	-	-	-	-	-	-
262	301562.9	6144030	80	10H10W	-	-	-	-	-	-	-	-
263	299721.9	6144259	90	8H5W	7H10W	7H10W	6H5W	9H5W	-	-	-	-
264	299716.2	6144244	100	5H5W	-	-	-	-	-	-	-	-
265	299704.7	6144235	50	5H10W	8H10W	6H10W5	-	-	-	-	-	-
266	299703.5	6144219	80	5H15W	-	-	-	-	-	-	-	-
267	299702.7	6144211	80	9H10W	-	-	-	-	-	-	-	-
268	299695.9	6144207	80	6H10W	-	-	-	-	-	-	-	-
269	299699.6	6144194	60	7H10W	-	-	-	-	-	-	-	-
270	299685.5	6144194	40	5H5W	-	-	-	-	-	-	-	-
271	299689.3	6144181	60	8H10W	-	-	-	-	-	-	-	-
272	299680.3	6144170	40	6H10W	-	-	-	-	-	-	-	-
273	299675.3	6144159	50	6H10W	-	-	-	-	-	-	-	-
274	299690.5	6144144	50	5H10W	-	-	-	-	-	-	-	-
275	299668.2	6144151	70	7H5W	-	-	-	-	-	-	-	-
276	299661.4	6144129	60	5H20W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
277	299655.2	6144118	110	5H15W	-	-	-	-	-	-	-	-
278	299644.9	6144117	30	6H5W	-	-	-	-	-	-	-	-
279	299648.9	6144113	50	7H5W	5H10W	-	-	-	-	-	-	-
280	299622.7	6144119	60	6H10W	-	-	-	-	-	-	-	-
281	299631.3	6144123	60	5H10W	-	-	-	-	-	-	-	-
282	299636.1	6144120	50	5H10W	-	-	-	-	-	-	-	-
283	299635.1	6144142	30	5H10W	-	-	-	-	-	-	-	-
284	299631.8	6144144	40	5H10W	-	-	-	-	-	-	-	-
285	299626.5	6144147	30	5H10W	-	-	-	-	-	-	-	-
286	299622.2	6144142	30	5H10W	-	-	-	-	-	-	-	-
287	299613.2	6144132	70	6H10W	-	-	-	-	-	-	-	-
288	299626.6	6144128	70	5H10W	5H10W	7H5W	-	-	-	-	-	-
289	299619.3	6144123	60	9H10W	7H15W	-	-	-	-	-	-	-
290	299607.9	6144135	30	5H10W	-	-	-	-	-	-	-	-
291	299597.9	6144136	40	6H5W	-	-	-	-	-	-	-	-
292	299594.7	6144137	50	8H10W	-	-	-	-	-	-	-	-
293	299592.2	6144131	40	5H10W	-	-	-	-	-	-	-	-
294	299599.8	6144129	80	7H10W	-	-	-	-	-	-	-	-
295	299609.8	6144117	50	5H15W	8H10W	-	-	-	-	-	-	-
296	299608.4	6144122	40	5H10W	-	-	-	-	-	-	-	-
297	299600.2	6144123	80	7H10W	-	-	-	-	-	-	-	-
298	299600.2	6144122	70	5H10W	-	-	-	-	-	-	-	-
299	299583.6	6144118	50	8H10W	-	-	-	-	-	-	-	-

Hollow Bearing Tree	Easting	Northing	Diameter at Breast Height (cm)	Hollow 1 H = Hollow Height (m) D = Hollow Diameter (cm)	Hollow 2	Hollow 3	Hollow 4	Hollow 5	Hollow 6	Hollow 7	Hollow 8	Hollow 9
300	299589.5	6144116	50	5H10W	7H10W	5H10W	-	-	-	-	-	-
301	299584.7	6144123	50	6H5W	-	-	-	-	-	-	-	-
302	299587.7	6144123	50	5H10W	7H10W	-	-	-	-	-	-	-
303	299587.4	6144132	40	5H5W	-	-	-	-	-	-	-	-
304	299590.1	6144136	40	10H10W	6H10W	-	-	-	-	-	-	-
305	299601.2	6141875	40	5H10W	-	-	-	-	-	-	-	-

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