Appendix D

Revised Biodiversity Development Assessment Report

Part 1 (Revised BDAR, Main Body)

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Mallee Wind Farm

Revised Biodiversity Development Assessment Report

Final

March 2026

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Mallee Wind Farm

Revised Biodiversity Development Assessment Report

Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Sparks Renewables Pty Ltd

Project Director:	Nathan Baker
Project Manager:	Bharat Gordhan
Technical Director:	Ryan Parsons
Technical Manager:	James Garnham
Report No.:	31894/R03
Date:	March 2026

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

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Document Status

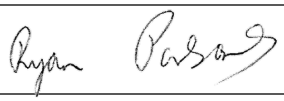
Rev No.	Reviewer Name	Date	Approved for Issue Name	Date
V1	Rachel Musgrave	23/01/2026	Nathan Baker	27/01/2026
V2	Ryan Parsons	19/03/2026	Nathan Baker	20/03/2026
V3	Ryan Parsons	26/03/2026	Nathan Baker	26/03/2026

Declarations

Certification under clause 6.15 *Biodiversity Conservation Act 2016*

The undersigned certifies that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method (BAM) and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

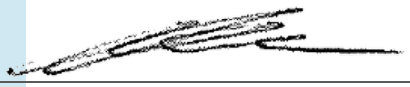
Name	James Garnham
Signature:	
Date:	27/03/2026
BAM Assessor Accreditation No:	BAAS19021

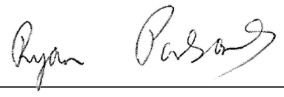
Name	Ryan Parsons
Signature:	
Date:	27/03/2026
BAM Assessor Accreditation No:	BAAS17048

Conflict of Interest

The undersigned declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

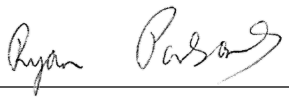
Name	James Garnham
Signature:	
Date:	27/03/2026
BAM Assessor Accreditation No:	BAAS19021

Name	Ryan Parsons
Signature:	
Date:	27/03/2026
BAM Assessor Accreditation No:	BAAS17048

Assessment of MNES

The undersigned certifies that all EPBC Act listed threatened species and communities that occur on the subject land, or in the vicinity, have been identified in this Biodiversity Development Assessment Report (BDAR) including those that are ecosystem credit species.

Name	James Garnham
Signature:	
Date:	27/03/2026
BAM Assessor Accreditation No:	BAAS19021

Name	Ryan Parsons
Signature:	
Date:	27/03/2026
BAM Assessor Accreditation No:	BAAS17048

Details and Experience of Author/s and Contributors

Name	BAM Assessor Accreditation Number (if relevant)	Position/Role	Tasks Performed	Relevant Qualifications
Ryan Parsons	BAAS17048	Principal Ecologist – Botanist / Biodiversity Technical Director / Field Surveyor	Scoping and delivery of BAM assessment, technical oversight and review of BDAR and BAM-C Fieldwork including vegetation mapping, BAM VI plots and Category 1 – Exempt Land categorisation – September 2022	Bachelor of Environmental Science and Management (Honours)
Dr James Garnham	BAAS19021	Principal Ecologist / Biodiversity Technical Manager / Field Surveyor	Scoping and delivery of BAM assessment, survey coordination and planning, BDAR preparation Targeted threatened fauna surveys (March 2023) Revised BDAR preparation	Doctor of Philosophy (Conservation Biology) Bachelor of Environmental Science and Management (Honours)
Rachel Musgrave	BAAS18032	Ecology Manager South East Australia – Principal Ecologist	Revised BDAR review	Bachelor of Science (Honours) Ecology
Hannah Reid	BAAS18114	Senior Ecologist	BDAR preparation	Bachelor of Science (Biology and Marine Science) Master of Environmental Science
Naomi Buchhorn	-	Principal Ecologist	MNES preparation	Bachelor of Science (Hons)
Bill Wallach	BAAS001353	Principal Ecologist	Revised BDAR review	Bachelor Biological of Sciences (Honours)

Name	BAM Assessor Accreditation Number (if relevant)	Position/Role	Tasks Performed	Relevant Qualifications
Shaun Corry	BAAS17041	Principal Ecologist/ Field Surveyor	Bird and Bat Utilisation Surveys – November 2022 Targeted threatened flora and fauna surveys – February 2023	Bachelor of Science (Biology) Diploma Conservation and Land Management
Belinda Howe	BAAS21019	Senior Ecologist/ Former Biodiversity Technical Manger / Field surveyor	Preparation of the Biodiversity Constraints Report Bird and Bat Utilisation Surveys – November 2022 Targeted threatened flora and fauna surveys – February 2023	Bachelor of Environmental Science and Management (Hons 1)
Dayna Mitchell	-	Senior Ecologist/ Field surveyor	Bird and Bat Utilisation Surveys – November 2022	Bachelor of Environmental Science and Management (Hons)
Ray Turnbull	-	Ecologist/ Field surveyor	Bird and Bat Utilisation Surveys April, May, July and October 2023, February and May 2024	Bachelor of Natural Resources Graduate Diploma Ornithology
Mark Allen	BAAS22025	Senior Ecologist / Field Surveyor	BDAR preparation – co-authored Prescribed Impacts Assessments	Bachelor of Science (Honours – First Class) Resource and Environmental Management

Name	BAM Assessor Accreditation Number (if relevant)	Position/Role	Tasks Performed	Relevant Qualifications
Zachariah Cotter	-	Senior Ecologist / Field Surveyor	Targeted threatened flora surveys – October 2022	Bachelor of Environmental Science and Management Master of GIS and Remote Sensing
Alexandra Cottle	-	Senior Ecologist / Field Surveyor	Targeted threatened flora surveys – October 2022 MNES report preparation	Bachelor of Environmental Science
Dr David Sharpe	-	Principal Ecologist / Field Surveyor	Bird and Bat Utilisation Surveys – October 2023 BDAR preparation – co-authored Prescribed Impacts Assessments	Doctor of Philosophy, Ecology of the Squirrel Glider in the Core of its Range Bachelor of Applied Science (Honours) Bachelor of Applied Science
Jade Philipson	-	Ecologist	BDAR and MNES report preparation Revised BDAR reporting updates	Master of Environmental Management and Sustainability Bachelor of Zoology
Lee O'Shea	-	Ecologist / Field Surveyor	Bird and Bat Utilisation Surveys – May and August 2024 BDAR preparation	Bachelor of Science (Honours) Ecology and Conservation Biology

Name	BAM Assessor Accreditation Number (if relevant)	Position/Role	Tasks Performed	Relevant Qualifications
Loren Appleby	-	Principal Ecologist / Field Surveyor	Bird and Bat Utilisation Surveys – February 2024	Bachelor of Science, Ecology and Conservation Biology. Griffith University
Philippa Fagan	BAAS18117	Senior Ecologist/ Field Surveyor	Bird and Bat Utilisation Surveys – February 2023	Bachelor of Biodiversity and Conservation Masters in Environmental and Business Management
Dr Ross Crates	-	Principal Ecologist/ Field Surveyor	Bird and Bat Utilisation Surveys – February 2023	Doctor of Philosophy Bachelor of Science (Honours)
Jessica Skewes	-	Senior Ecologist / Field Surveyor	Targeted threatened fauna surveys – March 2023	Postgraduate Diploma in Science (Ecology) Bachelor of Science (Ecotourism)
Maddie Sanders	-	Senior Ecologist	BDAR preparation	Bachelor of Environmental Science and Management (Honours) Bachelor of Science (Biology)
Kate Schmahl	-	Ecologist	BDAR preparation	Bachelor of Environmental Science and Management

Name	BAM Assessor Accreditation Number (if relevant)	Position/Role	Tasks Performed	Relevant Qualifications
Michael Jones	-	Ecologist	Vegetation mapping, BAM VI plots and Category 1 – Exempt Land categorisation – April 2024	Bachelor of Environmental Science
David Russell (David Russell Ecology)	BAAS18084	Vegetation Ecologist / Field Surveyor	Vegetation mapping, BAM VI plots and Category 1 – Exempt Land categorisation – April 2024	Bachelor of Science University of Newcastle
Nathan Baker	n/a	Project Director	General review of BDAR	Masters of Design Science, Certified Environmental Practitioner (CEnvP), Associate Member - Planning Institute of Australia (PIA)
Jessica Henderson-Wilson	n/a	Project Manager	General review of BDAR	Masters of Environmental Management, Certified Environmental Practitioner (CEnvP), PRINCE2 Project Management Practitioner, IAP2 (Foundations of Public Participation Certification)

Name	BAM Assessor Accreditation Number (if relevant)	Position/Role	Tasks Performed	Relevant Qualifications
Amanda Antcliff	n/a	Registered Environmental Assessment Practitioner (REAP)	REAP review of BDAR	Bachelor of Environmental Science Graduate Diploma Urban and Regional Planning Registered Planner, Planning Institute of Australia (PIA) Registered Environmental Assessment Practitioner, PIA
Rebecca Abbott	n/a	Senior Spatial Consultant	Spatial calculations, preparation of figures	Certificate III in Detail Drafting
Corey Miskell	n/a	GIS Consultant	Spatial calculations, preparation of figures	Bachelor of Science

Executive Summary

Spark Renewables Pty Ltd (the Proponent) engaged Umwelt to prepare a Biodiversity Development Assessment Report (BDAR) for the proposed Mallee Wind Farm (the Project), located approximately 16 kilometres (km) north east of Buronga, NSW and 22 km north east of Mildura within the South West Renewable Energy Zone (South West REZ).

The Project will include the installation, operation, maintenance and decommissioning of up to 76 wind turbine generators (WTGs), a single grid scale 100 megawatts (MW) /200 megawatt hour (MWh) Battery Energy Storage System (BESS), ancillary infrastructure and temporary facilities associated with construction of the Project. The current development design incorporates each WTG with a maximum blade-tip height of 280 m above ground level (AGL) with an installed capacity of up to 402 MW.

The Development Footprint of the Project, being the disturbance area within the broader Project Area, is approximately 445 hectares (ha). Ongoing design and refinement of the Project through the application of avoidance measures resulted in biodiversity surveys being completed in a larger area beyond the Development Footprint, which is referred to as the Biodiversity Study Area. The Development Footprint is located within the Biodiversity Study Area and included comprehensive surveys within it.

The Development Footprint also includes three offsite areas that will be subject to road upgrades as part of the Project. These three areas did not contain native vegetation that could be assigned to a Plant Community Type (PCT) and therefore were not assessed further as part of the biodiversity assessment for the Project.

This Revised BDAR (March 2026 version) prepared by Umwelt forms part of the broader response to submissions received during the public exhibition period relating to biodiversity and assesses the potential biodiversity impacts of the Project in accordance with the NSW Biodiversity Assessment Method (BAM). Surveys identified the following PCTs and vegetation within the Development Footprint:

Survey Type	Area (ha)
Development Footprint	
PCT 58: Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	30.37
PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	5.02
PCT 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	18.95
Category 1 – Exempt Land/Cleared/Road/Track	390.35
Subtotal	**444.69**

Survey Type	Area (ha)
Off-site Road Upgrade Areas	
Exotic roadside	0.10
Planted native cultivar	0.02
Planted exotic	0.02
Cleared/road	0.11
Subtotal	**0.25**
Grand Total	**444.94**

No candidate threatened species-credit species were recorded within the Development Footprint or Biodiversity Study Area. The completion of surveys and assessments identified the following threatened ecosystem credit species:

- Southern whiteface (*Aphelocephala leucopsis*)
- Dusky woodswallow (*Artamus cyanopterus cyanopterus*)
- Pied honeyeater (*Certhionyx variegatus*)
- Spotted harrier (*Circus assimilis*)
- Little pied bat (*Chalinolobus picatus*)
- Chestnut Quail-thrush (*Cinclosoma castanotum*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- White-fronted Chat (*Epthianura albifrons*)
- Black falcon (*Falco subniger*)
- Little Eagle (*Hieraaetus morphnoides*)
- Shy heathwren (*Hylacola cautus*)
- Square-tailed Kite (*Lophoictinia isura*)
- Hooded Robin (southeastern subspecies) (*Melanodryas cucullata cucullata*)
- Gilbert's Whistler (*Pachycephala inornata*)
- Regent parrot (eastern subspecies) (*Polytelis anthopeplus monarchoides*)
- Inland forest bat (*Vespadelus baverstocki*).

One Threatened Ecological Community (TEC) was recorded as being present in the Development Footprint, being the Mallee Bird Community listed as an Endangered Ecological Community (EEC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This TEC occurs in the moderate-good condition areas of PCT 170 and 171, which totals approximately 22.76 ha within the Development Footprint.

Impact to biodiversity has been avoided as far as practicable through Project design conducted to date and refinement of the proposed disturbance area. The majority of the area of impact occurs in areas mapped as Category 1 – Exempt Land.

Following the application of avoidance and mitigation measures, the following biodiversity credits are required to offset the impacts of the Project.

Entity	Credits Required[1]
PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	990
PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	107
PCT 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	529

Note 1: credit values have increased due to updates to the BAM-C that corrected system generated issues associated with biodiversity risk weightings being incorrectly calculated i.e., these credit values have not changed as a result in any increase in impact.

Abbreviations

Abbreviation	Definition
AHD	Australian Hight Datum
AOBV	Areas of Outstanding Biodiversity Value
AoS	Assessment of Significance
BAM	Biodiversity Assessment Method 2020
BAM-C	Biodiversity Assessment Method Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BCF	Biodiversity Conservation Fund
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
BOS	NSW Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
CPHR	The Regional Delivery Division (RD), South West of the Conservation Programs, Heritage, and Regulation (CPHR) formerly South West BCD) section of NSW DCCEEW, also known as RD
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DA	Development Application
DBH	diameter at breast height
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts (superseded)
DNG	derived native grassland
DPE	NSW Department of Planning and Environment (superseded)
DPHI	NSW Department of Planning, Housing and Infrastructure
DPI	NSW Department of Primary Industries (superseded)
DPIRD	NSW Department of Primary Industries and Regional Development
DSEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities (superseded)
EAH	Environmental Agency Head
EEC	Endangered Ecological Community
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EIS	Environment Impact Statement
FM Act	NSW *Fisheries Management Act 1994*
FTE	full time equivalent
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information Systems

Abbreviation	Definition
ha	hectares
km	kilometres
kV	kilovolt
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environment Plan
LGA	Local Government Area
LLS	Local Land Services
LLS Act	NSW *Local Land Services Act 2013*
LLS Regulation	NSW Local Land Services Regulation 2014
m	metres
mm	millimetres
MNES	Matters of National Environmental Significance
MWh	megawatt hour
NPW Act	NSW *National Parks and Wildlife Act 1974*
NSW	New South Wales
NVR Map	Native Vegetation Regulatory map
OSOM	oversize, overmass
PCT	plant community type
PMST	Protected Matters Search Tool
the Project	Mallee Wind Farm
PVP	Property Vegetation Plan
RBGS	Royal Botanic Gardens Sydney
South West REZ	South West Renewable Energy Zone
SAII	serious and irreversible impact
SEARS	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
South West REZ	South West Renewable Energy Zone
SPRAT	Species Profiles and Threats Database
SSD	State Significant Development
SVTM	State Vegetation Type Map
TBDC	Threatened Biodiversity Data Collection
TEC	threatened ecological community
TSSC	Threatened Species Scientific Committee
Umwelt	Umwelt (Australia) Pty Ltd
VI	vegetation integrity
WTG	Wind Turbine Generator

Glossary

Term	Definition
Accredited person or assessor	Means as person accredited under the BC Act to prepare reports in accordance with the BAM.
Associated dwellings	Dwellings not located on land within the Project Area or hosting infrastructure, however, the Proponent has a negotiated agreement in place with the landowner regarding Project impacts and are therefore associated with the Project. For Mallee Wind Farm there are no associated dwellings.
Ancillary Infrastructure	Permanent ancillary infrastructure required to support the Project and includes internal roads, hardstands, main and collector substations, switchyards, operations and maintenance facilities, underground and overhead electricity transmission lines and poles, communications cables, permanent meteorological masts and water storage tanks.
Associated landholder	The owner(s) of an associated dwelling. An associated landholder has reached a private agreement with Spark Renewables in relation to the Project and management of impacts. An associated landholder is distinct from a host landholder in that no Project infrastructure is proposed to be built on the associated landholder's property.
Battery Storage	Compound and technology for storing and discharging energy. Includes the battery energy storage system (BESS), as well as associated buildings, shipping containers and other infrastructure to contain the chosen technology and to connect the battery storage infrastructure with the WTGs, and substations via underground and/or overhead cables.
Benefit sharing	Benefit sharing aims to distribute benefits generated by a project between the Proponent and the community through mutually agreed opportunities such as funding or sponsoring local community initiatives, programs or projects.
Biodiversity Assessment Method Calculator	Biodiversity Assessment Method Calculator (BAM-C) – the online computer program that provides decision support to assessors and proponents by applying the BAM and referred to as the BAM-C.
Biodiversity Credit Report	The report produced by the BAM-C that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site (DPIE 2020a).
Biodiversity Offsets	The gain in biodiversity values achieved from the implementation of management actions on areas of land, to compensate for losses to biodiversity values from the impacts of development (DPIE 2020a).

Term	Definition
Biodiversity Offsets and Agreement Management System	The online system used to administer the Biodiversity Offsets Scheme. The BOAMS is used by accredited assessors (to carry out specific BAM-related tasks involving access to the BAM-C to perform assessments, submit data, generate credits and calculate a credit price), by landholders (to apply for a Biodiversity Stewardship Agreement and manage ongoing reporting obligations for their agreement) and by proponents of developments (to view their credit obligation or the payment required to the Biodiversity Conservation Fund).
Biodiversity Study Area	The 4,879.17 ha specific assessment area adopted for the biodiversity study. It is the amalgamation of previous and current designs of the Project. Since 2022, the Project has undergone refinement considering various constraints. The result of surveys within each design iteration has been built upon to form a comprehensive dataset for the Biodiversity Study Area which the Development Footprint forms a smaller component. Through the process of avoidance and minimisation, Project related disturbance has been refined down to the current Development Footprint. Surveys undertaken across the broader Biodiversity Study Area have been used in this assessment.
Biodiversity Stewardship Site	Refers to land which is the subject to a Biodiversity Stewardship Agreement under the BC Act.
BioNet Vegetation classification	Refers to the vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. Refer About BioNet Vegetation Classification | NSW Environment and Heritage (NSW DCCEEW 2024a).
Candidate Species	Also known as 'species credit species', these are threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. These species are identified in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species on the Development Footprint. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the proponent may elect to assume the species is present (DPIE 2020a).
Construction	The construction of the Project, including but not limited to the construction of WTGs, battery storage, ancillary infrastructure but excluding pre-construction works.
Cumulative Impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2022) for cumulative impact assessment requirements.
Decommissioning	The removal of WTGs, battery storage and ancillary infrastructure.

Term	Definition
Development Consent	State significant development consent to carry out the Project granted by the consent authority as nominated under the NSW Environmental Planning and Assessment Act 1979.
Development Footprint	The area of land that is directly impacted by the proposed development.
Direct Impact	Direct impacts on biodiversity values include those related to clearing native vegetation and threatened species habitat and impacts on biodiversity values prescribed by the Biodiversity Conservation Regulation 2017 (the BC Regulation).
Ecosystem credit species	Threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for ecosystem credits. This is analogous with the definition of 'predicted species'.
Ecosystem credits	A measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development, activity, clearing or biodiversity certification site and the gain in biodiversity values at a biodiversity stewardship site (DPIE 2020a).
Expert	A person who, in the opinion of the Secretary of the Department or anyone authorised by the Secretary, has specialised knowledge, which may be based on training, study or experience, to provide an expert opinion regarding a threatened species to which the report relates. A person who has the relevant experience and/or qualifications to provide an expert opinion in relation to the biodiversity values to which an expert report relates.
Ground Disturbance	Activities that cut into the existing ground surface. To avoid any doubt this does not include activities that occur on the ground surface including but not limited to driving vehicles on the ground, parking vehicles, placing infrastructure or materials such as stockpiles on the ground.
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component (DPIE 2020a).
Heavy Vehicle	As defined under the Heavy Vehicle National Law (NSW), but excluding light and medium rigid trucks (less than eight (8) tonnes and with no more than two (2) axles) and buses containing more than 12 seats.
Host Landholder	The owner(s) of a host dwelling. A host landholder has reached an agreement with Spark Renewables to host Project infrastructure within their landholdings and in relation to the management of impacts.

Term	Definition
Important area (mapped)	Mapping of important habitat areas provided by the DPIE for those species for which the habitat constraint in the Threatened Biodiversity Data Collection (TBDC) refers to a mapped important area.
Indirect impact	Impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the Development Footprint or within retained areas (e.g., transporting weeds or pathogens, dumping rubbish). This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts (DPIE 2020a).
Internal Roads	Roads established and/or upgraded within the Project Area for the purposes of constructing, operating, maintaining and decommissioning the Project, but does not include off-site road works areas.
Landscape assessment area	The Development Footprint and the area of land within 500 m of the Development Footprint that is determined as per Subsection 3.1.2 of the BAM.
Light Vehicle	A car or rigid truck up to eight (8) tonnes gross vehicle mass or a bus containing up to 12 seats.
Locality	Land within a 20 km radius of the Development Footprint.
Local Transport Route	The transport route extending from Sturt Highway/ Carey Street Euston to the Project access point on Arumpo Road.
Matter of National Environmental Significance	A Matter of National Environmental Significance (MNES) is any of the nine defined components protected by a provision of Part 3 of the EPBC Act (Commonwealth).
Micro-siting	This is commonly the process of locating WTGs, battery storage, ancillary infrastructure and temporary infrastructure during detailed design without further approval, providing that certain thresholds are met. In this case, and as a broader Development Corridor is not proposed, these include: • Ground disturbance is wholly contained within the Disturbance Footprint. • No WTG is moved more than 100 metres from the relevant GPS coordinates listed in Appendix 3 of the EIS and any ground disturbance is contained within the Disturbance Footprint • The revised location of the blade of a WTG is at least 50 m from the canopy of existing hollow-bearing trees; or where the proposed location of the blade of a WTG is already within 50 m of the canopy of existing hollow-bearing trees, the revised location is not any closer to the existing hollow-bearing trees. • The revised location of the blade of a WTG is at least 50 m from the canopy of existing hollow-bearing trees; or where the proposed location of the blade of a WTG is already within 50 m of the canopy of existing hollow-bearing trees, the revised location is not any closer to the existing hollow-bearing trees.
Mitigation	Action to reduce the severity of an impact.

Term	Definition
Native Vegetation	Has the same meaning as in section 1.6 of the BC Act and section 60B of the LLS Act. In summary: • Trees (including any sapling or shrub or any scrub) • Understorey plants • Groundcover (being any type of herbaceous vegetation) • Plants occurring in a wetland. A plant is native to New South Wales if it was established in New South Wales before European settlement (BC Act). Native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). Marine vegetation is covered by the provisions of the FM Act.
Non-associated Dwelling	A dwelling on privately-owned land in respect of which the owner has not entered into a private agreement with Spark Renewables in relation to the Project's impacts. or A dwelling on privately-owned land in respect of which the owner has reached an agreement with Spark Renewables in relation to the Project's impacts, but the agreement does not cover the relevant impact, or the performance measure for such impact (under that agreement) has been exceeded.
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (DPIE 2020a).
Off-site Road Works	Includes the following activities: • Proposed upgrades to the local transport route • establishment of site access points • ground disturbance, clearing/pruning of vegetation associated with the activities described above.
Operational footprint	The area that will be subject to ongoing operational impacts from the Project. This includes the road, surrounding safety verges and infrastructure, fauna connectivity structures and maintenance access tracks and compounds.
Patch size	An area of native vegetation that: • occurs on the development site or biodiversity stewardship site • includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site (DPIE 2020a).
Planning Agreement	An offer by a developer to Council to dedicate land, make monetary contributions, or provide any other material public benefit, to be used for or applied toward a public purpose.

Term	Definition
PlantNET	An online database of the flora of New South Wales which contains currently accepted taxonomy for plants found in the State, both native and exotic.
Population	A group of organisms, all of the same species, occupying a particular area (DPIE 2020a).
OSOM Transport Route	The route associated with the transportation of some project components (such as wind turbine blades, nacelles and transformers) that would require over-size, over-mass (OSOM) vehicles from the Port of Newcastle.
Pre-construction Works	Includes the following activities: • surveys • building/road dilapidation surveys • investigative drilling, excavation or salvage • minor clearing or translocation of native vegetation • establishing temporary site office and compounds • installation of environmental impact mitigation measures, fencing, enabling works, meteorological masts • flora and fauna investigations and pre-clearing surveys, inspections, specific habitat feature removal and relocation • adjustments to services/utilities, signage etc. including associated vegetation • removal and heritage artefact salvage • off-site road works.
Predicted species	Also known as 'ecosystem credit species', these are threatened species whose occurrence can generally be predicted by vegetation surrogates and/or landscape features, or that have a low probability of detection using targeted surveys. The TBDC identifies the threatened species assessed for ecosystem credits. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.
Prescribed impact	Means the prescribed impacts identified in clause 6.1 of the BC Regulation. Prescribed impacts can be direct or indirect impacts (DPIE 2020a).
Project	The Mallee Wind Farm.
Project Area	The Project Area encompasses all land within and including the Project Boundary.
Project Boundary	The outer boundary of the Project Area. The Project Boundary is the maximum spatial extent of potential land access defined by the boundaries of the host landholder properties (i.e. all agreed lots owned by host landholders).
Proponent	Spark Renewables Pty Limited.
Rehabilitation	The restoration of land disturbed by the Project to its former condition (as much as practicable), to ensure it is safe, stable, and non-polluting.

Term	Definition
Dwelling	Includes: • residences that have development consent, but have yet to commence or complete construction • proposed dwellings that are subject to a development application that has been lodged prior to the DA for the Project but is yet to be determined. A dwelling does not include moveable dwellings (i.e. tents, caravans or other portable devices used for human habitation), or any derelict dwelling or dwelling that has been built illegally, as confirmed by the relevant Council.
Serious and irreversible impact	Impacts likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct in accordance with the principles set out in clause 6.7(2) of the BC regulation.
Spatial datasets	Spatial databases required to prepare a BDAR: • BioNet NSW (Mitchell) Landscapes – Version 3.1 • NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 • NSW soil profiles • hydrogeological landscapes • acid sulfate soils risk • digital cadastral database • Vegetation Information Systems maps • Geological sites of NSW.
Species credit species	Threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits (DPIE 2020a). This is analogous with the definition of 'candidate species'.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection (DPIE 2020a).
Species polygon	An area of land identified in Chapter 5 (of the BAM) that contains habitat or is occupied by a threatened species (DPIE 2020a).
Substation	A facility in an electrical power system where voltage is transformed from high to low or vice versa, and where power is routed and distributed to various areas. It typically includes transformers, circuit breakers, and other equipment.
Switchyards	A section within a substation or a standalone facility where electrical power is switched and routed between different transmission lines or equipment. It mainly involves circuit breakers, switches, and busbars for controlling the flow of electricity.

Term	Definition
Telecommunications Facility	A telecommunications facility is any part of the infrastructure of a telecommunications network or any line, cable, optical fibre, equipment, apparatus, tower, mast, antenna, dish, tunnel, duct, hole, pit, pole or other structure in connection with a telecommunications network. Telecommunications facilities provide for transmission of voice, data, image, graphic and video information between or among points by wire, cable, optical fibre, microwave, radio, satellite or similar facilities.
Temporary Facilities	Temporary facilities used for the construction, repowering and/or decommissioning of the Project, including but not limited to the temporary workforce accommodation (TWA), site offices, amenities, construction compounds and laydown areas (including stockpiling and materials storage areas, rock crushing facilities, concrete or asphalt batching plants, minor 'work front' construction access roads, environmental management and monitoring and signage.
Threatened Biodiversity Data Collection	A publicly assessable online database (registration required) which contains information for listed threatened species, populations and ecological communities (DPIE 2020a). Part of the BioNet database, published by the EHG and accessible from the BioNet website at www.bionet.nsw.gov.au.
Vegetation integrity (score)	The condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT. The vegetation integrity score is the quantitative measure of vegetation condition calculated by the BAM-C (DPIE 2020a).
Vegetation zone	A relatively homogeneous area of native vegetation on a development site, clearing site, land to be biodiversity certified or biodiversity stewardship site that is the same PCT and has the same broad condition state (DPIE 2020a).

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Appendix E Flora List

Appendix F Vegetation Integrity Data

Appendix G Weather

Appendix H Expert Report

Appendix I BAM Credit Report

Appendix J Additional Survey Information to Satisfy CPHR Submission Item 5.1

1.0 Introduction

1.1 Proposed Project Background

The NSW Electricity Strategy and NSW Electricity Infrastructure Roadmap (the Roadmap) set out a plan to deliver the State's first five Renewable Energy Zones (REZs). These REZs will play a vital role in delivering affordable, reliable energy generation to help replace the State's existing power stations as they come to their scheduled end of operational life.

Spark Renewables Pty Ltd (Spark Renewables) proposes to develop the Mallee Wind Farm (the Project), located approximately 16 kilometres (km) north east of Buronga in the Murray region of south western New South Wales (NSW) and 22 km north east of Mildura; within the South West REZ. The Project is therefore strategically located in an area identified by the NSW Government as suitable for renewable energy projects and will assist the NSW government in delivering on the objectives for the Roadmap and the South West REZ.

The Project will include the installation, operation, maintenance and decommissioning of up to 76 wind turbine generators (WTGs), a single grid scale 100 megawatts (MW) /200 megawatt hour (MWh) Battery Energy Storage System (BESS), ancillary infrastructure and temporary facilities associated with construction of the Project. The current development design incorporates each WTG with a maximum blade-tip height of 280 m above ground level (AGL) with an installed capacity of up to 40 MW.

The Project is regarded as a State Significant Development (SSD) and requires approval from the NSW Minister of Planning under Division 4.7 of Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The Project has been declared a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and requires approval from the Commonwealth Minister for the Environment and Water.

The Environmental Impact Assessment (EIS) for the Project (SSD-53293710) was submitted to the NSW Department of Planning, Housing and Infrastructure (DPHI) (formerly Department of Planning and Environment (DPE)) in November 2024 and publicly exhibited between 13 November 2024 to 10 December 2024 with 140 unique submissions made, including 20 submissions received from State and Commonwealth Government Agencies (in the form of advice).

This Revised BDAR (March 2026 version) prepared by Umwelt forms part of the broader response to submissions received during the public exhibition period relating to biodiversity and assesses the potential biodiversity impacts of the Project in accordance with the NSW Biodiversity Assessment Method (BAM).

This BDAR addresses the Secretary's Environmental Assessment Requirements (SEARs) as issued by DPHI, and Supplementary SEARs issued by the Commonwealth Department of Climate Change, Energy, the Environment and Water (Commonwealth DCCEEW) (as varied by Spark Renewables under Section 156B of the EPBC Act and accepted by Commonwealth DCCEEW on 4 September 2024). The Revised BDAR also responds to comments received from the and advice received from the Regional Delivery Division, South West of the Conservation Programs, Heritage, and Regulation (CPHR) (formerly South West Biodiversity and Conservation Division (BCD)) section of NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) and Commonwealth DCCEEW.

This BDAR provides an assessment of the biodiversity values of the Biodiversity Study Area, which encompasses the Development Footprint, along with separate minor off-site road works, refer to **Section 2.0** for further details. The Biodiversity Study Area is an amalgamation of previous and current designs of the Project, where survey has occurred, refer to **Table 3.1**. Through the process of avoidance and minimisation the Biodiversity Study Area has been refined down to the current Development Footprint. Surveys undertaken across the Biodiversity Study Area have been used in this assessment.

This assessment documents the application of the avoid, minimise and offset framework and assesses the likely biodiversity impacts of the Project. This BDAR has been prepared in accordance with the *Biodiversity Conservation Act 2016* (NSW) and the BAM (DPIE 2020a). The NSW Biodiversity Offset Scheme (BOS) including the BAM has been endorsed as the assessment method for Matters of National Environmental Significance (MNES) under a Bilateral Agreement made under the EPBC Act. The Australian Government is the decision-maker for whether the Project will be approved under the EPBC Act.

1.2 Identification of the Development Footprint

1.2.1 Location and Size

The Project is located approximately 16 km north east of Buronga of NSW, close to the NSW-Victorian state border within the Wentworth Shire Local Government Area (LGA). The Project Area is located on relatively flat land at an elevation of approximately 100 m above sea level and covers approximately 57,330 hectares (ha). Current agricultural operations will continue during the construction, operation and decommissioning phases of the Project.

The Project Area is primarily located on land zoned RU1 Primary Production under the Wentworth Local Environmental Plan 2011 (Wentworth LEP 2011). The Project Area is currently used for cropping and grazing, with patches of remnant native vegetation present. The Project EnergyConnect transmission line corridor is located to the south west of the Project Area.

The boundary of the Project Area, Biodiversity Study Area, Development Footprint and offsite road works is provided as **Figure 1.1**. The following definitions provided for each of these areas are included in **Section 3.1**.

1.2.2 Identification of Construction and Operational Footprints

The development layout including the proposed Development Footprint and impact avoidance areas associated with the Project are mapped in **Figure 1.2**. The key components of the Project include:

- Up to 76 (three (3) blade) WTGs, with a maximum blade-tip height of 280 m above ground.
- A single grid-scale 100 MW /200 MWh BESS.
- Permanent ancillary infrastructure including internal access tracks, hardstands, main and collector substations, switchyards, operations and maintenance facilities, underground and overhead electricity transmission lines and poles, telecommunications facilities and utility services, permanent meteorological masts and water storage tanks.

- Temporary facilities including temporary workforce accommodation (TWA) facility, site offices, amenities, construction compounds and laydown areas, concrete or asphalt batching plants, minor 'work front' construction access roads, environmental management and monitoring and signage.
- Off-site road works, involving upgrades to the proposed local transport route and establishment of site access points.

All impacts associated with Asset Protection Zones (APZs) and fencing requirements have been considered within the current Project layout and designed to occur within the Development Footprint assessed within this report. The APZs were established as per the Bush Fire Hazard Assessment, and their scale and extent factored into the design. A detailed fencing design/layout would be prepared during the detailed design of the Project.

The Project also seeks the option for subdivision and boundary adjustments to occur. These may be required to subdivide lands for the 330 kilovolt (kV) main switchyard connecting into Project EnergyConnect, the BESS, and the two (2) on-site collector substation and switchyard facilities, and/or other subdivisions that may be required following the detailed design of the Project. With respect to this BDAR, the subdivision/s are administrative activities that do not involve any physical works.

The Project has been designed through a comprehensive process that incorporates community and stakeholder feedback, and the findings of environmental and social studies to maximise positive social, economic and environmental outcomes while minimising adverse impacts. Spark Renewables has undertaken engagement with local landholders and other community stakeholders throughout the Project planning and assessment process.

