



Pottinger Solar Farm
MNES Preliminary Biodiversity Assessment

DRAFT REPORT

Prepared for Someva Renewables

17 August 2023

Biosis offices

NEW SOUTH WALES

Albury

Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle

Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney

Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Western Sydney

Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong

Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat

Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne

Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta

Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

Document information

Report to:	Someva Renewables
Prepared by:	Dimity Bambrick Callan Wharfe Sarah Tobin Nick Lloyd
Biosis project no.:	38557
File name:	38557.PottingerEnergyPark.SolarFarm.MNES.Prelim BioAssessment.FIN01.20230817
Citation:	Biosis 2023. Pottinger Solar Farm. MNES Preliminary Biodiversity Assessment. Report for Someva Renewables. Bambrick, D, Wharfe, C, Tobin, S, Lloyd, N. Biosis Pty Ltd. Sydney, NSW. Project 38557.

Document control

Version	Internal reviewer	Date issued
Draft version 01	Mitch Palmer	03/08/2023
Final version 01	Callan Wharfe	17/08/2023

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- Someva renewables – Tim Mead and Tom Stokes
- RPS – Dianne Munro and Nicholas Simmons

Biosis staff involved in this project were:

- Dimity Bambrick (lead author)
- Nick Lloyd (fieldwork and report preparation)
- Callan Wharfe (field work and quality assurance)
- Sarah Tobin (zoological technical input)
- Matt Looby, Mitch Palmer (oversight and technical input)
- James Shepherd and Astrid Mackegard (GIS and mapping).

Contents

Glossary	1
1 Introduction	3
1.1 Project background	3
1.2 Scope of assessment	3
1.3 Relevant terminology	4
1.4 Location of the subject land	4
2 Legislative Context	6
2.1 Environment Protection and Biodiversity Conservation Act 1999.....	6
2.2 Environmental Planning and Assessment Act 197 and Biodiversity Conservation Act 2016	6
2.3 Local Land Services Act Amendment Act 2016	7
2.4 Fisheries Management Act 1994	8
2.5 National Parks and Wildlife Act 1974.....	8
3 Methods	9
3.1 Database Searches	9
3.2 Literature review and regulator consultation.....	9
3.3 Land category and desktop vegetation mapping assessment.....	10
3.4 Field investigation, SVTM validation and summer BBUS	10
3.5 Biodiversity constraints mapping.....	11
3.6 Limitations and assumptions.....	16
4 Results	17
4.1 Matter of National Environmental Significance	17
4.2 Vegetation communities	19
4.3 Threatened ecological communities	33
4.3.1 Myall Woodland.....	33
4.3.2 Natural Grasslands of the Murray Valley Plains.....	33
4.3.3 Sandhill Pine Woodland.....	34
4.4 Threatened species	34
4.4.1 BAM species credit species	35
4.5 Aquatic habitats	40
4.6 Land category assessment	40
5 Preliminary impact assessment and next steps	43
5.1 Biodiversity values and potential impacts.....	43
5.1.1 EPBC Act listed species and communities (MNES).....	45
5.2 Direct and indirect impacts.....	46
5.2.1 Estimated direct impacts to biodiversity values.....	46
5.2.2 Estimated Indirect, prescribed and uncertain impacts.....	47
5.3 Avoidance and minimisation of impacts	47

5.3.1	Considered alternatives.....	48
5.3.2	Preliminary mitigation options.....	48
6	Recommendations	50
6.1	Recommendations	50
	References.....	52
	Appendices.....	53
Appendix 1	Photos.....	54

Tables

Table 1	Lot and DPs of the Solar farm subject land	4
Table 2	Biodiversity constraint model outputs definitions, justifications and management / mitigation approach	13
Table 3	MNES of relevance to the Project	17
Table 4	Summary of modelled and ground validated PCTs within the subject land	21
Table 5	Preliminary assessment of potential occurrence of BAM candidate species credit species within and surrounding the subject land	36
Table 6	Estimated direct impacts of the project.....	46

Figures

Figure 1	Subject land - Pottinger Solar Farm.....	5
Figure 2	MNES biodiversity values	39
Figure 3	Land category assessment	42
Figure 4	Avoid and minimise biodiversity constraints	49

Glossary

BAM	<i>Biodiversity Assessment Method</i>
BC Act	<i>NSW Biodiversity Conservation Act 2016</i>
Biosecurity Act	<i>Biosecurity Act 2015</i>
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DPI	Department of Primary Industries
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FM Act	<i>Fisheries Management Act 1994</i>
GIS	Geographic Information System
IBRA	Interim Biogeographic Regionalisation for Australia
Indicative development footprint	Equivalent to the approximate development footprint to be assessed in the future BDAR
LGA	Local Government Area
LLS	Local Land Services Amendment Act 2016
LLS Act	<i>Local Land Services Act 2013</i>
Locality	A 20 km radius of the subject land
Matters of NES	Matters of National Environmental Significance
NPW Act	<i>National Parks and Wildlife Act 1974</i>
NSW	New South Wales
PCT	Plant Community Type
Pottinger Solar farm	Solar farm project for which Application will be made
Project	The proposed Pottinger Solar farm
Project area	The portion of the property that relates to the Project and will be subject to the state and Commonwealth applications

SEPP	NSW State Environmental Planning Policy
SIC	Significant Impact Criteria
Subject land	The entire property upon which the Project is situated, and to where the BAM will be applied.
TEC	Threatened Ecological Community
WM Act	<i>Water Management Act 2000</i>
WTG	Wind turbine generator

1 Introduction

1.1 Project background

Biosis Pty Ltd was commissioned by Someva Renewables Pty Ltd to undertake a preliminary biodiversity assessment for the proposed Pottinger Solar Farm (the Project) with a focus on Matters of National Environmental significance (MNES) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Project is proposed within an Energy Park comprised of wind and solar renewable energy infrastructure and associated structures including a 300 Megawatt solar farm, wind farm and Battery Energy Storage System (BESS). For the purpose of this report only, the solar farm, BESS and associated infrastructure have been assessed, with the solar farm being the subject of separate report. The Project is within the South-West Renewable Energy Zone (REZ), in an area with exceptional solar resource and low population density comprising primarily pastoral lands used for sheep and cattle grazing.

The Project is located on a large rural agricultural property, comprising a total area of approximately 14,000 hectares across 108 lot/DPs, east of the Cobb Highway, approximately 60 kilometres south of Hay, New South Wales (NSW) (the subject land).

This preliminary biodiversity assessment report describes the MNES biodiversity values and constraints associated with the Project, within the subject land and indicative development footprint (approximate footprint of solar farm and associated infrastructure) as shown on Figure 1. The report will facilitate the preparation of the project's application under Part 9 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The objective of this preliminary biodiversity assessment report is to determine the potential presence of any MNES within the subject land and indicative development footprint, and provide guidance on means of avoiding and minimising potential impacts to those entities.

This report has informed early project design to avoid, minimise and mitigate biodiversity impacts likely to arise from the project.

1.2 Scope of assessment

The scope of this preliminary MNES biodiversity assessment is to identify high level constraints and describe biodiversity values within the subject land. This preliminary assessment allows for recommendations to be provided in terms of avoidance, mitigation and/or further detailed assessment of biodiversity. Following a thorough review of publicly available information, previous environmental reports for the subject land, a rapid field investigation was undertaken in February 2023, the primary objectives were:

- Describe the MNES biodiversity values present within the subject land based on best available desktop and ground validated data.
- Identify potential constraints for the Project with respect to remnant vegetation, threatened ecological communities (TECs), threatened species habitat, potential turbine collision risk, and flow on effects on approvability and potential/likely impacts with respect to the EPBC Act.
- Provide details of any other high-risk issues that may be likely to arise in the EPBC Act referral / approvals process and the state-based planning regime more broadly.

- Provide recommendations on activities and an associated scope of work to support a future state significant development (SSD) application and EPBC referral and assessment process with respect to biodiversity values.

1.3 Relevant terminology

The following terms are used throughout this assessment, within the scoping report and across other relevant specialist studies.

- **Subject land:** The entire property upon which the Project is situated. This includes the indicative development footprint as well as areas that will not be subject to development, operational agriculture area, residential dwelling etc. and areas proposed for separate solar development.
- **Project area:** the portion of the property that relates to the Project and will be subject to the applications under Part 9 of the EPBC Act for Secretaries Environmental Assessment Requirements (SEARs) under the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and *Biodiversity Conservation Act 2016* (BC Act).
- **Indicative development footprint:** Equivalent to the approximate development footprint to be assessed in the future Biodiversity Development Assessment Report (BDAR). This area is currently indicative due to the Project being in the early stages of design. The indicative development footprint sits within the project area and the subject land. (Figure 1)

1.4 Location of the subject land

The subject land is located east of the Cobb Highway between Hay and Deniliquin, approximately 60 kilometres south-east of Hay and approximately 220 kilometres west of Wagga Wagga (Figure 1). It encompasses approximately 14,000 hectares of private land, with internal and adjacent public road reserves, and waterways. It is zoned RU1 primary production.

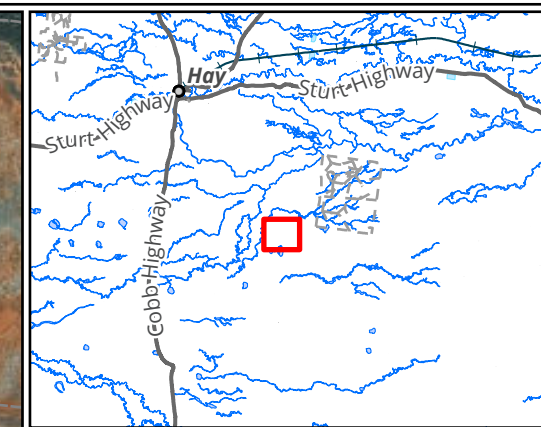
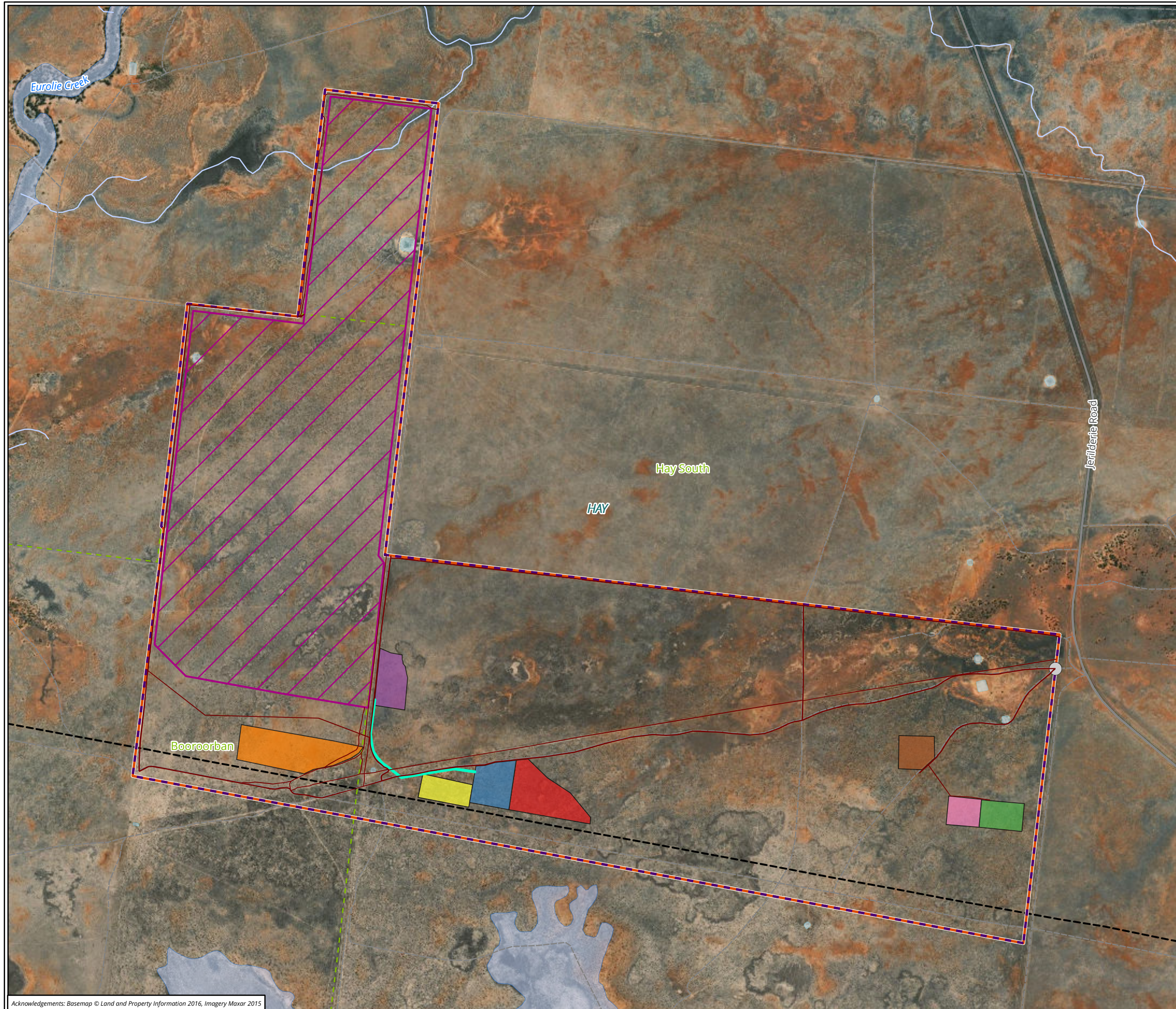
The subject land is within the:

- Riverina Interim Biogeographic Regionalisation for Australia (IBRA) and Murrumbidgee subregion.
- Murrumbidgee channels and floodplains, Murrumbidgee Depression Plains and Murrumbidgee Scaled Plains Mitchell landscapes (predominantly).
- Murrumbidgee catchment.
- Riverina and Murray Local Land Services (LLS) Management Areas.
- Hay and Edward River Local Government Areas (LGA).
- Hay and Deniliquin Local Aboriginal Land Councils.
- Within the South-West REZ.
- Close proximity to existing and approved future transmission line infrastructure.

The proposed Solar Farm development includes the following cadastral boundaries in Table 1.

Table 1 Lot and DPs of the Solar farm subject land

Lot//Plan Label	Lot//Plan Label	Lot//Plan Label
1//DP116080	42//DP591554	91//DP756809
106//DP756809	107//DP756809	108//DP756809



- Legend**
- Subject land
 - Project area
 - Project Energy Connect alignment (assumed)
- Indicative development footprint**
- Proposed photovoltaic arrays
 - Solar transmission line
 - Access track
 - Project access
 - BESS
 - Main Substation
 - O&M
 - Solar Substation
 - Solar Temporary Storage and Construction
 - Switching Station
 - Temporary Accommodation Facilities
 - Temporary Construction Compound

Figure 1 Subject land - Pottinger Solar Farm

0 0.25 0.5 0.75 1
 Kilometers
 Scale: 1:25,000 @ A3
 Coordinate System: GDA2020 MGA Zone 55



Matter: 38557,
 Date: 10 May 2023,
 Prepared for: CW, Prepared by: AM, Last edited by: amackegard
 Layout: Solar_F1_Subjectland
 Project: P:\385500s\38557\Mapping\38557_PottingerEnergyPark_figures_v2.aprx

Acknowledgements: Basemap © Land and Property Information 2016, Imagery Maxar 2015

2 Legislative Context

2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). Under the EPBC Act, if the Minister determines that an action is a 'controlled action' which would have or is likely to have a significant impact on a MNES or Commonwealth land, then the action may not be undertaken without prior approval of the Minister.