The Project has been designed using an iterative approach incorporating community and other stakeholder feedback from the commencement of engagement undertaken by Spark Renewables since 2022 through the EIS phase, with the design of the Project changing as a result of this feedback. The Project design has avoided impacts where practicable, and included provision for mitigation and offsetting of residual impacts that could not be avoided. These mitigation measures have been incorporated into the design of the Project.

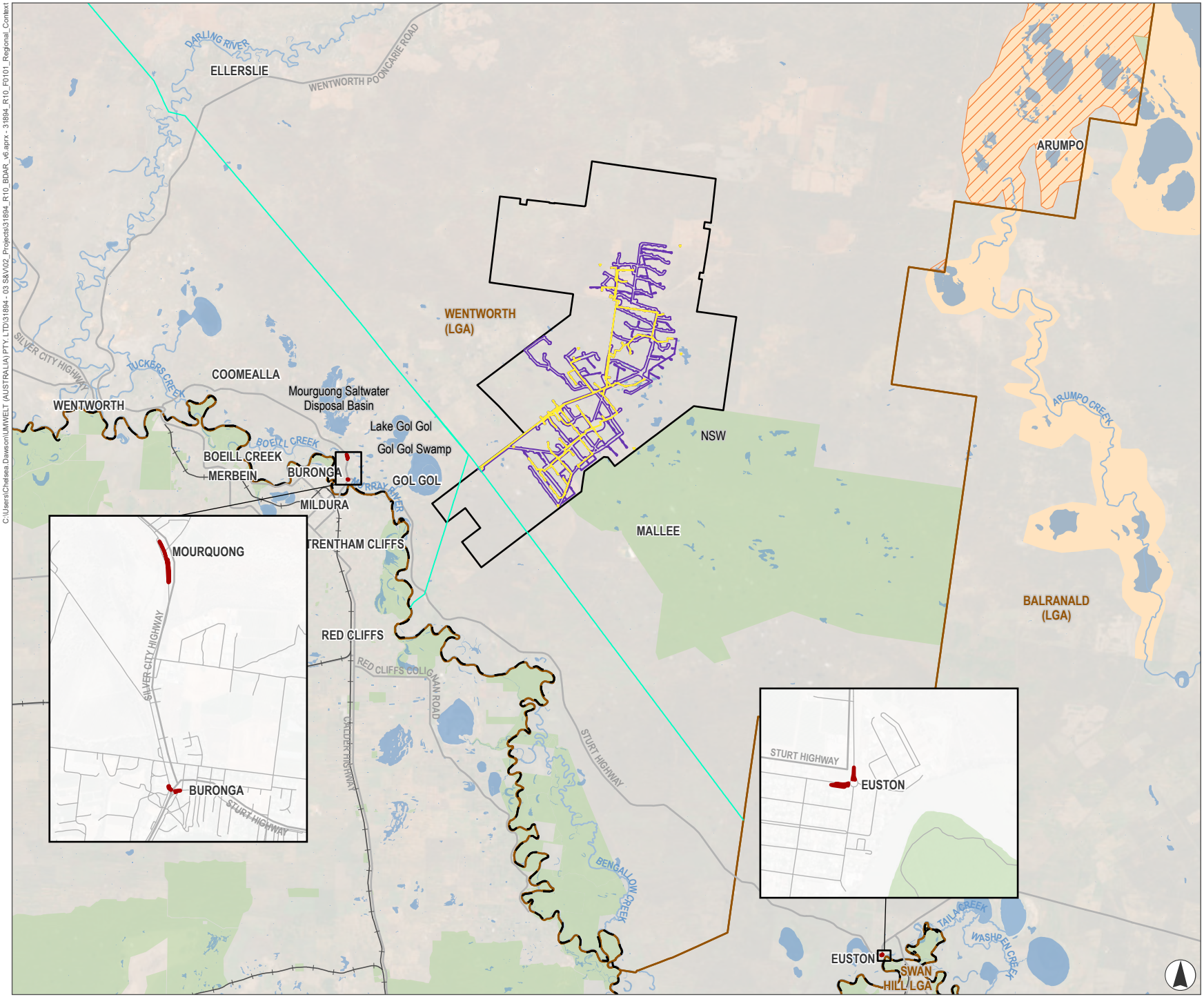

FIGURE 1.1
Regional Context

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Off-site Road Works
- Project EnergyConnect
- Willandra Lakes Region / National Heritage Property
- Willandra Lakes World Heritage Area
- State Border
- Local Government Area (LGA)
- NPWS Estate
- Road
- Railway
- Watercourse
- Water Body

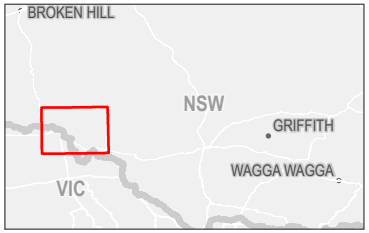

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Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

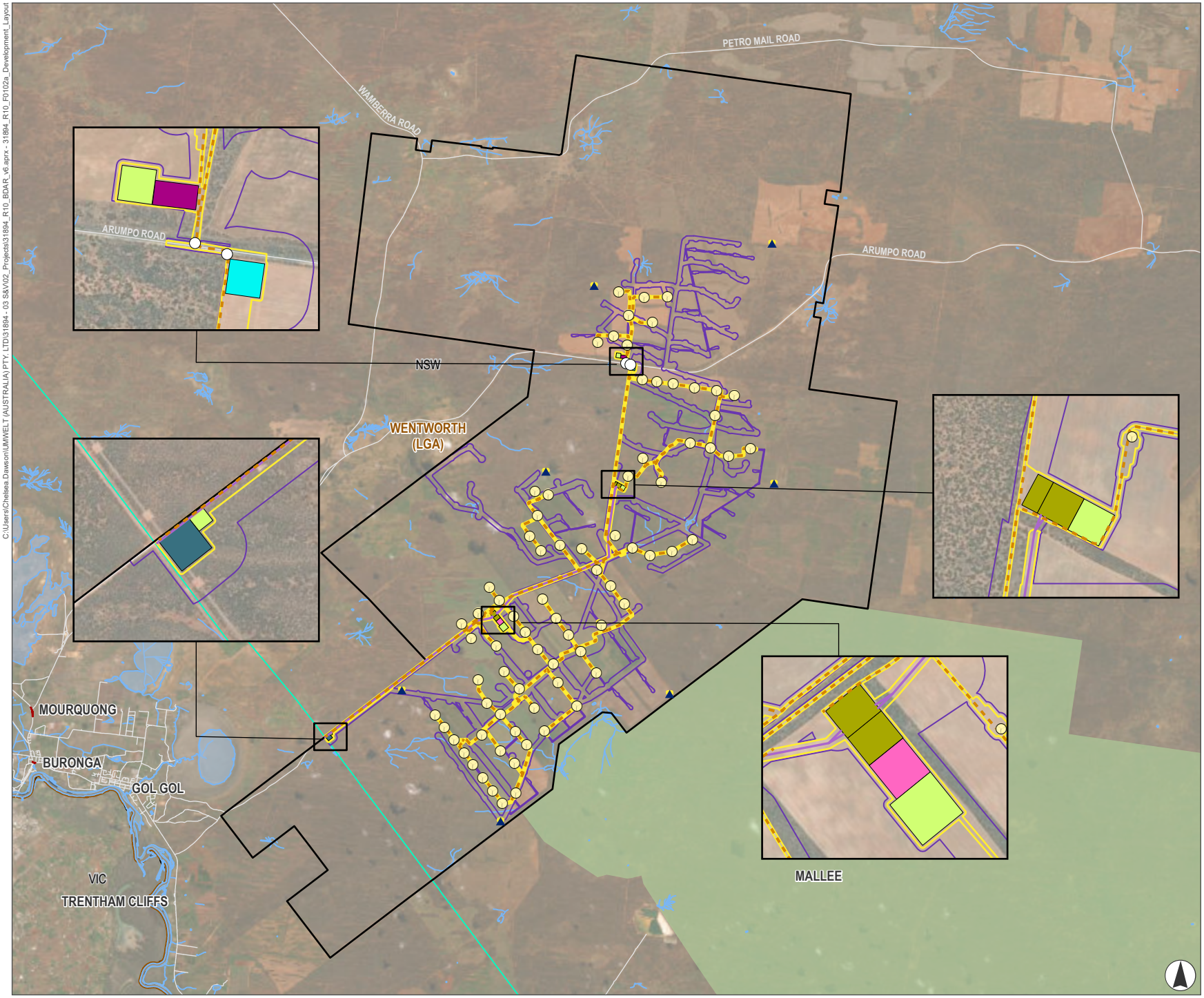

FIGURE 1.2A
Development Layout

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Off-site Road Works
- Wind Turbine Generators
- Permanent Meteorological Masts
- Access Points
- Access Tracks
- HV Transmission Line
- Collector Substation and Switchyard
- Operations and Maintenance Facility
- Construction Compound
- Accommodation Camp
- Switchyard
- Battery Energy Storage System (BESS)
- Project EnergyConnect
- State Border
- Local Government Area (LGA)
- NPWS Estates
- Road
- Watercourse
- Waterbody

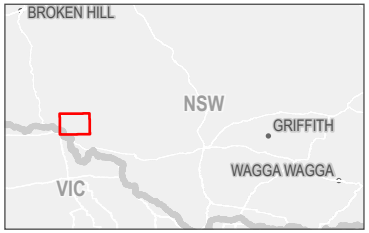

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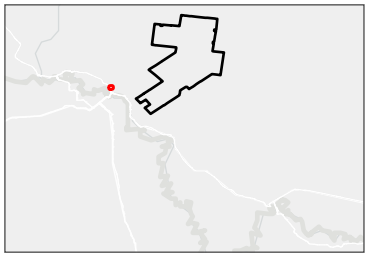
FIGURE 1.2B

Development Layout Off-site Road Works - Arumpo Road

Legend

Off-site Road Works



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Metres

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Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

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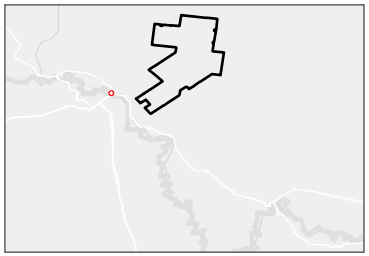
FIGURE 1.2C

Development Layout Off-site Road Works - Buronga

Legend

Off-site Road Works



0 25 50

Metres

Scale 1:1,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

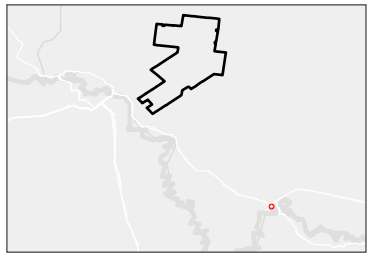
C:\Users\Chelsea.Dawson\UMWELT (AUSTRALIA) PTY. LTD\31894 - 03 S&V\02_Projects\31894_R10_BDAR_v6.aprx - 31894_R10_F01020d_Development_Layout_Euston

FIGURE 1.2D

Development Layout Off-site Road Works - Euston

Legend

Off-site Road Works



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Metres

Scale 1:1,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

1.3 Purpose and Scope of the Report

1.3.1 Secretary's Environmental Assessment Requirements (SEARs) and CPHR Submission

This March 2026 Revised BDAR has been prepared by Umwelt on behalf of Spark Renewables and forms part of the EIS documentation for the Project to address the SEARs in relation to biodiversity for the proposed wind farm. The matters raised within the SEARs and addressed in this BDAR are detailed in **Table 1.1**.

Advice from the Regional Delivery Division, South West office of CPHR was received as part of the Submissions phase and has been addressed in this Revised BDAR (March 2026). A summary of the matters raised and how they have been addressed in this Revised BDAR are provided in **Table 1.2**.

This report provides an assessment of the biodiversity values within the Biodiversity Study Area and off-site road work areas, documents the application of the avoid, minimise and offset framework and assesses the likely biodiversity impacts of the Project.

This March 2026 Revised BDAR has been prepared in accordance with the BC Act and BAM (DPIE, 2020a) under the BOS. The Project is regarded as SSD under Division 4.7 of Part 4 of the EP&A Act and is therefore required to be accompanied by a BDAR in accordance with section 7.9 of the BC Act.

CPHR has been consulted during the assessment process via teleconferences and written communication. Where feasible and appropriate, advice from CPHR has been adopted and is reflected in this report accordingly.

Figures within this BDAR have been presented as a single page map within the body of the report itself, with a set of detailed multipage figures presented in **Appendix A**.

Table 1.1 Issued SEARS and NSW DCCEEW Agency Advice (Biodiversity)

Key Issue	Requirement (Specific Assessment Requirements in Addition to the General Requirements)	Section Addressed
SEARS		
Biodiversity	An assessment of the biodiversity values and the likely biodiversity impacts of the project, including impacts associated with transport route road upgrades and indirect impacts on the Mallee Cliffs National Park and surrounding conservation areas in accordance with the BC Act, the BAM 2020 and documented in a BDAR.	The BDAR itself.
	The BDAR must include a detailed description of the proposed regime for avoiding, minimising, managing and reporting on the biodiversity impacts (including on grasslands) of the development over time, and a strategy to offset any residual impacts of the development in accordance with the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), including a detailed description of the proposed regime for avoiding, minimising, managing and reporting on the biodiversity impacts (including on grasslands) of the development over time, and a strategy to offset any residual impacts of the development in accordance with the BC Act.	**Section 7.0**, **Section 9.0**, and **Section 12.0** of this BDAR.
	An assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts.	**Section 8.6** of this BDAR.
	An assessment of the impacts of the development on birds and bats, including blade strike, low air pressure zones at the blade tips (barotrauma), alteration to movement patterns, and cumulative impacts of other wind farms in the vicinity.	**Section 8.3.4** and **Appendix B** of this BDAR.
	A cumulative impact assessment of biodiversity values in the region from nearby developments.	**Section 8.7** of this BDAR.
	If an offset is required, include details of the measures proposed to address the offset obligation.	**Section 12.0** of this BDAR.
Biodiversity Conservation Division (BCS) Advice (pre-EIS)		
Biodiversity	Biodiversity impacts related to the proposed development are to be assessed in accordance with section 7.9 of the BC Act using the BAM 2020 and documented in a BDAR. The BDAR must include information in the form detailed in the BC Act (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and the BAM, unless DPE determines that the proposed development is not likely to have any significant impact on biodiversity values.	The BDAR itself.

Key Issue	Requirement (Specific Assessment Requirements in Addition to the General Requirements)	Section Addressed
	The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect, uncertain and prescribed impacts in accordance with the BAM.	**Section 7.0, Section 9.0**, and **Section 12.0** of this BDAR
	The BDAR must include details of the measures proposed to address the offset obligation as follows: 1. The total number and classes of biodiversity credits required to be retired for the development/project 2. The number and classes of like-for-like biodiversity credits proposed to be retired 3. The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules 4. Any proposal to fund a biodiversity conservation action 5. Any proposal to make a payment to the Biodiversity Conservation Fund (BCF). If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	**Section 10.0**, **Section 11.0** and **Section 12.0** of this Revised BDAR
	The BDAR must be submitted with all digital spatial data associated with the survey and assessment as per Appendix K of the BAM.	Submitted to agencies with BDAR
	The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the BC Act.	Declarations ii (page 6) of this BDAR
	The EIS must assess the impact of wind turbine strikes on protected animals including: a. Predict the likelihood of impact on aerial species resident in, or likely to fly over, the Project Area, including but not limited to bat/bird strike and barotrauma. b. Predict the rate of impact per turbine per year for species likely to be affected. c. Justify predictions of likelihood of impact and rates of impact with reference to relevant literature and other published sources of information. d. Predict the consequences of impacts for the persistence of bioregional populations, with reference to relevant literature and other published sources of information. e. Predict and map the likely zone of disturbance around wind turbines for aerial species resident in, or likely to fly over, the Project Area, with reference to relevant literature and other published sources of information.	**Section 8.3.4** and **Appendix B** of this BDAR

Key Issue	Requirement (Specific Assessment Requirements in Addition to the General Requirements)	Section Addressed
	f. Map significant landscape and habitat features within the zone of disturbance for species likely to be affected, including but not limited to hollow bearing trees, nest trees, microbat habitat and important habitat for migratory species. g. Predict the likelihood and describe the nature of indirect impacts on aerial species resident in, or likely to fly over, the Project Area including but not limited to barriers to migratory pathways and breeding, feeding and resting resources. h. For migratory species, predict the impact of avoidance behaviour relative to migration distances and the availability of suitable habitat for breeding, feeding and resting over the migration route, with reference to relevant literature and other sources of published information. i. Justify prediction of likelihood and nature of impact, with reference to relevant literature and other published sources of information. j. Predict the cumulative impact of the project together with existing wind farms with respect to movement patterns and the use of adjacent habitat and provide justification for these predictions.	
National Parks and Wildlife Estate	The EIS must identify and assess: a. In the case of a project that adjoins land reserved under Part 4 of the National Parks and Wildlife Act 1974, ensure no encroachment of assets or ancillary infrastructure occurs, and the project is restricted to the development site and adequately buffered from the reserve. b. In the case of a project that adjoins, is in the immediate vicinity of, or upstream of land reserved under the *National Parks and Wildlife Act 1974*, ensure the matters outlined in the *Developments adjacent to National Parks and Wildlife Service lands: Guidelines for consent and planning authorities* are adequately considered and include: i. recognition of the natural, cultural, social and educational values attached to that land. The Mallee Cliffs National Park Plan of Management should be considered in the assessment of these values ii. recognition of the impacts, including direct, indirect and cumulative impacts as they relate to the environmental values of that land, its location, and greater landscape connectivity within the South-West REZ iii. extent of the direct, indirect and cumulative impacts on that land	**Section 8.7** and **Appendix C** of this BDAR. Section 5 and Section 6 of the EIS.

Key Issue	Requirement (Specific Assessment Requirements in Addition to the General Requirements)	Section Addressed
	iv. duration of the direct, indirect and cumulative impacts on the interface, the greater environmental values and the reserves connectivity in the landscape to other reserved land v. consideration of any impacts from the development on that part of Mallee Cliffs National Park identified as an Asset of Intergenerational Significance (Asset AIS_E0_221) under Part 12A of the NPW Act. Current values prompting the declaration of the land as an AIS are Numbat, Greater Stick-nest Rat and Bilby. c. Measures proposed to prevent, control, abate, minimise and manage the direct and indirect impacts including an evaluation of the proposed measures effectiveness and reliability over the life of the project. d. Residual impacts and their significance subject to the protection and conservation of Mallee Cliffs National Park. e. Risks and increased restrictions imposed to land management operations undertaken by NPWS as a result of the proposed windfarm project, especially in the use of low flight aircraft for aerial pest baiting, weed spraying, firefighting and hazard reduction purposes. Justify compliance with Australian Government Civil Aviation Safety Authority regulations. Consult with NPWS when assessing this. f. Impacts and environmental risks to the values and resilience of Mallee Cliffs National Park. g. Bushfire protection requirements attached to the proposed windfarm project ensuring they are restricted to the development site, and all ignition threats relating to the project are identified and planned for within the confines of the development site. No fire management is to affect, burden or threaten land reserved as Mallee Cliffs National Park, including any impact on NPWS fire management operations. The Mallee Cliffs National Park Fire Management Strategy should be considered in this assessment. h. Risk of interference to the functionality and operation of the emergency telecommunications system used by NPWS on Mallee Cliffs National Park as a result of the proposed windfarm project. Consult with NPWS when assessing this.	

Table 1.2 Summary and Reference Table for CPHR Advice addressed within the Revised BDAR

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
Survey effort for threatened birds and flight path mapping do not meet the requirements of the BAM			
5.1	Demonstrate that targeted bird surveys have been completed in accordance with the BAM and Threatened Biodiversity Profiles data collection (TBDC) for candidate bird species or complete additional surveys.	Additional information provided to CPHR in the form of a meeting (3 September 2025) and subsequent briefing note (Umwelt 2025) to outline the survey effort and justify its adequacy. The additional information was accepted by CPHR on 24 September 2025.	**Appendix J**
6.1	Map likely flight paths for avifauna on and through the development site.	Flyway and flight path data can only be accurately collected via radar or smart cameras. Any data which maps flight paths without the use of specialist technology is not an accurate data provision, which may understate impacts and/or overstate avoidance measures. Noting the inherent uncertainty around turbine strike risk assessment, Umwelt had opted to ensure the assessment is accurate as possible and provide alternative data. Specifically, Figure 8.1 to 8.8 within **Appendix B** of the BDAR showed the distance and direction of bird observations from the observer which provides indicative bird utilisation patterns across the Project Area. In order to provide additional information with regard to landscape scale movements of avifauna, Appendix B has been revised to include figures detailing indicative landscape scale movement pathway for avifauna across the Project Area, and indicative migration pathways for migratory and nomadic fauna.	**Appendix B** of this BDAR.
A draft Bird and Bat Adaptive Management Plan (BBAMP) is needed to address the uncertain impacts of turbine strike (as per BAM section 8.5)			
7.1	Prepare a draft BBAMP using the information from **Appendix B** of the BDAR.	**Section 7.4.1** of the BDAR detailed a comprehensive Bird and Bat Adaptive Management Plan (BBAMP) framework to inform the preparation of the BBAMP following approval of the EIS. The framework includes details of surveys proposed	**Section 7.4.1** of this BDAR. **Appendix B** of this BDAR

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
		(including methods and frequency) as part of operational monitoring of turbine strike on avifauna, as well as details on impact triggers and associated response procedures for both threatened and nonthreatened species, mitigation measures, and reporting requirements. Preparing a BBAMP prior to Project approval and the finalisation of detailed design risks unnecessary rework as key design elements have yet to be designed. Furthermore, both NSW and Commonwealth agencies would have the opportunity to review and comment of the BBAMP as part of agency consultation prior to the BBAMP being adopted and implemented. In lieu of a complete BBAMP, Umwelt has supplemented the detail which would be included within the BBAMP in **Section 7.4.1** of this Revised BDAR, as well as provided a Table of Contents for the BBAMP in **Appendix B**.	
7.2	Ensure the draft BBAMP meets the requirements of section 8.4 of the BAM.	The draft BBAMP will be prepared to meet the requirements of Section 8.4 of the BAM where appropriate and will consider the following: • Documentation of mitigation measures proposed to manage impacts, including techniques, timing, frequency and responsibility for implementing each measure • Identification of any measures for which there is a risk of failure • Evaluation of risk and consequence of any impacts likely to remain after mitigation measures are applied • Documentation of any proposed adaptive management strategies, including: ○ Baseline data against which monitoring will occur	**Section 7.4.1**

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
		○ Any seasonal changes to the resource that are relevant to the impacts being monitored ○ Monitoring methods, including frequency, timing and reporting ○ Trigger values for when adaptive management actions should be initiated ○ Adaptive management actions proposed to reduce or eliminate the impact, which may include actions to retire additional biodiversity credits ○ Information that will be necessary to measure the impact over time ○ How the results of the adaptive management strategy will be applied to the ongoing management of the proposed to reduce the extent of indirect and/or prescribed impact.	
7.3	Ensure the monitoring duration is ecologically defensible and will accurately capture species distribution across variable climatic conditions.	The feedback from CPHR recommends extending the initial carcass monitoring period from 2 to 5 years to account for species distribution across variable climatic conditions (drought, high rainfall, etc.), then recommends an additional 5 years of monitoring for all turbines classified as medium risk or above. The current BBAMP method proposes an initial carcass monitoring period of two years, representing a minimum of two monitoring rounds per season to capture climatic variability and species distribution. Following the initial monitoring period, there is a possibility of extending for a further three years to total a 5 year program if there is a clear discrepancy between estimated and realised frequency of bird and bat mortality.	

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
8.1	Review the collision risk assessment for microbat species and revise the collision risk rating where appropriate.	Umwelt has reviewed and where necessary updated the collision risk for microbats in **Appendix B**.	**Appendix B**
Expert reports to exclude candidate fauna need revision to meet BAM Section 5.3			
9.1	Update the expert report for Painted Burrowing Frog and Desert Mouse to include additional justification for species absence from the approved expert based on local site conditions and the approved expert's assessment of the subject land and associated PCTs. Where additional justification from the expert cannot be provided, species assumed presence may have to be considered.	On 19 December 2025, Umwelt sought confirmation from CPHR via email on the approach regarding the expert report presented in Appendix H of the BDAR. This is on the basis that: • The existing expert report for the Painted Burrowing Frog and Desert Mouse meets all BAM Section 5.3 requirements, and no further justification for species absence is needed. • The expert is the only approved expert for these species, and his methodology and recommendations carry significant weight. • Surveys and data review were undertaken by a third party consultant nominated by the approved expert for their specialist experience and local knowledge, and fully aligned with BAM requirements. • Umwelt also provided extensive supporting BDAR data. On 19 January 2026, CPHR confirmed that the expert reports will be accepted as they are and therefore no revisions to the expert reports are required and that the species are not to be assumed present.	**Section 5.3**
Identification and assessment of some direct, indirect and prescribed impacts require review and more specific detail			
10.1	Provide details in s1.2.2 of the BDAR about requirements and commitments to asset protection that are likely to impact native vegetation, including APZ and security fencing.	Further information relating to asset protection has been provided in **Section 1.2.2**.	**Section 1.2.2** of this BDAR

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
10.2	Update the BDAR, BAM-C and spatial data to include any direct impacts to native vegetation that have not been addressed.	No updates are required as all direct impacts to native vegetation have been addressed, including those related to APZs and security fencing, in this BDAR.	**Section 1.2.2** of this BDAR
11.1	Assess the potential indirect impacts on Mallee Cliffs National Park and the feral predator-free area.	It is understood that habitat fragmentation from project disturbance can result in increased predatory movements, that may result in predator species congregating into intact environments, including National Parks. However, with consideration to the disturbed nature of the existing site, works are not expected to influence the number of predators impacting the Mallee Cliffs National Park and the feral predator-free area. This expected negligible impact is further justified by the implementation of the 800 metre (increased from 300 m) site impact buffer between the southeastern WTG and the Mallee Cliffs Natural Park, and the existence of the 37.2 km feral predator-proof fence surrounding the perimeter of the Mallee Cliffs National Park.	**Section 8.2.2.1**
11.2	Commit to ongoing pest management actions in conjunction with NPWS. Pest management actions should not be delayed until triggers are met.	The proponent's commitment to ongoing pest management actions in conjunction with NPWS is outlined in the Biodiversity Management Plan (BMP) that implements a series of measures and protocols and is summarised in **Table 9.1**. The known presence of pest species and the disturbed nature of the site implies that the approaches outlined in the BMP are appropriate. However, to reinforce the commitment to pest management in response to CPHR's comments, **Table 9.1** has been revised to include additional proactive management measures that do not rely on triggers, including the use of predictive indicators to predict pest number outbreaks before they occur and the continued use of regular control measures even during low pest periods.	**Table 9.1** of this BDAR

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
11.3	Assess the potential indirect impacts on Gol Gol Swamp and Lake Gol Gol and the species that rely on these waterbodies, particularly in relation to bird movement to and from the waterbodies.	The assessment of potential indirect impacts of species that rely on Gol Gol Swamp, Lake Gol Gol and other surrounding waterbodies has been addressed in **Table 3.1** and Table 8.26 of **Appendix B**. The revised BDAR further addresses Action 11.3 by adding **Section 8.2.3** 'Consideration of local waterbodies in the greater landscape' to specify the species subject to indirect risk of turbine strike during movement between waterbodies.	**Table 3.1** and **Table 8.26** of **Appendix B** of this BDAR. **Section 8.2.3** of this BDAR
11.4	Define edge effects and outline how impacts will be measured.	Further identification and analysis of edge effects have been incorporated into the revised BDAR, with reference to the existing fragmented nature of the site.	**Table 8.5** and **Table 9.1** of this BDAR
12.1	Revise the prescribed impact assessment for vehicle strike to consider all vehicle movements associated with the development.	The revised BDAR has been updated to further elaborate on the risk of vehicle strike, including over-size, over-mass (OSOM) vehicles across the project Area and identified threatened species suspectable to strike.	**Table 6.1** and **Table 7.5** of this BDAR
Mitigation measures need to include specific detail to be effective in managing impacts and need to include binding terms			
13.1	Clarify the timing of mitigation measures to be completed during detailed design. Provide an auditable list of all actions that have been, or will be, completed during detailed design and how the proponent will demonstrate that the outcomes have been achieved.	The Revised BDAR has been updated to correctly reference the extent of design that has occurred to inform the original BDAR and this BDAR; noting that detailed design of the Project is yet to occur. The wording within **Table 9.1** has been reviewed and updated to incorporate SMART goals where applicable.	**Table 9.1** of this BDAR
13.2	Specify the target weeds to be controlled, locations and outcomes, addressing all impacts relating to weeds.	Spark Renewables is committed to preparing a BMP prior to construction of the Project (B04 within **Table 9.1**). The BMP would specify target weeds, suitable control measures, and key performance indicators. Additional detail with regard to specific weeds which are likely to be included as part of weed control measures within a BMP has been provided B13 within **Table 9.1**.	**Table 9.1** of this BDAR

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
14.1	Review the BDAR and appendices to ensure all proposed measures are detailed in **Table 9.1**.	Impact assessment for vehicle strike has been revised in **Table 9.1** and now considers all vehicle movements associated with the development. Mitigation measures relating to the BBAMP, such as Carrion removal, raptor perch management and lighting design, are outlined in **Table 7.6**, and are not repeated in **Table 9.1**.	**Table 9.1** of this BDAR
14.2	Demonstrate the proponent's commitment to these measures by using binding language.	**Table 9.1** has been reviewed in accordance with CPHR comments and has been altered using binding language to demonstrate the proponent's commitment to mitigation measures. It is noted that 'where possible' in B10 refers to vegetation within the Development Footprint thus its use is appropriate within this context.	**Table 9.1** of this BDAR
14.3	Remove funding of operational mitigation and monitoring measures as a possible conservation measure to offset the impact of turbine strike.	Section 10.1.4.1 of the Revised BDAR (March 2026) provides seven (7) conservation measures (including a proposed approach for implementation) which could be adopted to offset the predicted prescribed impacts that are associated with the Project in accordance with clause 6.5 of the Biodiversity Conservation Regulation 2017 (BC Regulation 2017), and as detailed within Section 4.5.11 of the Biodiversity Assessment Method 2020 Operational Manual – Stage 2. Umwelt acknowledges that the sixth and seventh proposed conservation measure - "*Funding the implementation and monitoring of operational mitigation measures (such as curtailment) to assess the interaction with birds and bats*" and "*Funding of testing technological advancements, such as IdentiFlight, Robin Radar or similar technology*" could be misinterpreted as funding of the mitigation measure itself, rather than the intended funding to research of effectiveness.	**Section 10.1.4.1** of this BDAR

Key Assessment Issues	CPHR Submission	Summary of Approach	Reference to Where it has Been Addressed
		To provide clarity, the seventh and sixth dot point within Section 10.1.4.1 has been reworded to the following: "*Funding of a research project to investigate the long-term effectiveness of operational mitigation measures (such as curtailment) on impacts to bird and/or bat species*" and "*Funding research to investigate technological advancements, such as IdentiFlight, Robin Radar or similar technology*".	
Matters of National Environmental Significance (MNES)			
16.1	Revise the significant impact assessment after further assessment of Pink Cockatoo (as detailed in Issue 5).	No action required following response to item 5.1 being: "*Additional information provided to CPHR in the form of a meeting (3 September 2025) and subsequent briefing note (Umwelt 2025) to outline the survey effort and justify its adequacy. The additional information was accepted by CPHR on 24 September 2025.*". No changes to significant impact assessment.	**Appendix J**

1.3.2 EPBC Act Assessment Requirements

The Project has been declared a controlled action under the EPBC Act (EPBC 2023/09500). The BAM has been endorsed as the assessment method for Matters of National Environmental Significance under a Bilateral Agreement (Amending Agreement No.1) made under the EPBC Act. The Project will be assessed by the NSW Government under the Bilateral Agreement between NSW and the Commonwealth. Nationally listed threatened species threatened ecological communities and migratory species have been considered and assessed as part of this BDAR. The EPBC Act Environmental Assessment Requirements for Biodiversity addressed in this BDAR are detailed in **Table 1.3**.

The Commonwealth DCCEEW has been consulted during the assessment process via teleconferences and written communication. Where feasible and appropriate, advice from Commonwealth DCCEEW has been adopted and is reflected in this report accordingly.

It is noted that the EPBC 2023/09500 controlled action was varied under Section 156B of the EPBC Act and accepted by Commonwealth DCCEEW on 4 September 2024.

Table 1.3 EPBC Act Environmental Assessment Requirements for Biodiversity

Key Issue	Commonwealth Assessment Requirement	Section Addressed
General Requirements		
Relevant Regulations	The EIS must address all matters outlined in Schedule 4 of the EPBC Regulations and all matters outlined below in relation to the controlling provisions.	**Appendix C** of this BDAR
Project Description	The title of the action, background to the action and current status.	**Appendix C** of this BDAR
	The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.	**Appendix C** of this BDAR
	How the action relates to any other actions that have been, or are being taken in the region affected by the action	**Appendix C** of this BDAR
	How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	**Section 2.0** and **Appendix C** of this BDAR
Impacts	The EIS must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions, including: • a description and detailed assessment of the nature and extent of the likely direct, indirect and consequential impacts, including short term and long term relevant impacts • a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible • analysis of the significance of the relevant impacts • any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	**Appendix C** of this BDAR

Key Issue	Commonwealth Assessment Requirement	Section Addressed
Avoidance, mitigation and offsetting	For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action including: i. a description, and an assessment of the expected or predicted effectiveness of the mitigation measures ii. any statutory policy basis for the mitigation measures iii. the cost of the mitigation measures iv. an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action, including any provisions for independent environmental auditing v. the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	**Section 7.0**, **Section 9.0** and **Appendix C** of this BDAR
	Where a significant residual adverse impact to a relevant protected matter is considered likely, the EIS must provide information on the proposed offset strategy, including discussion of the conservation benefit associated with the proposed offset strategy.	**Appendix C** of this BDAR
	For each of the relevant matters likely to be impacted by the action the EIS must provide reference to, and consideration of, relevant Commonwealth guidelines and policy statements including any: i. conservation advice or Recovery Plan for the species or community ii. relevant threat abatement plan for the species or community iii. wildlife conservation plan for the species iv. any strategic assessment. Note: the relevant guidelines and policy statements for each species and community are available from the Department of the Environment Species Profiles and Threats Database. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl].	**Appendix C** of this BDAR
	In addition to the general requirements described above, specific information is required with respect to each of the determined controlling provisions. These requirements are outlined below under Biodiversity (threatened species and communities) – Assessment Requirements.	**Appendix C** of this BDAR

Key Issue	Commonwealth Assessment Requirement	Section Addressed
Biodiversity (threatened species and communities)		
Assessment Requirements	The EIS must identify each EPBC Act listed threatened species and community likely to be impacted by the action. For any species and communities that are likely to be impacted, the proponent must provide a description of the nature, quantum and consequences of the impacts. For species and communities potentially located in the Project Area or in the vicinity that are not likely to be impacted, provide evidence why they are not likely to be impacted.	**Section 8.5** and **Appendix C** of this BDAR
	For each of the EPBC Act listed threatened species and communities likely to be impacted by the action the EIS must provide a separate: i. description of the habitat (including identification and mapping of suitable breeding habitat, suitable foraging habitat, important populations and habitat critical for survival), with consideration of, and reference to, any relevant Commonwealth guidelines and policy statements including listing advice, conservation advice and Recovery Plans ii. details of the scope, timing and methodology for studies or surveys used and how they are consistent with (or justification for divergence from) published Australian Government guidelines and policy statements iii. description of the relevant impacts of the action having regard to the full national extent of the species or community's range iv. description of the specific proposed avoidance and mitigation measures to deal with relevant impacts of the action v. identification of significant residual adverse impacts likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account vi. a description of any offsets proposed to address residual adverse significant impacts and how these offsets will be established vii. details of how the current published BAM has been applied in accordance with the objects of the EPBC Act to offset significant residual adverse impacts	**Appendix C** of this BDAR

Key Issue	Commonwealth Assessment Requirement	Section Addressed
	Any significant residual impacts not addressed by the BAM may need to be addressed in accordance with the EPBC Act 1999 Environmental Offset Policy. http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.	**Appendix C** of this BDAR

1.3.3 Excluded Impacts

Clause 6.8(3) of the BC Act specifies that 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 (as defined in Part 5A of the *Local Land Services Act 2013* (LLS Act)), other than prescribed impacts (as defined in clause 6.1 of the BC Regulation).

Areas of Category 1 – Exempt Land include those where vegetation was cleared as at 1 January 1990 or there has been a lawful removal of all native vegetation (all strata) prior to the commencement of Part 5A of the LLS Act, being 25 August 2017. 'Cleared as at 1990' has been interpreted as areas where there is clear evidence of the complete removal of all vegetation or evidence of compositional change in the grassland prior to 1990 and in which shrubs or trees had not regrown prior to 1990.

An assessment of land categorisation was completed for the Project to determine areas of Category 1 – Exempt Land. This assessment included desktop and ground-truthing surveys.

Potential Category 1 – Exempt Land areas were identified using available online data sets, including:

- Draft Native Vegetation Regulatory Map (NSW DCCEEW 2024a)
- NSW Government Historical Imagery Viewer (DCS Spatial Services 2024).

Ground-truth surveys were undertaken during vegetation and land categorisation mapping surveys in September 2022 and April 2024. Combined with the results of the field surveys, Category 1 – Exempt Land was identified through aerial photography interpretation of historical imagery, identifying areas of cropping or tillage. Section 4.7 provides the outcome of the Category 1 – Exempt Land assessment.

1.3.4 Statutory Considerations

Commonwealth and State Legislation relevant to this BDAR is described in **Table 1.4**.

Table 1.4 Legislation Relevant to the Project

Relevant Legislation	Governing Agency	Summary
Commonwealth Legislation		
***Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)**	Commonwealth DCCEEW	The EPBC Act is the Commonwealth Government's primary piece of environmental legislation and is administered by the Commonwealth DCCEEW. It is designed to protect national environmental assets, known as MNES, which include threatened species of flora and fauna, endangered ecological communities, and migratory species, as well as other protected matters. It defines the categories of threat for threatened flora and fauna, identifies key threatening processes and provides for the preparation of Recovery Plans for threatened flora, fauna, and communities. The Project was referred under Part 7 of the EPBC Act to the Commonwealth DCCEEW. The Commonwealth DCCEEW determined that the Project is a controlled action and requires assessment and approval under the EPBC Act (EPBC Number: 2023/09500). The BAM has been endorsed as the assessment method for MNES under a Bilateral Agreement made under the EPBC Act. The Commonwealth Assessment Requirements and where this BDAR addresses each requirement are summarised in **Table 1.2**. **Appendix C** addresses these requirements in detail.
State Legislation		
***Environmental Planning and Assessment Act 1979* (EP&A Act)**	DPHI	The EP&A Act is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, populations and ecological communities, and their habitats of biodiversity values as listed in the BC Act and FM Act. Section 4.36 of the EP&A Act provides for the declaration of a project as SSD. Under the EP&A Act, the declaration of a project as SSD can be made by meeting the requirements of a State Environmental Planning Policy (SEPP) (Planning Systems) 2021 (Planning Systems SEPP) or by declaration of the Minister for Planning and Public Spaces. The Project is SSD under Schedule 1, Clause 20 of Planning Systems SEPP, being development for the purpose of 'electricity generating works' that has an Estimated Development Cost (EDC) of more than $30 million.

Relevant Legislation	Governing Agency	Summary
		As SSD, the Project would be assessed under Part 4 Division 4.7 section 4.36 of the EP&A Act. Under Section 4.5(a) of the EP&A Act the consent authority for SSD is the Independent Planning Commission (IPC) (if the development is of a kind for which the Commission is declared the consent authority by an environmental planning instrument) or the Minister for Planning and Public Spaces (if the development is not of that kind). In accordance with clause 2.7(1) of the Planning System SEPP if select criteria are exceeded the IPC is the consent authority. If none of those criteria are triggered, DPHI will determine the development application under delegated authority of the Minister for Planning and Public Spaces. The consent authority is required to take into consideration the matters listed under section 4.15 of the EP&A Act when determining the development application. The SEARs and where this BDAR addresses each requirement are summarised in **Table 1.1**.
***Biodiversity Conservation Act 2016* (BC Act)**	NSW DCCEEW	The BC Act and its supporting regulations commenced on 25 August 2017. The BC Act repealed the *Threatened Species Conservation Act 1995* (TSC Act) along with other natural resource management legislation, while retaining the TSC Act species list. The BC Act sets out the environmental impact assessment framework for threatened species, TECs and Areas of Outstanding Biodiversity Value (AOBV) (formerly critical habitat) for Major Projects, Part 5 activities, and local development. The BC Act provides a framework to avoid, minimise and offset the impacts of proposed development and established a methodology for assessing the likely impacts on biodiversity values and calculating measure to offset those impacts (the BAM). Sections 7.9 of the BC Act requires that SSD under Part 4 of the EP&A Act that triggers the BOS must be accompanied by a BDAR prepared by an accredited assessor in accordance with the BAM.
***Fisheries Management Act 1994* (FM Act)**	Department of Primary Industries and Regional Development (DPIRD) (formerly Department of Primary Industries (DPI) – Fisheries)	The objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. More detailed objectives relevant to the Project include: • to conserve fish stocks and key fish habitats • to conserve threatened species, populations and ecological communities of fish and marine vegetation • to promote ecologically sustainable development, including the conservation of biological diversity.

Relevant Legislation	Governing Agency	Summary
		DPIRD agency advice received with the SEARs noted that: "*The scoping report and draft SEARs have been reviewed and as there is no Key Fish Habitat (KFH) within the study area, DPI Fisheries has no comment on the proposal*". The FM Act does not apply to the Project.
Local Land Services Act 2013 **(LLS Act)**	Local Land Services (LLS)	The LLS Act, supported by the Local Land Services Regulation 2014 (LLS Regulation), established 11 regional LLS organisations to provide biosecurity, natural resources management and agricultural advisory services. Under Part 5A of the LLS Act and the supporting regulation, a Native Vegetation Regulatory (NVR) map showing the extent of categorised land in NSW is to be published by the Environmental Agency Head (EAH). The NVR map underpins the legislative framework for native vegetation clearing in rural areas by categorising land in NSW. However, the map applies only to the following zones (if they are not in an excluded LGA): Zone RU1 Primary Production, Zone RU2 Rural Landscape, Zone RU5 Primary Production Small Lots and Zone RU6 Transition. Currently, a draft NVR map and various map categories have been released under staged transitional arrangements. During the transition period landholders and/or proponents must determine if their land is Category 1 or Category 2 under the LLS Act. The BAM does not need to be applied to land mapped as Category 1 – Exempt Land. Portions of the Development Footprint have been mapped for this Project as Category 1 – Exempt Land on the extract of the Draft NVR map, provided by the NSW Government.
Biosecurity Act 2015	DPIRD	The Biosecurity Act replaced the *Noxious Weeds Act 1993* on 1 July 2017. The Biosecurity Act is a wide-ranging legislation that outlines the requirements of government, councils, private landholders, and public authorities in the management of biosecurity matters. Priority weeds are regulated under the Biosecurity Act with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Some priority weeds have additional management obligations which may apply generally, or under specific circumstances. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised as is reasonably practicable.
National Parks and Wildlife Act 1974 **(NPW Act)**	National Parks and Wildlife Service (NPWS)	The NPW Act provides for the protection of Aboriginal sites and designated conservation areas as well as the flora and fauna within conservation areas. There are no conservation areas declared under the NPW Act that are within Project Area, however the Mallee Cliffs National Park is adjacent to Project Boundary in the southeastern section of the wind farm. The objective of the NPW Act is to consolidate and amend the law relating to the establishment, preservation

Relevant Legislation	Governing Agency	Summary
		and management of national parks, historic sites, certain other areas, and the protection of certain fauna, native plants and Aboriginal objects. The Mallee Cliffs National Park adjoins the Project Area. Where a Proposed Action/ Project adjoins land reserved under Part 4 of the NPW Act, an assessment of the direct and indirect impacts on the park, its values and NPWS management of the park is required in keeping with the NPWS *Development adjacent to NPWS lands Guidelines for consent and planning authorities* (DPIE 2013). Risks to be considered include: • erosion and movement of sediment onto NPWS land • stormwater and nutrient impacts • pests, weeds and edge effects • fire management • boundary encroachments and access through NPWS land • Visual, odour, noise, vibration, air quality and amenity impacts • wildlife connectivity and groundwater-dependent ecosystems • cultural heritage • road network design changes. Development of the design of the Project has considered proximity to the Mallee Cliffs National Park, impacts on connectivity and impacts of operation of the Project on birds and bats that may occur in the national park. (a Proposed Action adjoins land reserved under the NPW Act). The design includes a 700 m buffer to the wind turbine generators (from blade tip) which exceeds the recommended buffer to avoid and minimise impacts to birds and bats. Part 12A of the NPW Act provides for the identification of Assets of Intergenerational Significance (AIS). This includes reserved land that is an environmental or cultural asset of intergenerational persistence. Under Section 153I of the NPW Act it is an offence to damage, harm or disturb an area of land declared as an AIS. The area of enclosed (fenced) land within the Mallee Cliffs National Park that has been established for reintroduction of a number of mammal species listed as extinct under the BC Act has been identified as an AIS, Site# AIS_EO_221. The site has been declared for the extinct numbat (*Myrmecobius fasciatus*), bilby (*Macrotis lagotis*) and greater stick-nest rat (*Leporillus conditor*). The AIS is within the national

Relevant Legislation	Governing Agency	Summary
		park and a minimum of 5.1 km from the shared boundary of the Project Area and Mallee Cliffs National Park. The Proposed Action will not impact directly or indirectly the AIS values, threatened species and/or management of the AIS area. Further details are provided in Chapter 7 of the EIS.
State Environmental Planning Policy (Biodiversity and Conservation) 2021	DPHI	SEPP (Biodiversity and Conservation) 2021 commenced in March 2022 and includes a number of previous planning policies including Koala Habitat Protection 2020 and Koala Habitat Protection 2021, Chapter 3 and 4, respectively. Schedule 2 identifies that the provisions of Chapters 3 and 4 apply in the Wentworth Shire LGA. Both chapters apply to development applications to Councils accordingly there are no specific obligations to consider the Biodiversity SEPP for SSD. Notwithstanding this, the following addresses the aims of the SEPP as relevant to the Project. The majority of the Project Area is zoned RU1 (Primary Production) and accordingly Chapter 3 Koala Habitat Protection 2020 applies. Koala Habitat Protection 2020 applies to development applications to council requiring proponents to determine if the land is potential koala habitat (based on occurrence of 10 koala feed trees) and if so is it core koala habitat. Parts of the Project Area are zoned C2 Environmental Conservation and accordingly Chapter 4 Koala Protection 2021 applies. This chapter identifies a larger number of koala feed trees as listed in Schedule 3 of the SEPP for different koala management areas. The vegetation in the Project Area does not support any of the 10 koala feed trees listed in Schedule 1 (Chapter 3) and accordingly potential koala habitat as defined by Chapter 3 does not occur on the rural zoned land. The Wentworth LGA is in the far west koala management area which identifies 20 koala feed trees for the purposes of defining koala habitat in accordance with Chapter 4. Vegetation communities in the Project Area do not support any of the koala feed trees and accordingly the Project Area does not provide highly suitable koala habitat.

1.4 Information Sources

The following guidance documents and resources relevant to the preparation of this BDAR were reviewed.

1.4.1 BAM Guidance Documents

The guidance documents and resources specific to the BAM reviewed as part of preparation of this BDAR are detailed in **Table 1.5**. **Appendix D** includes a checklist of the components required and recommended in a BDAR as per Table 41 of the BDAR Template.

Table 1.5 Guidance Documents and Resources Relating to the NSW BOS

Resource	Source
Biodiversity Assessment Method (DPIE 2020a)	NSW Department of Planning, Industry and Environment (DPIE) (superseded)
Biodiversity Assessment Method 2020 Operational Manual – Stage 1 (DPIE 2020b)	DPE https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-operational-manual-stage-1-220279.pdf
Biodiversity Assessment Method Operational Manual – Stage 2 (DPE 2023a)	DPE https://www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-assessment-method-operational-manual-stage-2
Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme (DPE 2023b)	DPE https://www.environment.nsw.gov.au/research-and-publications/publications-search/determining-native-vegetation-land-categorisation-for-application-in-the-biodiversity-offsets-scheme
Streamlined Assessment Module Planted Native Vegetation: Biodiversity Assessment Method Operational Manual (NSW DCCEEW 2024c)	NSW DCCEEW https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/streamlined-assessment-module-planted-native-vegetation-biodiversity-assess-method-op-manual-240260.pdf

1.4.2 Datasets

The NSW and Commonwealth datasets reviewed as part of preparation of this BDAR are detailed in **Table 1.6**.

Table 1.6 NSW Guidance and Resources Reviewed

Resource	Source	Search Parameter
NSW Datasets		
BioNet Vegetation Classification, vegetation information system (VIS) (NSW DCCEEW 2024a)	NSW DCCEEW https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet – date last accessed 02/08/2024	Plant Community Type (PCT) descriptions
BioNet Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW 2024a)	NSW DCCEEW https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet - date last accessed 12/08/2024	20 km buffer around the Development Footprint All valid threatened flora, fauna, ecological community records
BioNet Atlas (NSW DCCEEW 2024a)	NSW DCCEEW https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet - date last accessed 12/08/2024	20 km buffer around the Development Footprint All valid threatened flora, fauna, ecological community records
Important Area Maps (NSW DCCEEW 2024b)	NSW DCCEEW	Project Area
Biodiversity Assessment Method Calculator (BAM-C)	NSW DCCEEW	Development Footprint
Transitional NVR Map	NSW DCCEEW https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=NVRMap – date last accessed 31/07/2024	Project Area
Biodiversity Values Map	NSW DCCEEW https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap – date last accessed 21/08/2024	Project Area
NSW WeedWise (DPI 2024a)	DPI (https://weeds.dpi.nsw.gov.au/ - date last accessed 11/08/2024	Project Area

Resource	Source	Search Parameter
PlantNet – NSW Flora Online	The Royal Botanic Gardens https://plantnet.rbgsyd.nsw.gov.au/ - date last accessed 02/08/2024	Species Descriptions
Register of Declared Areas of Outstanding Biodiversity Value (AOBV)	DPE https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/areas-of-outstanding-biodiversity-value/area-of-outstanding-biodiversity-value-register - date last accessed 11/08/2024	Project Area
Commonwealth Datasets		
Protected Matters Search Tool (PMST)	Commonwealth DCCEEW https://www.awe.gov.au/environment/epbc/protected-matters-search-tool - date last accessed 12/08/2024	10 km buffer around the Development Footprint
Register of Critical Habitat	Commonwealth DCCEEW https://www.environment.gov.au/cgi-bin/sprat/public/publicregisterofcriticalhabitat.pl - date accessed 06/07/2024	Project Area
Atlas of Groundwater Dependent Ecosystems (GDEs) (BoM 2024a)	Bureau of Meteorology (BoM) http://www.bom.gov.au/water/groundwater/gde/ - date accessed 06/08/2024	Project Area
Climate Data Online (BoM 2024b)	BoM http://www.bom.gov.au/climate/data/?ref=ftr – date accessed 31/07/2024	Mildura Airport (076031
Other		
Atlas of Living Australia Spatial Portal	Atlas of Living Australia https://www.ala.org.au/ - date accessed 01/08/2024	N/A

1.4.3 Survey Guidelines

The NSW and Commonwealth surveys guidelines referred to as part of preparation of this BDAR are detailed in **Table 1.7**.

Table 1.7 NSW and Commonwealth Survey Guidelines

Resource	Source
Threatened reptiles biodiversity assessment method survey guide (2022c)	DPE https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-reptiles-biodiversity-assessment-method-survey-guide
Surveying threatened plants and habitats NSW survey guide biodiversity assessment method (2020c)	DPIE https://www.environment.nsw.gov.au/research-and-publications/publications-search/surveying-threatened-plants-and-their-habitats-survey-guide-for-the-biodiversity-assessment-method
Flora species with specific survey requirements (XLS) (DPE 2019)	
Species credit threatened bats and their habitats NSW guide for biodiversity assessment method (DPIE 2021)	DPIE https://www.environment.nsw.gov.au/research-and-publications/publications-search/species-credit-threatened-bats-nsw-survey-guide-for-biodiversity-assessment-method
NSW survey guide for threatened frogs (DPIE 2020d)	DPIE https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-survey-guide-for-threatened-frogs
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (DEC 2004)	NSW Department of Environment and Conservation (DEC) (superseded) https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-biodiversity-survey-and-assessment
Threatened species survey and assessment guidelines: field survey methods for fauna. Amphibians (DEC 2009)	NSW Department of Environment and Climate Change (DECC) (superseded) https://www.environment.nsw.gov.au/research-and-publications/publications-search/threatened-species-field-survey-methods-for-fauna-amphibians

Resource	Source
Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act (DEWHA (2010a).	Department of Environment, Water, Heritage and the Arts (DEWHA) https://www.dcceew.gov.au/environment/epbc/publications/survey-guidelines-australias-threatened-bats
Survey guidelines for Australia's threatened birds (DEWHA 2010b).	Department of Environment, Water, Heritage and the Arts (DEWHA) https://www.dcceew.gov.au/sites/default/files/documents/survey-guidelines-birds-april-2017.pdf
Survey Guidelines for Australia's threatened frogs (DEWHA 2011).	Department of Environment, Water, Heritage and the Arts (DEWHA) https://www.dcceew.gov.au/sites/default/files/documents/survey-guidelines-frogs.pdf
Survey guidelines for Australia's threatened mammals (DSEWPaC 2011a).	Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) https://www.dcceew.gov.au/environment/epbc/publications/survey-guidelines-australias-threatened-mammals
Survey guidelines for Australia's threatened reptiles (DSEWPaC 2011b).	Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) https://www.dcceew.gov.au/environment/epbc/publications/survey-guidelines-australias-threatened-reptiles

Other information sources relied upon are referenced in the text and are listed in the references Section of this report.

1.5 Agency Consultation

Umwelt has undertaken extensive consultation with CPHR through the process of undertaking the biodiversity assessment for Mallee Wind Farm. Below is a summary of consultation undertaken on the Project:

- 15 December 2022 – Project commencement meeting, including Project overview, proposed biodiversity assessment methods and preliminary results.
- 14 February 2023 – written advice on proposed threatened fauna survey methods and requirement for an expert report.
- 4 April 2023 – advice for assessing recorded *Pterostylis jeanesii* (not listed under BC Act or EPBC Act) due to rarity in NSW.
- 31 May 2023 – provision of draft Bird and Bat Utilisation Surveys (BBUS) methodology document and subsequent advice.
- 24 July 2023 – advice for applying turbine risk assessment and avoidance.
- 3 September 2025 – meeting to discuss item 5.1 of CPHR agency advice (DOC24/925566) and subsequent written advice demonstrating target bird surveys were completed in accordance with the BAM.
- 19 January 2026 – advice supporting acceptance of expert reports for Desert Mouse and Painted Burrowing Frog.

In addition, general consultation with Commonwealth DCCEEW, including updates on avoidance and biodiversity values, has occurred as follows:

- 13 December 2022 – updates on biodiversity matters as part of a pre-referral meeting
- 28 June 2023 – site visit with DCCEEW assessment officers
- 9 February 2024 – project update meeting with DCCEEW assessment officers
- 23 July 2024 – meeting to discuss project revisions and Section 156 Variation
- 4 September 2024 – Section 156 Variation Approval.

1.6 Limitations of the Assessment

Field surveys for this BDAR were carried out periodically over an approximate 2-year period between September 2022 and August 2024.

However, as is the case with all surveys, there are factors that can influence the effectiveness in detecting the full spectrum of flora and fauna species as well as ecological processes likely to occur within the Biodiversity Study Area. In addition to the surveys undertaken, the full spectrum of flora and fauna species and ecological processes likely to occur in the Biodiversity Study Area were considered assessing the potential species to occur on the Development Footprint based on previous records, the type and condition of habitats present, the historical and recent land use practices as well as the broader landscape context.

To address any survey limitations, surveys were conducted at specific times of year to optimise detectability, in accordance with relevant guidelines, and where appropriate, a precautionary approach was used to assess impacts to threatened species. All species were assessed on the basis of the presence of their habitat and the likely significance of that habitat in supporting a viable local population.

Any specific limitation relating to native vegetation assessment and threatened species surveys are detailed within **Section 4.1.5** and **Section 5.5** accordingly.

Figures within this BDAR have been presented as a single page map within the body of the report itself, with a set of detailed multipage figures presented in Appendix A. The BAM requires that figures be presented at a scale of 1:1000 or finer; however, due the size of the Project Area a total of 14,303 pages would be required to show a single figure at a 1:1000 scale. With over 300 figures within the BDAR, this was considered impractical. Instead, figures within the BDAR are presented at a scale of 1:20,000. At this scale, a single figure is shown across 27 pages and retains necessary detail to be legible and meaningful to the reader.

2.0 The Project

2.1 Project Overview

The Project is a proposed wind farm which includes the installation, operation, maintenance and decommissioning of up to 76 WTGs, battery storage, ancillary infrastructure and temporary facilities associated with construction of the Project. The Project design incorporates up to 76 wind turbines with an installed capacity of up to 402 MW.

The actual turbine dimensions will be confirmed during detailed design. To provide a precautionary assessment, the Prescribed Impacts Assessment has assumed a lowermost blade tip height of 50 m AGL.

A detailed description of the Project can be found within Section 3.0 of the EIS.

2.2 Project

The Project is located approximately 16 km north east of Buronga of NSW, close to the NSW-Victorian state border within the Wentworth Shire LGA. Smaller localities of Mallee, Red Cliffs and Trentham Cliffs are located to the south and south west of the Project.

The Project Area encompasses approximately 57,330 ha of predominantly cropping and grazing land and adjoins the Mallee Cliffs National Park, which is located directly south and south east. The majority of the Project Area is zoned as RU1 Primary Production with some patches zoned as C2 Environmental Conservation within the Wentworth Local Environment Plan (LEP) 2011.

In addition to the Project Area, concept road upgrade designs have been prepared for works required to facilitate OSOM movements along the local transport route. These provide a predicted disturbance area for the external road upgrades within NSW.

2.3 Key Project Features

The Project will include the installation, operation, maintenance and decommissioning of up to 76 WTGs, BESS facilities, ancillary infrastructure and temporary facilities associated with construction of the Project. The current development design incorporates each WTGs (with a maximum blade-tip height of 280 m above ground level (AGL) with an installed capacity of up to 402 MW.

The key components of the Project include:

- Up to 76 (three (3) blade) WTGs with a maximum blade-tip height of 280 m above ground.
- A single grid-scale 100 MW /200 MWh BESS.
- Permanent ancillary infrastructure including internal access tracks, hardstands, main and collector substations, switchyards, operations and maintenance facilities, underground and overhead electricity

- Temporary facilities including temporary workforce accommodation (TWA) camp, site offices, amenities, construction compounds and laydown areas, concrete or asphalt batching plants, minor 'work front' construction access roads, environmental management and monitoring and signage.
- Off-site road works, involving upgrades to the proposed local transport route and establishment of site access points to facilitate delivery of wind turbine components to the Project Area as required.

3.0 Site Context

3.1 Assessment Areas

Table 3.1 Key Assessment and Boundaries

Name	Details	Area (ha)
Project Area	The Project Area encompasses all land within and including the Project Boundary.	57,330.31
Project Boundary	The outer boundary of the Project Area. The Project Boundary is the maximum spatial extent of potential land access defined by the boundaries of the host landholder properties (i.e. all agreed lots owned by host landholders).	57,330.31
Biodiversity Study Area	The specific assessment area adopted for the biodiversity study. The Biodiversity Study Area is the amalgamation of previous and current designs of the Project. Since 2022, the Project has undergone refinement considering various constraints. The result of surveys within each design iteration has been built upon to form a comprehensive dataset for the Biodiversity Study Area which the Development Footprint forms a smaller component. Through the process of avoidance and minimisation Project related disturbance has been refined down to the current Development Footprint. Surveys undertaken across the broader Biodiversity Study Area have been used in this assessment. Note that detailed vegetation surveys have been undertaken across the Biodiversity Study Area, while threatened species surveys have been undertaken within approximately 75% of the Biodiversity Study Area. All native vegetation and potential threatened species habitat within the current Development Footprint falls entirely within the portion of the Biodiversity Study Area which has been subject to detailed vegetation assessment and threatened species surveys.	4,879.17
Development Footprint	The area of land that is directly impacted by the proposed development. The Development Footprint is equivalent to the total area of impact identified within the EIS inside the Project Area. The “Disturbance Footprint” identified in the EIS is equivalent to the Development Footprint referred to in this BDAR, but extends to include any and all disturbance associated with off-site roads works noted below. The actual location and extent of the Disturbance Footprint will be determined prior to construction, subject to the micro-siting provisions outlined in the EIS. For the purposes of this BDAR (and broader EIS) this includes disturbance associated with the seven (7) proposed permanent meteorological masts, but excludes access to these meteorological masts that would be provided via existing farm tracks or cleared agricultural land.	444.69
Off-site road works	Minor ground disturbance, clearing/pruning of vegetation associated with road upgrades.	0.25

Name	Details	Area (ha)
Blade Overhang Areas	Areas within the Project Area within which WTG blades fall outside with Development Footprint. These areas will be subject to ongoing prescribed impacts from potential bird and bat strike and barotrauma during Project operation.	-
Landscape assessment area	The Development Footprint and the area of land within 500 m of the Development Footprint that is determined as per Subsection 3.1.2 of the BAM. For the purposes this assessment, a 500 m buffer has been applied to the linear assessment area.	10,708.62

Section 3.1.2 of the BAM requires the assessor to determine the assessment area around the Development Footprint based on whether the Project is linear, or site based. The BAM defines the following development types:

- Linear-shaped development: development that is generally narrow and extends across the landscape; for example, major roads, rail lines.
- Multiple fragmentation impact development: developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines, and a network of associated development such as roads, tracks, gathering systems/flow lines and transmission lines.
- Site-based development: a development other than a linear-shaped development, or a multiple fragmentation impact development.

The assessment area forms part of the landscape assessment within which per cent native vegetation cover is calculated, as described within Section 3.2 of the BAM. The method of assessment (linear or site-based) also affects whether the biodiversity values are assessed across one or more IBRA subregions when the Development Footprint falls across multiple. Both IBRA subregion selection and per cent native vegetation cover are used as filters within the BAM-C to predict threatened species likely to occur or use habitat on the Development Footprint.

Within the Project Area, the Development Footprint is comprised of a variable width corridor with an area of approximately 444.69 ha. All Project related infrastructure, including WTG pads, access roads and ancillary infrastructure is located within the Development Footprint. It is comprised of multiple arms of WTG and access tracks and a transmission line extending further south west across an area approximately 25 km from east to west, and 20 km from north to south. As the Development Footprint is linear and multiple fragmentation in nature, this assessment has adopted the linear assessment method, with a 500 m buffer placed around the Development Footprint within the Project Area, in accordance with Section 3.1.2 of the BAM (**Figure 3.1**).

It is noted that the three minor off-site road works (0.25 ha) occur in a separate IBRA region (Riverina), however these areas do not contain any native vegetation that can be assigned to a PCT and cannot be entered into the BAM-C. These areas contain non-native vegetation and planted native vegetation, as well as lack any threatened species habitat. A description of these areas is provided in **Section 4.8** and these areas are assessed in **Section 10.2** as impacts that do not need further assessment given the presence of non-native vegetation, planted native vegetation (assessed against the streamlined assessment module for plant native vegetation, DPE 2022b) and the absence of habitat for threatened species. For completeness, all off-site road work area calculations are included with the Development Footprint for the Mallee Wind Farm site.

3.2 Landscape Features

Landscape features are described in **Table 3.2**. Landscape features identified within and surrounding the Biodiversity Study Area and Landscape Assessment Area are shown on **Figure 3.1** to **Figure 3.6**.

Table 3.2 Landscape Features

Landscape Feature	Landscape Assessment Area
BRA bioregions and subregions	Bioregion – Murray Darling Depression Subregion – South Olary Plain Refer to **Figure 3.1**.
NSW (Mitchell) Landscapes	Mallee Cliffs Sandplains Mallee Cliffs Linear Dunes Refer to **Figure 3.2**.
Native Vegetation Cover	>10–30% Refer to **Figure 3.6**.
Cleared Areas	The Biodiversity Study Area and Development Footprint predominantly consist of cleared land associated active agricultural practices, primarily being non-irrigated broad-acre grain cropping activities, with associated access tracks and structures.
Rivers, streams and estuaries	The Development Footprint and broader Biodiversity Study Area do not contain any rivers, streams, estuaries or wetlands. Waterbodies in the wider area include: Willandra Lakes Region World Heritage Area, Mourguong Saltwater Disposal Basin, The Murray and Darling Rivers, Lake Gol Gol and Gol Gol Swamp. There are three dams within the Biodiversity Study Area. These exist as small farm dams that range from 0.2 to 1.8 ha in size. No dams are present in the Development Footprint. Refer to **Figure 3.3**.
Wetlands	The Commonwealth Government's PMST has identified three wetlands of international importance within 200 km of the Project Area. These include: • Banrock Station Wetland Complex (approximately 200 km west of the Biodiversity Study Area) • Riverland (approximately 150 km west of the Biodiversity Study Area) • The Coorong and Lakes Alexandria and Albert Wetland (approximately 400 km west of the Biodiversity Study Area). There are no wetland communities or ephemeral wetland PCTs present within the Development Footprint or within the Biodiversity Study Area. In periods of high rainfall, it is likely that water would hold across some of the landscape for a short amount of time, due to the small differences in elevation.
Connectivity Features	The Biodiversity Study Area and Development Footprint primarily contains cropping land, with grazing also occurring in the northern property. Opportunities for wildlife movement across these landscapes would be limited to more mobile species such as large birds, microbats and macropods.

Landscape Feature	Landscape Assessment Area
	Thin strips of native vegetation and small patches of shrubland occur throughout the Biodiversity Study Area and Development Footprint, providing habitat links for less mobile species. These patches are often thin in nature and comprise varying levels of disturbance and understorey/ground cover, reducing the connectivity value to species sensitive to disturbance. Mallee Cliffs National Park is located approximately southeast, which contains an expanse of native vegetation and connects to several other large natural areas managed for conservation. Intact vegetation in the Biodiversity Study Area and Development Footprint forms part of a large intact expanse of native vegetation in the locality. Providing connectivity between the Project Area and habitat to the north, south, east and west for a variety of threatened species such as woodland birds, amphibians, reptiles, and mammals. The Murray River, which is located approximately 10 km west of the Biodiversity Study Area, provides a movement barrier for less mobile species. Refer to **Figure 3.4**.
Areas of geological significance and soil hazard features	The Biodiversity Study Area falls within the Wilkurra Land System (NSW DCCEEW 1991). This landscape comprises a sandplain of Quaternary aeolian material with isolated dunes and rises trending east west, relief to 5 m; small level swales and flats. Soils are highly calcareous solonized brown soils; dunes with deep brownish sands. Vegetation largely comprises dense stands of belah and rosewood, scattered mulga, wilga and inedible shrubs; white cypress pine on sandy rises; variable speargrass, copperburrs and forbs. The soils are prone to minor windsheeting and drift. Land management considerations include pasture management, erosion hazard if cleared, woody weed control and wind erosion control. No karsts, caves, crevices, cliffs, rocks are present within the Biodiversity Study Area.
Areas of outstanding biodiversity value (AOBV)	No AOBV are present within the Biodiversity Study Area.
Important Habitat Mapping	No areas of Important Habitat Mapping fall within the Biodiversity Study Area or in the surrounding region.
Biodiversity Values Mapping	There is no Biodiversity Values Mapping in the Biodiversity Study Area. Refer to **Figure 3.5**.
Additional landscape features identified within the SEARs	The SEARS identified that the adjacent National Park and Wildlife Estate, Mallee Cliffs National Park must be adequately identified and assessed in the EIS.

3.3 Native Vegetation Cover

The native vegetation cover within the assessment area was determined through site surveys of the Biodiversity Study Area and aerial photograph interpretation using ArcGIS Pro software, the world imagery basemap aerial accessed August 2024 and the NSW State Vegetation Type Map: Western 1.0 (VIS_ID 4492) (NSW DCCEEW 2019).

Table 3.3 summarises the extent of native vegetation cover within the assessment area and **Figure 3.6** shows the extent of native vegetation cover within the assessment area.