The EPBC Act identifies the following nine MNES:

- World Heritage properties.
- National heritage places.
- Ramsar wetlands of international significance.
- Threatened species and ecological communities.
- Migratory species.
- Commonwealth marine areas.
- The Great Barrier Reef Marine Park.
- Nuclear actions (including uranium mining).
- Water resources (in relation to coal seam gas development and large coal mining development)

Further flora and fauna studies will confirm biodiversity impacts, during the preparation of an EIS. At this stage however, given the potential nature and scale of the Project, an EPBC Act referral on the basis of potential to significantly impact specific Commonwealth listed TECs, birds and bats, inclusive of migratory species is being undertaken.

2.2 Environmental Planning and Assessment Act 197 and Biodiversity Conservation Act 2016

The Project will be assessed under Part 4 of the EP&A Act and has a capital investment cost estimated at more than \$30 million. Therefore, the Project is "State Significant Development (SSD)" under Part 4 of the EP&A Act.

The BC Act relates to the conservation of biodiversity. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community consistent with the principles of ecological sustainable development. The BC Act brings in changes to biodiversity survey, assessment and offset methodologies. It also requires specific consideration of irreversible impacts. The Project will impact on native vegetation and biodiversity values. SSD projects must enter the Biodiversity Offset Scheme (BOS) and a Biodiversity Development Assessment Report (BDAR) will be required to assess biodiversity impacts following the Biodiversity Assessment Method (BAM 2020).

This is likely to trigger biodiversity offset liabilities for the Project in accordance with the BC Act (and potentially EPBC Act), with any offset obligations achieved by:

- Acquiring or retiring credits that are publicly available or setting up an onsite or offsite Stewardship Site under the BOS.

- Making payments into the Biodiversity Conservation Fund using the offsets payment calculator (generally only suitable for small credit liabilities to risk and premium associated costs), or
- Funding a biodiversity action that benefits the threatened entity(ies) impacted by the development.

2.3 Local Land Services Act Amendment Act 2016

A review of land categorisation under the *Local Land Services Act Amendment Act 2016* (LLS Act) to clarify the native vegetation management regime was undertaken. Where applicable to do so (land applicable to the LLS act i.e. rural), the potential for land to be mapped as Category 1 exempt land was evaluated, as land mapped or determined as Cat 1 land can be excluded from the BAM and are not required to be assessed, with exception to prescribed impacts in reference to relevant legislation is provided below:

- **BC Act s6.8(3):** The BAM is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1 exempt land (within the meaning of Part 5A of the LLS Act 2013), other than any impacts prescribed by the regulations under section 6.3.
- **BAM cl1.5:** Biodiversity values not assessed under the BAM include: (d) biodiversity values associated with the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1 exempt land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC regulation; (that being prescribed impacts).

Where development consent is required under the EP&A Act, to meet the Category 1 exempt land requirement, land must be;

- Legally cleared at or since 1st Jan 1990 (Woody vegetation only); and/or
- Significantly disturbed or modified since 1990 (Non-woody vegetation).

As the Native Vegetation Regulatory maps (NVR) are not publicly available, during the transitional period (until the entire Native Vegetation Regulatory map is released), accredited assessors may establish the categorisation of land for the consent authority to consider by approximating the method used to make the NVR map under the provisions of the BC Act and the LLS Act. This is done via:

- Historical aerial imagery.
- Landuse mapping:
 - The land use layer contributes to identifying land for inclusion in category 1 in the NVR map. Chapter 4 of the NVR map method statement describes the process for identifying and mapping existing and historical agricultural land use since 1 January 1990. Mapping existing and historical land use focuses on identifying patterns or evidence of agricultural land uses according to high resolution aerial or satellite imagery and classifying land under a national land use classification system.
- Woody extent layer:
 - Contributes to identifying areas for inclusion in category 2 in the NVR map (including individual trees).
 - Latest publicly available is NSW Woody Vegetation Extent, and FPC 2011 and 2017 update.
- Boundaries of sensitive regulated and vulnerable regulated land available on the NVR map portal.

Confirmation of the relevant land categories relevant to the Project will be included within any BDAR prepared to support the EIS and have been included where possible as part of constraints definition.

It is noted that exemption of biodiversity assessment on Category 1 exempt land does not apply to assessments under the EPBC Act.

2.4 Fisheries Management Act 1994

Key fish habitat is defined under the FM Act as aquatic habitat important to the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. Assessment of the Hay LGA (DPI, 2017) identified streams of Strahler order 3 and above within the subject land including Euroolie Creek and Nyangay Creek.

Waterway crossings as well as clearing and excavation near key fish habitat must consider impacts on aquatic habitat, have pollution risks mitigated and 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.

2.5 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) establishes the fundamental functions of the NSW National Parks and Wildlife Service. These include the conservation of nature, objects, features, places and management of land reserved under the Act. Specifically, the conservation of nature includes:

- Landforms of significance, including geological features and processes.
- Landscapes and natural features of significance including wilderness and wild rivers.

Animal and plant provisions of the NPW Act have been repealed and replaced by the BC Act. *Guidelines for developments adjacent to National Parks and Wildlife Service lands* (DPIE 2020) are also relevant to the Project and will be considered; namely in relation to erosion control, storm and wastewater, pest and weed management, fire and access requirements including aerial and ground measures, visual, noise and other amenity impacts, connectivity impacts, impacts to groundwater dependant ecosystems and cultural heritage.

3 Methods

3.1 Database Searches

Information provided by Someva as well as other key information was reviewed, including:

- DCCEE Protected Matters Search Tool (PMST) for MNES protected by the EPBC Act.
- NSW BioNet Atlas of NSW Wildlife, for items listed under the BC Act within 20 kilometres (study locality) of the subject land.
- The NSW Department of Primary Industries (DPI) Spatial Data Portal for FM Act listed threatened species, populations and communities
- NSW DPI *Biosecurity Act 2015* for Priority listed weeds for the Murray LLS area.
- Review of the NSW Biodiversity Values Map and Threshold Tool.
- Establishment of a BAM Calculator project(s) for the assessment to determine the requirements for threatened species survey.
- Review BAM Important Areas mapping for areas of habitat mapped for threatened entities considered potentially be subject to Serious and Irreversible Impacts (SIIIs).
- Vegetation Information System (VIS) mapping, including.
 - NSW Government’s modelled State Vegetation Type Mapping (SVTM) Riverina (RiverinaSVM_v1p2_PCT_E_4469, OEH 2016)
- Review Birddata and Birdlife Australia databases.
- EnergyConnect (NSW – Eastern Section) Technical Paper 1 – Revised Biodiversity Development Assessment Report (WSP 2022) relative to overlapping project areas.
- Cotemporary Scoping Reports and EISs for other solar farm projects in the South-West Renewable Energy Zone (SW REZ).

The implications for the Project are assessed in relation to key biodiversity legislation and policy including:

- EPBC Act.
- EP&A Act.
- BC Act.
- NPW Act.
- LLS Act.

3.2 Literature review and regulator consultation

A review of relevant literature was undertaken to provide local context for threatened species occurrence and contemporary information relating to relevant threatened species, and where possible their interaction with relevant solar farm projects. A review of the following key documents was undertaken:

- EnergyConnect (NSW – Eastern Section) Technical Paper 1 – Revised Biodiversity Development Assessment Report (Project Energy Connect BDAR) (WSP 2022).
- The Plains Solar Farm Scoping Report (ERM 2022).
- Dinawan Solar Farm Scoping Report (EMM 2022).
- Keri Keri Solar Farm Preliminary Biodiversity Assessment (ERM 2022).
- Scoping Report: Wilan Wind Farm (Biosis and Kilara Energy 2022)
- Yanko Delta Wind Farm Biodiversity Development Assessment Report (Jacobs 2022).

Key issues have been discussed with regulators with regards to solar farm development in the SW REZ, and these issues have been considered as part of this preliminary biodiversity assessment however, it should be noted that regulator consultation specific to this Project is yet to commence.

3.3 Land category and desktop vegetation mapping assessment

A detailed land category assessment (LCA) and review desktop vegetation mapping to PCT was undertaken to inform the extent of the area subject to assessment under the BAM and BC Act, as well as preliminary PCT mapping and field validation described below (Figure 3 and Table 4).

In order to pre-emptively exclude highly utilised and/or modified areas from assessment under the BC Act, a desktop review of land categorisation under the LLS Act was undertaken. This assessment clarifies the native vegetation management and land use regime of the subject land and where applicable to do so, the potential for land to be mapped as 'Category 1 exempt land'. Land mapped or determined as Category 1 exempt can be excluded from the BAM and is not required to be assessed, with the exception of prescribed impacts. Note, the LCA does not remove the requirement to address matters under the EPBC Act.

The results of Biosis' LCA are provided in Figure 3. Note that the results of Biosis LCA is yet to be compared to Native Vegetation Regulatory (NVR) mapping from DPE for the subject land, however historically Biosis' LCA results have proven well aligned with the NVR mapping.

Again, it is noted that exemption of biodiversity assessment on Category 1 exempt land does not apply to assessments under the EPBC Act. A LCA has been undertaken for NSW state approvals process, and is provided here to provide context to assessment under the EPBC Act only.

3.4 Field investigation, SVTM validation and summer BBUS

Biosis undertook a rapid field validation survey of the subject land between 15-17 February 2023, with staff involved including Callan Wharfe (BAM Accredited Assessor, Senior Associate Botanist – Technical Lead Major Projects and Offsets) and Nick Lloyd (Graduate Botanist). Early mapping and validation of PCTs and TECs will ensure informed ongoing design decisions and biodiversity risks assessment can be considered from the outset of the Project, with biodiversity impacts avoided and minimised from the outset. The field investigations included:

- Preliminary vegetation mapping of PCTs across the subject land, including validation of the Riverina SVTM (OEH 2016) vegetation modelling.
- Mapping of any TECs listed under the EPBC Act and/or BC Act.
- Consideration of broad vegetation condition states to determine vegetation zones.

- Verification of previously recorded locations of threatened species and undertaking opportunistic surveys for threatened species considered to have the potential to occur within the subject land.
- Preliminary habitat assessment in accordance with the BAM to determine the potential for threatened species identified under the BAM as 'ecosystem credit species' and 'species credit species', and well as MNES to occur.
- Indicative mapping ecological constraints such as habitat trees, wetlands, waterways and nearby areas supporting potential habitat for threatened species.
- Flora and fauna species inventory.

Further to the above PCT mapping and habitat assessment work, Biosis completed the first and second seasonal replicate of the bird and bat utilisation surveys (BBUS) that will inform the threatened fauna species section of the BDAR, and the Bird and Bat Adaptive Management Plan (BBAMP) required for the wind farm component of the Pottinger Energy Park.

3.5 Biodiversity constraints mapping

Table 2 below provides an overview and explanation of the biodiversity constraints parameters used to develop a site specific biodiversity constraints GIS model and GIS outputs. This constraints model has been used to undertake initial avoidance and minimisation of impacts (see Section 5.3 for more detail), and will continue to form the basis for impact minimisation throughout the design and assessment phases of the Project. GIS outputs layers include specific 'WTG and powerline constraints' and 'Civil constraints', based on the various parameters and specific project constraints and opportunities each presents to the different components.

It should be noted that WTG and powerline constraints have been primarily developed for the associated Pottinger Wind Farm, however overhead powerlines associated with the solar development project present potential indirect impacts to bird and bat species and remain subject to the biodiversity constraints detailed in Table 2.

Key biodiversity constraints of the subject land, which will require consideration throughout the Project, include but not limited to:

- DPE mapped Important Areas of Plains Wanderer *Pedionomus torquatus* habitat, a species potentially subject to serious and irreversible impacts (SAIIs) under the NSW *Biodiversity Assessment Method* (BAM), and is listed as Critically Endangered under the Commonwealth EPBC Act.
- The occurrence, or potential occurrence, of the following EPBC Act and/or BC Act TECs:
- Confirmed TECs:
 - Myall Woodlands:
 - Weeping Myall Woodlands – EPBC Act Endangered Ecological Community (EEC).
 - *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* - BC Act EEC.
 - *Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions* – BC Act EEC.
- Potential TECs:

- *Natural Grasslands of the Murray Valley Plains* – EPBC Act Critically Endangered Ecological Community (CEEC).
- The presence of potential habitat for threatened flora and fauna species listed under the EPBC Act and/or BC Act (as provided in Table 5).

In order to assess the constraints of vegetation and habitat present within the subject land, areas were identified and mapped into the four categories outlined in Table 2 below. Landscape features and mapped biodiversity values present outside the subject land were considered to ensure the influence of any values beyond the site were captured. Various landscape habitat features and mapped biodiversity values are considered to result in different levels of consistent for overhead powerlines as opposed to civil works associated with both solar development projects. As such, details of the constraints values relevant to each constraint category for different project components are provided separately below.

The data input into the constraints model is based on best available desktop GIS data, combined with ground validated PCTs determined during the February 2023 field survey, as described above.

Table 2 Biodiversity constraint model outputs definitions, justifications and management / mitigation approach

Constraint category	Definition	Powerline constraint value (predominantly in regard to bird and bat collision risk)	Civil constraint value (includes solar arrays, ancillary infrastructure, site reticulation and access etc.)	Suggested management / mitigation approach
<p>No Go areas (Constraint score – 4)</p>	<p>These are areas that should be avoided and if not, may impact regulatory approval, including the EPBC Act referral, of the project (i.e. regulators may require significant redesign to reduce impacts, or impose further impact minimisation/mitigation measures at approval). Additional consideration may be raised during the EPBC Act referral process.</p>	<ul style="list-style-type: none"> • EPBC Act Critically Endangered (CE) Plains Wanderer habitat mapped under the DPE 'Important Areas of Plains Wanderer habitat', with an additional 100 m buffer to reduce potential for direct impacts to areas of highest potential habitat. Plains Wanderer is a species potentially subject to Serious and Irreversible Impacts (SAILs) under the BAM. 	<ul style="list-style-type: none"> • DPE mapped Important Areas of Plains Wanderer habitat, with an additional 100 m buffer to reduce potential for direct impacts to areas of highest potential habitat. 	<ul style="list-style-type: none"> • Remove all infrastructure from mapped No Go areas. • Minor encroachment may be acceptable, but increases the risk of future redesign and protracted approvals timeframes, subject to EPBC Act referral. • Inclusion of any requirements raised during the EPBC Act referral process.
<p>High Constraint (Constraint score – 3)</p>	<p>These are areas where impacts should be avoided wherever possible, with any unavoidable residual impacts likely to be subject to impact minimisation/mitigation measures. Justification for unavoidable impacts will be required in the BDAR, including assessment of MNES impacts. Include areas that are likely to generate high biodiversity credit</p>	<ul style="list-style-type: none"> • Additional 200 m buffer on No-Go areas associated with mapped Plains Wanderer habitat to reduce the potential for indirect MNES impacts, generally during the operational phase of the project. 	<ul style="list-style-type: none"> • Additional 200 m buffer on No-Go areas associated with mapped Plains Wanderer habitat to reduce the potential for indirect impacts, during the construction and operational phases of the project. • Mapped potential threatened ecological communities (TECs) listed under the EPBC Act and/ or BC Act . This includes EPBC Act listed Weeping Myall Woodland (PCT 26), Natural Grassland of the Murray Valley Plains (PCT 44,45,46) and BC Act listed Weeping Myall Woodland (PCT 26), Sand Hill Pine Woodland (19, 28) 	<ul style="list-style-type: none"> • Minimise project infrastructure in High Constraint areas to reduce direct and indirect impacts. • Impacts minimisation strategies including maintenance of infrastructure-free zones (flyways) between wetlands (stepping-stones) and other habitat feature should be employed during project design. • Implement measures in designing solar arrays to dissuade perching and attracting aerial fauna. • Construction and operational impacts may be subject to requirements

Constraint category	Definition	Powerline constraint value (predominantly in regard to bird and bat collision risk)	Civil constraint value (includes solar arrays, ancillary infrastructure, site reticulation and access etc.)	Suggested management / mitigation approach
	per hectare requirements at offsetting.		<ul style="list-style-type: none"> Threatened species populations and habitat. <i>(note this potential constraint has not been included in the current GIS model due to difficulties relating to scale, and constraints generally being associated with PCTs and landscape features. Threatened species are to be considered further during future design stages, and further surveys have been completed).</i> 	<p>through DCCEEW following assessment of an EPBC Act referral.</p> <ul style="list-style-type: none"> Direct and indirect impact to TECs should be avoided and minimised and all impacts will require justification for state and Commonwealth approvals.
Moderate Constraint (Constraint score – 2)	<p>Suitable for development, however being predominantly native vegetation (and associated habitats) will be subject to legislative requirements to demonstrate application of avoid and minimise principles.</p> <p>Areas likely to generate a moderate biodiversity credit per hectare that require offsetting.</p> <p>Areas that are not listed as MNES. .</p>	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> All native vegetation (not subject to the above constraints, including non EPBC Act and BC Act listed TECs) remains a moderate constraint due to the legislative requirements to avoid and minimise impacts, and the potential for threatened species to occur. 	<ul style="list-style-type: none"> Consider the overall design requirements of the project and how that relates to impact minimisation from the outset. Locate as much infrastructure as possible in areas of non-native vegetation and/or Category 1 exempt land (further detailed below). Locate as much infrastructure as possible in areas of existing disturbance, such as farm tracks, decommissioned canals, existing access locations, gates and fence lines. Avoidance of threatened species populations and habitat (or minimisation of impacts) can be undertaken during future design stages.
Low Constraint	<p>Best suited for development. These areas are unlikely to generate biodiversity credits</p>	<ul style="list-style-type: none"> n/a 	<ul style="list-style-type: none"> Non-native vegetation or areas likely to meet the definition of Category 1 exempt land and where prescribed impacts are considered negligible 	<ul style="list-style-type: none"> Preferentially locate project infrastructure in areas of non-native vegetation and/or Category 1 exempt land.

Constraint category	Definition	Powerline constraint value (predominantly in regard to bird and bat collision risk)	Civil constraint value (includes solar arrays, ancillary infrastructure, site reticulation and access etc.)	Suggested management / mitigation approach
(Constraint score - 1)	(exotic/cultivated areas) or may have low biodiversity credit requirements per hectare.			<ul style="list-style-type: none"> Category 1 exempt land (assessed under the Local Land Services Act) is excluded from assessment under the BAM, with the exceptions of Prescribed Impacts and impacts to BC Act listed critically endangered entities. EPBC Act considerations must also be addressed in regard to development on Category 1 exempt land.
Items considered but not subject to specific constraints	<ul style="list-style-type: none"> NSW National Parks estate and setbacks are not directly applicable as the project areas is >3 km from the nearest park. Mapped watercourses are not subject to specific constraints as mapped vegetation provides and prescribes suitable constraints levels and setbacks. Threatened species habitat and/or presence cannot be incorporated into the constraints model (at this scale), and relevant constraints/recommendations and captured by those relating to native vegetation. Requirements outlined by DCCEEW during the EPBC Act referral process cannot be incorporated into the constraints model at this stage. Any requirements outlined during the EPBC Act referral process will be incorporated into the detailed design of the proposed solar farm. 			

3.6 Limitations and assumptions

Biodiversity constraints outlined above are based on desktop assessment of best available spatial mapping data, with refinement during ground validation surveys in February 2023 only. It should be noted that the wetter period over early summer 2022, has resulted in a number of wetlands within the subject land still being inundated in February 2023, this allowed for direct observation of the habitat value of these areas for waterbirds (in particular) during wet years.

The constraints mapping contained herein is based on modelled interpretation of this data using the rulesets outlined Table 2 above using a GIS processing model, and no substantial interpretation of aerial imagery has been undertaken to determine any inconsistencies between the existing datasets and observable on-ground conditions. The above presented constraints relate to biodiversity values and related approvals only, and does not consider other environmental assessment requirements such as cultural heritage values, flooding or geotechnical constraints.

4 Results

The principal land uses in the subject land have included modified and native pasture grazing as well as irrigated cropping. The contemporary landscape is dominated by the physical structures associated with irrigated agriculture such as irrigation bays and banks, channels, roads, fences, farm infrastructure and regulators. Grazing with sheep (predominantly) and cattle has also had a significant negative effect on the structure and diversity of floodplain and chenopod shrubland vegetation communities in some instances.

The subject land contains areas conducive to semi-arid chenopod dominated landscapes with grasslands areas supporting various densities of woody shrubs interspersed with open Pine and Myall woodlands, with Lignum / Nitre Goosefoot wetlands present in areas more frequently inundated. The subject land predominantly supports native vegetation, with only highly disturbed areas devoid of native species. Native vegetation and habitat occur in a range of condition states, however the majority would be considered to be on moderate ecological condition, with some areas occurring in a more natural state and others being more degraded by historical land management practices.

Three main watercourses exist within the broader property, two the west and south of the subject land; Nyangay Creek, Eurolie Creek and Coleambally Outfall Drain (a concrete-lined irrigation channel), and a number of large areas of natural wetlands occur associated with Eurolie Creek, and to the north-east of the subject land.

4.1 Matter of National Environmental Significance

Based on the results of a Protected Matters Search Tool run in March 2023, and the findings of the preliminary field investigations, MNES potentially of relevance to the Project are provided in Table 3 below.

Table 3 MNES of relevance to the Project

MNES	Relevance to the Project
World Heritage Properties	Not identified within the subject land or a 30 km radius.
National Heritage Places	Not identified within the subject land or a 30 km radius.
“Wetlands of International Importance (Ramsar Wetlands)	There are no Wetlands of International Importance within the subject land or 30 km buffer. The closest Ramsar Wetlands, based on a PMST search include: <ul style="list-style-type: none"> • Banrock Station Wetland Complex (300 – 400km downstream). • The Coorong, and Lakes Alexandrina and Albert Wetland (400 – 500km downstream). • Hattah-Kulkyne Lakes (150 – 200km downstream). • Riverland (300 – 400km downstream).
Great Barrier Reef Marine Park	Not identified within the subject land or a 30 km radius.
Commonwealth Marine Area	Not identified within the subject land or a 30 km radius.
Listed Threatened Ecological Communities	A total of five Commonwealth listed TECs are predicted to occur within the subject land and/or 30 km buffer. Those TECs include:

MNES	Relevance to the Project
	<ul style="list-style-type: none"> • Natural Grasslands of the Murray Valley Plains (Critically Endangered) – Potentially recorded within the subject land and indicative development footprint. • Weeping Myall Woodlands (Endangered) – Likely to be present within the subject land and indicative development footprint. • Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (Critically Endangered) – Not recorded within the subject land and not expected to occur. • Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Endangered) – Not recorded within the subject land and not expected to occur. • Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions (Endangered) – Not recorded within the subject land and not expected to occur.
<p>Listed Threatened Species</p>	<p>A total of 31 listed threatened species are predicted to occur within the subject land and 30km buffer. Those considered most likely to occur include:</p> <ul style="list-style-type: none"> • Chariot Wheels <i>Maireana cheelii</i> (Vulnerable) • Mossgiel Daisy <i>Brachyscome papilosa</i> (Vulnerable) • Painted Honeyeater <i>Grantiella picta</i> (Vulnerable) • Plains-wanderer <i>Pedionomus torquatus</i> (Critically Endangered) • Slender Darling-pea <i>Swainsona murrayana</i> (Vulnerable) – Recorded within the subject land • Southern Bell Frog <i>Litoria raniformis</i> (Vulnerable) • Superb Parrot <i>Polytelis swainsonii</i> (Vulnerable) • Winged Pepper-cress <i>Lepidium monoplocoides</i> (Endangered) <p>The PMST search indicates the following species, additional to those predicted to occur through the BAM, are known or likely to occur within the search area and may require additional consideration during the survey and EIS phase:</p> <ul style="list-style-type: none"> • Known: <ul style="list-style-type: none"> – Silver Perch <i>Bidyanus bidyanus</i> (Critically Endangered) – Australasian Bittern <i>Botaurus poiciloptilus</i> (Endangered) – Spot-tailed Quoll <i>Dasyurus maculatus maculatus</i> (Endangered) – Australian Painted Snipe <i>Rostratula australis</i> (Endangered) – Murray Cod <i>Maccullochella peelii</i> (Vulnerable) – Grey Falcon <i>Falco hypoleucos</i> (Vulnerable) • Likely: <ul style="list-style-type: none"> – Grey Snake <i>Hemiaspis damelii</i> (Endangered) <p>A search of the NSW Department of Primary Industries (DPI) threatened freshwater species indicative population mapping found two species have the potential to occur within waterways in the subject land:</p> <ul style="list-style-type: none"> • Silver Perch – mapped within Eurlie Creek within the subject land • Flathead Galaxias <i>Galaxias rostratus</i> (Critically Endangered) – mapped within the Coleambally Outfall Drain connected to Eurolie Creek direct adjacent to the subject land.
<p>Listed Migratory Species</p>	<p>A total of 10 listed migratory species are predicted to occur within the subject land and 30km buffer. Those considered most likely to occur include:</p> <ul style="list-style-type: none"> • Common Sandpiper <i>Actitis hypoleucos</i>

MNES	Relevance to the Project
	<ul style="list-style-type: none"> • Sharp-tailed Sandpiper <i>Calidris acuminata</i> • Pectoral Sandpiper <i>Calidris melanotos</i> • Yellow Wagtail <i>Motacilla flava</i> • Marsh Sandpiper <i>Tringa stagnatilis</i> • Glossy Ibis <i>Plegadis falcinellus</i> (note this species was not predicted to occur by the PMST search, however it is considered highly likely to occur in the subject land)

MNES listed above, along with any other MNES recorded or predicted as likely to occur within the subject land, will require consideration as part of ongoing ecological assessments. A referral of the Project to DCCEEW will provide a determination as to whether the Project is considered a Controlled Action under the EPBC Act. The above listed MNES will form the basis of potential impacts included in the Referral.

Preliminary assessments have concluded that habitat is not present for the Spot-tailed Quoll and Murray Cod within the subject land.

4.2 Vegetation communities

Desktop mapping and analysis confirmed 20 potential Plant Community Types (PCT) had been modelled as occurring within 5 kilometres of the subject land (Riverina SVTM, OEH 2016), and the primary aim of the preliminary field investigation was to validate the PCTs (and TECs) present within the subject land and immediate surrounds.

A total of 16 PCTs were confirmed as present across the Pottinger Energy Park during the field investigation, ranging from wetlands and woodland / wetlands, to drier sandplain / sand hill woodlands, chenopod shrubland and grasslands (Table 4). Vegetation condition ranged from high condition in areas less subject to historical pressures such as clearing and grazing, to low condition in areas of ongoing disturbance from agricultural activities. The majority of the subject land's vegetation is considered to be in moderate ecological condition, subject to some level of historical/ongoing disturbance but a generally lower level of current negative pressures such as exotic species infestations, erosion, overgrazing, trampling etc. However, this will be confirmed in the BDAR.

Up to three TECs have been assessed as likely to be present within the subject land:

- Confirmed TECs:
 - Myall Woodlands:
 - Weeping Myall Woodlands – EPBC Act EEC
 - *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* - BC Act EEC
 - *Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions* – BC Act EEC
- Potential TECs:
 - *Natural Grasslands of the Murray Valley Plains* – EPBC Act CEEC

Further information is provided in Table 4 and Section 4.3 below.

A summary of ground validated PCTs and TEC within the subject land is provided in Table 4. A number of 'modelled only' PCTs remain included in Table 4 as their presence (or potential presence) throughout the broader subject land provides background habitats and to the potential original PCTs in areas of derived grasslands/shrublands.