Table 3.3 Native Vegetation Cover in the Assessment Area

Native Vegetation Cover	
Assessment area (Ha)	10,708
Total area of native vegetation cover (Ha)	3,076
Percentage of native vegetation cover (%)	28.7
Class (0–10, >10–30, >30–70 or >70 %)	>10–30%

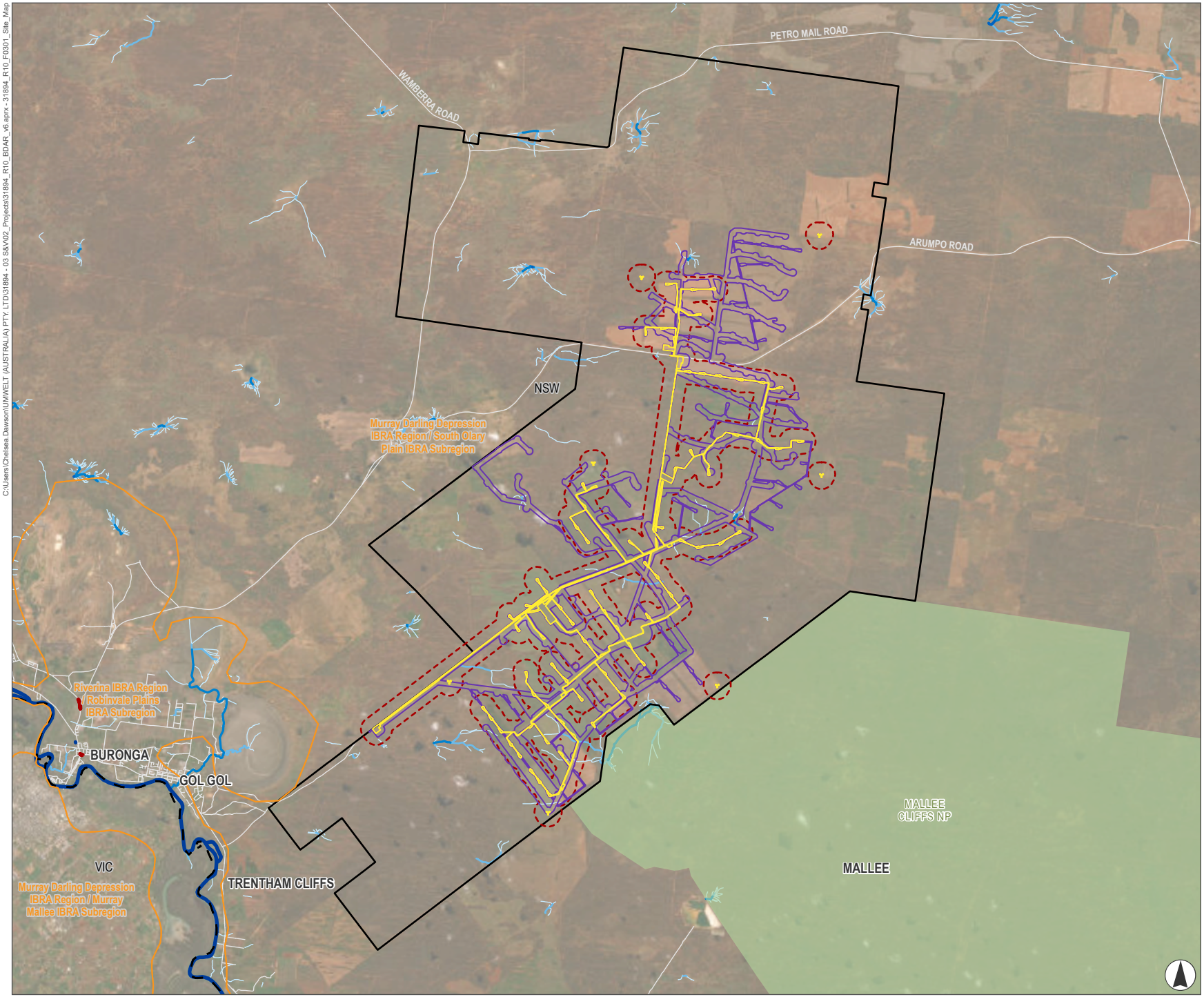


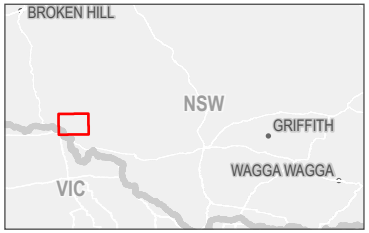
FIGURE 3.1
Site Map

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Assessment Area (500m buffer from Development Footprint)
- Off-site Road Works
- State Border
- IBRA Region / Subregion
- NPWS Estates
- Road

Strahler Stream Order

- 1st Order Stream
- 2nd Order Stream
- 3rd Order Stream
- 4th Order Stream
- 5th Order Stream or Greater



0 5 10

Kilometres

Scale 1:225,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

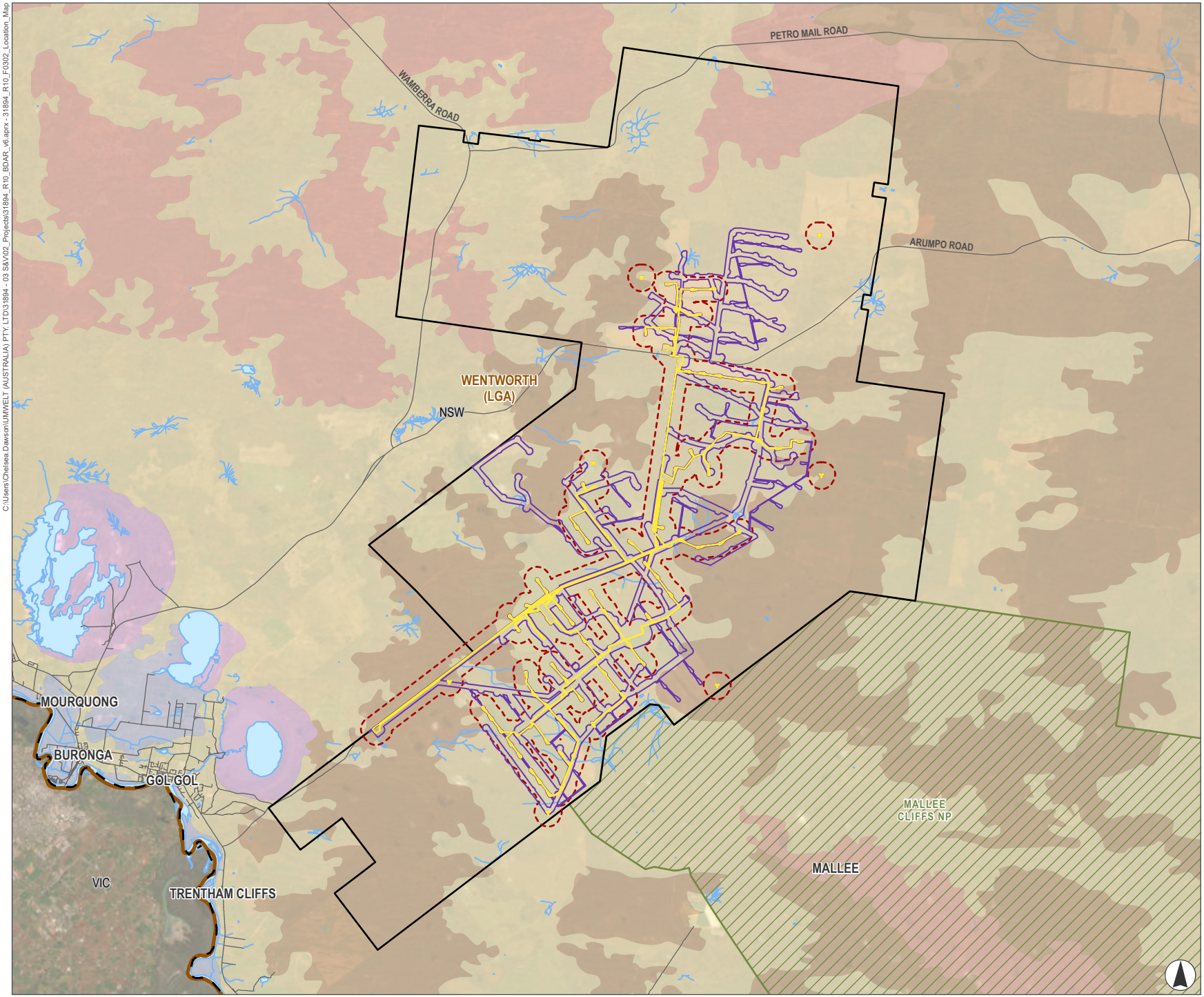


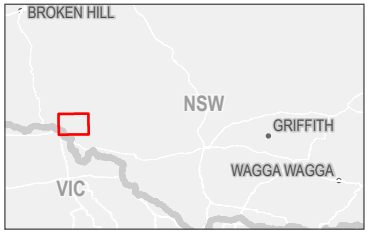
FIGURE 3.2
Location Map

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Assessment Area (500m buffer from Development Footprint)
- State Border
- Local Government Area (LGA)
- NPWS Estates
- Waterbody
- Road
- Watercourse

Mitchell Landscape

- Mallee Cliffs Dunes
- Mallee Cliffs Linear Dunes
- Mallee Cliffs Sandplains
- Murray Channels and Floodplains
- Murray Lakes, Swamps and Lunettes



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Kilometres

Scale 1:225,000 at A4
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umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

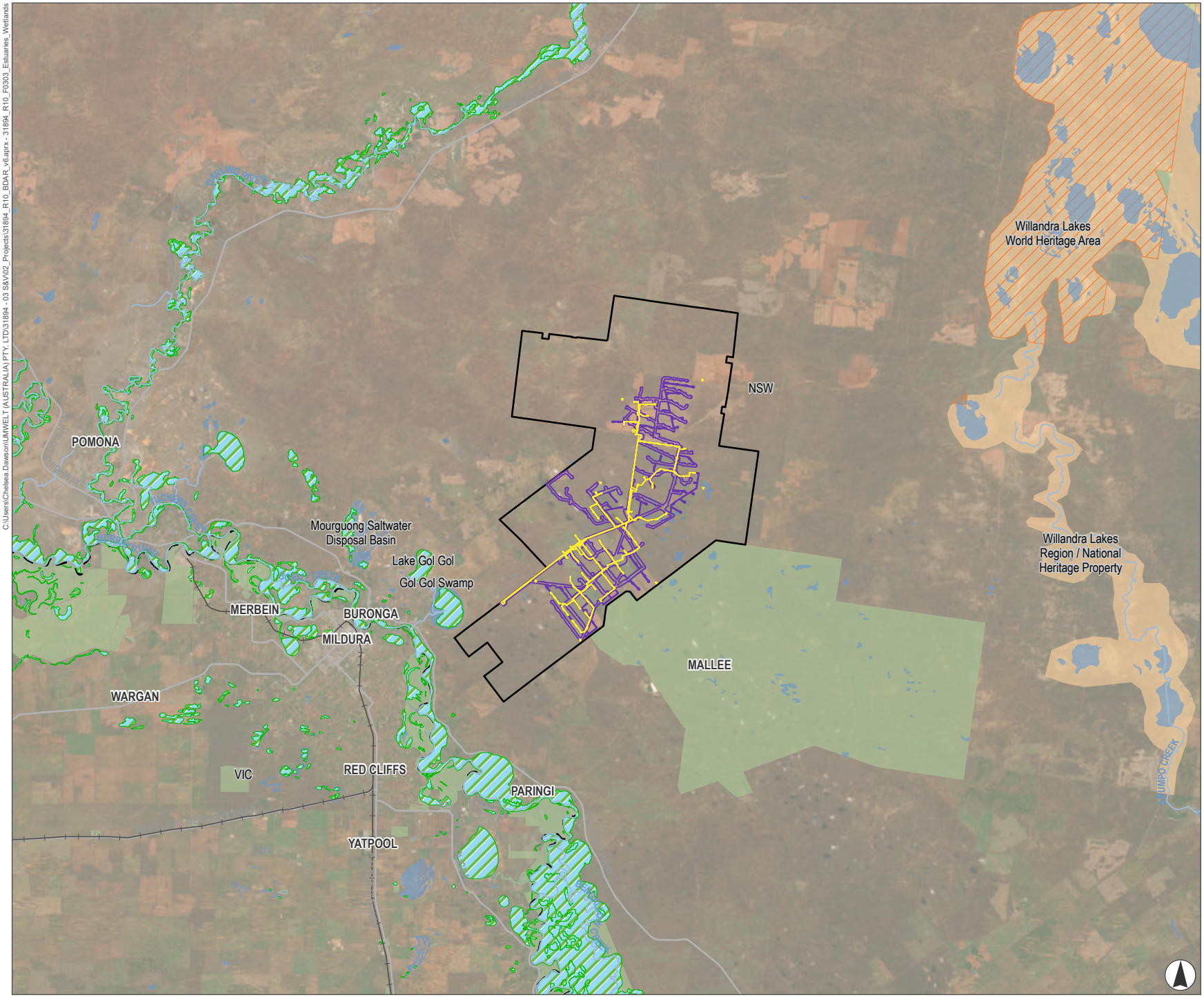
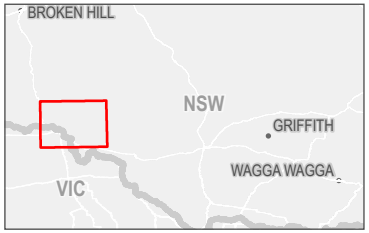


FIGURE 3.3

River, Streams, Estuaries and Wetlands downstream of the Biodiversity Study Area

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Wetland
- Willandra Lakes Region / National Heritage Property
- Willandra Lakes World Heritage Area
- State Border
- NPWS Estate
- Road
- Railway
- Watercourse
- Water Body



0 5 10

Kilometres

Scale 1:500,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

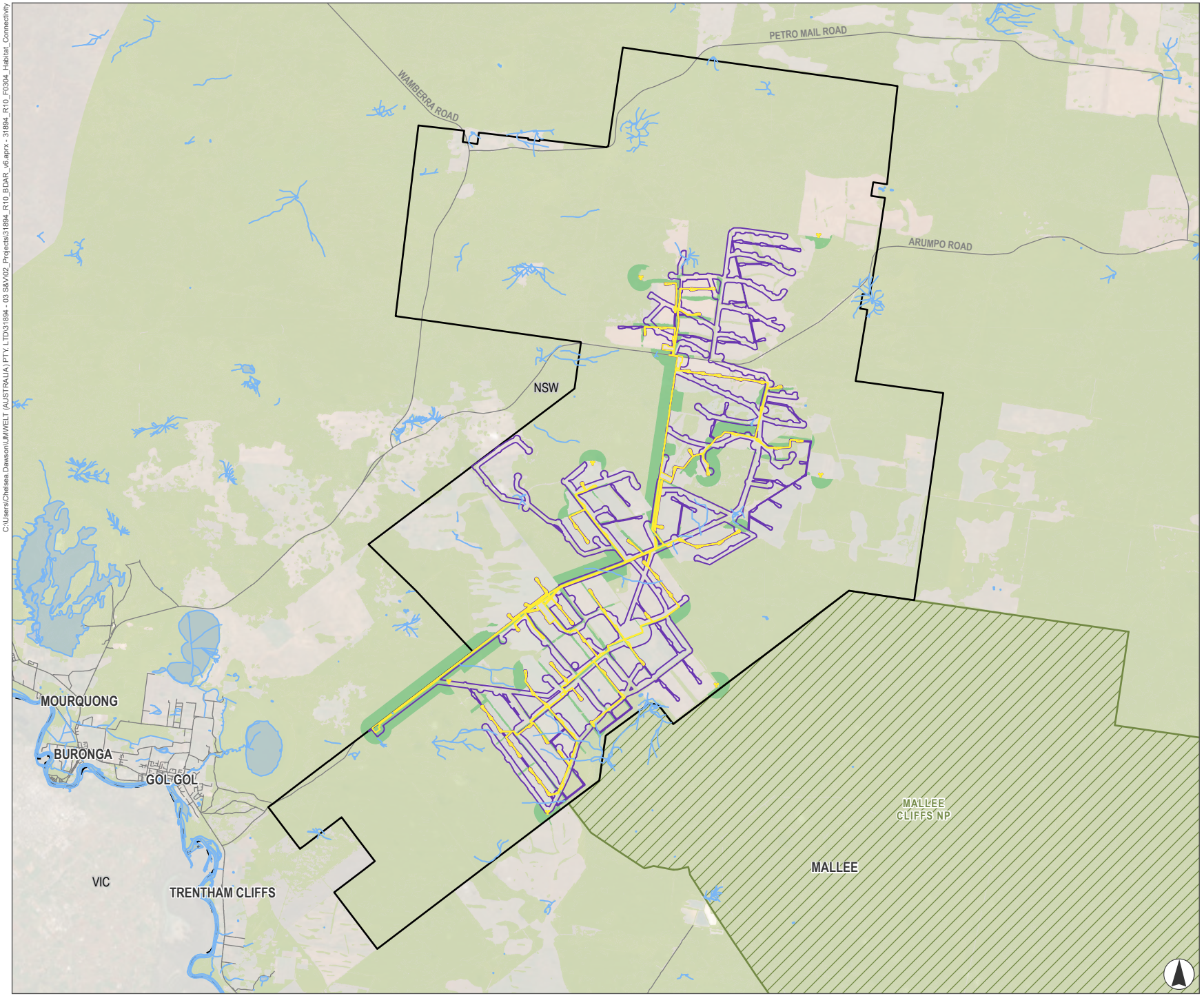
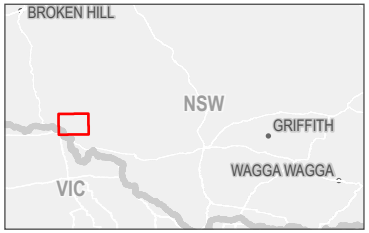


FIGURE 3.4
Habitat Connectivity

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Woody Vegetation Formation (Umwelt)
- Woody Vegetation Formation (SVTM)
- State Border
- NPWS Estates
- Road
- Watercourse
- Waterbody



0 5 10

Kilometres

Scale 1:225,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

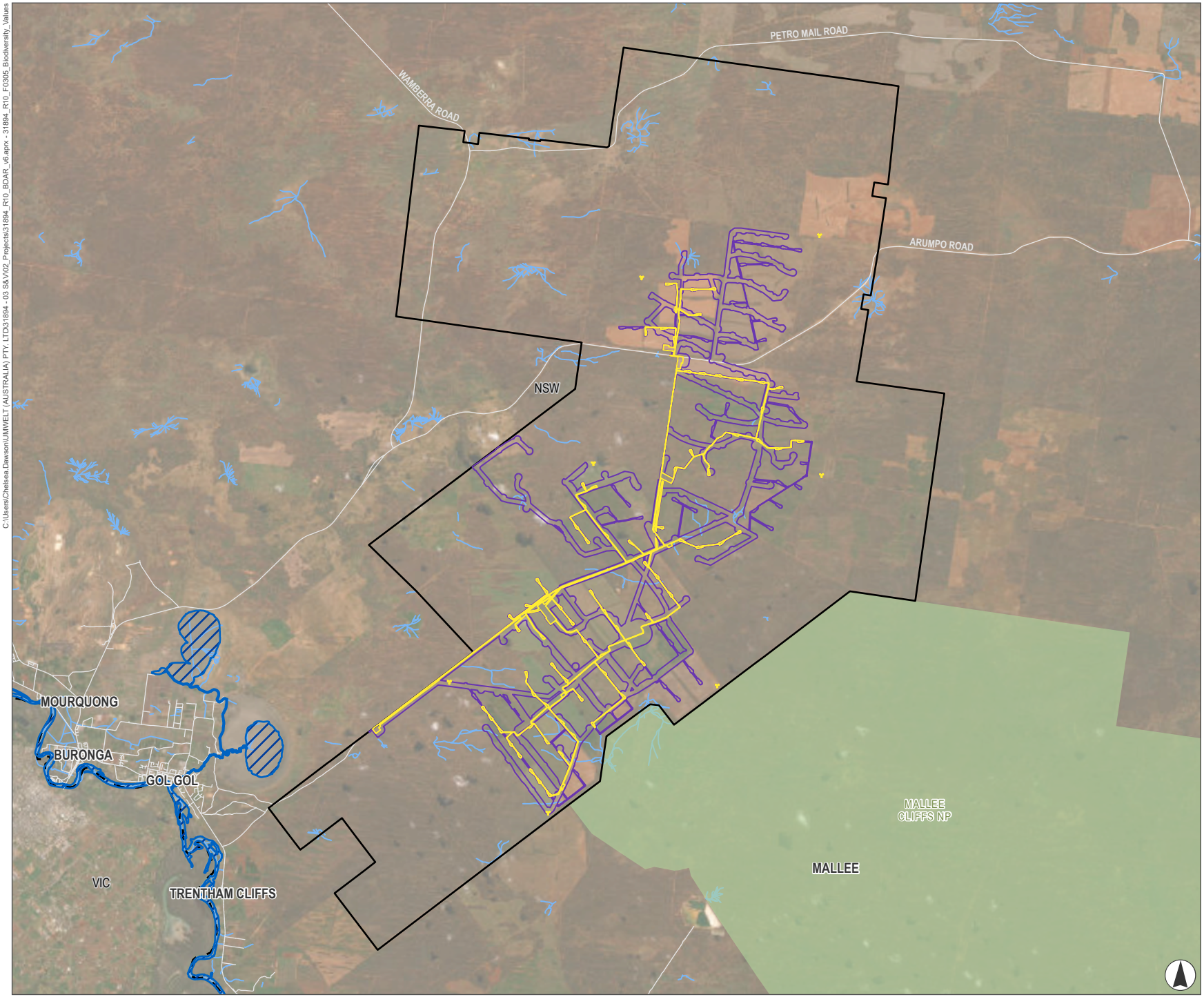
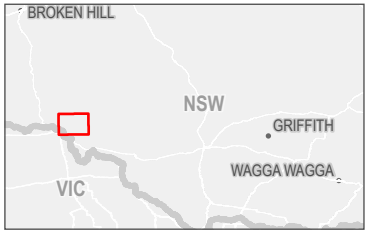


FIGURE 3.5
Biodiversity Values Map

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Biodiverse riparian land
- NPWS Estates
- State Border
- Road
- Watercourse



0 5 10

Kilometres

Scale 1:225,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

C:\Users\Chelsea.Dawson\UMWELT (AUSTRALIA) PTY. LTD\31894 - 03 S&V\02_Projects\31894_R10_BDAR_v6.aprx - 31894_R10_F0306_Native_Veg_Extent

FIGURE 3.6

Native Vegetation Extent

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Assessment Area (500m buffer from Development Footprint)
- Native Vegetation Extent
- Cleared Land
- NPWS Estates
- Road
- Watercourse
- Waterbody

0 2.5 5

Kilometres

Scale 1:145,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

4.0 Threatened Ecological Communities and Vegetation Integrity

4.1 Methodology

4.1.1 Background Research

Prior to commencing field surveys, a review of existing resources and databases was undertaken to identify the potential PCTs and TECs that could occur within the Biodiversity Study Area.

The review included the following sources:

- BioNet Vegetation Classification (NSW DCCEEW, 2024a).
- NSW State Vegetation Type Map (SVTM): Western 1.0 (VIS_ID 4492) (NSW DCCEEW 2019).
- GHD (2022) Mallee Wind preliminary ecological assessment.
- Department of Agriculture, Water, and the Environment (DAWE) 2021a. Conservation Advice for the Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions.
- DAWE (2021b). Approved Conservation Advice for the Mallee Bird Community of the Murray Darling Depression Bioregion.
- Bureau of Meteorology Groundwater Dependent Ecosystems Atlas (BoM, 2024a).

4.1.2 Vegetation Survey and Assessment

4.1.2.1 Identification of Native Vegetation Extend and Plant Community Types

Prior to field surveys, the descriptions of PCTs mapped within the Biodiversity Study Area by the SVTM and held within BioNet Vegetation Classification were assessed.

The native vegetation extent within the Biodiversity Study Area was determined during site surveys, through Geographic Information Systems (GIS) mapping and aerial photograph interpretation using recent aerial imagery. Native vegetation and PCT mapping were undertaken using best-practice techniques to delineate vegetation communities across the Biodiversity Study Area. Vegetation within the Biodiversity Study Area was mapped via the following method:

- Review of aerial imagery to assess vegetation distribution patterns as dictated by change in canopy texture, tone, and colour, as well as topography.
- Review of the modelled distribution of vegetation communities within broader scale regional based vegetation mapping.
- Transects and traverses using a hand-held tablet containing ESRI Field Maps to record boundaries of, and variation within stratification units not apparent from aerial imagery.

- Collection of data from rapid data points and vegetation notes to obtain information on vegetation community structure and distribution, to accurately assign stratification units to vegetation communities.
- Collection of vegetation integrity (VI) plot data in accordance with the BAM 2020.

Vegetation communities were delineated through the identification of patterns of plant species assemblages in each of the identified strata. Slight variations in species composition are typical across the extent of a community and are often associated with microhabitats or ecotones with other plant communities. The native vegetation within the Biodiversity Study Area was identified to a PCT as described in the BioNet Vegetation Classification System.

4.1.2.2 Vegetation Zones

The condition states which were used to delineate vegetation zones are described in **Table 4.1**.

Table 4.1 Vegetation Zone Condition States

Condition State	Definition
Moderate-Good	Vegetation is structurally and floristically intact across all strata, moderate to high levels of native species diversity, which may be variable between species growth forms. Weed species present within the understorey and groundcover stratum are generally low.
Weedy Understorey	Similar condition to moderate-good, with a high cover of exotics species in the understorey.
Derived – Native	Derived form of a PCT with high native species richness and cover. Modified structure with the removal of trees.
Derived – Weedy	Derived form of a PCT with moderate to high exotic cover. Modified structure with the removal of trees.

4.1.2.3 Plot-based Floristic and Vegetation Integrity Survey

Plot-based floristic vegetation surveys and vegetation integrity plots (BAM VI plot surveys) were conducted in accordance with Section 5.2 and 5.3 of the BAM. BAM plot surveys were carried out for vegetation zones occurring within the Biodiversity Study Area.

A total of 62 BAM VI plots occur within the Biodiversity Study Area, of these 8 are within or partially within the Development Footprint. A further 15 BAM VI plots are located within 20 m of the Development Footprint. Those that occur outside of the Development Footprint are a result of design changes of the Project, including facilitating avoidance and minimisation efforts. Furthermore, as the Development Footprint generally aligns with existing tracks within the Project Area, BAM VI plots were located in areas of broad condition states of vegetation zones and measures were made to ensure plot boundaries did not intersect vehicle tracks and their edges, or other disturbed areas as per Section 4.3.4 of the BAM. The condition of the BAM VI plots within the Biodiversity Study Area are representative of the Development Footprint.

The number of BAM VI plots required for each vegetation zone was calculated in accordance with Table 4 of the BAM based on the total area of each vegetation zone within the Development Footprint.

Plot-based vegetation surveys were completed to assess vegetation composition, structure, function, enable calculation of the vegetation integrity scores for vegetation zones, sample areas of expected environmental variation and verify the results of previous mapping and available site information. Plot locations were selected to ensure that they captured attributes relevant to each vegetation zone, to provide a representative assessment of the vegetation integrity of the vegetation zone, accounting for the level of variation in the broad condition state of the vegetation zone. The following information was recorded for each plot:

- Unique plot reference
- GPS coordinates (easting and northing)
- Date of the survey
- Name of field surveyors
- Bearing along a 50 m transect through the plot
- Physiographic features that may assist in PCT identification such as slope, aspect and soil characteristics
- Signs of disturbance
- Photographs of the vegetation.

Floristic composition and structure data were collected from within a 400 m^2 plot (standard 20 m x 20 m) and included:

- Species name: Scientific and common name
- Species status: native, exotic or high threat exotic
- Growth form: tree, shrub, grass, and grass like, forb, fern and other
- Stratum (and layer) in which each species occurs
- Cover: Percent foliage cover across the plot for each species rooted in or overhanging the plot (Section 5.3.4.13 of the BAM)
- Abundance: estimate of the number of individuals or shoots of each species was recorded (Table 2 of the BAM).

Species naming and classification was undertaken in accordance with the naming conventions and botanical keys provided by PlantNET (Royal Botanic Gardens and Domain Trust). Those plant species which could not be identified were sent to the NSW Herbarium at the Royal Botanic Gardens Sydney (RBGS) for verification.

Following field data collection, native plant species recorded within each plot were assigned to a growth form group (i.e., shrub, grass and grass like, forb, fern and other) according to the NSW DCCEEW lookup table or the definitions set out in Table 15 of the BAM. Similarly, the species status (i.e., native, exotic or high threat exotic) was determined for each species based on the NSW DCCEEW lookup table.

Floristic function data was collected from within a 1,000 m^2 plot (standard 20 m x 50 m) and included:

- Number of large trees: With reference to the appropriate large tree benchmark for each PCT (30 cm for PCT 58, 170 and 171).

- Tree regeneration: Presence or absence of living trees with < 5 cm diameter at breast height (DBH) over bark.
- Tree stem size class: 5–9, 10–19, 20–29, 30–49, 50–79 and > 80 cm DBH.
- Length of fallen logs: Total length in metres of all woody material >10 cm in diameter and >50 cm in length.
- Trees with hollows: Count of the number of trees with hollows that are visible from the ground.
- Litter coverage (as a percentage) was also measured from within five, one square metre sub-plots located evenly along and either side of the 50 m plot midline. Litter was considered as plant material detached from a plant including leaves, seeds, twigs, branchlets and branches with a diameter of <10 cm and in contact with the ground. The percentage litter cover from the five sub-plots was used to generate the average percentage litter cover for the entire plot.

A total of 62 BAM plots were sampled by Umwelt ecologists between 7 September 2022 and 13 April 2024, as detailed below:

- 7–14 September 2022
- 7 February 2023
- 8–13 April 2024.

Plot locations are shown in **Figure 4.1** and plot stratification details for each vegetation zone are provided in **Table 4.2**.

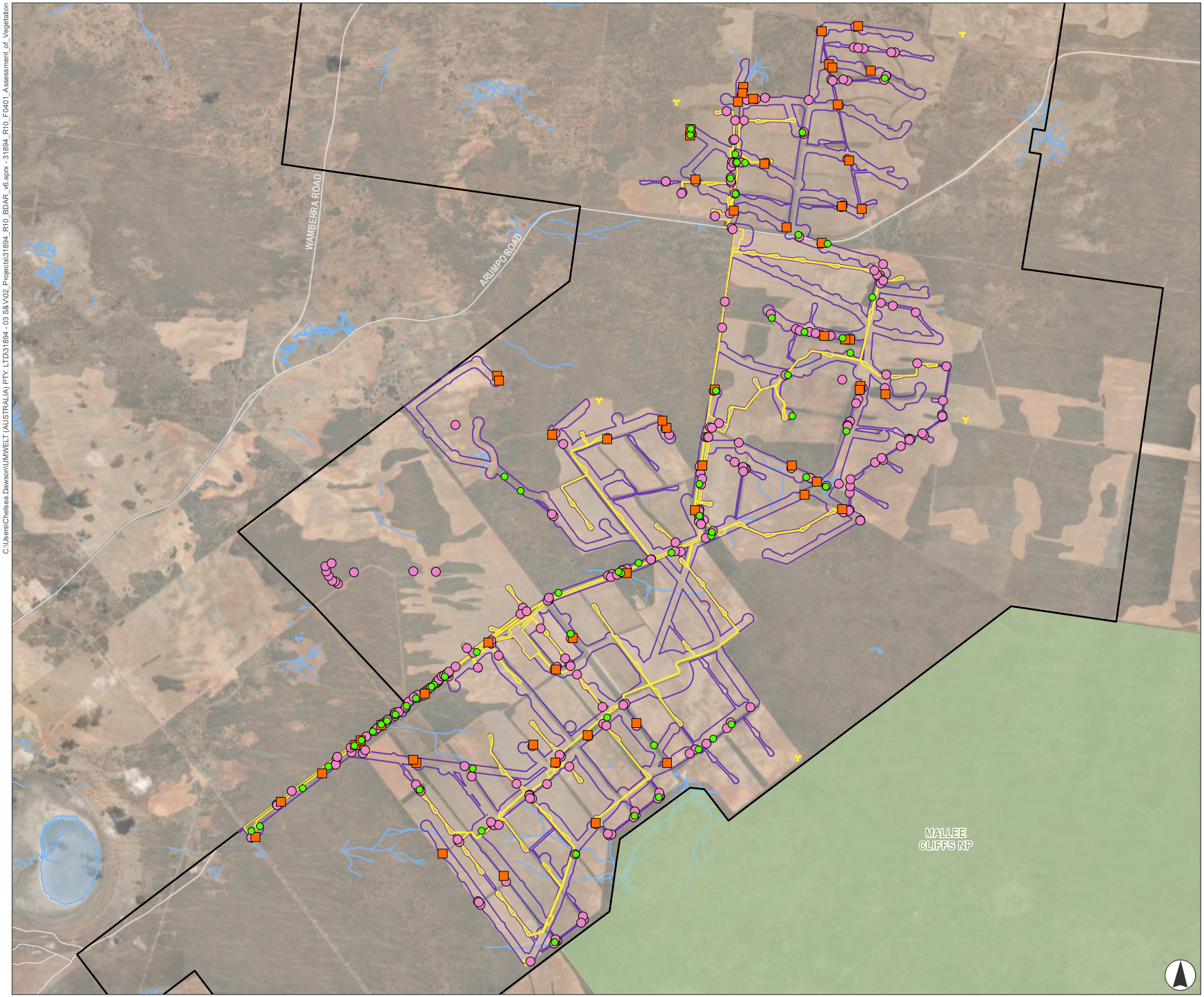


FIGURE 4.1

Assessment of Vegetation

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- BAM Plot Location
- Rapid Vegetation Assessments
- Vegetation Notes
- Road
- Watercourse
- Waterbody
- NPWS Estates

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

Table 4.2 Minimum number of Plots Required and Completed Vegetation Zone

VZ ID	PCT	Condition	BC Act	EPBC Act	Area within Biodiversity Study Area (ha)	Area within Development Footprint (ha)	No. Plots Required*	No. Plots Completed
Zone 1	PCT 58 Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate-Good	-	-	558.14	26.81	4	16
Zone 2	PCT 58 Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Derived-Weedy	-	-	41.42	3.39	2	7
Zone 3	PCT 58 Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Weedy Understory	-	-	35.72	0.17	1	4
Zone 4	PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Moderate-Good	-	E – Mallee Bird Community	157.49	3.81	2	11
Zone 5	PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived-Native	-	-	22.19	1.15	1	5
Zone 6	PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived-Weedy	-	-	39.01	0.06	1	6
Zone 7	PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Weedy Understory	-	E – Mallee Bird Community	8.25	0.00	0	1
Zone 8	PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	Moderate-Good	-	E – Mallee Bird Community	131.50	18.95	3	12
Category 1 – Exempt Land/Cleared/Road/Tracks					**3,882.87**	**390.35**	**-**	**-**
Dams					**2.58**	**0**	**-**	**-**
Total					**4,879.17**	**444.69**	**14**	**62**

*Minimum number of plots required calculated on the Development Footprint

4.1.2.4 Rapid Vegetation Assessments and Vegetation Notes

Rapid vegetation assessments were undertaken throughout the Biodiversity Study Area. A total of 59 rapid vegetation assessments were collected as part of the biodiversity assessment. The locations of the rapid vegetation assessments are provided in **Figure 4.1**.

Rapid vegetation assessments collected qualitative data including but not limited to:

- Species diversity
- Vegetation Structure
- Extent of Disturbance
- Likely PCT allocation
- Potential for TEC alignment.

The use of rapid vegetation assessments assisted with mapping native vegetation within the Biodiversity Study Area, particularly demonstrating changes in PCT's and condition.

In addition to the rapid vegetation assessments, vegetation notes were also recorded across the Biodiversity Study Area confirming vegetation zones and areas identified as cropped paddocks. A total of 323 vegetation notes were collected.

4.1.2.5 Digital Aerial Photography Interpretation

Digital imagery (aerial photographs) of the Biodiversity Study Area was viewed prior to and after vegetation survey to identify spatial patterns in vegetation, land use and landscape features. These informed field survey design and implementation, ecological assessment and vegetation community mapping of the Biodiversity Study Area. Mapping was undertaken using the QGIS and ESRI ArcGIS Pro using the latest google ESRI world imagery basemap last accessed August 2024.

4.1.2.6 Drone Surveys – Category 1 – Exempt Land

Drone surveys were undertaken in September 2022 to capture high resolution aerial imagery across the Biodiversity Study Area to inform vegetation mapping, in particular verification of Category 1 – Exempt Land. Drones were operated by CASA approved pilots, following Umwelt pilot procedures. Drones were launched and flown in line of sight, where the drone hovered at approximately 20 m above the areas of interest to capture footage and imagery to be further analysed and inform future surveys efforts.

4.1.2.7 Plant Identification and Nomenclature Standards

All vascular plants recorded or collected within plots and on meandering transects were identified using keys and nomenclature in Harden (1992, 1993, 2000 and 2002). Where known, changes to nomenclature and classification have been incorporated into the results. Updated taxonomy has been derived from PlantNET (Royal Botanic Gardens Trust 2024).

The specimens collected during the survey that were lacking adequate flowering or fruiting material were not of potential significance or importance and so were identified to genus level only.

Where applicable, vegetation communities identified in the Biodiversity Study Area were compared to TECs listed under the Commonwealth EPBC Act and NSW BC Act and an assessment of similarity with the NSW Scientific Committee Final Determinations and the Commonwealth Threatened Species Scientific Committee Listing and Conservation Advice. The following approach was used:

- full-floristic plot assessments and meandering surveys to determine floristic composition and structure of each ecological community
- comparison with published species lists, including lists of 'important species' as identified on the listing advice provided by the NSW Scientific Committee and/or Commonwealth Threatened Species Scientific Committee
- comparison with habitat descriptions and distributions for listed TECs
- assessment using guidelines and recovery plans published by the Commonwealth DCCEEW and the NSW DCCEEW
- comparison with other assessments of TECs in the region.

4.1.3 Approach to Confirming Land Categorisation Mapping

As detailed within **Section 1.3.3**, this assessment has reviewed the draft NVR Map as published by NSW DCCEEW. As identified within the BAM Assessor Updates (No. 22 6 September 2019 and No. 3 6 August 2018), accredited assessors are responsible for responsible for Category 1 – Exempt Land for developments affecting rural land. Refinement to the draft NVR Map has been completed in areas where cropping has occurred in areas mapped as Category 2 – Regulated. A combination of the results of field inspections and the review of recent high resolution aerial photographs was undertaken to make mapping refinement.

4.1.4 Patch Size

The patch size for each vegetation zone located on the Development Footprint was calculated for each of the vegetation zones in accordance with Section 4.3.2 of the BAM. Given the large native vegetation cover across the Development Footprint, Biodiversity Study Area, and wider landscape, each vegetation zone was allocated to the largest patch size of ≥100 ha.

4.1.5 Limitations

The additional vegetation integrity plots sampled in April 2024 were notably sampled at a drier period to the plots sampled in September 2022/February 2023 and this may have impacted vegetation integrity scores due to seasonal differences.

4.2 Native Vegetation Extent

The extent of native vegetation across the Biodiversity Study Area is shown in Figure 3.6. The mapped broad native vegetation extent visible on the aerial imagery utilised for this assessment was confirmed upon ground truthing during surveys. A substantial proportion of the Biodiversity Study Area does not contain native vegetation. These areas include access tracks, farm dams and cropped paddocks (wheat and legumes).

4.3 Plant Community Types

4.3.1 Overview of Plant Community Types

Identification of the PCTs occurring with the Biodiversity Study Area was guided by the results of the review of existing data (**Section 4.1.1**) and surveys of the Biodiversity Study Area (**Section 4.1.2**). The data collected during surveys of the Biodiversity Study Area was analysed in conjunction with a review of the PCTs held within the BioNet Vegetation Classification Database and previously published regional vegetation mapping, namely the SVTM C2.0M2.0 (December 2023). Consideration was given to the following:

- Occurrence within the Murray Darling Depression IBRA bioregion
- Vegetation formation
- Dominant upper, mid and ground strata species
- Landscape position, soil types and edaphics.

A total of three (3) PCTs comprising eight (8) vegetation zones were recorded across the Biodiversity Study Area (refer to **Table 4.3**). A summary of these PCTs is provided in **Section 4.3.2** to **Section 4.3.4**.

Vegetation within the Biodiversity Study Area has been assessed as aligning with the BioNet Vegetation Classification PCTs identified within **Table 4.3** and an overview of their extent is shown in **Figure 4.2** (refer to **Appendix A** for detailed figure set). Detailed descriptions of each PCT are provided in the following subsections. The list of flora species recorded within each vegetation zone is provided in **Appendix E**.

Table 4.3 Plant Community Types Identified within the Biodiversity Study Area

PCT ID	PCT Name	Condition Zone	Biodiversity Study Area (ha)	Development Footprint Area (ha)
58	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate-Good	558.14	26.81
		Derived-Weedy	41.42	3.39
		Weedy Understory	35.72	0.17
170	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Moderate-Good	157.49	3.81
		Derive-Native	22.19	1.15
		Derived-Weedy	39.01	0.06
		Weedy Understory	8.25	0.00
171	Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	Moderate-Good	131.50	18.95
Category 1 – Exempt Land/ cleared/ structure/ tracks/ road			**3,882.87**	**390.35**
Waterbodies			**2.58**	**0.00**
Total			**4879.17**	**444.69**

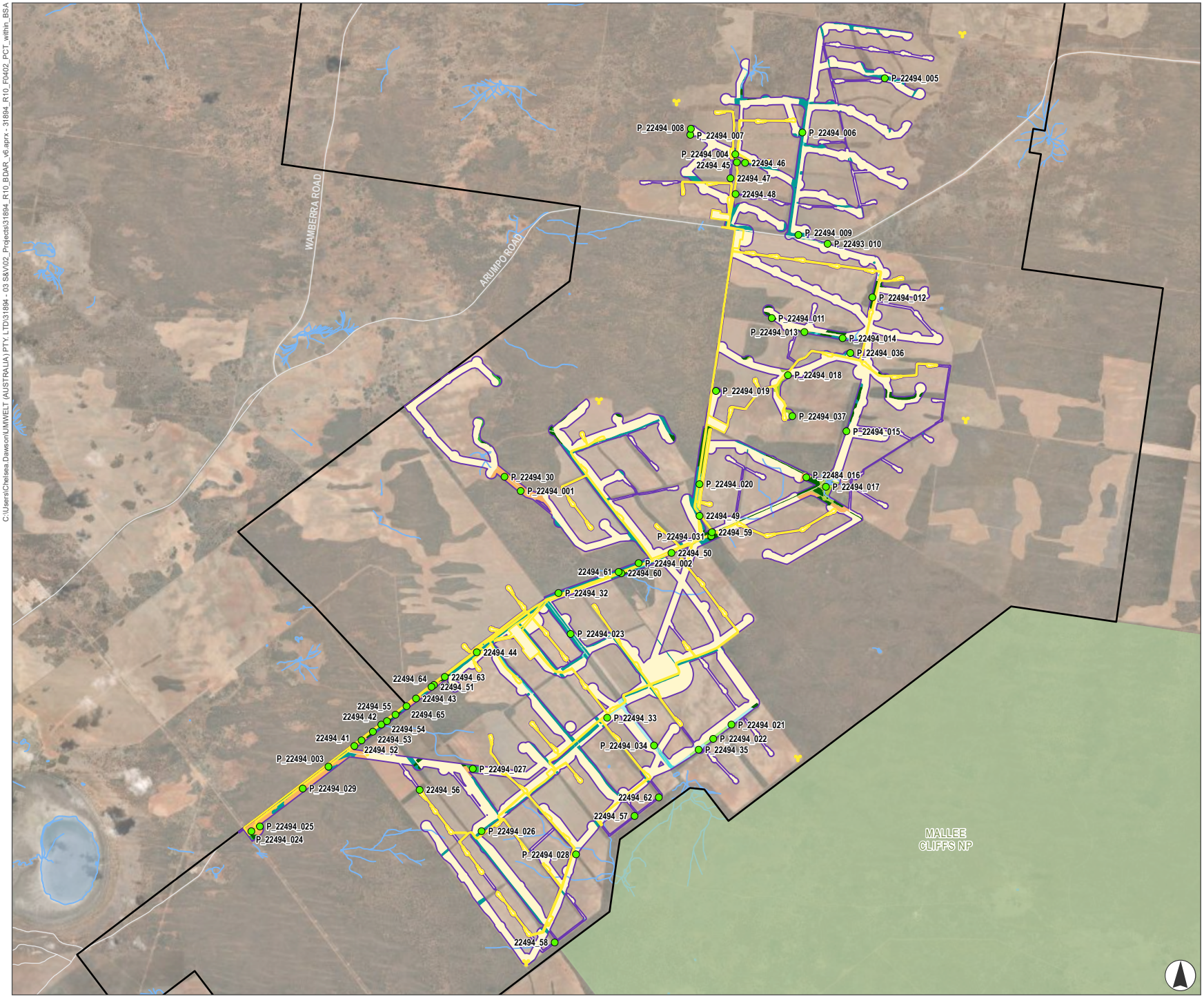


FIGURE 4.2

Plant Community Types present within the Biodiversity Study Area

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates
- BAM Plot Location

Plant Community Type

- PCT 58 (Moderate-Good)
- PCT 58 (Derived-Weedy)
- PCT 58 (Weedy understory)
- PCT 170 (Moderate-Good)
- PCT 170 (Derived-Native)
- PCT 170 (Derived-Weedy)
- PCT 170 (Weedy Understory)
- PCT 171 (Moderate-Good)
- Dam
- Category 1 – Exempt Land/Cleared/ Structure/ Tracks/ Road

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

4.3.2 PCT 58 Black Oak – Western Rosewood Open Woodland on Deep Sandy Loams Mainly in the Murray Darling Depression Bioregion

Table 4.4 details the vegetation formation, class, per cent cleared and extent for PCT 58 within the Biodiversity Study Area.

Table 4.4 PCT 58 – Black Oak – Western Rosewood Open Woodland on Deep Sandy Loams Mainly in the Murray Darling Depression Bioregion

PCTID	58
PCT name	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)
Vegetation class	Semi-arid Sand Plain Woodlands
Per cent cleared value (%)	50.00
Extent within Biodiversity Study Area (ha)	635.28
Extent within Development Footprint (ha)	30.37

PCT 58 occurs in the following vegetation zones within the Biodiversity Study Area as detailed in **Table 4.5**, **Table 4.6** and **Table 4.7**.

Table 4.5 Black Oak – Western Rosewood Open Woodland on Deep Sandy Loams Mainly in the Murray Darling Depression Bioregion: Moderate-Good

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion		
Condition	Moderate-Good	
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)	
Vegetation class	Semi-arid Sand Plain Woodlands	
Per cent cleared value (%)	50.00	
Area (ha)	Biodiversity Study Area – 558.14 ha Development Footprint 26.81 ha	

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	
BAM Vegetation Integrity Plots	16 Plots (P_22494_002, P_22494_004, P_22494_005, P_22494_006, P_22494_009, P_22494_014, P_22494_026, P_22494_028, P_22494_032, Plots 22494_42, 22494_44, 22494_46, 22494_48, 22494_49, 22494_50, 22494_61)
Patch Size Class (ha)	101 ha
General Description	This vegetation Zone is in generally moderate-good condition and comprises low open woodland of approximately 8–12 m in height. Weed occurrence is low to moderate and varies throughout the zone. Common weed species recorded throughout this zone include Wards weed (*Carrichtera annua*), wiry noon-flower (*Psilocaulon granulicaule*) and London rocket (*Sisymbrium irio*).
Structure and Characteristic Species	The canopy is dominated by black oak (*Casuarina pauper*) and western rosewood (*Alectryon oleifolius* subsp. *canescens*). The mid storey commonly comprises Mueller's daisy (*Olearia muelleri*), wilga (*Geijera parviflora*), sugarwood (*Myoporum platycarpum*), *Olearia pimeleoides* and wait-a-while (*Acacia colletioides*). The ground cover comprises a mixture of low-lying shrubs, grasses and forbs, including limestone bindii (*Sclerolaena obliquicuspis*), grey copperburr (*Sclerolaena diacantha*), *Chenopodium curvispicatum*, Ruby Saltbush (*Enchylaena tomentosa*), Spear grass (*Austrostipa nitida*), *Crassula colorata*, cannonball burr (*Dissocarpus paradoxus*), pink-seeded bluebush (*Maireana trichoptera*), small-leaf bluebush (*Maireana brevifolia*), mallee saltbush (*Atriplex stipitata*), *Maireana sclerolaenoides*, *Chenopodium desertorum* and *Salsola australis*.
PCT Allocation	**Location/Landscape Position:** PCT 58 is described within the VIS as occurring on level to undulating sandplains, sandy rises and interdune swales composed of calcareous earths (pH >7) of red to red-brown loam, sand and texture contrast soils. Widely distributed in the far south-western NSW mainly in the Murray Darling Depression Bioregion, generally subject to less than 400 mm of annual rainfall. Within the Biodiversity Study Area this vegetation zone occurs on flat sandplains and aligns with the VIS classification description. **Community structure:** PCT 58 is described as Mid-high (about 7 m high) low open woodland or isolated clumps of trees. The structure of this community closely matches the VIS description. Species assemblage: VIS classification description - Canopy dominated by black oak (*Casuarina pauper*) and western rosewood (*Alectryon oleifolius* subsp. *canescens*) with either a shrubby or grassy understorey. The shrub layer is sparse or very sparse. It includes species such as wilga (*Geijera parviflora*), *Senna artemisioides* sens lat., leafless ballart (*Exocarpos aphyllus*), thorny saltbush (*Rhagodia spinescens*), black bluebush (*Maireana pyramidata*), Mueller's daisy bush (*Olearia muelleri*), *Eremophila deserti*, *Eremophila sturtii*, *Eremophila glabra*, *Acacia oswaldii*, *Acacia colletioides*, narrow-leaved hopbush (*Dodonaea viscosa* subsp. *angustissima*), *Chenopodium curvispicatum* and shrubby twinleaf (*Roepera aurantiacum*). The ground cover is generally very sparse and includes low shrubs such as grey copperburr (*Sclerolaena diacantha*), cannonball burr

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	
	(*Dissocarpus paradoxus*), spear-fruit copperburr (*Sclerolaena patenticuspis*), limestone bindii (*Sclerolaena obliquicuspis*), slender saltwort (*Salsola tragus* subsp. *tragus*) and Mallee saltbush (*Atriplex stipitata*), Spear grass (*Austrostipa nitida*, *Austrostipa scabra* or *Austrostipa elegantissima*) are common along with a range of forbs. The vegetation within this zone closely resembles the species assemblage detailed in VIS, with commonly recorded species within the canopy, mid storey and ground cover aligning with the PCT description. Of the 55 characteristics species listed in the VIS description, 27 species were recorded in this vegetation zone. **Other PCTs considered:** PCTs 170, 221, 128, 143, 23, 59, 154 and 252 were identified by the VIS classification as a potential match for this vegetation zone. Despite being a close match floristically, PCT 59 was discounted due to wrong IBRA subregion. PCTs 170, 128, 143, 23, 154 and 252 were discounted due to species composition. The dominant canopy species in these communities did not match those recorded within this zone. PCT 221 is similar floristically and structurally to the vegetation recorded within this zone, however Pearl Bush (*Maireana sedifolia*) was not recorded. The VIS classification description states that PCT 221 grades into the more common PCT 58 to the east which has less or little Pearl Bluebush in the understorey.
BC Act Status	According to the VIS classification, PCT 58 corresponds in part to two BC Act listed TECs. These include *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and *Acacia loderi* shrublands EEC. This zone does not meet the criteria set out in the Final Determination for either of the two EECs listed above given the absence of the dominant trees/shrubs *Acacia loderi* and *Acacia melvillei*.
EPBC Act Status	The PCT does not correspond to any TECs listed under the EPBC Act.

Table 4.6 Black Oak – Western Rosewood Open Woodland on Deep Sandy Loams Mainly in the Murray Darling Depression Bioregion: Derived-Weedy

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion		
Condition	Derived-Weedy	
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)	
Vegetation class	Semi-arid Sand Plain Woodlands	
Per cent cleared value (%)	50.00	

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	
Area (ha)	Biodiversity Study Area – 41.42 ha Development footprint 3.39 ha
BAM Vegetation Integrity Plots	7 plots (P_22494_010, P_22494_020, P_22494_023, P_22494_036, 22494_45, 22494_47 and 22494_58)
Patch Size Class (ha)	101 ha
General Description	This vegetation zone is generally in low condition due to high weed occurrence and absence of canopy/mid storey cover. Weed occurrence is high throughout the zone. Common weed species recorded throughout this zone include *Carrichtera annua*, *Medicago laciniata*, *Salvia verbenaca*, and *Sisymbrium irio*.
Structure and Characteristic Species	The canopy is largely absent within this zone. Scattered occurrences of western rosewood (*Alectryon oleifolius* subsp. *canescens*) are present in some areas. Native species comprise a mixture of low-lying shrubs, grasses and forbs, including limestone bindii (*Sclerolaena obliquicuspis*), grey copperburr (*Sclerolaena diacantha*), cannonball burr (*Dissocarpus paradoxus*), ruby saltbush (*Enchylaena tomentosa*), spear grass (*Austrostipa nitida*), mallee saltbush (*Atriplex stipitata*) and small-leaf bluebush (*Maireana brevifolia*).
PCT Allocation	Location/Landscape Position: PCT 58 is described within the VIS as occurring on level to undulating sandplains, sandy rises and interdune swales composed of calcareous earths (pH >7) of red to red-brown loam, sand and texture contrast soils. Widely distributed in the far south-western NSW mainly in the Murray Darling Depression Bioregion, generally subject to less than 400 mm of annual rainfall. Within the Biodiversity Study Area this vegetation zone occurs on flat sandplains and aligns with the VIS classification description. It occurs adjacent to PCT 58 in moderate-good condition. Community structure: PCT 58 is described as Mid-high (about 7 m high) low open woodland or isolated clumps of trees. This community comprises a disturbed version of the VIS description. Canopy cover is sparse and ground cover dominated by exotic species; however the general structure is representative of a disturbed version of PCT 58. Species assemblage: VIS classification description - Canopy dominated by black oak (*Casuarina pauper*) and western rosewood (*Alectryon oleifolius* subsp. *canescens*) with either a shrubby or grassy understorey. The shrub layer is sparse or very sparse. It includes species such as wilga (*Geijera parviflora*), *Senna artemisioides* sens lat., leafless ballart (*Exocarpos aphyllus*), thorny saltbush (*Rhagodia spinescens*), black bluebush (*Maireana pyramidata*), Mueller's daisy bush (*Olearia muelleri*), *Eremophila deserti*, *Eremophila sturtii*, *Eremophila glabra*, *Acacia oswaldii*, *Acacia colletioides*, narrow-leaved hopbush (*Dodonaea viscosa* subsp. *angustissima*), *Chenopodium curvispicatum* and

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	
	shrubby twinleaf (*Roepera aurantiacum*). The ground cover is generally very sparse and includes low shrubs such as grey copperburr (*Sclerolaena diacantha*), cannonball burr (*Dissocarpus paradoxus*), spear-fruit copperburr (*Sclerolaena patenticuspis*), limestone bindii (*Sclerolaena obliquicuspis*), slender saltwort (*Salsola tragus* subsp. *tragus*) and Mallee saltbush (*Atriplex stipitata*). Spear grass (*Austrostipa nitida*, *Austrostipa scabra* or *Austrostipa elegantissima*) are common along with a range of forbs. The native vegetation within this zone resembles the species assemblage detailed in VIS, with commonly recorded species within the canopy, mid storey and ground cover aligning with the PCT description. Due to historical disturbance, the canopy cover is greatly reduced. Weed species are common within the zone, reducing native species density. Other PCTs considered: PCTs 170, 221, 128, 143, 23, 59, 154 and 252 were identified by the VIS classification as potential matches for this vegetation zone. Despite being a close match floristically, PCT 59 was discounted due to wrong IBRA subregion. PCTs 170, 128, 143, 23, 154 and 252 were removed due to species composition. The dominant canopy species in these communities did not match those recorded within this zone. PCT 221 is similar floristically and structurally to the vegetation recorded within this zone, however pearl bush (*Maireana sedifolia*) was not recorded. The VIS classification description states that PCT 221 grades into the more common PCT 58 to the east which has less or little Pearl Bluebush in the understorey.
BC Act Status	According to the VIS classification, PCT 58 corresponds in part to two BC Act listed TECs. These include *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and *Acacia loderi* shrublands EEC. This zone does not meet the criteria set out in the Final Determination for either of the two EECs listed above given the absence of the dominant trees/shrubs *Acacia loderi* and *Acacia melvillei*.
EPBC Act Status	The PCT does not correspond to any TECs listed under the EPBC Act.

Table 4.7 Black Oak – Western Rosewood Open Woodland on Deep Sandy Loams Mainly in the Murray Darling Depression Bioregion: Weedy Understory

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	
Condition	Weedy Understorey
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)
Vegetation class	Semi-arid Sand Plain Woodlands
Per cent cleared value (%)	50.00
Area (ha)	Biodiversity Study Area – 35.72 ha Development Footprint 0.17 ha
BAM Vegetation Integrity Plots	4 Plots (Plots P_22494_021, P_22494_033, P_22494_034 and P_22494_35)
Patch Size Class (ha)	101 ha
General Description	This Vegetation Zone is in low-moderate condition and comprises low open woodland. Weed occurrence within the understorey and ground cover is high. Common weed species recorded throughout this zone include Ward's weed (*Carrichtera annua*), London rocket (*Sisymbrium irio*), cut-leaved medic (*Medicago laciniata*), wiry noon-flower (*Psilocaulon granulicaule*) and smooth catsear (*Hypochaeris glabra*).
Structure and Characteristic Species	The canopy is dominated by Black Oak (*Casuarina pauper*). The mid storey is generally sparse, most commonly comprising western rosewood (*Alectryon oleifolius* subsp. *canescens*) and sugarwood (*Myoporum platycarpum*). The ground cover comprises a mixture of low-lying shrubs, grasses and forbs, including limestone bindii (*Sclerolaena obliquicuspis*), grey copperburr (*Sclerolaena diacantha*), ruby saltbush (*Enchylaena tomentosa*), *Austrostipa nitida*, cannonball burr (*Dissocarpus paradoxus*), mallee saltbush (*Atriplex stipitata*), *Maireana sclerolaenoides*, *Chenopodium curvispicatum* and *Austrostipa nodosa*.
PCT Allocation	Location/Landscape Position: PCT 58 is described within the VIS as occurring on level to undulating sandplains, sandy rises and interdune swales composed of calcareous earths (pH >7) of red to red-brown loam, sand and texture contrast soils. Widely distributed in the far south-western NSW mainly in the Murray Darling Depression Bioregion, generally subject to less than 400 mm of annual rainfall.

PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	
	Within the Biodiversity Study Area this vegetation zone occurs on flat sandplains and aligns with the VIS classification description. Community structure: PCT 58 is described as Mid-high (about 7 m high) low open woodland or isolated clumps of trees. Species assemblage: VIS classification description – Canopy dominated by black oak (*Casuarina pauper*) and western rosewood (*Alectryon oleifolius* subsp. *canescens*) with either a shrubby or grassy understorey. The shrub layer is sparse or very sparse. It includes species such as wilga (*Geijera parviflora*), *Senna artemisioides* sens lat., leafless ballart (*Exocarpos aphyllus*), thorny saltbush (*Rhagodia spinescens*), black bluebush (*Maireana pyramidata*), Mueller's daisy bush (*Olearia muelleri*), *Eremophila deserti*, *Eremophila sturtii*, *Eremophila glabra*, *Acacia oswaldii*, *Acacia colletioides*, narrow-leaved hopbush (*Dodonaea viscosa* subsp. *angustissima*), *Chenopodium curvispicatum* and shrubby twinleaf (*Roepera aurantiaca*. The ground cover is generally very sparse and includes low shrubs such as grey copperburr (*Sclerolaena diacantha*), cannonball burr (*Dissocarpus paradoxus*), spear-fruit copperburr (*Sclerolaena patenticuspis*), limestone bindii (*Sclerolaena obliquicuspis*), slender saltwort (*Salsola tragus* subsp. *tragus*) and Mallee saltbush (*Atriplex stipitata*). Spear grass (*Austrostipa nitida*, *Austrostipa scabra* or *Austrostipa elegantissima*) are common along with a range of forbs. The native vegetation within this zone resembles the species assemblage detailed in VIS, with commonly recorded species within the canopy, mid storey and ground cover aligning with the PCT description. Weed species are common within the zone, reducing native species density. Other PCTs considered: PCTs 170, 221, 128, 143, 23, 59, 154 and 252 were identified by the VIS classification as potential matches for this vegetation zone. Despite being a close match floristically, PCT 59 was discounted due to wrong IBRA subregion. PCTs 170, 128, 143, 23, 154 and 252 were removed due to species composition. The dominant canopy species in these communities did not match those recorded within this zone. PCT 221 is similar floristically and structurally to the vegetation recorded within this zone, however pearl bush (*Maireana sedifolia*) was not recorded. The VIS classification description states that PCT 221 grades into the more common PCT 58 to the east which has less or little Pearl Bluebush in the understorey.
BC Act Status	According to the VIS classification, PCT 58 corresponds in part to two BC Act listed TECs. These include *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and *Acacia loderi* shrublands EEC. This zone does not meet the criteria set out in the Final Determination for either of the two EECs listed above given the absence of the dominant trees/shrubs *Acacia loderi* and *Acacia melvillei*.
EPBC Act Status	The PCT does not correspond to any TECs listed under the EPBC Act.

4.3.3 PCT 170 Chenopod Sandplain Mallee Woodland / Shrubland of the Arid and Semi-arid (warm) Zones

Table 4.8 details the vegetation formation, class, per cent cleared and extent for PCT 170 within the Biodiversity Study Area.

Table 4.8 PCT 170 Chenopod Sandplain Mallee Woodland/Shrubland of the Arid and Semi-Arid (warm) Zones

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
PCT name	**170**
Vegetation formation	Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones
Vegetation class	Semi-arid Woodlands (Shrubby sub-formation)
Per cent cleared value (%)	Semi-arid Sand Plain Woodlands
Extent within Biodiversity Study Area (ha)	41.00
Extent within Development Footprint (ha)	226.93

PCT 170 occurs in the following vegetation zones within the Biodiversity Study Area as detailed in **Table 4.9, Table 4.10, Table 4.11** and **Table 4.12**.

Table 4.9 Chenopod sandplain Mallee Woodland/Shrubland of the Arid and Semi-arid (warm) Zones: Moderate-Good

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones		
Condition	Moderate-Good	
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)	
Vegetation class	Semi-arid Sand Plain Woodlands	
Per cent cleared value (%)	41.00	
Area (ha)	Biodiversity Study Area – 157.49 ha Development footprint 3.81 ha	
BAM Vegetation Integrity Plots	11 Plots (Plots P_22494_007, P_22494_011, P_22494_012, P_22494_015, P_22494_025, P_22494_031, 22494_53, 22494_54, 22494_56, 22494_59 and 22494_63)	
Patch Size Class (ha)	101	

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
General Description	This community comprises a moderate-good condition open mallee woodland with a ground cover dominated by low lying shrubs. Weed cover is low.
Structure and Characteristic Species	Canopy dominated by red mallee (*Eucalyptus socialis*), with glossy-leaved red mallee (*Eucalyptus oleosa*), white Mallee (*Eucalyptus dumosa*) and snap and rattle (*Eucalyptus gracilis*) are also common. The understorey is dominated by a mixture of low shrubs, grasses and forbs. Common species include *Chenopodium curvispicatum*, pink-seeded saltbush (*Maireana trichoptera*), satiny bluebush (*Maireana turbinata*), ruby saltbush (*Enchylaena tomentosa*), grey copperburr (*Sclerolaena diacantha*), limestone bindii (*Sclerolaena obliquicuspis*), *Austrostipa nitida*, gallweed (*Roepera apiculata*) and rabbit tales (*Ptilotus seminudus*).
PCT Allocation	Location/Landscape position: PCT 170 is described within the VIS as occurring on calcareous red-brown, sandy-loam or loamy clay soils, sometimes containing limestone nodules, on aeolian sandplains or in inter-dune plains or swales. The largest occurrences of this community are north-west of Balranald forming a transition between the dune mallee and the Riverine Plain. Within the Biodiversity Study Area this vegetation zone occurs on flat sandplains and swales between dunes, and aligns with the VIS classification description. Community Structure: PCT 170 is described as Mallee woodland or open mallee shrubland most usually about 8 m tall dominated by several mallee species, which closely aligns with vegetation recorded within this zone. Species assemblage: VIS classification description: Canopy dominated by white mallee (*Eucalyptus dumosa*), red mallee (*Eucalyptus socialis*), glossy-leaved red mallee (*Eucalyptus oleosa*) and snap and rattle (*Eucalyptus gracilis*). White cypress pine (*Callitris glaucophylla*) or slender pine (*Callitris gracilis* subsp. *murrayensis*) may be present. Chenopods shrubs form a major component of the understorey. Common shrubs include *Chenopodium curvispicatum*, ruby saltbush (*Enchylaena tomentosa*), mallee saltbush (*Atriplex stipitata*), cannonball burr (*Dissocarpus paradoxus*), *Chenopodium desertorum* subsp. *desertorum*, erect mallee bluebush (*Maireana pentatropis*), slit-wing bluebush (*Maireana georgei)*, black bluebush (*Maireana pyramidata*), pearl bluebush (*Maireana sedifolia*), limestone bindii (*Sclerolaena obliquicuspis*), manna wattle (*Acacia microcarpa*), sugarwood (*Myoporum platycarpum*), *Senna* form taxon 'filifolia' and spiny saltbush (*Rhagodia spinescens*). Forbs include shrubby twinleaf (*Roepera aurantiaca*), gallweed (*Roepera apiculata*), tall mulla mulla (*Ptilotus exaltatus* var. *exaltatus*) and fuzzweed (*Vittadinia cuneata*). Grasses include *Austrostipa* and *Austrodanthonia* species. Canopy and understorey species align with the VIS classification description. Of the 58 characteristics species listed in the VIS description, 29 species were recorded in this vegetation zone. Other PCTs considered: PCTs 171, 172, 221, 58 and 143 were identified by the VIS classification as potential PCT matches for this vegetation zone. They were discounted as they all lacked a canopy dominated by Mallee species with a low-lying shrub layer dominated by Chenopods. These PCTs had fewer floristic similarities to the zone than PCT 170. The ground cover of PCT 171 (presence of *Triodia scariosa*) did not align with the data collected within this zone. The Mallee species recorded within the zone are not characteristic of PCT 58. One of the dominant canopy species (*Eucalyptus socialis*) is not a listed species for PCT 221

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
	and the dominant canopy species do not align with those listed for PCT 221. PCT 172 is a closer match however, the vegetation within this zone lacked a dense shrub layer and characteristic canopy species such as *Callitris verrucosa* and *Eucalyptus costata*.
BC Act Status	According to the VIS classification, PCT 170 corresponds in part to two BC Act listed TECs. These include *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and *Acacia loderi* shrublands EEC. This zone does not meet the criteria set out in the Final Determination for either of the two TECs listed above given the absence of the dominant trees/shrubs *Acacia loderi* and *Acacia melvillei*.
EPBC Act Status	The PCT relates to two EPBC Act listed communities, these include: Commonwealth Mallee Bird Community of the Murray Darling Depression Bioregion EEC and Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions Critically Endangered Ecological Community (CEEC). This zone does not meet the criteria set out in the Approved Conservation Advice for Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC. For further details refer to **Section 4.5**. The zone is considered to meet the criteria for the Mallee Bird Community of the Murray Darling Depression Bioregion EEC. For further details refer to **Section 4.5**.

Table 4.10 Chenopod Sandplain Mallee Woodland/Shrubland of the Arid and Semi-arid (warm) Zones: Derived-Native

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones		
Condition	Derived Native	
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)	
Vegetation class	Semi-arid Sand Plain Woodlands	
Per cent cleared value (%)	41.00	
Area (ha)	Biodiversity Study Area – 22.19 ha Development Footprint 1.15 ha	
BAM Vegetation Integrity Plots	5 Plots (Plots P_22494_008, P_22494_019, P_22494_027, 22494_55 and 22494_60)	

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
Patch Size Class (ha)	101 ha
General Description	Disturbed community with absent to sparse canopy recently cleared, represented by a low derived shrubland/grassland. Understorey and ground cover occur at moderate density and comprise a mixture of native and exotic species. Exotic species and generally in lower abundance include cut-leaved medic (*Medicago laciniata*), London rocket (*Sisymbrium irio*), vervain (*Salvia verbenaca*), Ward's weed (*Carrichtera annua*) and Mediterranean turnip (*Brassica tournefortii*).
Structure and Characteristic Species	Canopy species generally absent, in some areas low abundance of red mallee (*Eucalyptus oleosa*), western rosewood (*Alectryon oleifolius*) and red mallee (*Eucalyptus socialis*). The shrub layer is comprised of numerous low-lying shrubs, including *Chenopodium curvispicatum*, grey copperburr (*Sclerolaena diacantha*), limestone bindii (*Sclerolaena obliquicuspis*), cannonball burr (*Dissocarpus paradoxus*), small-leaf bluebush (*Maireana brevifolia*), ruby saltbush (*Enchylaena tomentosa*), erect mallee bluebush (*Maireana pentatropis*), *Chenopodium desertorum* and pink-seeded bluebush (*Maireana trichoptera*). The ground cover is dominated by *Austrostipa nitida*, *Rhodanthe pygmaea*, *Actinobole uliginosum* and *Austrostipa nodosa*.
PCT Allocation	Location/Landscape position: PCT 170 is described within the VIS as occurring on calcareous red-brown, sandy-loam or loamy clay soils, sometimes containing limestone nodules, on aeolian sandplains or in inter-dune plains or swales. The largest occurrences of this community are north-west of Balranald forming a transition between the dune mallee and the Riverine Plain. Within the Biodiversity Study Area this vegetation zone occurs on flat sandplains and adjacent to moderate-good condition forms of PCT 170. Community Structure: PCT 170 is described as mallee woodland or open mallee shrubland most usually about 8 m tall dominated by several mallee species. The vegetation within this zone is highly disturbed, with understorey and canopy mostly absent. It is likely that historically this zone would have met the community structure description. Species assemblage: VIS classification description: Canopy dominated by white mallee (*Eucalyptus dumosa*), red mallee (*Eucalyptus socialis*), glossy-leaved red mallee (*Eucalyptus oleosa*) and snap and rattle (*Eucalyptus gracilis*). White cypress pine (*Callitris glaucophylla*) or slender pine (*Callitris gracilis* subsp. *murrayensis*) may be present. Chenopods shrubs form a major component of the understorey. Common shrubs include *Chenopodium curvispicatum*, ruby saltbush (*Enchylaena tomentosa*), mallee saltbush (*Atriplex stipitata*), cannonball burr (*Dissocarpus paradoxus*), *Chenopodium desertorum* subsp. *desertorum*, erect mallee bluebush (*Maireana pentatropis*), slit-wing bluebush (*Maireana georgei*), black bluebush (*Maireana pyramidata*), pearl bluebush (*Maireana sedifolia*), limestone bindii (*Sclerolaena obliquicuspis*), manna wattle (*Acacia microcarpa*), sugarwood (*Myoporum platycarpum*), *Senna* form taxon 'filifolia' and spiny saltbush (*Rhagodia spinescens*). Forbs include shrubby twinleaf (*Roepera aurantiaca*), gallweed (*Roepera apiculata*), tall mulla mulla (*Ptilotus exaltatus* var. *exaltatus*) and fuzzweed (*Vittadinia cuneata*). Grasses include *Austrostipa* and *Austrodanthonia* species.