Table 4 Summary of modelled and ground validated PCTs within the subject land

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
10: River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic zone	<p>Structure: tall to mid-high woodland</p> <p>Height: to 18 m</p> <p>Upper stratum: River Red Gum <i>Eucalyptus camaldulensis</i>, Black Box <i>Eucalyptus largiflorens</i>.</p> <p>Mid stratum: may contain dense to very sparse stands of <i>Lignum Duma (Muehlenbeckia) florulenta</i>, River Cooba <i>Acacia stenophylla</i> with Pale-fruit Ballart <i>Exocarpos strictus</i> in lower numbers.</p> <p>Ground stratum: Warrego Grass <i>Paspalidium jubiflorum</i>, Spider-grass <i>Enteropogon acicularis</i>, Couch <i>Cynodon dactylon</i>, Ringed Wallaby Grass <i>Rytidosperma caespitosum</i>, Corkscrew Grass <i>Austrostipa nodosa</i>, Corrugated Sida <i>Sida corrugata</i>, <i>Oxalis perennans</i>, River Bluebell <i>Wahlenbergia fluminalis</i>, <i>Cyperus exaltatus</i>.</p>	Ground validated. Recorded as a single patch outside the subject land	Riparian woodland / wetland	N/a	N/a	N/a
13: Black box-lignum woodland of the inner floodplains in the semi-arid zone	<p>Structure: open woodland</p> <p>Height: to 15 m</p> <p>Upper stratum: Black Box <i>Eucalyptus largiflorens</i></p> <p>Mid stratum: scattered to dense cover of <i>Lignum Duma (Muehlenbeckia) florulenta</i>, Cooba <i>Acacia salicina</i>, Thorny Saltbush <i>Rhagodia spinescens</i>, Dillon Bush <i>Nitraria billardierei</i>.</p> <p>Ground stratum: Warrego Grass <i>Paspalidium jubiflorum</i>, Creeping Saltbush <i>Atriplex semibaccata</i>, Dense Stonecrop <i>Crassula colorata</i>, Ruby Saltbush <i>Enchylaena tomentosa</i>, Short-wing saltbush <i>Sclerolaena brachyptera</i>, Climbing Saltbush <i>Einadia nutans</i> subsp. <i>nutans</i>.</p>	Ground validated. Recorded along the major watercourses.	Riparian woodland / wetland	N/a	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
15: Black box open woodland with chenopod understorey	<p>Structure: very open woodland</p> <p>Height: to 10 m</p> <p>Upper stratum: Black Box <i>Eucalyptus largiflorens</i></p> <p>Mid stratum: scattered to dense cover of Thorny Saltbush <i>Rhagodia spinescens</i>, Dillon Bush <i>Nitraria billardierei</i>.</p> <p>Ground stratum: Ruby Saltbush <i>Enchylaena tomentosa</i>, Short-wing saltbush <i>Sclerolaena brachyptera</i>, Climbing Saltbush <i>Einadia nutans</i> subsp. <i>nutans</i>, Slender-fruit Saltbush <i>Atriplex leptocarpa</i>, Spider-grass <i>Enteropogon acicularis</i>, Fairy Grass <i>Sporobolus caroli</i>, Knottybutt Grass <i>Paspalidium constrictum</i>, <i>Marsilea costulifera</i>, Mousetail <i>Myosurus australis</i>.</p>	Ground validated. Recorded adjacent to the major watercourses.	Riparian woodland / wetland	N/a	N/a	N/a
16: Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW	<p>Structure: open woodland</p> <p>Height: to 10 m</p> <p>Upper stratum: Black Box <i>Eucalyptus largiflorens</i></p> <p>Mid stratum: Thorny Saltbush <i>Rhagodia spinescens</i></p> <p>Ground stratum: Ruby Saltbush <i>Enchylaena tomentosa</i>, Creeping Saltbush <i>Atriplex semibaccata</i>, <i>Salsola tragus</i> subsp. <i>tragus</i>, <i>Atriplex eardleyae</i>, Black Rolypoly <i>Sclerolaena muricata</i> var. <i>muricata</i>, Cannonball Burr <i>Dissocarpus paradoxus</i>, <i>Oxalis perennans</i>, Quena <i>Solanum esuriale</i>, Wallaby Grasses <i>Rytidosperma</i> spp.</p>	Ground validated. Recorded further from the major watercourses.	Woodland / wetland	N/a	N/a	N/a
17: Lignum shrubland of the semi-arid (warm) plains	<p>Structure: dense to open shrubland with aquatic and terrestrial components</p> <p>Height: to 4 m</p> <p>Upper stratum: occasional emergent River Red Gum <i>Eucalyptus camaldulensis</i>, Black Box <i>Eucalyptus largiflorens</i> or River Cooba <i>Acacia stenophylla</i>.</p> <p>Mid stratum: Lignum <i>Duma (Muehlenbeckia) florulenta</i> with scattered Nitre Goosefoot <i>Chenopodium nitrariaceum</i>.</p>	Ground validated. Single modified patch recorded along the western boundary of the subject land.	Ephemeral wetland (wetter sub-type)	N/a	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
	<p>Ground stratum: Spike Sedges <i>Eleocharis</i> spp., Rushes <i>Juncus</i> spp., Twin-leaved Bedstraw <i>Asperula gemella</i>, Black Rollypoly <i>Sclerolaena muricata</i> var. <i>villosa</i>, Pacific Azolla <i>Azolla filiculoides</i>, <i>Myriophyllum papillosum</i>, Australian Mudwort <i>Limosella australis</i>, Cat-tail <i>Myriophyllum caput-medusae</i>, Red Water-milfoil <i>Myriophyllum verrucosum</i>, Water Primrose <i>Ludwigia peploides</i> subsp. <i>montevicensis</i>, <i>Callitriche umbonata</i>, <i>Haloragis glauca</i> f. <i>glauca</i>, Tall Groundsel <i>Senecio runcinifolius</i>, Slender Monkey-flower <i>Mimulus gracilis</i>.</p>					
<p>19: Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplains</p>	<p>Structure: medium to high woodland Height: to 13 m Upper stratum: White Cypress Pine <i>Callitris glaucophylla</i> occasionally with Slender Cypress Pine <i>Callitris gracilis</i> subsp. <i>Murrayensis</i>. Mid stratum: often absent, if present Common Fringe-myrtle <i>Calytrix tetragona</i>, Silver Banksia <i>Banksia marginata</i>. Ground stratum: Ringed Wallaby Grass <i>Rytidosperma caespitosum</i>, <i>Oxalis perennans</i>, Flannel Cudweed <i>Actinobole uliginosum</i>.</p>	<p>Modelled only. Cypress Pine PCTs found only to represent PCT 28.</p>	<p>Riverine sandhill woodlands</p>	<p>N/a</p>	<p>EEC - Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions</p>	<p>N/a</p>
<p>23: Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones</p>	<p>Structure: tall open shrubland Height: to 6 m Upper stratum: N/A Mid stratum: Yarran <i>Acacia melvillei</i>, Black Oak <i>Casuarina pauper</i>, Spiny Saltbush <i>Rhagodia spinescens</i>, Turpentine Bush <i>Eremophila sturtii</i>, Black Cotton-bush <i>Maireana decalvans</i>, Small-leaf Bluebush <i>Maireana microphylla</i>, Dillon Bush <i>Nitraria billardierei</i>, Old Man Saltbush <i>Atriplex nummularia</i>, <i>Sclerolaena diacantha</i></p>	<p>Ground validated (potential). A single stand of potential <i>Acacia melvillei</i> was recorded outside the subject land. No reproductive material was present in February 2023 to confirm the species identification.</p>	<p>Riverine sandhill woodlands</p>	<p>N/a</p>	<p>EEC - Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions</p>	<p>N/a</p>

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
	<p>Ground stratum: Corkscrew Grass <i>Austrostipa nodosa</i>, Ringed Wallaby Grass <i>Rytidosperma caespitosum</i>, Soft Billy-buttons <i>Pycnosorus pleiocephalus</i>, <i>Leiocarpa brevicompta</i>, Woolly Plover-daisy <i>Leiocarpa tomentosa</i>, Corrugated Sida <i>Sida corrugata</i>, <i>Goodenia fascicularis</i>, <i>Tetragonia eremaea</i>, Hard-headed Daisy <i>Brachyscome lineariloba</i>, Plover Daisy <i>Leiocarpa leptolepis</i>, Fuzzweed <i>Vittadinia cuneata</i>, Twiggy Sida <i>Sida intricata</i>, Small White Sunray <i>Rhodanthe corymbiflora</i>, Bitter Saltbush <i>Atriplex stipitata</i></p>					
24: Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains	<p>Structure: tall tussock grassland Height: 2 m Upper stratum: N/A Mid stratum: Copperburrs <i>Sclerolaena</i> spp., Saltbushes <i>Atriplex</i> spp., Forest Germander <i>Teucrium racemosum</i>. Ground stratum: Canegrass <i>Eragrostis australasica</i>, Windmill Grass <i>Chloris truncata</i>, Blown Grass <i>Lachnagrostis filiformis</i>, Plains Grass <i>Austrostipa aristiglumis</i>, Neverfail <i>Eragrostis setifolia</i>, Weeping Lovegrass <i>Eragrostis parviflora</i>, <i>Eleocharis acuta</i>, <i>Eleocharis pusilla</i>, Pale Spike-sedge <i>Eleocharis pallens</i>, Rushes <i>Juncus</i> spp., Common Nardoo <i>Marsilea drummondii</i>, Narrow-leaf Nardoo <i>Marselia costulifera</i>, <i>Azolla filiculoides</i>, Water Milfoils <i>Myriophyllum</i> spp.</p>	Ground validated. Single occurrence recorded in unnamed watercourse outside the subject land.	Ephemeral wetland (wetter sub-type)	N/a	N/a	N/a
26: Weeping Myall open woodland of the Riverina Bioregion and NSW South	<p>Structure: mid-high open woodland Height: to 8 m Upper stratum: Weeping Myall <i>Acacia pendula</i>, Belah <i>Casuarina cristata</i> with Black Box <i>Eucalyptus largiflorens</i>, River Red Gum <i>Eucalyptus camaldulensis</i> occurring in depressions. Mid stratum: Spiny Saltbush <i>Rhagodia spinescens</i>, Black Cotton bush <i>Maireana decalvans</i>, Old Man Saltbush <i>Atriplex</i></p>	Ground validated. Single small patch in the northern portion of the subject land, with scattered trees along the western boundary of the subject land forming the edge of a larger	Riverine plain woodlands	EEC - Weeping Myall Woodlands	EEC - Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
Western Slopes Bioregion	<p><i>nummularia</i>, Nitre Goosefoot <i>Chenopodium nitrariaceum</i>, Needlewood <i>Hakea leucomyxa</i>, Northern Sandalwood <i>Santalum lanceolatum</i>, Leafless Ballart <i>Exocarpos aphyllus</i>, Cotton Bush <i>Maireana aphylla</i>.</p> <p>Ground stratum: Ringed Wallaby Grass <i>Rytidosperma caespitosum</i>, Smallflower Wallaby Grass <i>Rytidosperma setaceum</i>, Plains Grass <i>Austrostipa aristiglumis</i>, Speargrass <i>Austrostipa scabra</i>, Corkscrew Grass <i>Austrostipa nodosa</i>, fairy Grass <i>Sporobolus caroli</i>, Spiny-fruit Saltbush <i>Atriplex spinibractea</i>, Slender-fruit Saltbush <i>Atriplex leptocarpa</i>, Creeping Saltbush <i>Atriplex semibaccata</i>, Lesser Joyweed <i>Alternanthera denticulata</i>, Woolly-heads <i>Myriocephalus rhizocephalus</i>, Common Sneezeweed <i>Centipeda cunninghamii</i>, Small White Sunray <i>Rhodanthe corymbiflora</i>, Fuzzweed <i>Vittadinia cuneata</i> var. <i>cuneata</i>.</p>	contiguous patch of the PCT that occurs to the east.			Depression, Riverina and NSW South Western Slopes bioregions	
28: White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	<p>Structure: open woodland to derived grassland</p> <p>Height: to 15 m</p> <p>Upper stratum: White Cypress Pine <i>Callitris glaucophylla</i></p> <p>Mid stratum: Buloke <i>Allocasuarina luehmannii</i>, Needlewood <i>Hakea leucomyxa</i>, Hooked Needlewood <i>Hakea tephrosperma</i></p> <p>Ground stratum: Black Bluebush <i>Maireana pyramidata</i>, <i>Maireana enchylaenoides</i>, Thorny Saltbush <i>Rhagodia spinescens</i>, <i>Tetragonia tetragonioides</i>, <i>Sclerolaena diacantha</i>, <i>Sclerolaena obliquicuspis</i>.</p>	Ground validated. Commonly recorded on sand hills and over sand lenses associated with a prior streams outside the subject land, and present in low condition as scattered trees in the eastern portion of the subject land.	Riverine sandhill woodlands	N/a	EEC - Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	N/a
44: Forb-rich Speargrass - Windmill Grass - White Top grassland of the	<p>Structure: diverse open natural grassland or derived grassland from intergraded woodland communities</p> <p>Height: 0.5 m</p> <p>Upper stratum: N/A</p> <p>Mid stratum: N/A</p>	Ground validated. Recorded in the eastern portion of the subject land where grasslands occur with a lower (sparse to very	Riverine plain grassland	CEEC - Natural Grasslands of the Murray Valley Plains (potential)	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
Riverina Bioregion	Ground stratum: Corkscrew Grass <i>Austrostipa nodosa</i> , Windmill Grass <i>Chloris truncata</i> , Ringed Wallaby Grass <i>Rytidosperma caespitosum</i> , <i>Calotis scabiosifolia</i> , <i>Sida corrugata</i> , Hairy Bluebush <i>Maireana pentagona</i> and <i>Maireana excavate</i> .	sparse) cover of chenopod shrubs such as Cotton Bush, Dillon Bush and Nitre Goosefoot				
45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Structure: tussock grassland Height: to 2 m Upper stratum: N/A Mid stratum: Tangled Lignum <i>Duma (Muehlenbeckia) florulenta</i> Ground stratum: Plains Grass <i>Austrostipa aristiglumis</i> , <i>Walwhalleya proluta</i> , Wallaby Grass <i>Rytidosperma duttonianum</i> , Curly Windmill Grass <i>Enteropogon ramosus</i> , Fairy Grass <i>Sporobolus caroli</i> , Windmill Grass <i>Chloris truncata</i> , Nardoo <i>Marsilea drummondii</i> , Early Nancy <i>Wurmbea dioica</i> subsp. <i>dioica</i> , Wiry Dock <i>Rumex dumosus</i> , Small Vanilla Lily <i>Arthropodium minus</i> , Scaly Buttons <i>Leptorhynchos squamatus</i> subsp. A, Spreading Crassula <i>Crassula decumbens</i> var. <i>decumbens</i> , Silky Goodenia <i>Goodenia fascicularis</i> , Small White Sunray <i>Rhodanthe corymbiflora</i> , <i>Swainsona</i> spp., Pale Spike-sedge <i>Eleocharis pallens</i> .	Ground validated. Recorded as a smaller patch of grassland dominated by Plains Grass in the east of the subject land.	Riverine plain grassland	CEEC - Natural Grasslands of the Murray Valley Plains (potential)	N/a	N/a
46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	Structure: open to closed tussock grassland Height: to 0.3 m Upper stratum: N/A Mid stratum: <i>Sclerolaena stelligera</i> , Bottle Bluebush <i>Maireana excavate</i> , Cottonbush <i>Maireana aphylla</i> . Ground stratum: Curly Windmill Grass <i>Enteropogon ramosus</i> , Corkscrew Grass <i>Austrostipa nodosa</i> , Speargrass <i>Austrostipa scabra</i> , Wallaby Grasses <i>rytidosperma</i> spp., Small White Sunray <i>Rhodanthe corymbiflora</i> , <i>Crassula colorata</i> var. <i>acuminata</i> , Blue Storksbill <i>Erodium crinitum</i> , <i>Oxalis perennans</i> , Hairy <i>Sida Sida</i>	Ground validated. Recorded outside the subject land where grasslands occur with a lower (sparse to very sparse) cover of chenopod shrubs such as Cotton Bush, Dillon Bush and Nitre Goosefoot	Riverine plain grassland	CEEC - Natural Grasslands of the Murray Valley Plains (potential)	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
	<i>trichopoda</i> , Corrugated Sida <i>Sida corrugata</i> , <i>Goodenia pusilliflora</i> , <i>Goodenia fascicularis</i> , Rough burr-daisy <i>Calotis scabiosifolia</i> var. <i>scabiosifolia</i> , Pale Beauty-heads <i>Calocephalus sonderi</i> , Native Leek <i>Bulbine semibarbata</i> , <i>Daucus glochidiatus</i> form G.					
58: Black oak-western rosewood open woodland on deep sandy loams	<p>Structure: low open woodland or isolated clumps</p> <p>Height: to 7 m</p> <p>Upper stratum: Black Oak <i>Casuarina pauper</i></p> <p>Mid stratum: Western Rosewood <i>Alectryon oleifolius</i> subsp. <i>canescens</i>, Sugarwood <i>Myoporum platycarpum</i> subsp. <i>platycarpum</i>, <i>Acacia oswaldii</i>, <i>Pittosporum angustifolium</i>.</p> <p>Ground stratum: Thorny Saltbush <i>Rhagodia spinescens</i>, Black Bluebush <i>Maireana pyramidata</i>, <i>Sclerolaena patenticuspis</i>, <i>Sclerolaena obliquicuspis</i>, <i>Salsola tragus</i> subsp. <i>tragus</i>, <i>Atriplex stipitate</i>, Spear Grasses <i>Austrostipa nitida</i>, <i>Austrostipa scabra</i>, <i>Austrostipa elegantissima</i>.</p>	Modelled only	Riverine sandhill woodlands	N/a	N/a	N/a
153: Black bluebush low open shrubland of the alluvial plains and sand plains	<p>Structure: variable shrubland</p> <p>Height: to 1.3 m</p> <p>Upper stratum: N/A</p> <p>Mid stratum: Black Bluebush <i>Maireana pyramidata</i>, Bladder Saltbush <i>Atriplex vesicaria</i>, Dillon Bush <i>Nitraria billardierei</i>, Old Man Saltbush <i>Atriplex nummularia</i>, Thorny Saltbush <i>Rhagodia spinescens</i>.</p> <p>Ground stratum: <i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>, <i>Hyalosperma semisterile</i>, Eastern Flat-top Saltbush <i>Atriplex lindleyi</i>, Grey Copperburr <i>Sclerolaena diacantha</i>, Pigmy Sunray <i>Rhodanthe pygmaea</i>, Spear-grass <i>Austrostipa scabra</i>, Water Weed <i>Osteocarpum acropterum</i>.</p>	Modelled only. The modelled presence of this PCT in the broader landscape suggests areas currently occurring as grassland PCTs (44, 45, 46) may have once compromised areas of saltbush shrublands prior to historical grazing.	Aeolian chenopod shrublands	N/a	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
157: Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion	<p>Structure: variable shrubland</p> <p>Height: to 0.9 m</p> <p>Upper stratum: Mostly not present except for occasional Weeping Myall <i>Acacia pendula</i> or Black Oak <i>Casuarina pauper</i> isolated trees.</p> <p>Mid stratum: Bladder Saltbush <i>Atriplex vesicaria</i>, Desert Glasswort <i>Pachycornia triandra</i>, Three-spined Copperburr <i>Sclerolaena tricuspidis</i>, Poverty Bush <i>Sclerolaena intricate</i>, Pigface <i>Disphyma crassifolium</i> subsp. <i>Clavellatum</i>, Slender Glasswort <i>Sclerostegia tenuis</i>, <i>Sclerolaena brachyptera</i>, <i>Sclerolaena tenuis</i>, Black Cotton Bush <i>Maireana decalvans</i>, Cotton Bush <i>Maireana aphylla</i>, Soft Horns <i>Malacocera tricornis</i>, <i>Dissocarpus biflorus</i> var. <i>biflorus</i>, <i>Atriplex lindleyi</i>, <i>Atriplex pseudocampanulata</i>, Dillon Bush <i>Nitraria billardiarei</i>, Desert Glasswort <i>Pachycornia triandra</i>.</p> <p>Ground stratum: Windmill Grass <i>Chloris truncata</i>, Smallflower Wallaby Grass <i>Rytidosperma setaceum</i>, Fairy Grass <i>Sporobolus caroli</i>, <i>Minuria cunninghamii</i>, <i>Brachyscome smithwhitei</i>, Small White Sunray <i>Rhodanthe corymbiflora</i>, <i>Calandrinia volubilis</i>.</p>	<p>Modelled only. The modelled presence of this PCT in the broader landscape suggests areas currently occurring as grassland PCTs (44, 45, 46) may have once compromised areas of saltbush shrublands prior to historical grazing.</p>	Riverine chenopod shrublands	N/a	N/a	N/a
159: Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	<p>Structure: tall shrubland</p> <p>Height: to 2.5 m</p> <p>Upper stratum: Dominated by Old Man Saltbush <i>Atriplex nummularia</i>.</p> <p>Mid stratum: Chenopod shrub layer dominated by bluebushes such as <i>Maireana microcarpa</i>, <i>Maireana appressa</i>, <i>Maireana pyramidata</i> and <i>Maireana brevifolia</i>, Thorny Rhagodia <i>Rhagodia spinescens</i>, Bladder Saltbush <i>Atriplex vesicaria</i> and Nitre Goosefoot <i>Chenopodium nitrariaceum</i>.</p> <p>Ground stratum: Low ground shrubs include <i>Dissocarpus biflorus</i>, <i>Atriplex lindleyi</i> and a number of copperburr species</p>	<p>Ground validated. Recorded at one location as a large stand relatively near the homestead (outside the subject land). Whether this is a naturally occurring example of this PCT, or planted is yet to be determined.</p>	Riverine chenopod shrublands	N/a	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
	(<i>Sclerolaena</i> spp.). Forb species include <i>Senecio runcinifolius</i> , <i>Brachyscome lineariloba</i> , <i>Geococcus pusillus</i> , <i>Calandrinia eremaea</i> , <i>Bulbine bulbosa</i> , <i>Tetragonia tetragonioides</i> , <i>Crassula colorata</i> var. <i>colorata</i> , <i>Crassula sieberiana</i> subsp. <i>sieberiana</i> and <i>Osteocarpum acropterum</i> var. <i>deminuta</i> ; grass species include <i>Chloris truncata</i> , <i>Austrodanthonia caespitosa</i> , <i>Austrostipa nodosa</i> and <i>Walwhalleya proluta</i> .					
160: Nitre Goosefoot shrubland wetland on clays of the inland floodplains	<p>Structure: open to closed shrubland</p> <p>Height: to 2 m</p> <p>Upper stratum: N/A</p> <p>Mid stratum: Nitre Goosefoot <i>Chenopodium nitrariaceum</i> with occasional Dillon Bush <i>Nitraria billardierei</i> and Lignum <i>Duma (Muehlenbeckia) florulenta</i>.</p> <p>Ground stratum: <i>Tecticornia tenuis</i>, Common Sneezeweed <i>Centipeda cunninghamii</i>, Creeping Saltbush <i>Atriplex semibaccata</i>, Eastern Flat-top Saltbush <i>Atriplex lindleyi</i>, Mossgiel Daisy <i>Brachyscome papillosa</i>, Pale Spike Sedge <i>Eleocharis pallens</i>, Small White Sunray <i>Rhodanthe corymbiflora</i>, Short-wing Saltbush <i>Sclerolaena brachyptera</i>.</p>	Ground validated. Recorded as a number of patches within the subject land as more frequently inundated vegetation along minor drainage lines.	Ephemeral wetland (wetter and drier sub-types)	N/a	N/a	N/a
163: Dillon bush (Nitre bush) shrubland	<p>Structure: open shrubland</p> <p>Height: to 1.5 m</p> <p>Upper stratum: N/A</p> <p>Mid stratum: Dillon Bush <i>Nitraria billardierei</i>, Black Bluebush <i>Maireana pyramidata</i>, Bladder Saltbush <i>Atriplex vesicaria</i>, Cotton Bush <i>Maireana aphylla</i>, Old Man Saltbush <i>Atriplex nummularia</i>, Nitre Goosefoot <i>Chenopodium nitrariaceum</i>.</p> <p>Ground stratum: <i>Atriplex pseudocampanulata</i>, <i>Sclerolaena obliquicuspis</i>, <i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>, <i>Sida intricata</i>, Black Rolypoly <i>Sclerolaena muricata</i> var. <i>villosa</i>, Spider-</p>	Ground validated. Recorded occasionally outside the subject land	Open chenopod shrubland	N/a	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
	grass <i>Enteropogon acicularis</i> , Eastern Flat-top Saltbush <i>Atriplex lindleyi</i> , Short-wing Saltbush <i>Sclerolaena brachyptera</i> , Ringed Wallaby Grass <i>Rytidosperma caespitosum</i> .					
164: Cotton Bush open shrubland of the semi-arid (warm) zone	<p>Structure: open shrubland/herbland/grassland Height: to 1 m Upper stratum: N/A Mid stratum: Baldoo <i>Atriplex lindleyi</i>, <i>Atriplex eardleyae</i>, Angular Saltbush <i>Atriplex angulata</i>, Babbagia <i>Osteocarpum acropterum</i> var. <i>deminuta</i>, Pop Saltbush <i>Atriplex holocarpa</i>, Tangled Copperburr <i>Sclerolaena divaricata</i>, Tangled Poverty Bush <i>Sclerolaena intricata</i>, <i>Sclerolaena brachyptera</i>, Green Copperburr <i>Sclerolaena decurrens</i>, Grey Copperburr <i>Sclerolaena diacantha</i>, <i>Sclerolaena stelligera</i>, Salt Copperburr <i>Sclerolaena ventricosa</i>, Goathead Copperburr <i>Sclerolaena bicornis</i>, Cottonbush <i>Maireana aphylla</i>, Fissure Weed <i>Maireana ciliata</i>, Crown Fissure-weed <i>Maireana coronata</i>, Satiny Saltbush <i>Maireana turbinata</i>. Ground stratum: Common White Sunray <i>Rhodanthe floribunda</i>, Variable Dasiy <i>Brachyscome ciliaris</i>, Common Poison Pea <i>Swainsona affinis</i>, <i>Swainsona campylantha</i>, Neverfail grass <i>Eragrostis setifolia</i>.</p>	Ground validated. Commonly recorded throughout the subject land	Open chenopod shrubland	N/a	N/a	N/a
165: Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone	<p>Structure: mid-high open chenopod shrubland and/or very open woodland Height: to 1 m Upper stratum: Western Rosewood <i>Alectryon oleifolius</i>, Poplar Box <i>Eucalyptus populnea</i> subsp. <i>bimbil</i>, Black Box <i>Eucalyptus largiflorens</i>, Coolabah <i>Eucalyptus coolabah</i>. Mid stratum: Black Roly Poly <i>Sclerolaena muricata</i>, Goathead Burr <i>Sclerolaena bicornis</i>, Galvanised Burr <i>Sclerolaena birchii</i>, Buckbush <i>Salsola kali</i>, Small-leaf Bluebush <i>Maireana</i></p>	Modelled only.	Riverine plain grassland	N/a	N/a	N/a

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
	<p><i>microphylla</i>, Slender-fruit Saltbush <i>Atriplex leptocarpa</i>, Black Bluebush <i>Maireana pyramidata</i>.</p> <p>Ground stratum: Rat's Tail Couch <i>Sporobolus mitchellii</i>, Spider-grass <i>Enteropogon acicularis</i>, Tarvine <i>Boerhavia dominii</i>, Windmill Grass <i>Chloris truncata</i>, Native Millet <i>Panicum decompostum</i>, Fairy Grass <i>Sporobolus caroli</i>, Common Nardoo <i>Marsilea drummondii</i>, <i>Goodenia fascicularis</i>, Quena <i>Solanum esuriale</i>.</p>					
<p>216: Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion</p>	<p>Structure: low to high open chenopod shrubland Height: to 1 m Upper stratum: Occasional scattered Black Box <i>Eucalyptus largiflorens</i> Mid stratum: Black Roly Poly <i>Sclerolaena muricata</i> var. <i>semiglabra</i>, Grey Copperburr <i>Sclerolaena diacantha</i>, Small-leaf Bluebush <i>Maireana microphylla</i>, Woolly Buttons <i>Leiocarpa panaetioides</i>, Forest Germander <i>Teucrium racemosum</i>. Ground stratum: Creeping Saltbush <i>Atriplex semibaccata</i>, Fuzzweed <i>Vittadinia cuneata</i>, Winged New Holland Daisy <i>Vittadinia pterochaeta</i>, Small White Sunray <i>Rhodanthe corymbiflora</i>, Hairy Sida <i>Sida trichopoda</i>, Austral Cranesbill <i>Geranium solanderi</i> var. <i>solanderi</i>, Speargrass <i>Austrostipa scabra</i> subsp. <i>scabra</i>, Ringed Wallaby Grass <i>Rytidosperma caespitosum</i>, <i>Walwhalleya proluta</i>, Windmill Grass <i>Chloris truncata</i>.</p>	<p>Modelled only.</p>	<p>Riverine chenopod shrublands</p>	<p>N/a</p>	<p>N/a</p>	<p>N/a</p>

PCT	Description	Ground validated or modelled only	Corresponding habitat type	EPBC Act	BC Act	BAM SAI
Modified land (non-PCT)	<p>Structure: variable structure depending on land use history ranging from heavily cultivated areas with high proportion of bare ground to regenerating native vegetation dominated by indigenous grasses and chenopods.</p> <p>Height: to 0.2 m</p> <p>Upper stratum: N/A</p> <p>Mid stratum: occasional regeneration of <i>Lignum Duma (Muehlenbeckia) florulenta</i>, Dillon Bush <i>Nitraria billardierei</i>, Nitre Goosefoot <i>Chenopodium nitrariaceum</i>, Thorny Saltbush <i>Rhagodia spinescens</i>.</p> <p>Ground stratum: <i>Sida intricata</i>, <i>Vittadinia cervicalis</i>, <i>Walwhalleya proluta</i>, Black Rolpoly <i>Sclerolaena muricata</i> var. <i>muricata</i>, <i>Sclerolaena muricata</i> var. <i>villosa</i>, <i>Sclerolaena muricata</i> var. <i>semiglabra</i>, Soft Rolpoly <i>Salsola tragus</i>, Eastern Flat-top Saltbush <i>Atriplex lindleyi</i>, Giant Redburr <i>Sclerolaena tricuspis</i>, Quena <i>Solanum esuirale</i>. Cotton Bush <i>Maireanna aphylla</i>, Grey Germander <i>Teucrium racemosum</i>, Slender-fruit Saltbush <i>Atriplex leptocarpa</i>,</p> <p>Associated weed species: Spear Thistle <i>Cirsium vulgare</i>, Patterson's Curse <i>Echium plantagineum</i>, Barley Grass <i>Hordeum</i> spp., Burr Medic <i>Medicago polymorpha</i>, Bathurst Burr <i>Xanthium spinosum</i>, Oats <i>Avena</i> spp., Arabian Grass <i>Schismus barbatus</i>.</p>	<p>Ground validated. Modified land occurs in areas subject to higher levels of use relating to agricultural activities.</p>	<p>Irrigated cropping land, Dryland cropping, grazing land, disturbed areas</p>	<p>N/a</p>	<p>N/a</p>	<p>N/a</p>

4.3 Threatened ecological communities

4.3.1 Myall Woodland

Myall Woodland is a EPBC Act and BC Act listed EEC dominated by Weeping Myall *Acacia pendula*. The community structure can vary from low woodland and low open woodland to low sparse woodland or open shrubland, depending on disturbance history, soils, and topographical and ecological influence. The tree layer grows up 10 metres with Weeping Myall as either a dominant species or the only tree species present. The understorey consists of an open chenopod shrub layer including other woody plant species with an open to complete groundcover of herbs and grasses.

Myall Woodland occurs on alluvial plains on red-brown earths and heavy textured grey and brown alluvial soils. Within the subject land, the community occurs in moderately large patches and smaller isolated stands ranging from high to low/moderate condition, and as more scattered trees over derived grasslands, on sandplains across the northern portion of the site.

Within the subject land areas of PCT 26 meet the condition thresholds for listing of the BC Act listed Myall Woodlands. However not all condition zones of PCT 26 within the subject land are likely to meet the condition thresholds for listing under the EPBC Act. Listing criteria for the EPBC Act listed Myall Woodland includes:

- Tree canopy dominated (at least 50% of trees present) by living, dead or defoliated Weeping Myall *Acacia pendula* trees; and
- Overstorey must have at least 5% tree canopy cover or at least 25 dead or defoliated mature Weeping Myall trees/hectare; and
- Area is at least 0.5 hectares in size; and
- The patch has either:
 - More than two layers of regeneration of Weeping Myall present; or
 - The tallest layer of living, dead or defoliated Weeping Myall trees are at least four metres tall, and of the vegetative cover present, 50% is comprised of native species.

Figure 2 details areas considered to potentially meet the condition thresholds for EPBC Act listing and all areas of BC Act listing.

4.3.2 Natural Grasslands of the Murray Valley Plains

Natural Grasslands of the Murray Valley Plains is an EPBC Act listed CEEC dominated by Spear Grasses *Austrostipa* spp., Wallaby Grasses *Rytidosperma* spp. and Spider Grass *Enteropogon ramosus*. The ecological community may also be dominated or co-dominated by a range of forb species (McDougall et al 1994), depending on seasonality and disturbance history. The ecological community ranges from open to closed tussock grassland. In areas where grasses are sparse, the community may be a herbland/forbland. In other areas, the community may be an open grassy shrubland where low chenopod shrubs are co-dominant with grasses (DSE 2004b).

Natural Grasslands of the Murray Valley Plains occurs generally within a mosaic of woodlands and naturally occurring grasslands on flat alluvial lowland plains with heavy-textured grey, brown and red clays. Extant grasslands derived from the historical removal of open woodlands or chenopod shrublands (through clearing or overgrazing) do not represent an occurrence of the CEEC. Within the subject land, the community could potentially occur on alluvial plains where soils are heavier and less well-drained in the central and south-western extents of the site.

Further assessment of the origin of extant grasslands across the subject land is required to determine the presence/absence of the Natural Grasslands of the Murray Valley Plains CEEC. Within the subject land grasslands occur as predominantly grassy areas with a sparse to very sparse cover (<5% cover) of chenopod shrubs, such as Cotton Bush or Dillon Bush, as well as areas where chenopods and other woody plants occur at higher levels. Grasslands derived from former Myall, Pine and Black box woodlands occur across the subject land, and additional areas of grassland potentially derived from former chenopod shrublands, dominated by species such as Black Bluebush, Old Man Saltbush and Bladder Saltbush, may also exist. The historical presence of these chenopod shrublands is supported by the presence of SVTM modelled PCTs occurring within and surrounding the subject land in vegetation/landscape patterns similar to those where areas of grassland occur within the subject land. Furthermore, it is noted in BioNet that the presence of species such as Cotton Bush and Nitre Goosefoot (in drier habitats) indicate a history of overgrazing, and the potential occurrence of grasslands/shrublands derived from former woodland chenopod shrubland communities. A large stand of Old Man Saltbush shrubland occurs to the west of the subject land, further indicating the possible historical presence of chenopod shrublands, however it is possible that the patch of Old Man Saltbush is planted in origin, and requires clarification.