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
	Due to historical disturbance, the canopy is mostly absent to spare from this vegetation zone. However, the few trees that do fall within the zone meet the PCT description. The understorey and ground cover align with the VIS classification description. Other PCTs considered: PCTs 171, 172, 221, 58 and 143 were identified by the VIS classification as potential PCT matches for this vegetation zone. They were discounted as they all lacked a canopy dominated by mallee species with a low-lying shrub layer dominated by Chenopods. These PCTs had fewer floristic similarities to the zone than PCT 170. The ground cover of PCT 171 has a more grass dominated ground cover and as such did not align with the data collected within this zone. The Mallee species recorded within the zone are not characteristic of PCT 58. One of the dominant canopy species (*Eucalyptus socialis*) is not a listed species for PCT 221. The dominant canopy species do not align with those listed for PCT 221. PCT 172 is a close floristic match however, the vegetation within this zone lacked a dense shrub layer and characteristic canopy species such as *Callitris verrucosa* and *Eucalyptus costata* were absent.
BC Act Status	According to the VIS classification, PCT 170 corresponds in part to two BC Act listed TECs. These include *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and *Acacia loderi* shrublands EEC. This zone does not meet the criteria set out in the Final Determination for either of the two TECs listed above given the absence of the dominant trees/shrubs *Acacia loderi* and *Acacia melvillei*.
EPBC Act Status	This PCT relates to two EPBC Act listed communities, these include Commonwealth Mallee Bird Community of the Murray Darling Depression Bioregion EEC and Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC. The zone does not meet the criteria set out in the Approved Conservation Advice for Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions. For further details refer to Section 4.5. The zone does not meet the criteria for the Mallee Bird Community of the Murray Darling Depression Bioregion TEC given the absence of mallee trees. For further details refer to **Section 4.5**.

Table 4.11 Chenopod Sandplain Mallee Woodland/Shrubland of the Arid and Semi-arid (warm) Zones: Derived-Weedy

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones		
Condition	Derived-Weedy	
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)	
Vegetation class	Semi-arid Sand Plain Woodlands	
Per cent cleared value (%)	41.00	
Area (ha)	Biodiversity Study Area – 39.01 ha	
BAM Vegetation Integrity Plots	6 Plots (Plots P_22494_013, P_22494_017, P_22494_018, P_22494_037, 22494_57 and 22494_62)	
Patch Size Class (ha)	101 ha	
General Description	This community is in low condition with a mostly absent canopy. The understorey and ground cover are dominated by a mixture of exotic and native shrubs and grasses. Common weeds in high abundance include Ward's weed (*Carrichtera annua*), cut-leaved medic (*Medicago laciniata*), woolly burr medic (*Medicago minima*), vervain (*Salvia verbenaca*), Mediterranean turnip (*Brassica tournefortii*), *Sisymbrium irio*, *Citrullus amarus*, *Hypochaeris radicata* and *Conyza bonariensis*.	
Structure and Characteristic Species	The canopy is mostly absent, with less than 1% canopy cover recorded in all but one plot. Individual mallee trees such as red mallee (*Eucalyptus socialis*) are scattered over the zone. The ground cover is dominated by exotic species detailed above. Common native species also present include ruby saltbush (*Enchylaena tomentosa*) grey copperburr (*Sclerolaena diacantha*) limestone bindii (*Sclerolaena obliquicuspis*), *Atriplex stipitata*, small-leaf bluebush (*Maireana brevifolia*), cannonball burr (*Dissocarpus paradoxus*), *Salsola australis*, *Austrostipa nitida*, gallweed (*Roepera apiculata*) and *Cynoglossum australe*.	
PCT Allocation	Location/Landscape position: PCT 170 is described within the VIS as occurring on calcareous red-brown, sandy-loam or loamy clay soils, sometimes containing limestone nodules, on aeolian sandplains or in inter-dune plains or swales. The largest occurrences of this community are north-west of Balranald forming a transition between the dune mallee and the Riverine Plain.	

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
	Within the Biodiversity Study Area this vegetation zone occurs on flat sandplains and adjacent to moderate- good condition forms of PCT 170. Community Structure: PCT 170 is described as mallee woodland or open mallee shrubland most usually about 8 m tall dominated by several mallee species. The vegetation within this zone is highly disturbed, with understorey and canopy mostly absent. It is likely that historically this zone would have met the community structure description. Species assemblage: VIS classification description: Canopy dominated by white mallee (*Eucalyptus dumosa*), red mallee (*Eucalyptus socialis*), glossy-leaved red mallee (*Eucalyptus oleosa*) and snap and rattle (*Eucalyptus gracilis*). White cypress pine (*Callitris glaucophylla*) or slender pine (*Callitris gracilis* subsp. *murrayensis*) may be present. Chenopods shrubs form a major component of the understorey. Common shrubs include *Chenopodium curvispicatum*, ruby saltbush (*Enchylaena tomentosa*), mallee saltbush (*Atriplex stipitata*), cannonball burr (*Dissocarpus paradoxus*), *Chenopodium desertorum* subsp. *desertorum*, erect mallee bluebush (*Maireana pentatropis*), slit-wing bluebush (*Maireana georgei*), black bluebush (*Maireana pyramidata*), pearl bluebush (*Maireana sedifolia*), limestone bindii (*Sclerolaena obliquicuspis*), manna wattle (*Acacia microcarpa*), sugarwood (*Myoporum platycarpum*), *Senna* form taxon 'filifolia' and spiny saltbush (*Rhagodia spinescens*). Forbs include shrubby twinleaf (*Roepera aurantiaca*), gallweed (*Roepera apiculata*), tall mulla mulla (*Ptilotus exaltatus* var. *exaltatus*) and fuzzweed (*Vittadinia cuneata*). Grasses include *Austrostipa* and *Austrodanthonia* species. Due to historical disturbance, the canopy is mostly absent from this vegetation zone. However, the few trees that do fall within the zone meet the PCT description. The understorey and ground cover align with the VIS classification description. Other PCTs considered: PCTs 171, 172, 221, 58 and 143 were identified by the VIS classification as potential PCT matches for this vegetation zone. They were discounted as they all lacked a canopy dominated by mallee species with a low-lying shrub layer dominated by Chenopods. These PCTs had fewer floristic similarities to the zone than PCT 170. The ground cover of PCT 171 has a more grass dominated ground cover and as such did not align with the data collected within this zone. The Mallee species recorded within the zone are not characteristic of PCT 58. One of the dominant canopy species (*Eucalyptus socialis*) is not a listed species for PCT 221. The dominant canopy species do not align with those listed for PCT 221. PCT 172 is a close floristic match however, the vegetation within this zone lacked a dense shrub layer and characteristic canopy species such as *Callitris verrucosa* and *Eucalyptus costata* were absent.
BC Act Status	According to the VIS classification, PCT 170 corresponds in part to two BC Act listed TECs. These include *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and *Acacia loderi* shrublands EEC. This zone does not meet the criteria set out in the Final Determination for either of the two TECs listed above given the absence of the dominant trees/shrubs *Acacia loderi* and *Acacia melvillei*.
EPBC Act Status	The PCT relates to two EPBC Act listed communities, these include: Commonwealth Mallee Bird Community of the Murray Darling Depression Bioregion EEC and Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC.

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
	The zone does not meet the criteria set out in the Approved Conservation Advice for Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions. For further details refer to **Section 4.5**. The zone does not meet the criteria for the Mallee Bird Community of the Murray Darling Depression Bioregion TEC given the absence of mallee trees. For further details refer to **Section 4.5**.

Table 4.12 Chenopod Sandplain Mallee Woodland/Shrubland of the Arid and Semi-arid (warm) Zones: Weedy Understory

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones		
Condition	Weedy Understory	
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)	
Vegetation class	Semi-arid Sand Plain Woodlands	
Per cent cleared value (%)	41.00	
Area (ha)	Biodiversity Study Area – 8.25 ha Development footprint 0 ha	
BAM Vegetation Integrity Plots	1 plot (plot P_22494_022)	
Patch Size Class (ha)	101 ha	
General Description	This vegetation zone comprises a low open woodland with an understorey dominated by exotic species. Common exotic species recorded throughout this zone include Ward's weed (*Carrichtera annua*) and cut-leaved medic (*Medicago laciniata*), representing up to 60 percent cover.	
Structure and Characteristic Species	Canopy dominated by snap and rattle (*Eucalyptus gracilis*), with white Mallee (*Eucalyptus dumosa*). The common native understorey species include oink-seeded bluebush (*Maireana trichoptera*), *Maireana sclerolaenoides*, ruby saltbush (*Enchylaena tomentosa*), *Austrostipa nitida* and gallweed (*Roepera apiculata*).	

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
PCT Allocation	Location/Landscape position: PCT 170 is described within the VIS as occurring on calcareous red-brown, sandy-loam or loamy clay soils, sometimes containing limestone nodules, on aeolian sandplains or in inter-dune plains or swales. The largest occurrences of this community are north-west of Balranald forming a transition between the dune mallee and the Riverine Plain. Within the Biodiversity Study Area this vegetation zone occurs on flat sandplains. Community Structure: PCT 170 is described as mallee woodland or open mallee shrubland most usually about 8 m tall dominated by several mallee species. This vegetation has a mallee woodland structure, with an understorey dominated by exotic species. Species assemblage: VIS classification description: Canopy dominated by white mallee (*Eucalyptus dumosa*), red mallee (*Eucalyptus socialis*), glossy-leaved red mallee (*Eucalyptus oleosa*) and snap and rattle (*Eucalyptus gracilis*). White cypress pine (*Callitris glaucophylla*) or slender pine (*Callitris gracilis* subsp. *murrayensis*) may be present. Chenopods shrubs form a major component of the understorey. Common shrubs include *Chenopodium curvispicatum*, *Enchylaena tomentosa*, *Atriplex stipitata*, *Dissocarpus paradoxus*, *Chenopodium desertorum* subsp. *desertorum*, *Maireana pentatropis*, *Maireana georgei*, *Maireana pyramidata*, *Maireana sedifolia*, *Sclerolaena obliquicuspis*, *Acacia microcarpa*, *Myoporum platycarpum*, *Senna* form taxon 'filifolia' and *Rhagodia spinescens*. Forbs include *Zygophyllum aurantiacum*, *Zygophyllum apiculatum*, *Ptilotus exaltatus* var. *exaltatus* and *Vittadinia cuneata*. Grasses include *Austrostipa* and *Austrodanthonia* species. Although exotic species dominate the understorey, canopy and understorey species align with the VIS classification description. Other PCTs considered: PCTs 171, 172, 221, 58 and 143 were identified by the VIS classification as potential PCT matches for this vegetation zone. They were discounted as they all lacked a canopy dominated by mallee species with a low-lying shrub layer dominated by Chenopods. These PCTs had fewer floristic similarities to the zone than PCT 170. The ground cover of PCT 171 has a more grass dominated ground cover and as such did not align with the data collected within this zone. The mallee species recorded within the zone are not characteristic of PCT 58. The dominant canopy species do not align with those listed for PCT 221. PCT 172 is a close floristic match however, the vegetation within this zone lacked a dense shrub layer and characteristic canopy species such as *Callitris verrucosa* and *Eucalyptus costata* were absent.
BC Act Status	According to the VIS classification, PCT 170 corresponds in part to two BC Act listed TECs. These include *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and *Acacia loderi* shrublands EEC. This zone does not meet the criteria set out in the Final Determination for either of the two TECs listed above given the absence of the dominant trees/shrubs *Acacia loderi* and *Acacia melvillei*.
EPBC Act Status	The PCT relates to two EPBC Act listed communities, these include Commonwealth Mallee Bird Community of the Murray Darling Depression Bioregion EEC and Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC.

PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	
	The zone does not meet the criteria set out in the Approved Conservation Advice for Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions. For further details refer to **Section 4.5**. The zone meets the criteria for the Mallee Bird Community of the Murray Darling Depression Bioregion TEC given the presence of mallee trees. For further details refer to **Section 4.5**.

4.3.4 PCT 171 Spinifex Linear Dune Mallee Mainly of the Murray Darling Depression Bioregion

Table 4.13 details the vegetation formation, class, per cent cleared and extent for PCT 171 within the Biodiversity Study Area.

Table 4.13 Spinifex Linear Dune Mallee Mainly of the Murray Darling Depression Bioregion

PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	
PCT name	Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)
Vegetation class	Dune Mallee Woodlands
Per cent cleared value (%)	19.00
Extent within Biodiversity Study Area (ha)	131.50
Extent within Development Footprint (ha)	18.95

PCT 171 occurs in the following vegetation zones within the Biodiversity Study Area as detailed in **Table 4.14**.

Table 4.14 Spinifex Linear Dune Mallee Mainly of the Murray Darling Depression Bioregion: Moderate-good

PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion		
Condition	Moderate-Good	
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation)	
Vegetation class	Dune Mallee Woodlands	
Per cent cleared value (%)	19.00	
Area (ha)	Biodiversity Study Area – 131.50 ha Development Footprint 18.95 ha	

PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	
BAM Vegetation Integrity Plots	12 Plots (Plot P_22494_001, P_22494_003, P_22494_016, P_22494_024, P_22494_029, P_22494_030, 22494_41, 22494_43, 22494_51, 22494_52, 22494_64 and 22494_65)
Patch Size Class (ha)	101 ha
General Description	This community comprises a moderate-good condition mallee woodland with a ground cover dominated by grasses with some low-lying shrubs. Weed cover is low.
Structure and Characteristic Species	Sparse to mid-dense canopy dominated by red mallee (*Eucalyptus socialis*), with white mallee (*Eucalyptus dumosa*) and snap and rattle (*Eucalyptus gracilis*) also common. The shrub layer dominated by narrow-leaved hopbush (*Dodonaea viscosa* subsp. *angustissima*), wait-a-while (*Acacia colletioides*), tarbush (*Eremophila glabra*), Muller's daisy bush (*Olearia muelleri*) and numerous *Maireana* spp. A low-moderate density ground cover was dominated by a mixture of grasses, forbs and low-lying shrubs. Common species include porcupine grass (*Triodia scariosa*), fuzz-weed (*Vittadinia cuneata*), *Austrostipa nitida*, *Podolepis capillaris*, *Chenopodium curvispicatum*, ruby saltbush (*Enchylaena tomentosa*) and copperburrs such as *Sclerolaena diacantha*, *Sclerolaena obliquicuspis* and *Sclerolaena parviflora*.
PCT Allocation	Location/Landscape position: This community occurs on calcareous brown-red sand or loamy sand sometimes overlying grey clay on east-west linear sand dunes mainly in the Murray Darling Depression Bioregion in south far western plain of NSW. Within the Biodiversity Study Area this vegetation zone occurs on sandy rises and dunes. Community structure: Mallee shrubland or open shrubland most about 5 m tall but up to 8 m, most often in a whipstick habit, dominated by a number of mallee species. The structure of this community closely matches the VIS description. Species assemblage: Canopy dominated by mallee species including white mallee (*Eucalyptus dumosa*), red mallee (*Eucalyptus socialis*) and snap and rattle (*Eucalyptus gracilis*) and ridge-fruited mallee (*Eucalyptus costata*). Narrow-leaved red mallee (*Eucalyptus leptophylla*) is also often present along with sand dune pine (*Callitris verrucosa*). A mid-dense to sparse shrub cover includes wait-a-while (*Acacia colletioides*), narrow-leaved hopbush (*Dodonaea viscosa* subsp. *angustissima*), *Eremophila glabra*, *Olearia pimeleoides*, erect mallee bluebush (*Maireana pentatropis*), and *Grevillea huegelii*. Mulga (*Acacia aneura*) and Wilga (*Geijera parviflora*) may occur in northern and eastern areas. This community contains a species-rich understorey that is dominated by Porcupine Grass (*Triodia scariosa*). Besides Porcupine Grass, the ground cover includes fuzz-weed (*Vittadinia cuneata*), *Austrostipa nitida*, *Podolepis capillaris* and copperburrs such as *Sclerolaena diacantha* and *Sclerolaena obliquicuspis*. Canopy, understorey and ground cover align with the VIS classification description. Of the 44 characteristics species listed in the VIS description, 30 species were recorded in this vegetation zone. Other PCTs considered: PCTs 171, 170, 172, 221, 58, 173 and 631 were identified by the vis classification potential matches for this vegetation zone. PCTs 221, 58

PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	
	and 631 were removed due to species composition. The dominant canopy species in these communities are mainly Black Oak or Cypress Pine, which do not match those recorded within this zone (mallee species). Whilst the canopy composition is similar, the ground cover of PCT 170 is dominated by chenopods and as such did not closely align with the data collected within this zone. PCT 172 is a close floristic match however, the vegetation within this zone lacked a dense shrub layer. Canopy species characteristic of PCT 172 canopy were either uncommon (*Callitris verrucosa*) or absent (*Eucalyptus costata*).
BC Act Status	The PCT does not corresponds with any BC Act listed TECs.
EPBC Act Status	The zone is considered to meet the criteria for the Mallee Bird Community of the Murray Darling Depression Bioregion EEC. For further details refer to Section 4.5.

4.4 Vegetation Zone and Vegetation Integrity Score

Details on the number of BAM vegetation integrity plots required and completed for each vegetation condition zone, in accordance with Table 3 of the BAM, are provided in **Table 4.15**. The BAM vegetation integrity plot survey locations are shown in **Figure 4.2**.

The condition scores for the BAM vegetation integrity plots completed are provided in **Table 4.15**. This table represents the combined scores from all plots completed for each vegetation condition zone, including the vegetation integrity score and the presence of hollow bearing trees. The BAM vegetation plot survey data is provided in **Appendix F**.

Table 4.15 Vegetation Zones and Vegetation Integrity Scores

VZ ID	PCT	Condition State	Patch Size Class	Total Area within Biodiversity Study Area (ha)	Total Area within Development Footprint (ha)	Plots required for Development Footprint	Plots completed	TEC (Y/N)?	Composition condition score	Structure condition score	Function condition score	VI Score	Hollow Bearing Trees present (Y/N)?
1	PCT 58	Moderate-Good	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	558.14	26.81	4	16	N	90	99.6	55.8	79.4	Y
2	PCT 58	Derived-weedy	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	41.42	3.39	2	7	N	48.3	61.6	15.6	35.9	N
3	PCT 58	Weedy-understory	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	35.72	0.17	1	4	N	85.6	98.8	50.4	75.2	Y
4	PCT 170	Moderate-Good	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	157.49	3.81	2	11	N	84.9	75.1	37.3	61.9	Y
5	PCT 170	Derived-native	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	22.19	1.15	1	5				22.19	1.15	1
6	PCT 170	Derived-weedy	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	39.01	0.06	1	6	N	66.3	36.7	35	44	N
8	PCT 171	Moderate-Good	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	131.50	18.95	3	12	N	99.8	97.8	42.3	74.5	N

4.5 Threatened Ecological Communities

Seven threatened ecological communities (TECs) were identified as having the potential to occur within the Biodiversity Study Area and are listed in **Table 4.16**. Potential TECs have been identified based on associations listed for PCTs in the BioNet Vegetation Classification database, BioNet Atlas and PMST database searches and those identified in the SEARs.

Table 4.16 Threatened Ecological Communities with Potential to Occur in the Biodiversity Study Area

TEC	Source	BC Act Status	EPBC Act Status	Further Assessment Required
***Acacia loderi* shrublands**	BioNet Vegetation Classification database, BioNet Atlas	Endangered	Not listed	No. *Acacia loderi* was not identified within the Biodiversity Study Area based on detailed field surveys.
***Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions**	BioNet Vegetation Classification database, BioNet Atlas	Endangered	Not listed	No. *Acacia melvillei* was not identified within the Biodiversity Study Area based on detailed field surveys.
***Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression Bioregions/ Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions**	PMST, SEARs	Endangered	Endangered	No. Buloke was not identified within the Biodiversity Study Area based on detailed field surveys.
Mallee Bird Community of the Murray Darling Depression Bioregion	BioNet Vegetation Classification database, BioNet Atlas PMST, SEARs	Not listed	Endangered	Yes
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	BioNet Vegetation Classification database, BioNet Atlas	Not listed	Critically Endangered	Yes

TEC	Source	BC Act Status	EPBC Act Status	Further Assessment Required
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	BioNet Atlas	Endangered	Not listed	No. *Callitris glaucophylla* was not identified within the Biodiversity Study Area based on detailed field surveys.
***Tecticornia lylei*, Wiry Glasswort, low open-shrubland in the Murray Darling Depression Bioregion**	BioNet Atlas	Endangered	Not listed	No. *Tecticornia lylei* was not identified within the Biodiversity Study Area based on detailed field surveys.

4.5.1 Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions

The ecological community typically occurs on near-level plains or occasionally on gently sloping terrain surrounding and within run-on landscape depressions where soil textures are typically clay loams, but may occasionally be sandy clay loams or light clays (DAWE 2021a). The ecological community is associated with areas with an average annual rainfall typically in the range of 260 mm–450 mm, within semi-arid to arid regions of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions. It extends in an easterly direction towards Charlton, Boort and Kerang on the southern boundary, with a northern boundary more or less constrained by the Murray River (DAWE 2021a).

Soils are variable but are typically duplex, with clay loam or occasionally sandy clay loam topsoil textures mostly of Woorinen Formation aeolian origin, above deep fine textured clay subsoils. Typically, they are heavier in texture than soils that support most other mallee vegetation, but have a lower fraction of clay than soils supporting other vegetation in the region, such as saltbush shrublands and black box woodlands (DAWE 2021a).

The canopy of Plains mallee box woodlands is mostly medium (5–10 m) to occasionally tall (to 15 m). Tree canopy cover is typically sparse or open (10–15%). A small tree and/or large shrub layer may be present, but is typically low (3–5 m) and very sparse with < 5% cover. A medium shrub layer 1–3 m tall may also be present, but is also normally very sparse (< 10% cover). A distinctive low to decumbent chenopod sub-shrub layer can be a key feature in many occurrences. The ground layer is dominated by tussock grasses, but may be inconspicuous depending on drought conditions or livestock.

In NSW, it occurs primarily in the Kyalite-Tooleybuc-Koraleigh-Speewa area with possible extensions east toward Moulamein.

The primary diagnostic species particular to this community are the dominance of the box- barked eucalypt species mallee black box (*Eucalyptus porosa*) or bull mallee (*E. behriana*). In broad terms, *E. porosa* typically occurs in the northern and western parts of the ecological community's range, and *E. behriana* typically occurs in the southern and south-eastern parts of the ecological community's range. However, square-fruited mallee (*E. calycogona*), or white mallee (*E. dumosa*) may be dominant in some areas where they share understorey and other characteristics that are consistent with the ecological community. Peppermint box (*Eucalyptus odorata*) may be codominant in some areas. Buloke (*Allocasuarina luehmannii*) and belah (*Casuarina pauper*) can also be locally abundant, but not dominant across an entire patch (DAWE 2021a).

One PCT, PCT 170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm), may in part form part of the Plains Mallee Box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC according to the BioNet Vegetation Classification database.

An assessment against the Conservation Advice found that PCT 170 does not conform with Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC as listed under the EPBC Act. **Table 4.17** compares PCT 170 to the key diagnostic characteristics.

It was determined that the Plains Mallee Box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC was not present within the Biodiversity Study Area due to low abundance of diagnostic canopy species. A single diagnostic canopy species (DAWE 2021a) was recorded in lower abundance, comprising *Eucalyptus dumosa* (i.e., the species was not dominant within the vegetation community). The conservation advice requires *Eucalyptus porosa*, *Eucalyptus behriana* or *Eucalyptus dumosa* (or a combination of these species) to be a dominant canopy to conform to the CEEC. The vegetation within the Biodiversity Study Area is dominated by mallee species which are not characteristic of the CEEC. Additionally, according to the regional occurrence mapping provided in the conservation advice, the Project Area is further north of the area mapped where the CEEC may occur, with the nearest mapped occurrence approximately 100 km to the south.

Table 4.17 Plains mallee box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions Assessment

Key Diagnostic Characteristics (DAWE 2021a)	PCT 170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones
Occurs in New South Wales, Victoria and South Australia, within Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	The Biodiversity Study Area is located within the Murray-Darling Depression Regionalisation for Australia (IBRA) bioregion, which is characteristic of this TEC
Within these bioregions, the ecological community typically occurs on near-level plains or occasionally on gently sloping terrain surrounding and within run-on landscape depressions. Soils are variable but are typically duplex, with clay loam or occasionally sandy clay loam topsoil textures mostly of aeolian origin, above deep fine textured clay subsoils	Occurs on sandy loam soils within the Biodiversity Study Area
The primary diagnostic species particular to this community are the dominance of the box- barked eucalypt species *Eucalyptus porosa* (black mallee box) or *E. behriana* (bull mallee, broad-leaved mallee box). However, *E. calycogona* (square-fruited mallee, gooseberry mallee, red mallee), or *E. dumosa* (Dumosa mallee) may be dominant in some areas where the understorey characteristics are consistent with those described below, and landscape features are consistent with those described above	The primary diagnostic species *Eucalyptus porosa* and *Eucalyptus behriana* are absent from the Biodiversity Study Area. *Eucalyptus dumosa* is present within the Biodiversity Study Area however is not the dominant species. Dominance is defined as one or more of diagnostic tree canopy species (and their hybrids) being the most abundant tree in the canopy in terms of cover and/or stem density. Of the 12 plots completed in PCT 170 (moderate/good and weedy understorey condition types), *Eucalyptus dumosa* was recorded in 7 plots. In all instances *Eucalyptus dumosa* was not the dominant mallee species (in terms of cover or stem density) and therefore does not meet this key diagnostic characteristic. *Eucalyptus socialis*, *Eucalyptus oleosa* or *Eucalyptus gracilis* generally dominant PCT 170. Given PCT 170 does not meet this key diagnostic characteristic, a comparison to the subsequent key diagnostic characteristics has not been made
Conclusion	**Does not form part of the Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions CEEC**

4.5.2 Mallee Bird Community of the Murray Darling Depression Bioregion

The Mallee Bird Community of the Murray Darling Depression Bioregion EEC is an assemblage of 20 bird species that rely on mallee habitats. Within the assemblage two broad groups of species are recognised: mallee specialists and mallee dependents. Mallee specialists are found almost exclusively in mallee habitats and include black-eared miner (*Manorina melanotis*), chestnut quail-thrush (*Cinclosoma castanotum*), mallee emu-wren (*Stipiturus mallee*), malleefowl (*Leipoa ocellata*), red-lored whistler (*Pachycephala rufogularis*), scarlet-chested parrot (*Neophema splendida*), striated grasswren (*Amytornis striatus*) and mallee western whipbird (*Psophodes leucogaster*). Mallee dependents are bird species dependent on mallee where it is present, but that also utilise non-mallee woodland or shrubland habitat that intergrades with mallee vegetation. Mallee dependents include crested bellbird (*Oreoica gutturalis*), grey-fronted honeyeater (*Ptilotula plumula*), jacky winter (*Microeca fascinans*), purple-gaped honeyeater (*Lichenostomus cratitius*), regent parrot (*Polytelis anthopeplus*), shy heathwren (*Calamanthus cautus*), southern scrub-robin (*Drymodes brunneopygia*), splendid fairy-wren (*Malurus splendens*), spotted pardalote (*Pardalotus punctatus*), white-eared honeyeater (*Nesoptilotis leucotis*), white-fronted honeyeater (*Purnella albifrons*) and yellow-plumed honeyeater (*Ptilota ornata*). A number of these species are widely distributed with specific sub-species associated with mallee habitats (DAWE 2021b).

The Mallee Bird Community is found in mallee habitats to the east of the Flinders Ranges in South Australia, in western Victoria and the southwestern corner of New South Wales (DAWE 2021b).

The Mallee Bird Community of the Murray Darling Depression Bioregion EEC consists of six honeyeaters, three wrens, two parrots, two robins, a quail-thrush, a pardalote, a whistler, a thornbill, a megapode, a bellbird and a whipbird (DAWE 2021b).

Biodiversity surveys completed within the Biodiversity Study Area recorded conditions consistent with the diagnostic criteria for Mallee Bird Community of the Murray Darling Depression EEC contained within the approved conservation advice (DAWE 2021b). This vegetation consisted of two PCTs being, PCT 170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones and PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion.

An assessment against the approved conservation advice found that PCT 170 – moderate/good condition, PCT 170 – weedy understory and PCT 171 – moderate good condition conforms with the Mallee Bird Community of the Murray Darling Depression Bioregion EEC as listed under the EPBC Act. **Table 4.18** compares the characteristic attributes of each community. This assessment identified that the Mallee Bird Community of the Murray Darling Depression Bioregion – Condition Category A in accordance with the approved conservation advice for the Mallee Bird Community.

The details of the Mallee Bird Community of the Murray Darling Depression Bioregion EEC identified within the Biodiversity Study Area are listed in **Table 4.19** and the extent of each TEC is mapped in **Figure 4.3**.

Table 4.18 Mallee Bird Community of the Murray Darling Depression Bioregion Assessment

TEC Attribute	Key Diagnostic Questions in the Approved Conservation Advice for the Mallee Bird Community (DAWE 2021b)	Application to PCT 170 and 171 in the Biodiversity Study Area
Geographic	Is the area of interest within, or partially within any of the following IBRA bioregions or subregions: • Murray Darling Depression (MDD): all seven subregions; • Riverina (RIV) subregions where the Murray River intrudes into the MDD: Murray Fans (RIV03, west of Swan Hill), Robinvale Plains (RIV05), and Murray Scroll Belt (RIV06); • Darling Riverine Plains (DRP) subregions where the Darling River anabranches intrude into the MDD: Great Darling Anabranch (DRP08); and Pooncarie-Darling (DRP09).	Yes – Areas associated with PCT 170 and 171 within the Biodiversity Study Area are entirely contained within the geographic boundary for the Mallee Bird Community, being the Murray Darling Depression IBRA region.
Patch size of native vegetation	Is a patch of native vegetation of at least 10 hectares present (either wholly or partially within the site)?	Yes – The patch of native vegetation for PCT 170 and 171 is greater than 10 ha. These two PCTs form a continuous patch and linked across the landscape.
Presence of mallee habitats	Does the patch of native vegetation contain an area or areas of at least 5 hectares dominated by mallee? Mallee vegetation is defined as having the following combination of features within an area of native vegetation: • Vegetation structure is a native woodland to shrubland where a tree canopy is present that is at least sparse (5% crown cover) but not typically closed; AND • Mallee eucalypt trees are the dominant tree canopy type present. Other non-mallee trees (i.e. non-mallee eucalypts or non-eucalypt native species) may be present in the tree canopy but do not represent the most common structural type averaged across the remnant or site.	Yes – The patch of native vegetation dominated by mallee is greater than 5 ha for the moderate/ good condition zone for PCT 170 and 171. These PCTs contain canopy dominated by red mallee (*Eucalyptus socialis*), with glossy-leaved red mallee (*Eucalyptus oleosa*), white Mallee (*Eucalyptus dumosa*) and snap and rattle (*Eucalyptus gracilis*) also common.

TEC Attribute	Key Diagnostic Questions in the Approved Conservation Advice for the Mallee Bird Community (DAWE 2021b)	Application to PCT 170 and 171 in the Biodiversity Study Area
Terrestrial bird species assemblage	How many species of the Mallee Bird Community (listed in Table 1.1 of the Approved Conservation Advice) have been recorded from current bird surveys and/or from existing bird observation records within 20 km of the site and within the last ten years?	The surveys undertaken in the Biodiversity Study Area for the Project from September 2022 to July 2024 have recorded nine species listed in the Mallee Bird Community.
Condition Category		
Category A: High number of MBC species	At least 5 Mallee Bird Community species, any mix of mallee specialist and dependent species.	Yes – one mallee specialist and nine mallee dependent species have been recorded during surveys on the site. These are: Mallee specialists • Chestnut quail-thrush (*Cinclosoma castanotum*). Mallee dependents • Crested bellbird (*Oreoica gutturalis*) • Jacky winter (*Microeca fascinans*) • Shy heathwren (*Calamanthus cautus*) • White-eared honeyeater (*Nesoptilotis leucotis*) • Spotted pardalote (*Pardalotus punctatus*) • Splendid fairy-wren (*Malurus splendens*) • Yellow-plumed honeyeater (*Ptilotula ornata)* • White-fronted honeyeater (*Purnella albifrons*) • Regent parrot (*Polytelis anthopeplus*).