Nonetheless it is possible that areas of naturally occurring grasslands, conforming to Natural Grasslands of the Murray Valley Plains, exist within the subject land with large grassy areas, supporting a very sparse cover of woody shrubs present in the central and western portions of the site. Further detailed investigation is required to resolve the original vegetation likely to have been present in these areas.

Within the subject land, PCT 44, 45 and 46 have the potential to meet the condition thresholds for listing of this TEC.

4.3.3 Sandhill Pine Woodland

Sandhill Pine Woodland is a BC Act Endangered Ecological community dominated by White Cypress Pine *Callitris glaucophylla*. This community is not an EPBC Act listed community. The community is characterised by an open cover of trees, which may be reduced to isolated individuals or may be absent as a result of past clearing and regenerative failure. The tree layer is dominated by *C. glaucophylla*, primarily in pure stands but sometimes with a range of less abundant trees or tall shrubs. The structure and species composition of the community varies depending on disturbance history and temporal variability in rainfall.

Sandhill Pine Woodland occurs on aeolian stream source-bordering dunes on red-brown loam sands with alkaline sub-soils. Within the subject land, the community is found as extensive dune patches across the south-western extent of the site.

Within the subject land PCT 19 may meet the condition thresholds for listing of this TEC.

4.4 Threatened species

Background searches identified five threatened flora species and 29 threatened fauna species as being recorded (EES 2023) or predicted to occur (Commonwealth of Australia 2023) within 20 kilometres of the subject land (the locality). Furthermore, based on the PCTs confirmed present within the subject land, and those additional modelled PCTs conservatively included in the BAM Calculator case, a total of 33 candidate species credit species and 36 predicted ecosystem credit species, have been generated as potentially occurring within the subject land.

Review of relevant contemporary biodiversity studies, including the Project Energy Connect BDAR (WSP 2022) which overlaps with the subject land, confirmed records of four of the potentially occurring threatened flora species, and two of the potentially occurring threatened fauna species, within or in close proximity to the subject land. The potential presence of other threatened species has considered the findings of, and regulator responses to, other contemporary biodiversity assessments as listed in Section 3.2.

4.4.1 BAM species credit species

Table 5 below provides a preliminary assessment of potential occurrence of candidate species credit species within the subject land. This assessment is based on the PCTs confirmed present within the subject land, and those additional modelled PCTs conservatively included in the BAM Calculator case, and provides a list of relevant habitat or geographic constraints not present at the subject land (or outside the locality of the subject land), as well as a brief analysis of species records.

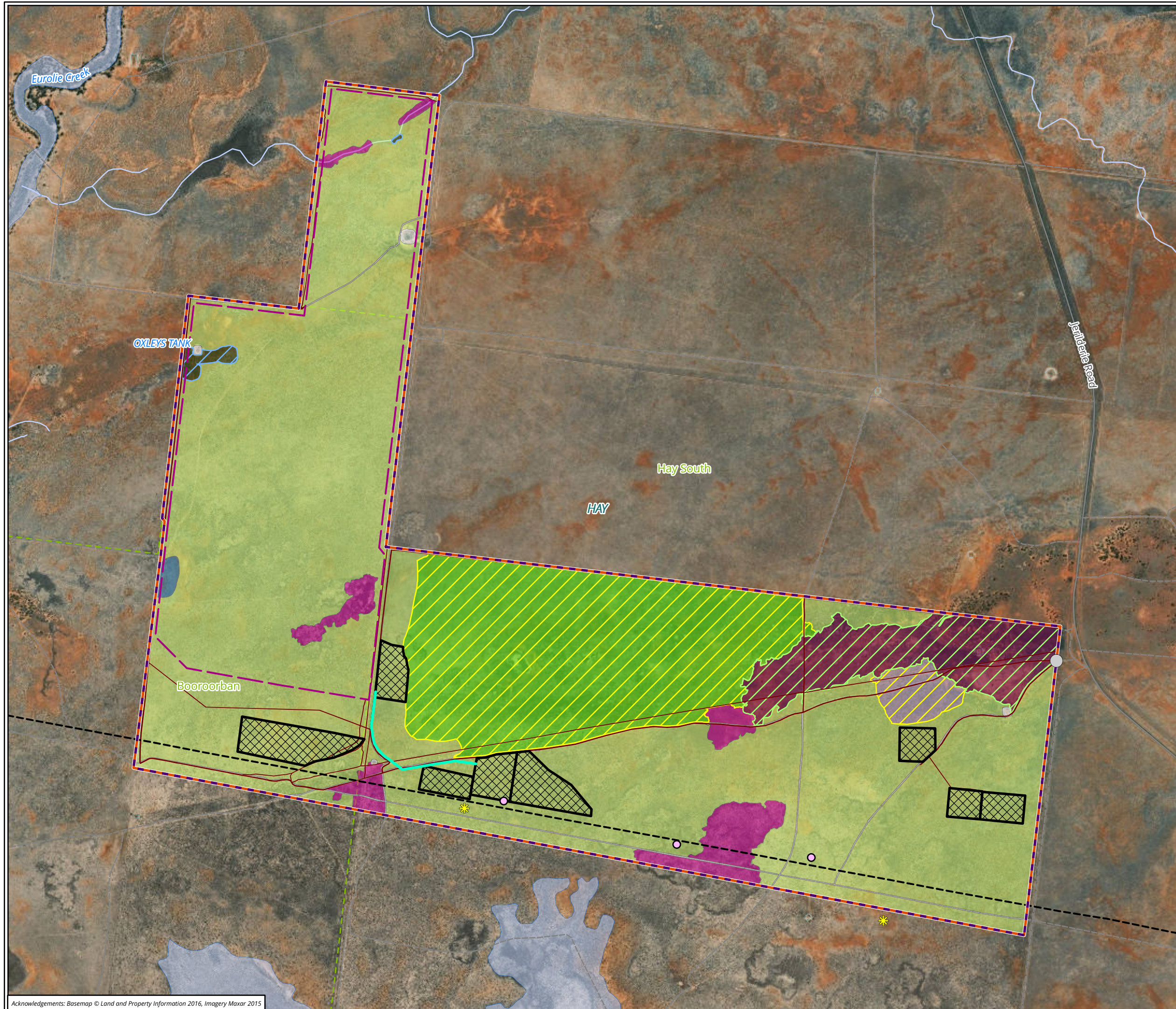
A preliminary likelihood of occurrence is then provided for each candidate species credit species based on preliminary habitat assessments undertaken in February 2023 and each species' known extent of occurrence based partly on existing records. It should be noted that a paucity of records may be as much a product of lack of official survey in the locality, as an actual lack of occurrence.

Those candidate species credit species concluded to have a moderate or higher likelihood of occurrence within the subject land are considered to have a higher likelihood of being impacted by the project.

Table 5 Preliminary assessment of potential occurrence of BAM candidate species credit species within and surrounding the subject land

Scientific name	Common Name	Listing		Associated PCT ID – Ground Validated														Associated PCT ID – Modelled Only				Relevant Habitat constraints / Geographic limitations	BioNet and other relevant record notes	Preliminary likelihood of occurrence within subject land (species credit habitat only)				
		EPBC Act	BC Act	10	13	15	17	23	24	26	28	44	45	46	160	163	164	16	153	157	159							
Flora – EPBC Act and BC Act listed																												
<i>Austrostipa wakoolica</i>	A spear-grass	E	E			x			x	x																	No records within 60km of the subject land, all records to the south	Moderate
<i>Brachyscome muelleroides</i>	Claypan Daisy	V	V									x	x	x													Closest record 115km to the east of the subject land near Morundah	Low – Moderate
<i>Brachyscome papillosa</i>	Mossgiel Daisy	V	V		x	x			x			x	x	x	x	x	x	x	x	x	x					Records within 10km of the subject land (PEC records close to subject land)	High	
<i>Caladenia arenaria</i>	Sand-hill Spider Orchid	E	E								x														East of Jerilderie	n/a	Negligible	
<i>Calotis moorei</i>	A burr-daisy	E	E					x																		Single historic (1913), low accuracy (25000m) record over 50km from the subject land	Low	
<i>Convolvulus tedmoorei</i>	Bindweed	E				x			x	x		x	x	x												Single historic (1969), low accuracy (10000m) record 50km from the subject land	Low	
<i>Lepidium monoplocoides</i>	Winged Peppergrass	E	E		x	x			x	x		x	x	x	x											Records within 10km of the subject land	Moderate - High	
<i>Maireana cheelii</i>	Chariot Wheels	V	V							x		x		x												Records within 5km of the subject land (PEC records close to subject land)	High	
<i>Sclerolaena napiformis</i>	Turnip Copperburr	E	E							x		x														Records centred around Jerilderie, 75km to the south-east of the subject land	Low - Moderate	
<i>Solanum karsense</i>	Menindee Nightshade	V	V		x	x	x		x							x										West of Maude	n/a	Negligible
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V			x			x	x	x	x	x			x	x									Recorded within the eastern portion of the subject land (numerous PEC records close to, and within subject land)	High	
<i>Swainsona plagiotropis</i>	Red Darling Pea	V	V							x		x	x	x												Records centred around Jerilderie, 75km to the south-east of the subject land	Low - Moderate	
Flora – BC Act listed only																												
<i>Cullen parvum</i>	Small Scurf-pea		E									x														No records on the Hay Plain, closest 60km south-east between Conargo and Jerilderie	Moderate	
<i>Eucalyptus leucoxydon subsp. pruinosa</i>	Yellow Gum		V		x	x																				Very few proximal records, single record cantered on Hay, remainder west of Moulamein (95-110km from the subject land)	Low	
<i>Leptorhynchus orientalis</i>	Lanky Buttons		E						x	x		x	x	x												Single historical (1917) records 35km from the subject land,	Low	

Scientific name	Common Name	Listing		Associated PCT ID – Ground Validated														Associated PCT ID – Modelled Only				Relevant Habitat constraints / Geographic limitations	BioNet and other relevant record notes	Preliminary likelihood of occurrence within subject land (species credit habitat only)			
		EPBC Act	BC Act	10	13	15	17	23	24	26	28	44	45	46	160	163	164	16	153	157	159						
<i>Myotis macropus</i>	Southern Myotis		V	x											x		x		x							No records on the Hay Plain, but generally surrounding the subject land	Low – Moderate
<i>Ninox connivens</i> (Breeding)	Barking Owl		V	x	x	x									x	x	x	x	x	x	x				Single historic (1985), low accuracy (10000m) record within 60km of the subject land	Low	
<i>Tyto novaehollandiae</i> (Breeding)	Masked Owl		V	x	x					x	x				x		x		x	x	x				Few historic (1955, 1982), low accuracy (1000-10000m) record within 70km of the subject land	Low	



- Legend**
- Subject land
 - Project Energy Connect alignment (assumed)
 - Subject land
- Indicative development footprint**
- Proposed photovoltaic arrays
 - Solar transmission line
 - Project area
 - Access track
 - Project access
 - Ancillary infrastructure
- PEC threatened flora records**
- Slender Darling Pea, *Swainsona murrayana*
- Threatened flora (Bionet 2023)**
- * Slender Darling Pea, *Swainsona murrayana*
- BC Act Threatened Ecological Communities**
- Sandhill Pine Woodland
- EPBC Act Threatened Ecological Communities (potential)**
- Myall Woodland
 - Natural Grasslands of the Murray Valley Plains
- Plant Community Types**
- Non-native / cleared
 - 17
 - 26
 - 28
 - 44
 - 45
 - 160
 - 164

Figure 2 MNES biodiversity values

0 0.25 0.5 0.75 1
Kilometers
Scale: 1:25,000 @ A3
Coordinate System: GDA2020 MGA Zone 55



Matter: 38557,
Date: 02 August 2023,
Prepared for: CW, Prepared by: AM, Last edited by: amackegard
Layout: Solar_F2_MNES
Project: P:\38500s\38557\Mapping\38557_PottingerEnergyPark_figures_v2.aprx

4.5 Aquatic habitats

Hydrological features occur within the subject land and broader property include channels, creeks, drainage lines and farm dams. The aquatic ecological communities within the subject land and broader locality are typified by wetland specialist and lowland river generalists, generally comprising highly modified watercourses, altered flow regimes, channel formation, diversions and removal or modification of riparian vegetation. Nevertheless, during peak periods and overflow, parts of subject land and surrounds provide significant habitat for a diverse range, and large number of species.

Aquatic and riparian areas provide a valuable and often essential resource for fauna and flora species. Within the subject land, aquatic habitats are considered to be in poor condition state generally, and provide sub-optimal to optimal habitat for aquatic species. However, this may include during a wetter season, important habitat for a range of wetland and migratory bird species.

Three main watercourses exist with Nyangay Creek and Eurolie Creek traversing to the west of the subject land in a north-east to south-west manner, flowing nearly in parallel, with Coleambally Outfall Drain, a concrete-lined irrigation channel, flowing generally east to west to the south of the subject land, to its confluence with Eurolie Creek. Two large naturally occurring wetland areas, dominated by Nitre Goosefoot shrublands, occur closer to the subject land. These wetlands were saturated during the field investigations undertaken in February 2023, and both were found to be providing habitat to a large number of waterbirds at the time. A number of small to moderate sized farm dams occur across the broader property, however of particular note is the large (400 metres x 400 metres approx.), elevated irrigation dam present at the confluence of the Coleambally Outfall Drain and Eurolie Creek.

Silver Perch, Murray Cod and Flathead Galaxias were identified during the desktop assessment as containing known habitat within 30 kilometres of the subject land. A preliminary assessment has confirmed no suitable habitat is present for the Murray Cod within the subject land. Flathead Galaxias is indicated under the NSW DPI Threatened Freshwater Species mapping as occurring within the Coleambally Outfall Drain connected to Eurolie Creek adjacent to the subject land. The Silver Perch is mapped as indicated within Eurolie Creek within the subject land and in the adjacent connected Coleambally Outfall Drain.

All native fish and aquatic invertebrates within all natural creeks, rivers, and associated lagoons, billabongs and lakes in the area are considered to be part of the FM Act listed threatened ecological community - *Aquatic ecological community in the natural drainage system of the lower Murray River catchment*.

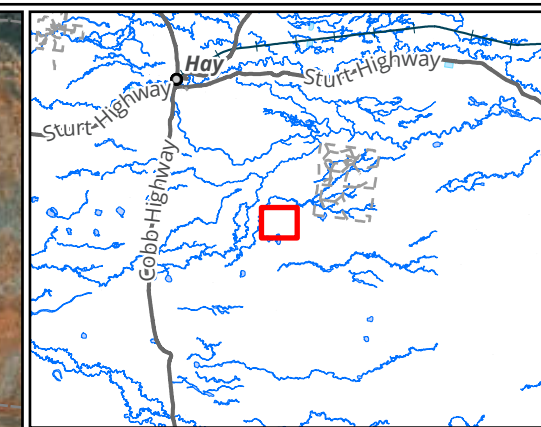
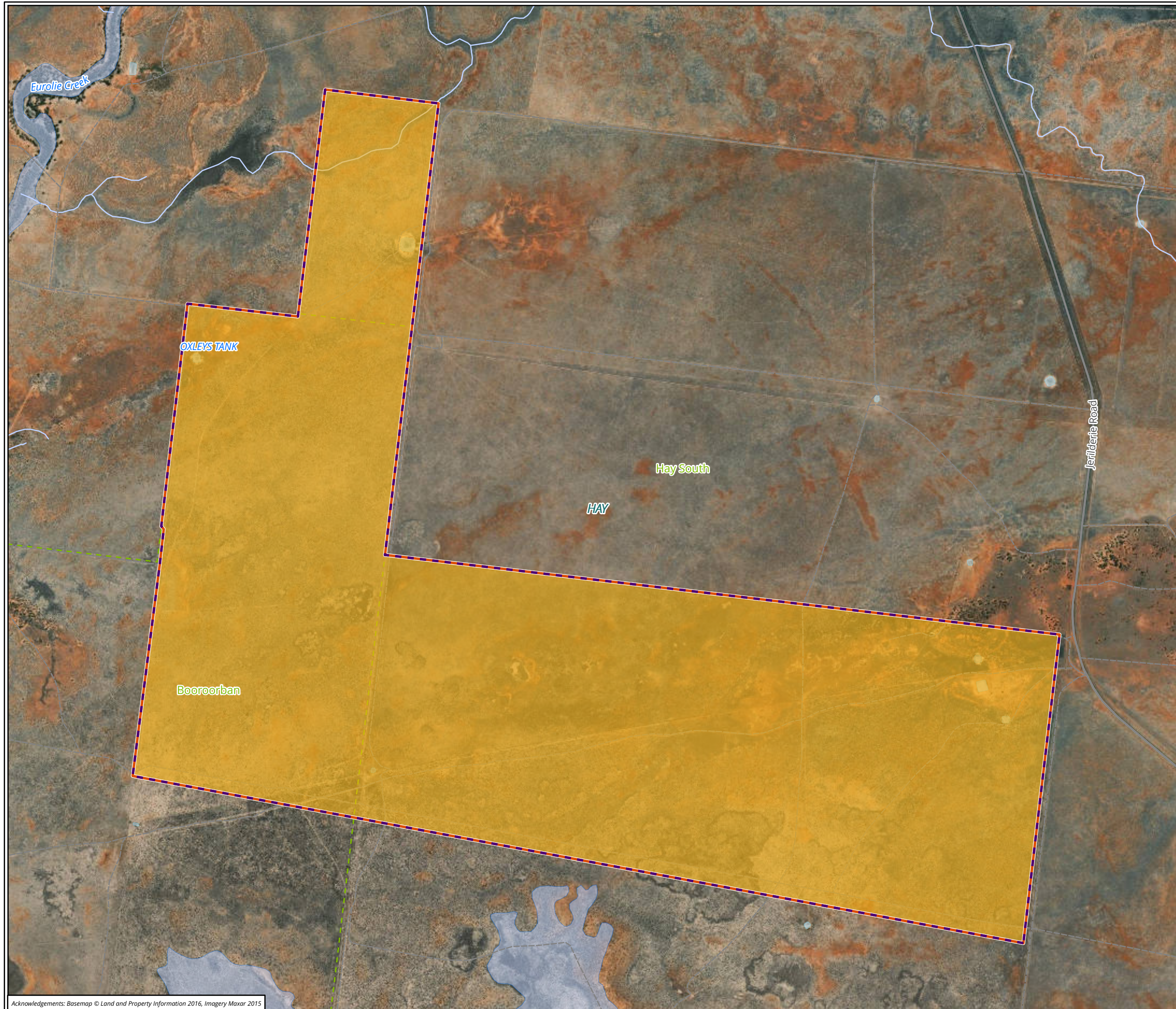
4.6 Land category assessment

The BC Act determines that the BAM is to exclude the assessment of the impacts of clearing native vegetation on Category 1 - exempt land. As the Category 1 Land regulatory maps are not yet publicly available, a preliminary assessment of whether cleared areas within the subject land meet the definition of the Category 1 exempt land was undertaken. Based on 2013 (OEH, 2014) and 2017 Landuse Datasets (OEH, 2017), NSW Woody Vegetation extent and foliage projection cover datasets (OEH, 2015), Native Vegetation Regulatory Mapping (NVRM) and historical aerial imagery, approximately 1,400 hectares of land within the broader property is considered to be classed as Category 1 exempt land (Figure 3).

The majority of this Category 1 exempt land is associated with cropping land in western portion of the site. Another large area occurs along the northern site boundary west of Nyangay Creek, which has recently been subject to large scale replanting of eucalypts for carbon sequestration over an area of approximately 250 hectares. Three smaller patches of Category 1 exempt land exists near the homestead (in areas excluded from potential development due to non-biodiversity related requirements), associated with the large irrigation dam off the Coleambally Outfall Drain and a very small area adjacent to Nyangay Creek. These

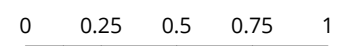
areas are exempt from further assessment in the BAM with exception to prescribed impacts as stated in Section 6.3 of the BC Act, however there is currently no development proposed for these areas.

The LCA has been undertaken for NSW state approvals process, and is provided here to provide context to assessment under the EPBC Act only.



- Legend**
- Subject land
 - Project area
- Land category**
- Cat 2 - Regulated

Figure 3 Land category assessment (Biosis)



Scale: 1:25,000 @ A3
 Coordinate System: GDA2020 MGA Zone 55



Matter: 38557,
 Date: 02 August 2023,
 Prepared for: CW, Prepared by: AM, Last edited by: amackegard
 Layout: Solar_F3_LandCat
 Project: P:\38550s\38557\Mapping\38557_PottingerEnergyPark_figures_v2.aprx

5 Preliminary impact assessment and next steps

5.1 Biodiversity values and potential impacts

Biodiversity values and potential impacts presented herein are based largely on the ground validated results of the field investigations completed in February 2023, with some areas outside the extent of the subject land (and the broader areas assessed during February 2023), subject to constraints based on modelled vegetation (Riverina SVTM) only. The subject land supports a range of biodiversity values with only the more degraded areas in the north-eastern corner considered of lower risk of impact. This is due to almost the entirety of the subject land supporting native vegetation. Higher risk areas are associated with TECs including Myall Woodland, Sandhill Pine Woodland (although present in lower condition) and the potential occurrence of Natural Grasslands of the Murray Valley Plains. Ongoing application of the principles of avoid, minimise and mitigate will be essential in development of a project design with further detailed surveys to be completed as part of the BDAR.

There are however, opportunities to locate project infrastructure in areas considered to be of lower risk to biodiversity values, albeit generally still within areas of native vegetation. Such areas include where historical land management practices have led to lower condition grassy / chenopod shrubland areas, less likely to support habitat for threatened species. Biodiversity constraints have been presented on a worst case scenario basis to allow for consideration of impact minimisation over the life of the project, and strategies are likely to be able to be developed that balance impact minimisation with maximising the benefits a project of this nature can provide.

The development and operation of the solar farm creates the potential to negatively impact threatened species and TECs listed under the EPBC Act and BC Act through direct and indirect impacts on habitats. The main potential impacts regarding the construction and operation of the Project that require assessment include:

- Clearing of TECs and the associated impacts to native species, in particular threatened and migratory species.
- Increased habitat fragmentation.
- Injury and mortality to fauna from vegetation clearing and vehicle strikes.
- Changes to floodplain and wetland hydrology and function.

The subject land currently supports a mix of native vegetation cover subject to broad-acre grazing. Impacts on native vegetation, native fauna and terrestrial ecosystems are likely to occur as a result of the Project. The construction of solar array infrastructure, access roads and associated facilities for the operation of the Project would require clearing of vegetation and some reshaping of the topography and landscape. These activities may result in a direct and long-term impact on the occurrence, extent and coverage of native vegetation, including threatened species habitat and ecological communities.

Indirect impacts including the loss of feeding, refuge and breeding habitat for native fauna, particularly threatened fauna, may also occur, including habitat fragmentation and the loss of habitat connectivity.

Direct and indirect impacts during the construction phase may include clearing, changes to water flow/floodplains, sedimentation, dust deposition, erosion, weed introduction and / or spread, vehicle / machinery strike, light and noise pollution, shading and vibration from the movement of equipment and

vehicles. Cumulative impacts may also occur in the context of development in the broader area, with other wind projects proposed in the local landscape within the South-West REZ.

Civil works constraints

Modelled biodiversity constraints for civil works associated with the Project have been developed in accordance with the hierarchy and method outlined in Table 2 and are illustrated on Figure 4 below. Higher level constraints for solar farms (i.e. solar arrays, roads, hardstands, transmission line towers, ancillary facility etc.), generally relate to direct and indirect impacts to TECs, threatened species populations and habitats, and areas of native vegetation.

The Project will avoid areas of high constraints comprising areas mapped as TECs (or potential TECs) listed under state or Commonwealth legislation wherever possible to ensure the EPBC Act and BC Act requirement for avoidance and minimisation of impacts to biodiversity values is implemented. Mapped (potential) TECs include areas of the EPBC Act listed Critically Endangered Natural Grasslands of the Murray Valley Plains, which has the potential to occur in areas of natural grasslands across the subject land. Further detailed data collection is required to confirm the presence/absence of this TEC within the subject land, however all areas of potential TEC have been conservatively mapped as the TEC to ensure avoidance and minimisation of impacts is considered in these areas from the outset of project design.

Impacts to treed PCTs, particularly those within proximity of a watercourse have the potential to directly and indirectly impact upon breeding habitat for bird and microbat species, as well as the state and Commonwealth listed Southern Bell Frog. Furthermore, the Riverina is known to support a large number of significant wetlands (NPWS 2003), and the landscape surrounding the subject land supports wetland habitats that can act as stepping stones between larger more significant wetland habitats. Impact minimisation strategies such as maintenance of infrastructure-free flyways (including over-head powerlines) during project design will be required to minimise Project specific and cumulative impacts. Moderate level constraints for solar farm projects, include the risk of impact associated with overhead powerline collisions, particularly for threatened and protected bird and bat species. Impacts of this nature are considered indirect, and will be minimised wherever possible.

Measures implemented during early project design, as detailed below in Section 5.3, have reduced the potential for the Project to result in the above higher risk impacts, and efforts will continue through future project design to further avoid and minimise impacts associated with the Project.

The current biodiversity constraints model does not specifically attribute constraints to existing records of threatened flora and fauna species. This is due to items such as issues with the scale at which the modelling was undertaken, the transient nature of threatened species records, and the use of native vegetation as suitable surrogates for threatened species related constraints during the early stages of project design. Following further detailed field survey, existing population of threatened species and/or higher condition habitats will form part of avoidance and minimise considerations and will represent specific biodiversity constraints to be considered.

All native vegetation (not highlighted as part of the above constraints) remains a moderate constraint due to the legislative requirements to avoid and minimise impacts, and the potential for threatened species to occur. However, locating project infrastructure within areas of moderate and low constraints is considered most suitable and is likely to result in the least amount impacts to biodiversity values. In locating project infrastructure in these areas, the potential for more significant or substantial impacts will be minimised and the operational phase of the solar farm is less likely to be subject to ongoing impact minimisation measures.

5.1.1 EPBC Act listed species and communities (MNES)

This preliminary assessment has determined the following key EPBC Act related risks to the proposed solar farm development are:

- Threatened Ecological Communities:
 - Myall Woodlands
 - Natural Grasslands of the Murray Valley Plains (to be confirmed as present)
- Threatened species:
 - Plains Wanderer

Weeping Myall Woodlands

Weeping Myall Woodlands occurs within the subject land as both the BC Act listed and EPBC Act listed community in the form of PCT 26. Further field investigations are required to confirm which areas of PCT 26 met the condition thresholds for listing of Myall Woodlands under the EPBC Act, refer to Table 6.

All area of potential Weeping Myall Woodland (PCT 26) are considered a high constraint for this project.

Natural Grasslands of the Murray Valley Plains

The Natural Grasslands of the Murray Valley Plains TEC has the potential to occur within the subject land due to its association with PCT 44, 45 and 46. This TEC is limited to specific types of grasslands, the diagnostic features for this grassland TEC must include:

- Does the patch of grassland have the following characteristics:
 - Located primarily within the Riverina, Wimmera plains, Murray Darling Depression bioregions, with outlying occurrences in the NSW south western slopes bioregion.
 - Typically occurs on a landscape of flat alluvial lowland plains with heavy textured-grey, brown and red clays.
 - Naturally treeless and shrubless, or with very sparse trees or shrubs.
 - Have a diversity of native grasses and forbs, with small chenopods (<1m) mixed between
- Are the trees and large shrubs sparse, such that woody cover is no greater than 10% projective foliage cover?
- Is there greater native plant cover than perennial exotic plant cover in the ground layer?
- Is the patch at least 0.04 hectares?
- Are there at least 15 native plants in the ground layer, including 1 indicator species from Table 1 of the Farming and Nationally Protected Grasslands of the Murray Valleys Plains publication (DoSEWPC 2012).

If any of these characteristics are not present, the absence of this TEC may be justified. It is important that surveys in grassland areas within the subject land are completed to confirm the presence or absence of this TEC. The preliminary investigations indicate this TEC is likely to be present, confirmation of presence or absence of this TEC will occur through assessment of the BAM Vegetation Integrity Plot species richness data in-line with the conservation advice for this TEC.

To assist in the preservation of this TEC, the conservation advice recommends a 30 metre buffer zone from the extent of the outer patch (DoSEWPC 2012).

Plains Wanderer

Plains Wanderer is likely to hold the highest EPBC Act threatened species significant impact risk for the project. Mapped important habitat under the BAM for the species has been identified, alongside this a number of recent records for this species are present throughout a 10 kilometre buffer of the subject land, including records linking the subject land directly to a known population of Plains Wanderer within Oolambeyan National Park.

Plains Wanderer is traditionally associated with the grassland PCTs (PCT 44,45,46) occurring within the subject land, and is also known to occur in a number of habitats fringing grassland areas and within saltbush communities (i.e. PCT 164 Cottonbush Shrubland). Initial biodiversity constraints have recommended all areas of mapped important habitat under the BAM are avoided as a No-Go areas for development, however thorough assessment of this species' presence will be required and completed during the BDAR process. This process will include mapping of suitable habitat, targeted surveys and detailed recommendations to continue to apply the avoid and minimise impact principles to this Critically Endangered EPBC Act listed species.

It is important to note that Plains Wanderer is also a Serious and Irreversible impacts (SAIL) listed species under the BAM.

SAIL are defined by the BC Act as an impact that the NSW consent authority considers likely to significantly increase the extinction risk of a threatened species or ecological community. Under section 9.1 of the BAM, the consent authority is responsible for determining if a SAIL impact is likely to occur. Impacts to SAIL species will be assessed as part of the BDAR process under the BAM.

5.2 Direct and indirect impacts

5.2.1 Estimated direct impacts to biodiversity values

The indicative development footprint has been developed following initial efforts to avoid and minimise impacts to biodiversity values as outlined above, with the estimated direct impacts associated with the project outlined in Table 6 below.

Table 6 Estimated direct impacts of the project

Biodiversity value	Estimated impacts
Native vegetation	
<ul style="list-style-type: none"> 7 PCTs (based on rapid field validation survey) 	<ul style="list-style-type: none"> 618.36 ha (approx.)
EPBC Act TECs	
<ul style="list-style-type: none"> Myall Woodland (PCT 26) Potential Natural Grasslands of the Murray Valley Plains (PCT 44, 45, 45) 	<ul style="list-style-type: none"> Up to 5.05 ha (approx.) Up to 4.43 ha (approx.)
BC Act (only) TECs	
<ul style="list-style-type: none"> Sandhill Pine Woodland (PCT 28) 	<ul style="list-style-type: none"> Up to 3.97 ha (approx.)