Table 4.19 TECs within the Biodiversity Study Area and Development Footprint

Threatened Ecological Community Name	EPBC Act Status	Associated Vegetation Zones Within the Biodiversity Study Area	Area within Biodiversity Study Area (ha)	Area within Development Footprint (ha)
Mallee Bird Community of the Murray Darling Depression Bioregion	Endangered	PCT 170 Condition Zone 4 moderate/good	157.48	3.81
		PCT 170 Condition Zone 7 weedy understory	8.25	0
		PCT 171 Condition Zone 8 moderate/good	131.50	18.95

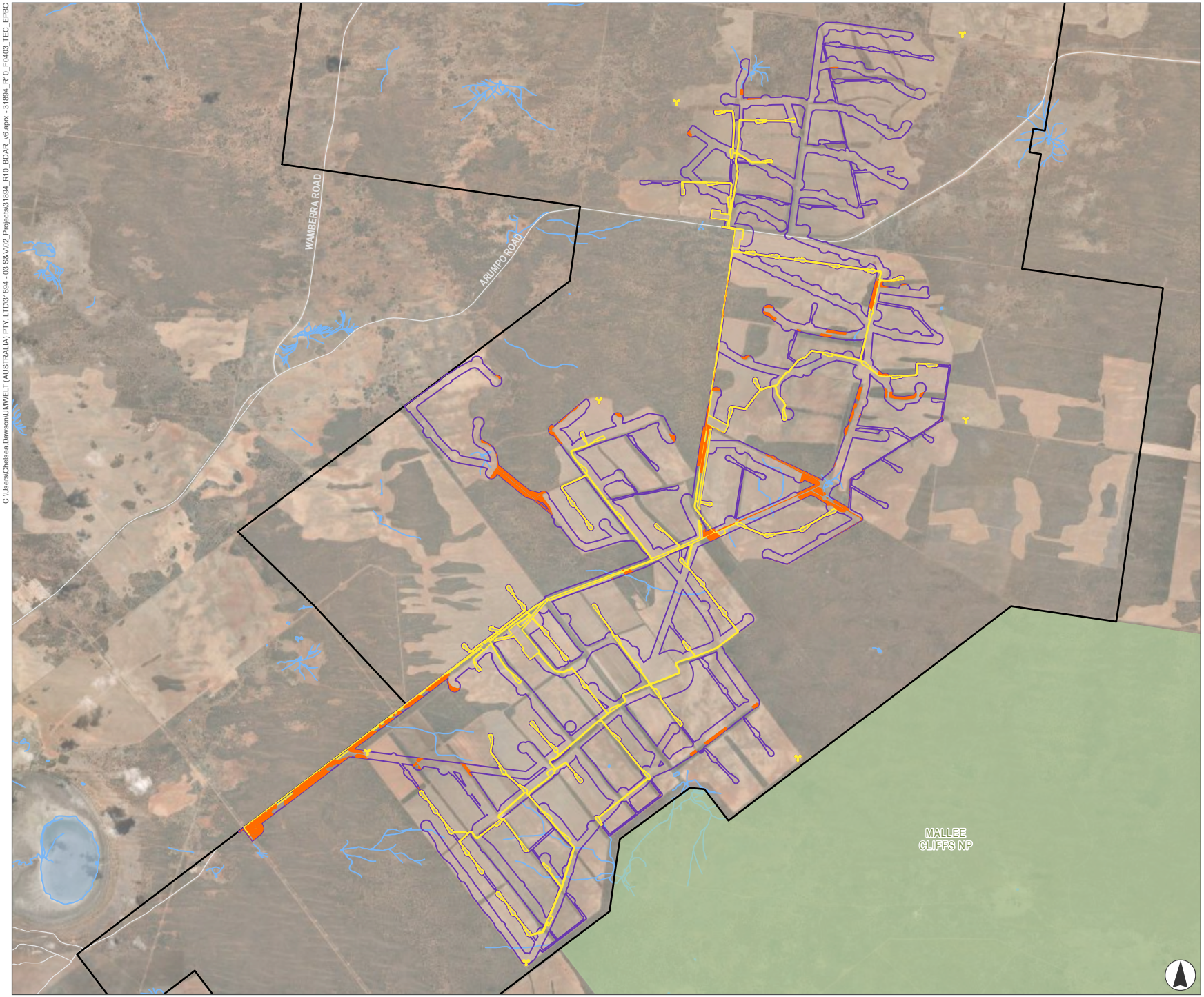


FIGURE 4.3

Distribution of Threatened Ecological Communities listed under EPBC Act across the Biodiversity Study Area

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates

Threatened Ecological Communities - EPBC Act

- Mallee Bird Community of the Murray Darling Depression Bioregion EEC

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

4.6 Groundwater Dependent Ecosystems and Aquatic Habitat

4.6.1 Groundwater Dependant Ecosystems

Groundwater dependent ecosystems (GDEs) rely on the presence of groundwater to function and sustain the resident assemblage of species, populations, and ecological communities. The level of groundwater dependence of vegetation communities in the Biodiversity Study Area has been identified using the GDE Atlas (BoM 2024a) and the Risk assessment guidelines for groundwater dependent ecosystems (Serov et al. 2012).

The GDE Atlas delineates and provides information about the following three types of GDEs (BoM 2024a):

- Aquatic ecosystems that rely on the surface expression of groundwater – This includes surface water ecosystems which may have a groundwater component, such as rivers, wetlands, and springs. Marine and estuarine ecosystems can also be groundwater dependent, but they are not mapped in the GDEs Atlas.
- Terrestrial ecosystems that rely on the subsurface presence of groundwater – This includes all vegetation ecosystems.
- Subterranean ecosystems – This includes cave and aquifer ecosystems.

Within the terrestrial ecosystem type, an area of vegetation can be classified as either a high potential, moderate potential or low potential GDE. According to the GDEs Atlas, the Project Area or surrounding area has no mapped aquatic GDEs and has not been analysed in a regional or national study for the presence of terrestrial GDEs.

4.6.2 Aquatic Habitat

There are limited mapped watercourses within the Project Area, all of which are of a minor nature. The only aquatic habitat associated with the Biodiversity Study Area comprises three farm dams, these however these will not be impacted by the Project as part of the Development Footprint. No other aquatic habitats are present within the Biodiversity Study Area. No habitat for any threatened species listed under the FM Act is present within the Development Footprint.

4.7 Land Categorisation

An assessment of land categorisation was completed for the Project to determine areas of Category 1 – Exempt Land. This assessment included desktop and ground-truthing surveys.

Potential Category 1 – Exempt Land areas were identified using available online data sets, including:

- Draft Native Vegetation Regulatory Map (NSW DCCEEW 2024)
- NSW Government Historical Imagery Viewer (DCS Spatial Services 2024).

Ground-truthing surveys were undertaken during vegetation and land categorisation mapping surveys in September 2022 and April 2024, noting seasonal differences between surveys. Combined with the results of the field surveys, Category 1 – Exempt Land was identified through aerial photography interpretation of historical imagery, identifying areas of cropping or tillage. Areas which were identified as having been cleared/disturbed as set out above were then mapped using geo-rectified imagery.

Figure 4.4 displays the draft native vegetation regulatory map, compared with **Figure 4.5** which shows the refined land categorisation based on field surveys and aerial photography review. A key difference between these maps is the southern portion of the Biodiversity Study Area where additional cropping has occurred and additional Category 1 – Exempt Land has been mapped.

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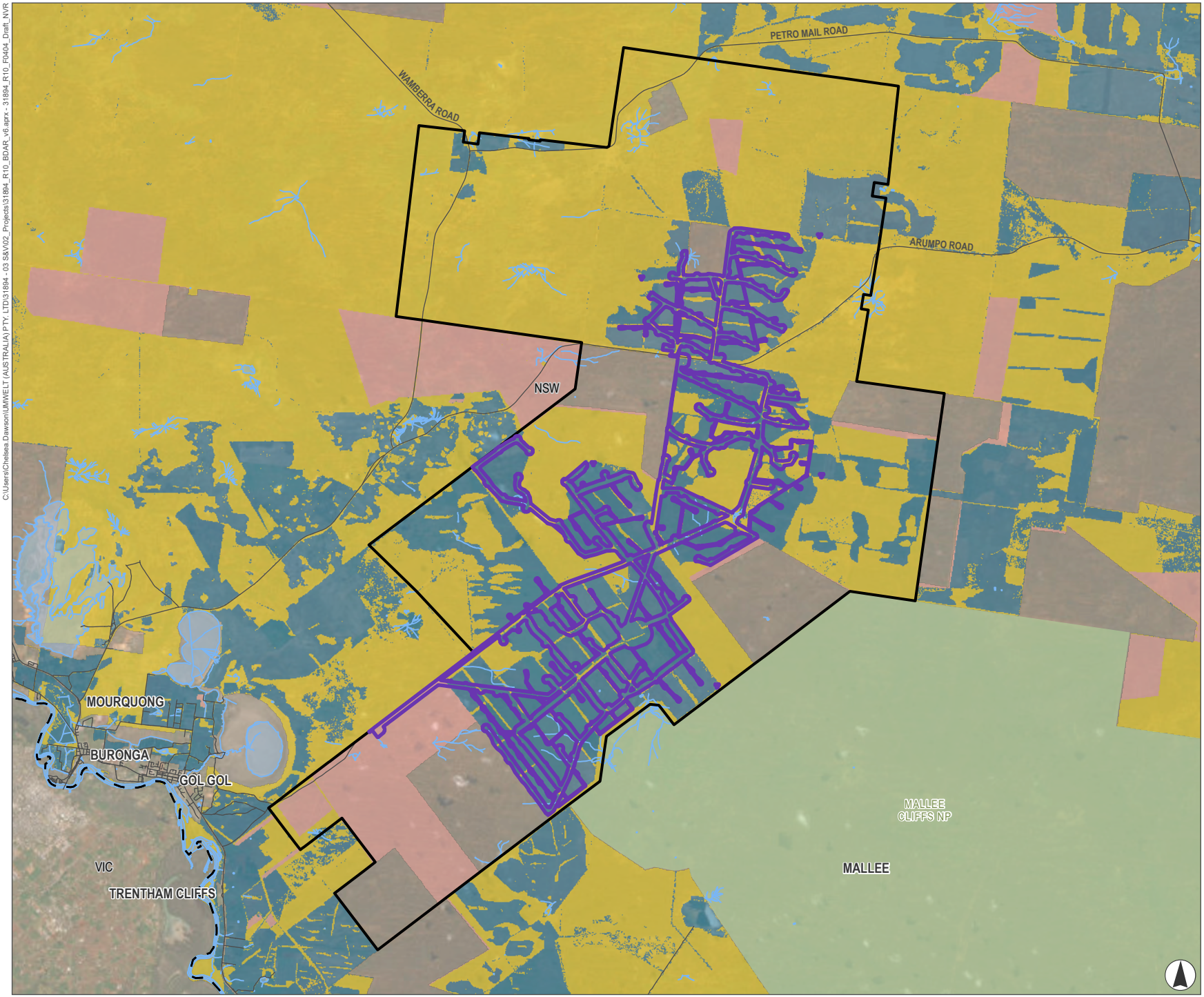


FIGURE 4.4

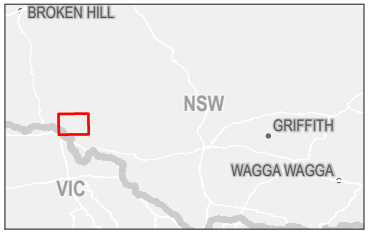
Draft Native Vegetation Regulatory Map

Legend

- Project Boundary
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates
- State Border

Draft native vegetation regulatory map

- Category 1-exempt land (draft)
- Category 2-regulated land (draft)
- Category 2-sensitive regulated land (in-force)



0 5 10

Kilometres

Scale 1:225,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

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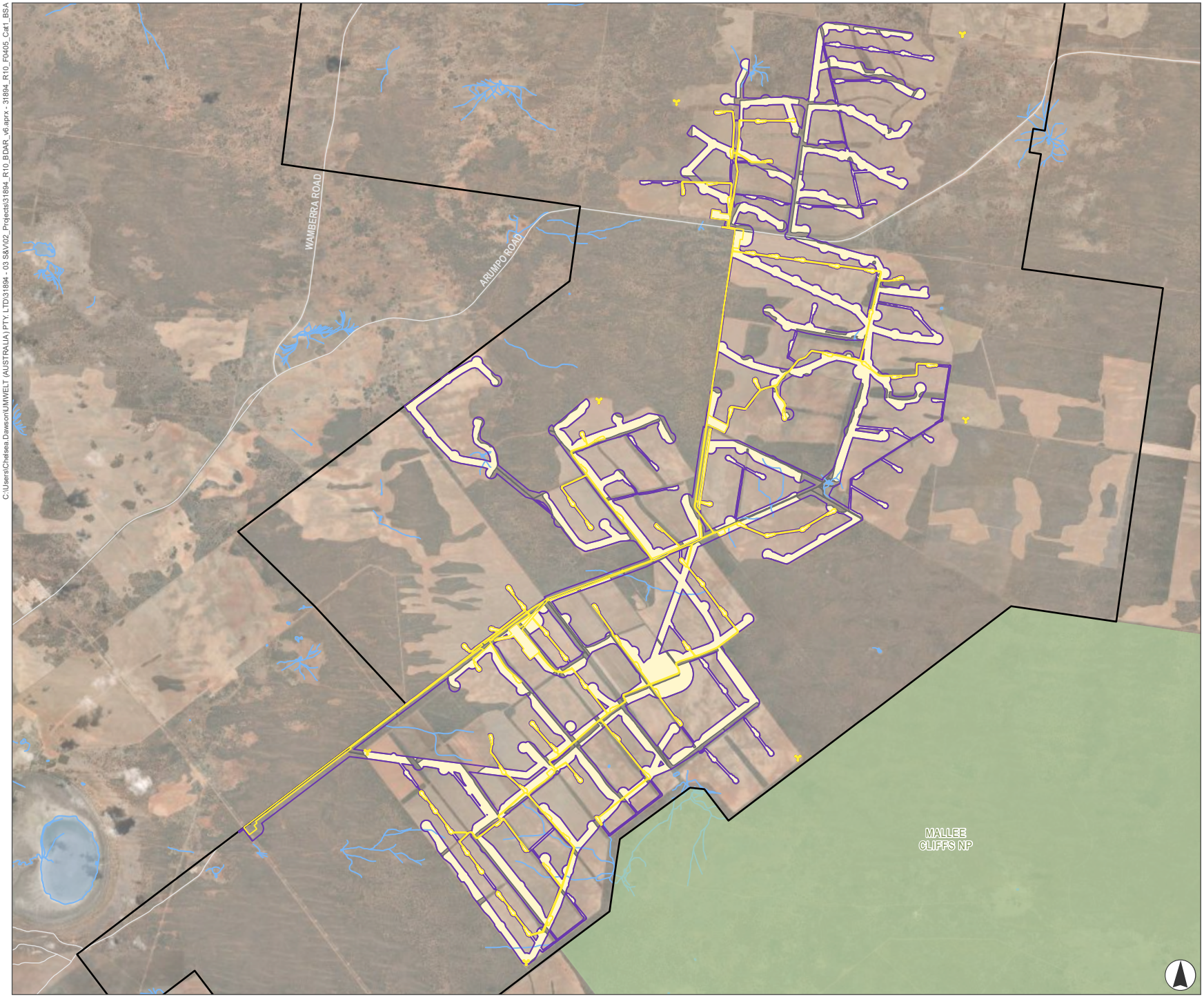

FIGURE 4.5

Land Categorisation of the Biodiversity Study Area

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Category 1 - Exempt Land, Cleared, Road and Tracks
- Road
- Watercourse
- Waterbody
- NPWS Estates

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

The areas assessed as Category 1 – Exempt Land contain highly disturbed non-woody vegetation primarily dominated by cropped wheat and legume paddocks, with grazing also present in the northern third of the Biodiversity Study Area (see **Photo 4.1**–**Photo 4.8**). Non-native vegetation within the Biodiversity Study Area historically would have once contained native vegetation, however due to the inherently high levels of disturbance and ongoing agricultural practices, these areas now contain Category 1 – Exempt Land. **Figure 4.6** displays cropping across the Biodiversity Study Area in the form of tilled paddocks.

Photo 4.1 **Aerial photo of an example of Category 1 – Exempt Land within the northern portion of the Project Area**

Photo 4.2 **Aerial photo of an example of Category 1 – Exempt Land within the central portion of the Project Area with visual evidence of tillage lines**

Photo 4.3 **Aerial photo of an example of Category 1 – Exempt Land within the southern of the Project Area demonstrating cropped paddocks and adjacent native vegetation in the form of windrows**

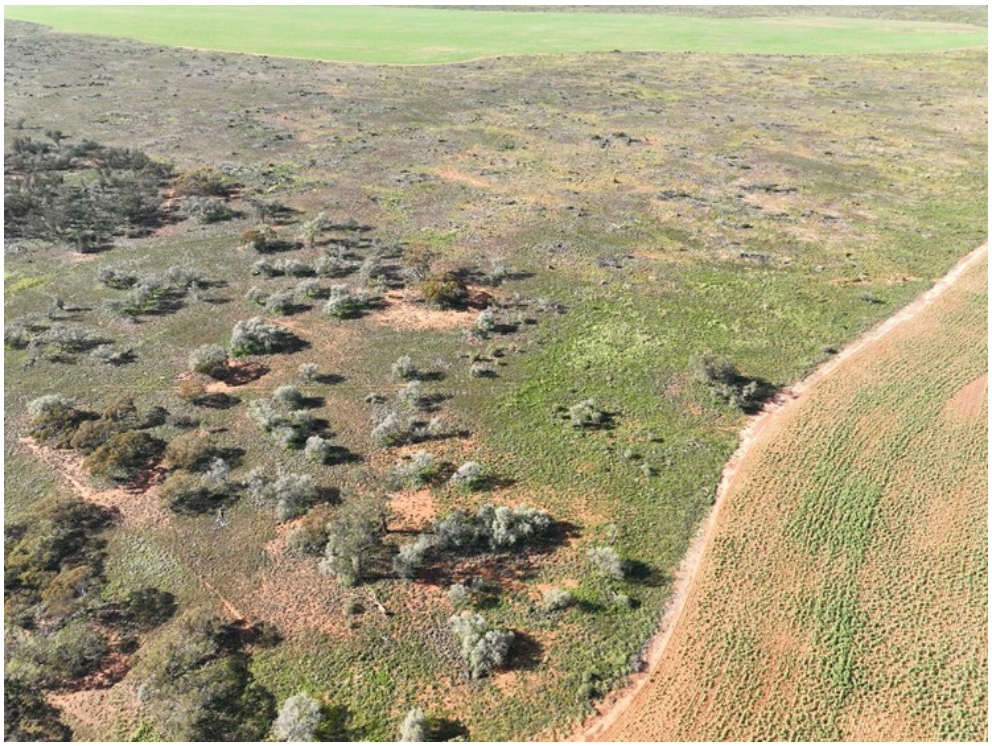

Photo 4.4 **Aerial photo of an example of Category 1 – Exempt Land (top and right of image) adjacent to native vegetation in the central portion of the Project Area**

Photo 4.5 **On ground example of Category 1 – Example Land within cropped and grazed paddock in the northern portion of the Project Area**

Photo 4.6 **On ground example of Category 1 – Example Land within cropped and grazed paddock in the northern portion of the Project Area**

Photo 4.7 **On ground example of Category 1 – Example Land within cropped paddock in the southern portion of the Project Area**

Photo 4.8 **On ground example of Category 1 – Example Land within cropped paddock in the Project Area**

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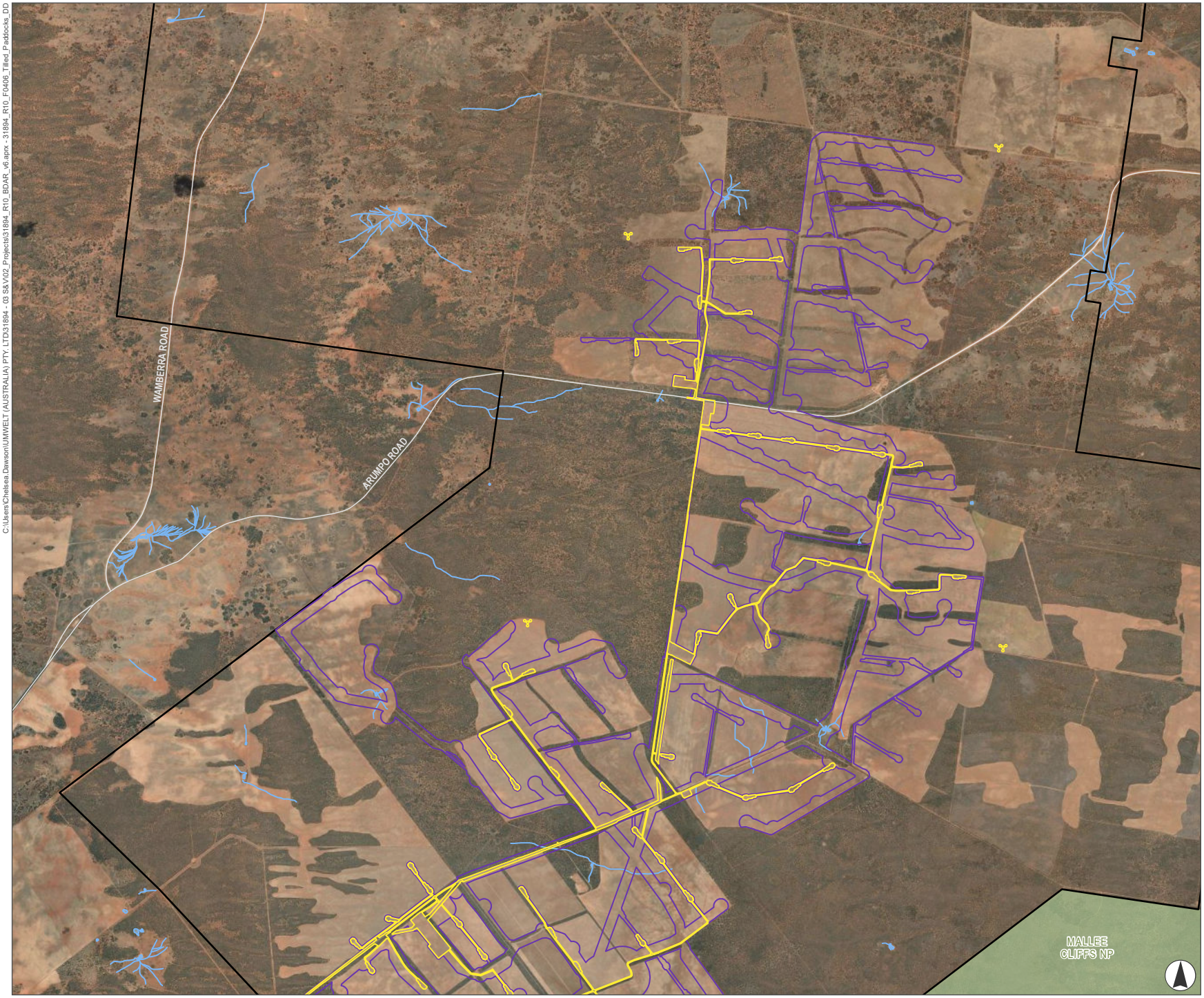

FIGURE 4.6A

Aerial Photograph displaying Tilled Paddocks across the Project Area

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates

0 2.5 5

Kilometres

Scale 1:108,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

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FIGURE 4.6B

Aerial Photograph displaying Tilled Paddocks across the Project Area

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates

0 2.5 5

Kilometres

Scale 1:108,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

Early in the Project it was identified that a Property Vegetation Plan (PVP) intersected the Development Footprint, specifically the transmission line. This area is identified as Category 2 – Sensitive Regulated Land on **Figure 4.4** above. Spark Renewables have engaged with LLS Buronga office with respect to this area including detailed email correspondence in March 2023 and April 2024 as well as an in-person meeting and presentation in April 2024.

The following approach has been discussed:

- Clearing of the PVP area may be permissible under an SSD approval. Spark Renewables and LLS are seeking further legal advice to determine how the LLS and EP&A Act would apply/prevail in this instance.
- If the PVP area is found to prevent clearing then the PVP can be amended. The landholder would need to demonstrate that the clearing is unavoidable and that another area of the same vegetation type exists on the property that can be set aside.
- Spark Renewables and LLS preference is not to amend the PVP prior to the Project securing grid connection approvals.

Spark Renewables will progress its grid connection and continue to consult with LLS regarding the requirements for works in this PVP area. Indicatively, grid access would be confirmed by Q2 2025 (with appropriate LLS consultation occurring prior, and PVP amendments occurring as a result) however the precise timing of grid access requirements is yet to be confirmed.

It is also noted that a voluntary Wildlife Refuge agreement is associated with 1727 DP 763667 and intersects with the Development Footprint. Spark Renewables is in discussions with the landholder and proposes to revoke the Wildlife Refuge prior to construction commencing.

4.8 Off-site Road Works Vegetation

Other vegetation that is not consistent with a PCT was identified among three (3) off-site road works areas that occur beyond the Project Area that are associated with off-site road upgrades and modifications as part of the Project. Specifically, these three (3) off-site road work areas occur at the following locations:

- Sturt Highway roundabout at intersection of Carey Street, Euston
- Sturt Highway roundabout onto Silver City Highway, Buronga
- Silver City Highway onto Arumpo Road.

These road works are modifications to the road network and can generally be classified as:

- Traffic Management: Activities related to optimising traffic flow, including roundabout adjustments, sign removal, and island modifications.
- Infrastructure Installation/Modification: Tasks involving the installation or modification of hardstands, gates, and fences.
- Vegetation Management: Activities related to clearing or trimming vegetation along the road corridor.
- Signage and Lighting: Adjustments to signage and lighting fixtures for improved visibility and safety.

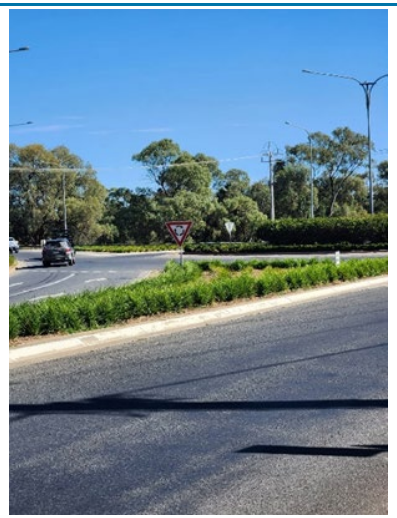
For the purpose of this assessment, it is assumed that any feature contained in the above off-site road work areas will be subject to impact in the form of clearing and/or ground disturbance.

Rapid vegetation assessment surveys were conducted at each of the above off-site road work areas to determine the presence and extent of any native vegetation and/or potential for threatened species and their habitats. An overview of the features within each of the off-site road work areas and their extent is provided in **Table 4.20** and are displayed in **Figure 4.7**, **Figure 4.8** and **Figure 4.9**.

There is planted native vegetation at the off-site road work area at Buronga. Impacts to this area of native planted vegetation has been assessed in **Section 10.2** by applying the streamlined assessment for planted native vegetation (NSW DCCEEW 2024c).

Table 4.20 Details of the Off-site Road Work Areas

Off-stie Road Work Area	Features	Description	Area (ha)	Survey Results	Representative Photographs
Silver City Highway onto Arumpo Road	Exotic roadside	Wild oats (Avena sp.), Galenia (Galenia pubescens), Medicago sp. Ward's weed (*Carrichtera annua*) and barley (*Hordeum* sp.)	0.07	No threatened species and/or their habitats recorded	
	Cleared/ road	Road	0.04		

Off-stie Road Work Area	Features	Description	Area (ha)	Survey Results	Representative Photographs
Sturt Highway roundabout onto Silver City Highway, Buronga	Cleared/road	Road, median strip, footpath	0.02	No threatened species and/or their habitats recorded	
	Planted exotic	Cocos palms, *Gazania* sp. *Nandina* sp.	0.02		
	Planted native cultivar	*Dianella* sp.	0.02		

Off-stie Road Work Area	Features	Description	Area (ha)	Survey Results	Representative Photographs
					
Sturt Highway roundabout at intersection of Carey Street, Euston	Cleared/road	Median strip	0.04	No threatened species and/or their habitats recorded	
	Exotic roadside	Kikuyu dominated groundcover	0.03		
	Planted exotic	Three exotic jacaranda street trees	0.01		

Off-stie Road Work Area	Features	Description	Area (ha)	Survey Results	Representative Photographs
					 

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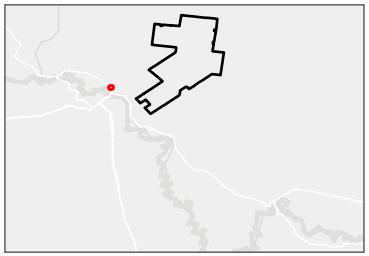
FIGURE 4.7

Features of Off-site Road Works - Arumpo Road

Legend

- Off-site Road Works
- Local Government Area (LGA)
- Cleared/road
- Exotic roadside



0 50 100

Metres

Scale 1:3,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

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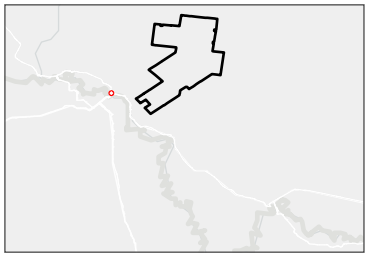
FIGURE 4.8

Features of Off-site Road Works - Buronga

Legend

- Off-site Road Works
- Local Government Area (LGA)
- Cleared/road
- Planted exotic
- Planted native cultivar



0 25 50

Metres

Scale 1:1,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

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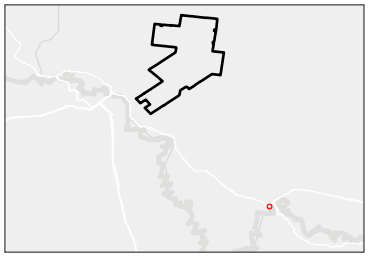
FIGURE 4.9

Features of Off-site Road Works - Euston

Legend

- Off-site Road Works
- Local Government Area (LGA)
- Cleared/road
- Exotic roadside
- Planted exotic



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Metres

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Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

5.0 Threatened Species

5.1 Ecosystem Species

5.1.1 Identification of Ecosystem Credit Species

Ecosystem credit species are those threatened species that can be reliably predicted to occur based on the PCTs identified within the Development Footprint. The BAM-C generates a list of predicted ecosystem credit species from numerous inputs such as landscape features and the native vegetation communities present. The ecosystem credit species applicable to the Project have been predicted using the BAM-C based on the following inputs:

- IBRA subregion: South Olary Plain
- Associated PCTs: 58, 170, 171
- Percentage native vegetation cover class: >10–30%
- Patch size class: >100 ha.

Table 5.1 provides the full suite of predicted ecosystem credit species applicable to the Project as generated by the BAM-C.

One species recorded during the assessment was listed under the BC Act during the process of carrying out the BAM assessment, being: Southern whiteface (*Aphelocephala leucopsis*) – listed as vulnerable on 1 December 2023.

Additionally, the SEARs identified a species that was also recently listed under the BC Act during the process of carrying out the BAM assessment, being: Blue-winged parrot (*Neophema chrysostoma*) – listed as vulnerable on 25 August 2023.

Since the submission and exhibition of the BDAR, both Southern whiteface (*Aphelocephala leucopsis*) and Blue-winged parrot (*Neophema chrysostoma*) have been subsequently listed as ecosystem credit species in the BAM-C and TBDC.

Table 5.1 Summary of Ecosystem Credit Species Considered as Part of this Assessment

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained?	Justification for any Exclusions	Associated PCT	Sensitivity to Gain Class
		BC Act	EPBC Act							
Bardick	*Echiopsis curta*	E	-	No	BAM-C	N/A	Y	N/A	171	Moderate
Black Falcon	*Falco subniger*	V	-	No	BAM-C	N/A	Y	N/A	58 170 171	Moderate
Black-breasted Buzzard	*Hamirostra melanosternon*	V	-	Yes	Identified during surveys	Land within 40 m of riparian woodland on inland watercourses/ waterholes containing dead or dying eucalypts	Y	N/A	58 170 171	Moderate
Blue-winged Parrot	*Neophema chrysostoma*	V	V	No	SEARS BAM-C	N/A	Y	N/A	58 170	Low
Bolam's Mouse	*Pseudomys bolami*	E	-	No	SEARs	N/A	Y	N/A	58 170 171	High
Chestnut Quail-thrush	*Cinclosoma castanotum*	V	-	No	BAM-C Identified during surveys	N/A	Y	N/A	170 171	High
Corben's Long-eared Bat	*Nyctophilus corbeni*	V	V	No	BAM-C Potential presence as species group (Nyctophilus spp.) recorded during surveys	N/A	Y	N/A	58 170 171	High
Diamond Firetail	*Stagonopleura guttata*	V	V	No	BAM-C	N/A	Y	N/A	58 170	Moderate
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	No	BAM-C Identified during field surveys	N/A	Y	N/A	58 170 171	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained?	Justification for any Exclusions	Associated PCT	Sensitivity to Gain Class
		BC Act	EPBC Act							
Gilbert's Whistler	*Pachycephala inornata*	V	-	No	BAM-C	N/A	Y	N/A	58 170 171	Moderate
Grey Falcon	*Falco hypoleucos*	V	V	No	BAM-C	N/A	Y	N/A	58 170 171	Moderate
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-	No	BAM-C	N/A	Y	N/A	58	Moderate
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	E	E	No	BAM-C Identified during surveys	N/A	Y	N/A	58 170 171	Moderate
Inland Forest Bat	*Vespadelus baverstocki*	V	-	No	BAM-C Identified during surveys	N/A	Y	N/A	58 170 171	High
Jewelled Gecko	*Strophurus elderi*	V	-	No	BAM-C	Triodia habitat	Y	N/A	170 171	High
Kultarr	*Antechinomys laniger*	E	-	No	BAM-C	N/A	Y	N/A	58 170 171	High
Little Eagle	*Hieraaetus morphnoides*	V	-	Yes	BAM-C Identified during surveys	Nest trees - live (occasionally dead) large old trees within vegetation.	Y	N/A	58 170 171	Moderate
Little Pied Bat	*Chalinolobus picatus*	V	-	No	BAM-C Identified during surveys	N/A	Y	N/A	58 170 171	High
Pink Cockatoo	*Lophochroa leadbeateri*	V	-	Yes	BAM-C	Living or dead tree with hollows greater than 10 cm diameter	Y	N/A	58 170 171	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained?	Justification for any Exclusions	Associated PCT	Sensitivity to Gain Class
		BC Act	EPBC Act							
Mallee Slender Blue-tongue Lizard	*Cyclodomorphus melanops elongatus*	E	-	No	BAM-C	Triodia habitat	Y	N/A	171	High
Mallee Worm-lizard	*Aprasia inaurita*	E	-	No	BAM-C	N/A	Y	N/A	170 171	High
Malleefowl	*Leipoa ocellata*	E	V	No	BAM-C	No	Y	N/A	170 171	High
Marble-faced Delma	*Delma australis*	E	-	No	BAM-C	Triodia habitat	Y	N/A	170 171	Moderate
Painted Honeyeater	*Grantiella picta*	V	V	No	BAM-C	N/A	Y	N/A	58	Moderate
Pied Honeyeater	*Certhionyx variegatus*	V	-	No	BAM-C Identified during surveys	N/A	Y	N/A	58 170 171	Moderate
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*	V	-	No	BAM-C	N/A	Y	N/A	170 171	High
Purple-gaped Honeyeater	*Lichenostomus cratitius*	V	-	No	BAM-C	N/A	Y	N/A	170 171	Moderate
Regent Parrot (eastern subspecies)	*Polytelis anthopeplus monarchoides*	E	V	Yes	BAM-C Identified during surveys	Living or dead E. camaldulensis with hollows greater than 5 cm diameter, greater than 5 m above the ground OR trees with DBH of greater than 40 cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of mallee	Y	N/A	58 170 171	Moderate

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained?	Justification for any Exclusions	Associated PCT	Sensitivity to Gain Class
		BC Act	EPBC Act							
Ringed Brown Snake		E	-	No	BAM-C	N/A	Y	N/A	58 170 171	Moderate
Sandy Inland Mouse	*Pseudonaja modesta*	V	-	No	BAM-C	N/A	Y	N/A	58 171	High
Scarlet-chested Parrot	*Pseudomys hermannsburgensis*	V	-	No	BAM-C	N/A	Y	N/A	170 171	High
Shy Heathwren	*Neophema splendida*	V	-	No	BAM-C Identified during surveys	N/A	Y	N/A	170 171	High
Southern Ningaui	*Ningaui yvonneae*	V	-	No	BAM-C	N/A	Y	N/A	170 171	High
Southern Scrub-robin	*Drymodes brunneopygia*	V	-	No	BAM-C	N/A	Y	N/A	171	Moderate
Southern whiteface	*Aphelocephala leucopsis*	V	V	No	BAM-C Identified during surveys	N/A	Y	N/A	58 170	Low
Spotted Harrier	*Circus assimilis*	V	-	No	BAM-C Identified during surveys	N/A	Y	N/A	58 170 171	Moderate
Square-tailed Kite	*Lophoictinia isura*	V	-	Yes	BAM-C Identified during surveys	SC: Nest trees	Y	N/A	58	Moderate
Stripe-faced Dunnart	*Sminthopsis macroura*	V	-	No	BAM-C	N/A	Y	N/A	58 171	High
Varied Sittella	*Daphoenositta* chrysoptera	V	-	No	BAM-C Identified during surveys	N/A	Y	N/A	58 170 171	Moderate
Wedgesnout	*Ctenotus brooksi*	V	-	No	BAM-C	N/A	Y	N/A	171	High
Western Blue-tongued Lizard	*Tiliqua occipitalis*	V	-		BAM-C	N/A	Y	N/A	170 171	High

Common Name	Scientific Name	Listing Status		Dual Credit Species	Sources	Habitat Constraints / Geographic Limitations	Species retained?	Justification for any Exclusions	Associated PCT	Sensitivity to Gain Class
		BC Act	EPBC Act							
Western Pygmy Possum	*Cercartetus concinnus*	E	-	No	BAM-C	SC: Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines EC: Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Y	N/A	58 170 171	High
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V	-	Yes	BAM-C	N/A	Y	N/A	58 170 171	High
White-fronted chat	*Epthianura albifrons*	V	-	No	Identified during surveys	N/A	Y	N/A	58 170 171	Moderate
Yellow-bellied sheathtail-bat	*Saccolaimus flaviventris*	V	-	No	BAM-C	N/A	Y	N/A	58 170	High
Yellow-tailed Plain Slider	*Lerista xanthura*	V	-	No	BAM-C	N/A	Y	N/A	58 170 171	High

Key: CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory

5.1.2 Candidate Species Credit Species

Species credit species are those threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates and therefore require further consideration through an assessment of habitat suitability.