Biodiversity value	Estimated impacts
Threatened species	
<ul style="list-style-type: none"> Plains Wanderer 	<ul style="list-style-type: none"> No areas of mapped important habitat under the BAM All areas of PCT 44, 46 and 164 have the potential to constitute habitat for this species which equate to approximately 591.9 ha of potential habitat.
All other threatened species	All other threatened species associated with PCTs within the subject land (refer to Table 5), including any additional EPBC Act listed species determined to be a MNES will be assessed during the environmental impact assessment phase accordingly with offsets applied under the BAM and EPBC Act policies.

It should be noted that potential Plains Wanderer habitat listed in the table above will be subject to detailed habitat assessment and it is expected that the area of suitable habitat will be greatly reduced from this initial conservative overestimate.

5.2.2 Estimated Indirect, prescribed and uncertain impacts

Indirect impacts associated with solar farm projects generally relate to items such as those highlighted above, including potential collisions with overhead powerlines and operational disturbance to adjacent retained habitats, as well as the suite of potential indirect impacts associated with major construction projects. Solar farms also have the potential to disrupt habitat connectivity and fauna movement for ground-dwelling fauna, and potential alteration of local-scale hydrological regimes, which may both be required to be addressed as prescribed impacts under BAM.

As part of application of the BAM it is a requirement to identify indirect and prescribed impacts and apply the same avoidance and minimisation hierarchy as with direct impacts. This process will be ongoing throughout the future design phases of the Project.

Any impacts that are determined as being uncertain would likely be subject to ongoing monitoring and adaptive management.

5.3 Avoidance and minimisation of impacts

As outlined above, the avoidance and minimisation of impacts to biodiversity values is a requirement under both state and Commonwealth legislation, and will be implemented throughout the Project. Avoidance and minimisation has already occurred in the initial project design phase, as a result of the initial desktop biodiversity constraints prepared by Biosis, prior to the February field investigation.

Initial desktop biodiversity constraints were based on parameters similar to those presented in Table 2, however included larger, more conservative buffers around some higher constraint biodiversity items (based on desktop assessment only). Some avoidance buffers have been reduced following ground validation of habitat values. Biodiversity constraints have been considered at the preliminary design phase of the Project. Initial impact avoidance and minimisation strategies have been considered. Application of the avoidance and minimisation principles in the initial pre-scoping stage of the Project has resulted in the following:

- No infrastructure being located in No Go areas (Plains Wanderer Mapped Important Areas).

- Moving roads and access tracks out of No Go areas, and minimising impacts in High Constraint areas by locating tracks in areas of existing disturbance.
- Locating all ancillary infrastructure outside of No Go and High Constraint areas.
- Refining the Project area to avoid high biodiversity and hydrological values identified in the original project area.
- Focusing development on grazed land and utilising existing tracks and access to minimise clearing.
- Commitments to future design continuing to minimise all impacts to High Constraint areas to the fullest extent possible.
- Considering floodplain function and flooding events in project design to minimise hydrological disruption within the landscape.

5.3.1 Considered alternatives

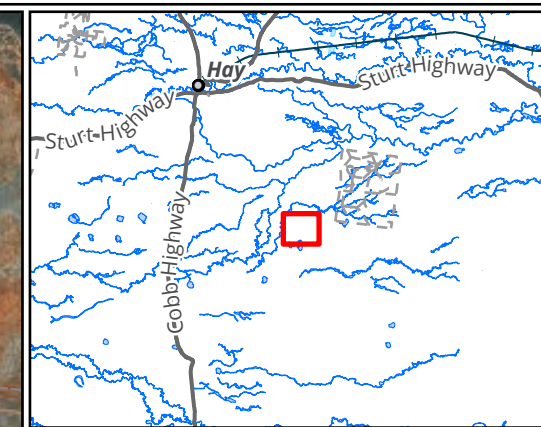
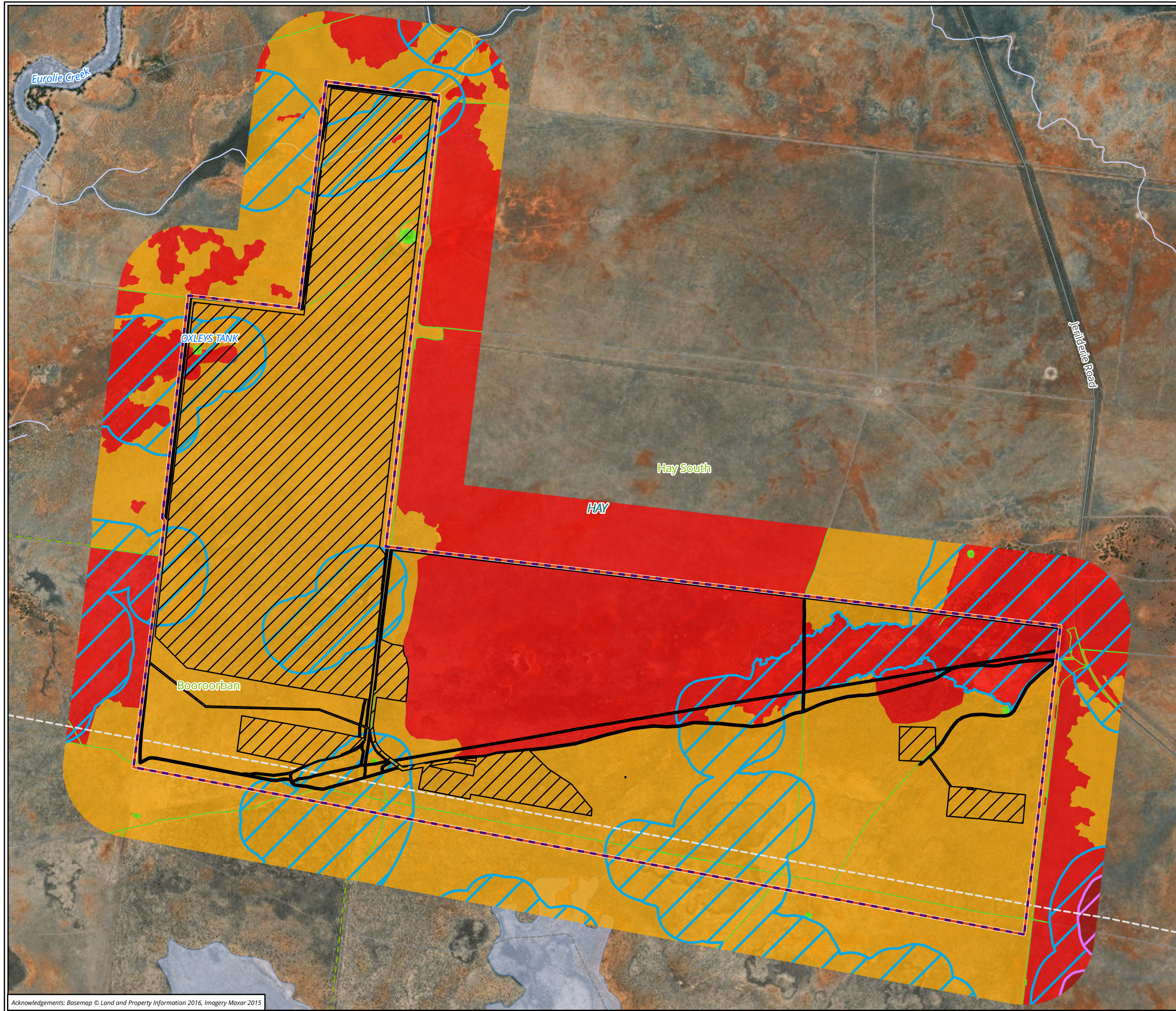
Alternatives considered are described in detail in Section 3.5 of the Scoping Report, with details provided on the following options:

- No project (i.e. Do nothing).
- Alternative sourcing of energy.
- Alternative site location.
- Maximised site layout.
- Benefits of proposed layout to maximum site layout.

5.3.2 Preliminary mitigation options

During the preparation of the BDAR, detailed mitigation measures will be stipulated. These mitigation measures will start through implementation of the avoid and minimise steps. Mitigation measures will be incorporated into and detail required management plans such as Construction Environmental Management Plans (CEMP) and a Biodiversity Management Plan (BMP). Any mitigation measures or requirements stipulated during the EPBC Act referral process will be incorporated into the BDAR and relevant additional plans to be carried out prior to, during construction and operation.

.



- Legend**
- Subject land
 - Project area
 - Project Energy Connect alignment (assumed)
 - Indicative development footprint
- WTG, powerline constraints**
- No-go
 - High constraint
- Civil constraints**
- No-go
 - High constraint
 - Moderate constraint
 - Low constraint

Figure 4 Biodiversity constraints

0 0.25 0.5 0.75 1
 Kilometers
 Scale: 1:25,000 @ A3
 Coordinate System: GDA2020 MGA Zone 55



Matter: 38557,
 Date: 10 May 2023,
 Prepared for: CW, Prepared by: AM, Last edited by: amackegard
 Layout: Solar_F4_Avoid
 Project: P:\38550s\38557\Mapping\38557_PottingerEnergyPark_figures_v2.aprx

Acknowledgements: Basemap © Land and Property Information 2016, Imagery Maxar 2015

6 Recommendations

6.1 Recommendations

The result of preliminary and future field surveys will be used to continue to guide the design for the Project. Avoiding and minimising impacts to biodiversity will be considered further during detailed design revisions and will be developed in consultation with relevant stakeholders and agencies. Specific considerations will include:

- Avoidance and minimisation of impacts to EPBC Act listed MNES and potential BAM SAI entities.
- Avoidance and minimisation of impacts to all threatened species (BC Act and EPBC Act).
- Clearing of native vegetation to the minimum extent necessary.
- Maintaining connectivity of threatened species and ecological communities habitat as much as possible.
- Minimising project infrastructure in High Constraint areas to reduce direct and indirect impacts.
- Minimising placement of all infrastructure types in mapped TECs and threatened species habitat / populations, to reduce potential impacts to highly sensitive biodiversity values and to ensure application of the avoid and minimise principles.
- Development of impacts minimisation strategies including maintenance of terrestrial habitat connectivity and infrastructure-free buffer zones (flyways) through the subject land, between wetlands (stepping-stones), and other habitat feature during project design.
- Minimisation of impacts in areas of good condition native vegetation and habitats.
- Minimisation of impacts to paddock trees and hollow-bearing trees as far as practicable.
- Avoidance of areas of greater overhead powerline collision risk to resident birds and bats and migrating species.
- Development of measures in designing solar arrays to dissuade perching attracting aerial fauna.
- Restoration of impacted areas beneath solar arrays with native vegetation to improve biodiversity values within the operational solar farm.
- Cross reference with other site/value-based constraints – e.g. Aboriginal cultural heritage values and flood prone areas.

A number of the above impact minimisation strategies have already been implemented during initial project design (as outlined in Section 5.3), and further work will continue as the assessment stage of the Project progresses, and the BDAR is developed.

As part of a BDAR, detailed ecological surveys, investigations and assessment will be undertaken including:

- Collection of floristic plot data.
- Confirmation of extent of all TECs present.
- Targeted surveys for candidate flora and fauna species.
- Assessment of all direct, indirect and prescribed impacts.

- Offset planning for unavoidable residual impacts.

On-site survey effort by suitability qualified ecologists will be undertaken to further ground truth vegetation types, associations with TECs and associations with threatened species habitats. Field surveys in relation to the BDAR will be grouped together into optimal surveys windows to address the requirements of the BAM, most likely within Spring and Summer. Surveys required for future operational requirements in the way of BBUS for collision risk modelling will require field data capture across all seasons and across a minimum 12 month survey period, as well ongoing operational monitoring.

As the Project may significantly impact Matters of National Environmental Significance, EPBC Act assessment requirements are also considered likely, and would need to be addressed with an EPBC referral and assessed under the NSW bilateral agreement.

The BOS and EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2012) will apply to the assessment, generating an offset requirement for the Project. Establishment of Biodiversity Stewardship Sites to satisfy the Project's offset credit obligation is likely to be the most effective approach for the Project, and has the greatest local biodiversity outcome. This can be completed by procuring land that has the potential to generate the required biodiversity credits, or negotiate with landholders to manage an offset site on their land, on their behalf whilst the Project is operational. However, this process will be confirmed during the EIS process.

References

- Biosis and Kilara Energy 2022. Scoping Report: Wilan Wind Farm. Authors: G McMillan, N Lloyd, I Griffiths & A Thomson, Biosis Pty Ltd, Project no. 37620.
- Bennun, L., van Bochove, J., Ng, C., Fletcher, C., Wilson, D., Phair, N., Carbone, G. (2021). Mitigating biodiversity impacts associated with solar and wind energy development. Guidelines for project developers. Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy
- Commonwealth of Australia 2012. Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy.
- Corriveau et al 2021. Broad-scale opportunistic movements in the tropical waterbird *Anseranas semipalmata*: implications for human-wildlife conflicts. Amélie Corriveau, Marcel Klaassen, Tara L. Crewe, Mirjam Kaestli, Stephen T. Garnett, David A. Loewensteiner, Rebecca M. Rogers & Hamish A. Campbell Emu - Austral Ornithology. 120:4, 343-354, DOI: 10.1080/01584197.2020.1857651
- DECCW 2010. NSW wetlands (GIS mapping layer). NSW Department of Environment, Climate Change and Water (DECCW) (<http://mapdata.environment.nsw.gov.au/DDWA>)
- DSE 2004. Flora and Fauna Guarantee Action Statement No. 182: Central Gippsland Plains Grassland Forest Red Gum Grassy Woodland, Northern Plains Grassland, South Gippsland Plains Grassland and Western (Basalt) Plains Grassland. Department of Sustainability and Environment, Melbourne
- DoSEWPC. 2012. Farming and nationally protected natural grasslands of the murray valley plains.
- DoSEWPC.. 2012. Approved Conservation Advice for Natural Grasslands of the Murray Valley Plains ecological community. Canberra, ACT.
- EMM 2022. Dinawan Wind Farm Scoping Report. Prepared for Spark Renewables. EMM Consulting.
- ERM 2022. The Plains Wind Farm Scoping Report. Prepared for Engie Australia. Environmental Resource Management Australia Pty Ltd.
- Jacobs 2022. Yanko Delta Wind Farm Biodiversity Development Assessment Report.
- McDougall KL, Barlow T and Appleby M 1994. Grassland communities and significant grassland sites: Western Basalt Plains, Lake Omeo, Murray Valley Riverine Plains and the Wimmera. In 'Conservation of lowland native grasslands in south-eastern Australia'. Eds KL McDougall, JB Kirkpatrick. pp. 44-112. World Wide Fund for Nature: Australia
- NSW National Parks and Wildlife Service 2003. The Bioregions of New South Wales: their biodiversity, conservation and history NSW National Parks and Wildlife Service Hurstville
- OEH 2016. Riverina Regional Native Vegetation Map Version v1.0 - VIS_ID 4469. NSW Office of Environment and Heritage, Sydney.
- Veltheim et al 2019. Breeding home range movements of pre-fledged broilga chicks, *Antigone rubicunda* (Gruidae) in Victoria, Australia - Implications for wind farm planning and conservation. Inka Veltheim, Simon Cook, Grant C. Palmer, F.A. Richard Hill, Michael A. McCarthy. Global Ecology and Conservation 20 (2019) e00703

Appendices

Appendix 1 Photos



Photo 1 PCT 45 grasslands potentially representing Natural Grasslands of the Murray Valley Plains CEEC



Photo 2 Grassy PCT 164 with a higher cover of chenopod shrubs such as Cotton Bush



Photo 3 Large Nitre Goosefoot dominated wetland (PCT 160) to the south of the subject land, providing habitat for a large number and diversity of waterbirds



Photo 4 High condition Myall Woodland EEC (PCT 26) to the south-west of the subject land



Photo 5 Large Weeping Myall tree (1 metre ranging pole can be seen in the foreground) along the western boundary of the subject land