The BAM-C generates a list of species credit species based on numerous inputs such as the distribution of the species occurring within the same IBRA subregion as the Development Footprint and the presence of habitat features and components associated within these species.

The candidate species credit species predicted to occur within the Development Footprint are identified in **Table 5.2**.

Justification is provided for any species identified automatically populated in the BAM-C that were excluded from further assessment. Geographic limitations, habitat constraints, degradation or lack of suitable microhabitats are the permitted reasons for excluding species credit species in accordance with Section 5.2.1(2)(b) and Section 5.2.2(2)(b) of the BAM.

For threatened flora species DPIE (2020a) identify that only the suitable habitat for the target species within the Development Footprint needs to be surveyed and includes areas on the Development Footprint supporting any listed habitat constraints and PCTs associated with that species in the TBDC. In this context DPIE (2020a) also identify that suitable habitat for threatened flora may encompass entire PCTs or be restricted to niches determined with consideration of habitat constraints, land use history, disturbance events and climatic factors. The TBDC and the Threatened Species Profile website, along with appropriate published or peer-reviewed references and/or data must be used to determine suitable habitat (DPIE 2020a).

No species credit species were removed from the BAM calculator automatically populated candidate species list.

An assessment of habitat suitability was carried out for each of the species identified in **Table 5.2**. The assessment was based on details provided within the TBDC including associated PCTs and known habitat or geographical constraints as detailed within **Table 5.2**.

Table 5.2 Candidate Species Credit Species

Common Name	Scientific Name	Listing Status		Sources	Associated PCTs	SAII	Habitat Constraints / Geographic Limitations	Vagrant?	Sensitivity to Gain Class	Species Retained for Further Assessment?	Justification if Excluded from Further Assessment
		BC Act	EPBC Act								
Flora											
Harrow Wattle	*Acacia acanthoclada*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170, 171	No	Deep silicious sands	No	High	Yes	N/A
Purple-wood Wattle	*Acacia carneorum*	V	V	☒ BAM-C ☐ Previous survey ☐ Current survey	58	Yes	N/A	No	Very High	Yes	N/A
A saltbush	*Atriplex infrequens*	V	V	☒ BAM-C ☐ Previous survey ☐ Current survey	170	No	N/A	No	High	Yes	N/A
A spear-grass	*Austrostipa metatoris*	V	V	☒ BAM-C ☐ Previous survey ☐ Current survey	170	No	N/A	No	High	Yes	N/A
A burr-daisy	*Calotis moorei*	E	E	☒ BAM-C ☐ Previous survey ☐ Current survey	170	Yes	N/A	No	High	Yes	N/A
Bluebush Daisy	*Cratystylis conocephala*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170, 171	No	N/A	No	Moderate	Yes	N/A
Desert Hopbush	*Dodonaea stenozyga*	CE	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170,171	Yes	N/A	No	High	Yes	N/A
Pink Velvet Bush	*Lasiopetalum behrii*	CE	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170, 171	Yes	Shallow, sandy soils	No	High	Yes	N/A
Winged Peppercress	*Lepidium monoplocoides*	E	E	☒ BAM-C ☐ Previous survey ☐ Current survey	170	No	N/A	No	High	Yes	N/A
Button Immortelle	*Leptorhynchos waitzia*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170	Yes	N/A	No	High	Yes	N/A
Thyme Rice-Flower	*Pimelea serpyllifolia* subsp. *serpyllifolia*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170	Yes	Within 50 km of the Murray River	No	High	Yes	N/A
Greenhood Orchid	*Pterostylis cobarensis*	V	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170, 171	No	N/A	No	Moderate	Yes	N/A
Bitter Quandong	*Santalum murrayanum*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170, 171	No	Sandy loam or loamy sand	No	Moderate	Yes	N/A

Common Name	Scientific Name	Listing Status		Sources	Associated PCTs	SAII	Habitat Constraints / Geographic Limitations	Vagrant?	Sensitivity to Gain Class	Species Retained for Further Assessment?	Justification if Excluded from Further Assessment
		BC Act	EPBC Act								
Bladder Senna	*Swainsona colutoides*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170, 171	No	n/a	No	High	Yes	N/A
Yellow Swainson-pea	*Swainsona pyrophila*	V	V	☒ BAM-C ☐ Previous survey ☐ Current survey	170, 171	No	N/A	No	High	Yes	N/A
Fauna											
Australian Bustard	*Ardeotis australis*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58	No	N/A	No	High	Yes	N/A
Bush Stone-curlew	*Burhinus grallarius*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58	No	Fallen/standing dead timber including logs	No	High	Yes	N/A
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170, 171	No	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	No	High	Yes	N/A
Black-breasted Buzzard	*Hamirostra melanosternon*	V	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170, 171	No	Land within 40 m of riparian woodland on inland watercourses/ waterholes containing dead or dying eucalypts	No	Moderate	Yes	N/A
Little Eagle	*Hieraaetus morphnoides*	V	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170, 171	No	Nest trees – live (occasionally dead) large old trees within vegetation)	No	Moderate	Yes	N/A
Southern Hairy-nosed Wombat	*Lasiorhinus latifrons*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170, 171	No	N/A	No	High	Yes	N/A
Pink cockatoo	*Lophochroa leadbeateri*	V	E	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170, 171	No	Living or dead tree with hollows greater than 10 cm diameter	No	High	Yes	N/A
Square-tailed Kite	*Lophoictinia isura*	V	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58	No	SC – Nest trees	No	Moderate	Yes	N/A
Crowned Gecko	*Lucasium stenodactylum*	V	-	☒ BAM-C ☐ Previous survey ☐ Current survey	170	No	N/A	No	High	Yes	N/A
Black-eared Miner	*Manorina melanotis*	CE	E	☒ BAM-C ☐ Previous survey ☐ Current survey	170, 171	Yes	N/A	No	High	Yes	N/A

Common Name	Scientific Name	Listing Status		Sources	Associated PCTs	SAII	Habitat Constraints / Geographic Limitations	Vagrant?	Sensitivity to Gain Class	Species Retained for Further Assessment?	Justification if Excluded from Further Assessment
		BC Act	EPBC Act								
Painted Burrowing Frog	*Neobatrachus pictus*	E	-	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170, 171	No	N/A	No	Moderate	Yes	N/A
Red-lored Whistler	*Pachycephala rufogularis*	CE	V	☒ BAM-C ☐ Previous survey ☐ Current survey	171	Yes	N/A	No	Moderate	Yes	N/A
Regent Parrot (eastern subspecies)	*Polytelis anthopeplus monarchoides*	E	V	☒ BAM-C ☐ Previous survey ☐ Current survey	58, 170	No	Living or dead E. camaldulensis with hollows greater than 5 cm diameter, greater than 5 m above the ground OR trees with DBH of greater than 40 cm, within 1 km of watercourses or billabongs. Trees can be isolated but within 20 km of mallee. Within 30 km of the Murray and Murrumbidgee Rivers	No	High	Yes	N/A
Desert Mouse	*Pseudomys desertor*	CE	-	☒ BAM-C ☐ Previous survey ☐ Current survey	171	Yes	N/A	No	High	Yes	N/A

Key: CE = Critically Endangered, E = Endangered, V = Vulnerable. Assessment of Habitat Suitability.

Table 5.3 Assessment of Habitat Suitability Within the Development Footprint and Assessment Approach of Retained Candidate Species

Common Name	Associated PCTs	Zone								Justification	Species Retained for Further Assessment?	Assessment	Development Footprint Area (ha)
		1	2	*3*	4	5	6	7	8				
Harrow Wattle	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Purple-wood Wattle	58	Y	Y	Y	N	N	N	N	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	30.37
A saltbush	170	N	N	N	Y	Y	Y	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	5.02
A spear-grass	170	N	N	N	Y	Y	Y	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	5.02
A burr-daisy	170	N	N	N	Y	Y	Y	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	5.02

Common Name	Associated PCTs	Zone								Justification	Species Retained for Further Assessment?	Assessment	Development Footprint Area (ha)
		1	2	3	4	5	6	7	8				
Bluebush Daisy	58, 170, 171	Y	Y	Y	Y	Y	Y	Y	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	54.34
Desert Hopbush	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Pink Velvet Bush	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Winged Peppercress	170	N	N	N	Y	Y	Y	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	5.02
Button Immortelle	170	N	N	N	Y	Y	Y	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	5.02
Thyme Rice-Flower	170	N	N	N	Y	Y	Y	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	5.02
Greenhood Orchid	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Bitter Quandong	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Bladder Senna	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Yellow Swainson-pea	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Fauna													
Australian Bustard	58	Y	Y	Y	N	N	N	N	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	30.37
Bush Stone-curlew	58	Y	Y	Y	N	N	N	N	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	30.37
White-bellied Sea-Eagle	58, 170, 171	Y	N	Y	Y	N	N	Y	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes – only within condition zones that contain trees for breeding.	Targeted Surveys	49.57
Black-breasted Buzzard	58, 170, 171	Y	N	Y	Y	N	N	Y	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes – only within condition zones that contain trees for breeding.	Targeted Surveys	49.57
Little Eagle	58, 170, 171	Y	N	Y	Y	N	N	Y	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes – only within condition zones that contain trees for breeding.	Targeted Surveys	49.57

Common Name	Associated PCTs	Zone								Justification	Species Retained for Further Assessment?	Assessment	Development Footprint Area (ha)
		1	2	3	4	5	6	7	8				
Southern Hairy-nosed Wombat	58, 170, 171	Y	Y	Y	Y	Y	Y	Y	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	54.34
Pink Cockatoo	58, 170, 171	Y	N	Y	Y	N	N	Y	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes – only within condition zones that contain trees for breeding.	Targeted Surveys	49.57
Square-tailed Kite	58	Y	N	Y	N	N	N	N	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes – only within condition zones that contain trees for breeding.	Targeted Surveys	26.98
Crowned Gecko	170	N	N	N	Y	Y	Y	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	5.02
Black-eared Miner	170, 171	N	N	N	Y	Y	Y	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	23.98
Painted Burrowing Frog	58, 170, 171	Y	Y	Y	Y	Y	Y	Y	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Expert Report	54.34
Red-lored Whistler	171	N	N	N	N	N	N	N	Y	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Targeted Surveys	18.95
Regent Parrot (eastern subspecies)	58, 170	Y	N	Y	Y	N	N	N	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes – only within condition zones that contain trees for breeding.	Targeted Surveys	30.79
Desert Mouse	171	N	N	N	N	N	N	Y	N	Included. Suitable habitat is present within associated PCTs in the Development Footprint.	Yes	Expert Report	18.95

5.2 Threatened Species Survey Methodology

5.2.1 Review of Existing Information

Background research was undertaken in accordance with the BAM to identify known and/or likely values of the Development Footprint. The review included the following databases and information sources:

- Biodiversity Assessment Method Calculator (BAM-C) – case number 00049809/BAAS19021/24/00049811.
- BioNet – the website for the Atlas of NSW Wildlife and Threatened Biodiversity Data Collection (TBDC) (NSW DCCEEW2024a) – initial search 23/09/2022 and subsequent search 12/08/2024.
- BioNet Vegetation Classification (NSW DCCEEW 2024a) – initial search 23/09/2022 and subsequent search 12/08/2024.
- Commonwealth DCCEEW Protected Matters Search Tool – initial search 23/09/2022 and subsequent search 12/08/2024.
- Important Area Maps (NSW DCCEEW 2024b) – reviewed 12/08/2024.
- Surveying threatened plants and habitats NSW survey guide biodiversity assessment method (DPIE, 2020c).
- Flora species with specific survey requirements (XLS) (NSW DCCEEW, 2024).
- Threatened reptiles biodiversity assessment method survey guide (DPE, 2022).
- Species credit threatened bats and their habitats NSW guide for biodiversity assessment method (DPIE, 2021).
- NSW survey guide for threatened frogs (DPIE, 2020c).
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (2004 Working Draft) (DEC, 2004).
- Threatened species survey and assessment guidelines: field survey methods for fauna. Amphibians (2009) (DECC, 2009).
- Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act (DEWHA, 2010a).
- Survey guidelines for Australia's threatened birds (DEWHA, 2010b).
- Survey Guidelines for Australia's threatened frogs (DEWHA, 2011).
- Survey guidelines for Australia’s threatened mammals (DSEWPaC, 2011a).
- Survey guidelines for Australia’s threatened reptiles (DSEWPaC, 2011b).

5.2.2 General Weather Conditions During the Surveys

The Development Footprint is located within an area classified as Climate Zone 4, which is characterised by hot dry summers, and cool winters (BOM, 2024b). Winter rainfall is considered to be reliable, while summer rainfall can be unreliable (BOM, 2019). Summer rainfall events tend to unreliable from year to year (BOM, 2019). The landscape around Mildura experiences frosts through winter and well into September; risk of frosts has typically ended by the start of October (BOM, 2019).

The closest weather station which collects both rainfall and temperature data is Mildura Airport (station 076031) which occurs approximately 17 km south west of the Development Footprint. The mean rainfall, minimum and maximum temperatures for all years is collated in **Table 5.4**. The climate data for the survey period is summarised in **Figure 5.1**. Daily weather for the survey period is provided in **Appendix G**.

Table 5.4 Maximum and Minimum Monthly Temperature Data for All Years and Average Monthly Rainfall Data for All Years – BOM Station 076031

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Maximum temperature (°C)	37.8	35.6	32.5	28.1	22.3	19.7	18.0	21.4	25.5	30.8	32.5	34.7	25.8
Minimum temperature (°C)	7.6	5.2	3.8	0.6	-2.1	-3.7	-4.0	-3.1	-1.1	1.1	3.3	5.3	-4.0
Mean Rainfall (mm)	23.2	20.5	18.9	19.6	25.0	22.5	24.5	25.3	26.5	29.3	26.5	24.3	285.5

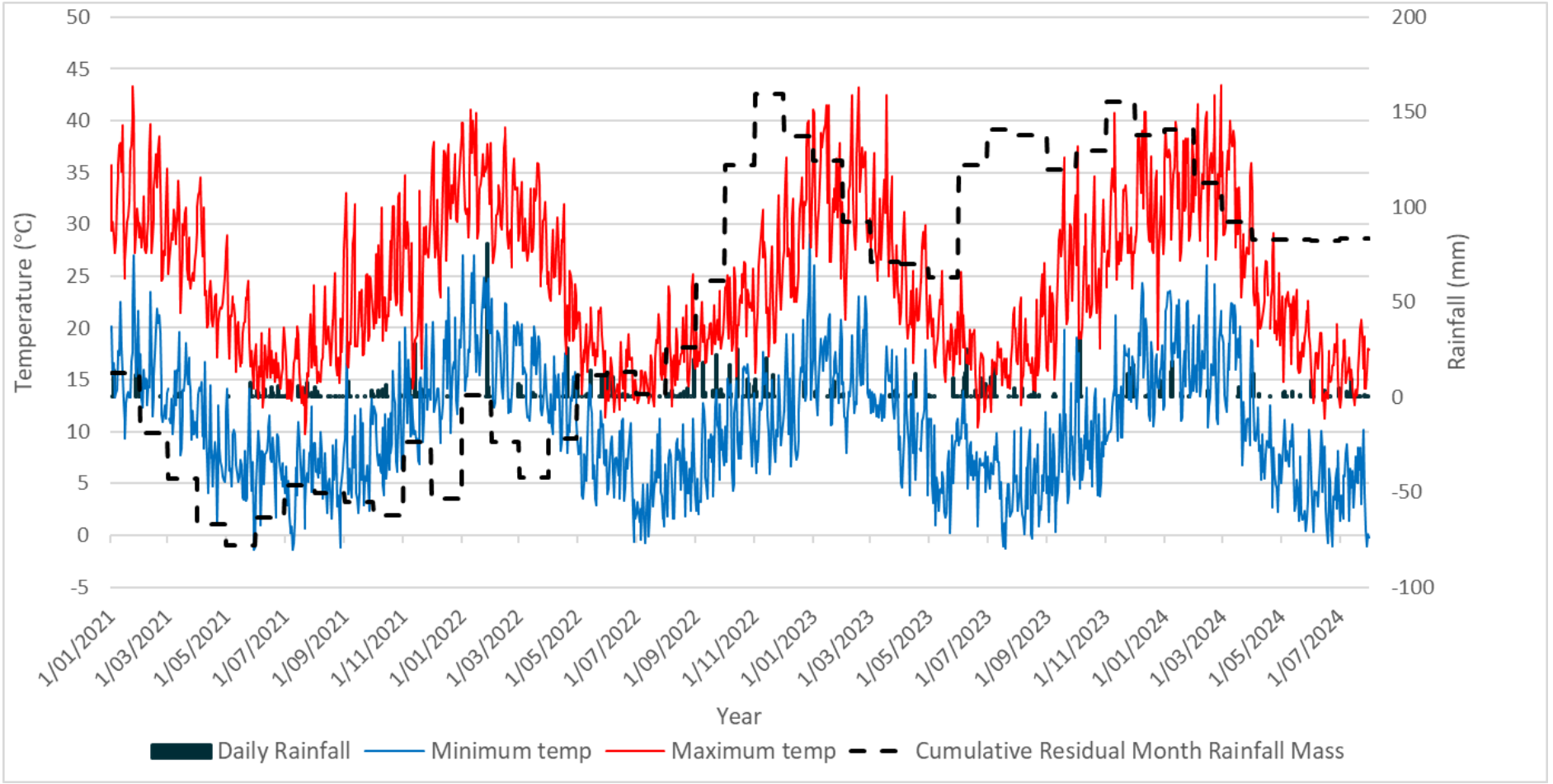


Figure 5.1 Weather for the Survey Period

Preceding the survey period, from 2018 to mid-2021, the Development Footprint and much of NSW was in a period of extended drought. Spring of 2021 marked the end of the dry period, and 2022 experienced almost double the average rainfall. The Development Footprint spans three parishes, being, Cliffs Parish, Brewang Parish and Winnegow Parish. The Combined Drought Indicator (CDI) for these three parishes, indicates that the area has experienced "Non-Drought" through 2022, 2023, and the first half of 2024 (DPI, 2024b) (See **Figure 5.2a–Figure 5.2c**).

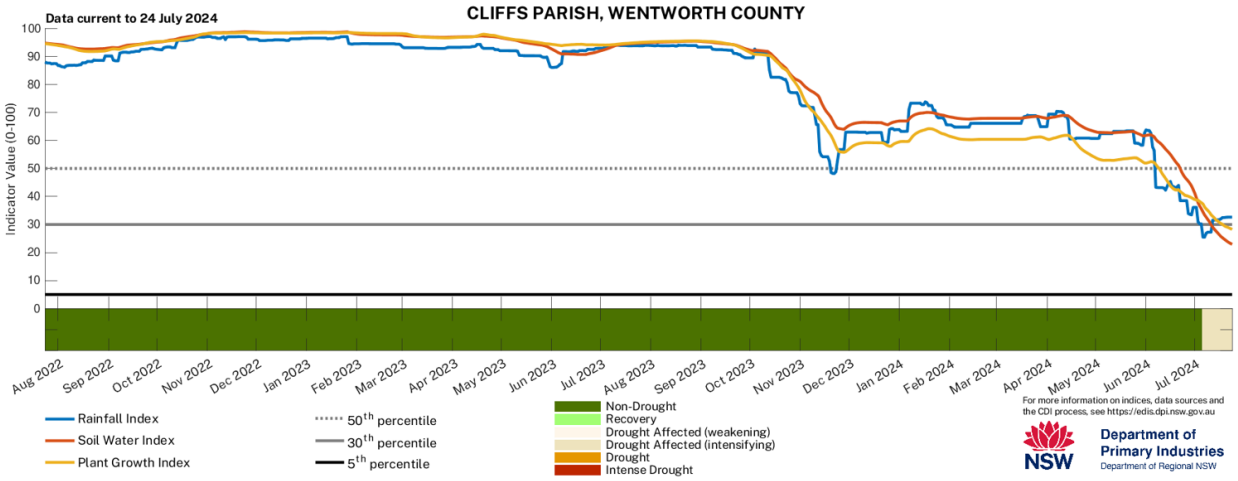


Figure 5.2a Combined Drought Indicator for Cliffs Parish between August 2022 and July 2024

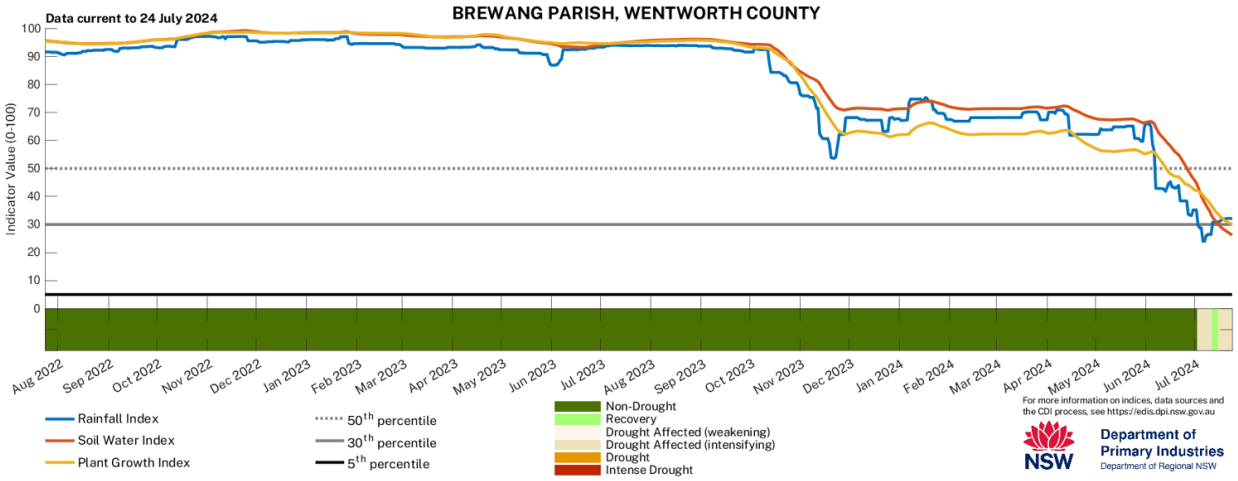


Figure 5.2b Combined Drought Indicator for Brewang Parish between August 2022 and July 2024

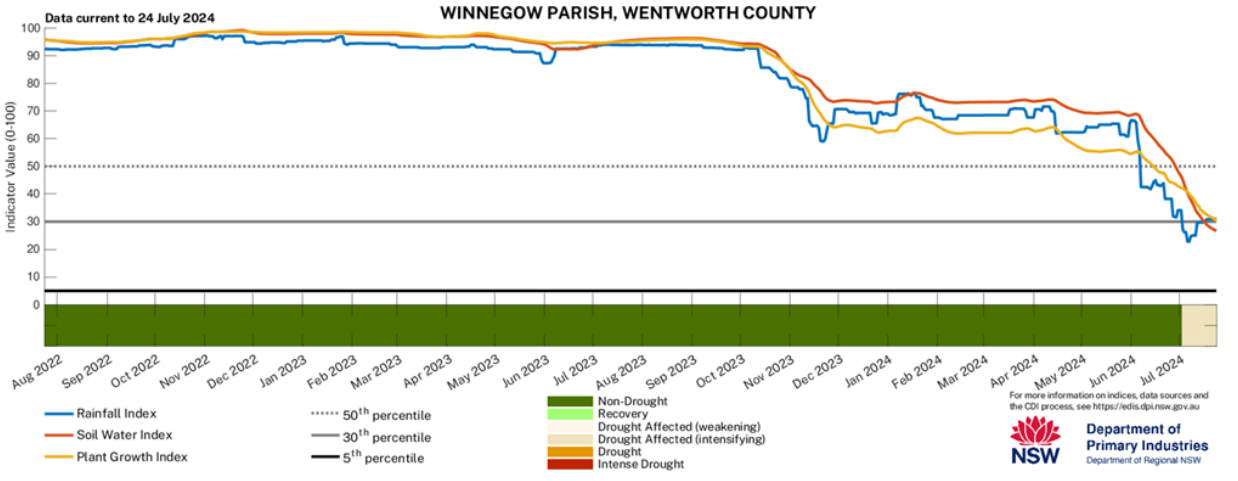


Figure 5.2c Combined Drought Indicator for Winnegow Parish between August 2022 and July 2024

Weather conditions during flora and fauna surveys were generally appropriate for detection of a wide variety of flora and fauna. Weather during the periods of survey were generally warm and dry, with occasional thunderstorms and cool nights.

Conditions during the flora surveys were generally favourable for plant growth and production of features required for identification of most species. The area had experienced sufficient rainfall, and the Plant Growth Index in the CDI for Cliffs Parish, Brewang Parish and Winnegow Parish had not dropped below the 50th percentile in since April 2022 (except for a brief period in November 2023 at the Cliffs Parish) (See **Figure 5.2a**–**Figure 5.2c**).

5.2.3 Habitat Assessment

A desktop review was carried out to identify areas of potential habitat constraints in the landscape, and surrounding the Biodiversity Study Area, relevant to the candidate threatened flora and fauna species which may influence habitat polygons for threatened flora and fauna. These habitat constraints include dams, rocky areas, and hollow bearing trees. Fauna habitat assessments were undertaken within the Development Footprint and adjoining land on a quarterly basis from October 2022 to July 2024.

Fauna habitat assessments included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, bush rock, and wetland areas such as creeks and soaks, and the presence of mistletoe and flowering trees for nectivorous bird species. Hollows were used as a general indication of habitat quality for arboreal fauna and for hollow dependent birds and bats. Fauna habitat features identified during the surveys are displayed on **Figure 5.3**.

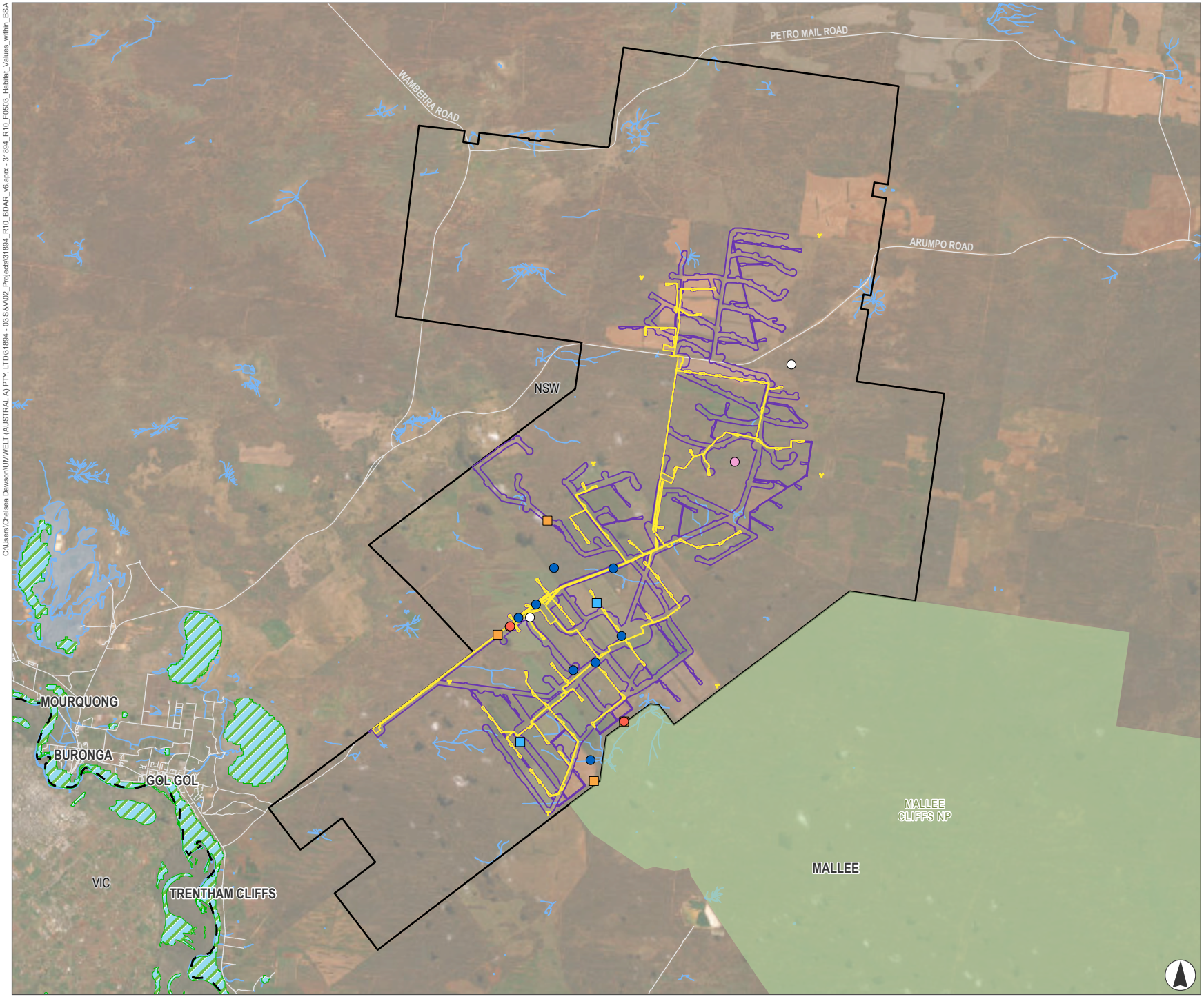


FIGURE 5.3

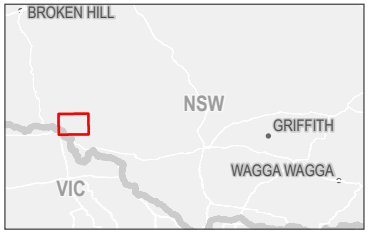
Habitat Values present within the Biodiversity Study Area and Project Boundary

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- Wetland
- NPWS Estates
- State Border

Habitat Features

- Burrow - inactive
- Hollow Bearing Tree
- Stick Nest (likely raptor) - unoccupied
- Stick Nest (likely raven) - unoccupied
- Wedge-tailed Eagle Stick Nest - active until spring 2024 (tree fallen over)
- Stick Nest - unoccupied



0 5 10

Kilometres

Scale 1:225,000 at A4
GDA2020 MGA Zone 54

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

Flora habitat assessments include consideration of vegetation structure and floristics, edaphic conditions, fire history, and the presence of microhabitats such as creeklines, soaks, rock outcrops, and soil types. The habitat constraints described within the TBCD present within the Biodiversity Study Area are described in **Table 5.5** below.

Table 5.5 Habitat Constraints as Listed within the TBDC Present within the Biodiversity Study Area

Habitat Constraint	Details
Burrows	A number of rabbit warrens, often of extensive size, were observed within red and red-brown loams of the Biodiversity Study Area. No other burrows were seen onsite.
Caves	No caves present within the Biodiversity Study Area or wider locality.
Claypans	No claypans present within the Biodiversity Study Area.
Cliffs	No cliffs present within the Biodiversity Study Area or wider locality
Dunes	Only minor areas of low sand rises were found within the Biodiversity Study Area, generally associated with PCT 171.
Epiphytes	Mistletoes are uncommon and were recorded in PCT 58 and CPT 170.
Escarpments	No escarpments present within the Biodiversity Study Area or wider locality
Fallen/standing dead timber	Fallen / standing timber varies greatly over the Biodiversity Study Area. Fallen timber is mostly present at low density across non-woody vegetation types and increases with canopy density.
Hollow bearing trees	Hollow bearing trees are rare over the Biodiversity Study Area and generally consist of tree with tiny and small sized hollows. Two hollow bearing trees with medium to large hollows were recorded within the Biodiversity Study Area. An additional two (2) hollow bearing trees with medium to large size hollows were incidentally recorded 200 to 400 m outside the Biodiversity Study Area.
Intertidal zones	The Biodiversity Study Area is not located near the coast; therefore, no intertidal zones are present within the Biodiversity Study Area or within the wider locality.
Rocky areas	No rocky areas, including surface rock, were recorded within the Biodiversity Study Area.
Semi-permanent / ephemeral wet areas	There are no wetland communities present within the Biodiversity Study Area.
Swamps	
Termite mounds	No termite mounds were recorded within the Biodiversity Study Area.
Waterbodies	There are three farm dams within the Biodiversity Study Area however these are not in the Development Footprint. The size of these dams range from 0.2 ha to 1.8 ha and they are located between 210 m to 890 m away from the Development Footprint.
Nest trees	Active raptor nests have been recorded in the broader Project Area; however only unoccupied potential raptor nest trees have been recorded within the Biodiversity Assessment Area. Identified nest trees were visited over two breeding seasons to detect evidence of use. It is noted that an active wedgetail eagle nest within the Project Area was identified in 2022, however August 2024 surveys confirmed that the tree with this nest has fallen over and the nest in no longer being actively used.

5.2.3.1 Woodland / Mallee Habitat

Within the Development Footprint, two types of woodland occur: eucalypt mallee woodland and Black Oak woodland. Woodland habitat occurs across the following vegetation zones:

- Zone 1: PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion: Moderate-Good.
- Zone 3: PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion: Weedy-Understorey.
- Zone 4: PCT 170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones: Moderate-Good.
- Zone 7 PCT 170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – Weedy Understorey.
- Zone 8: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion: Moderate-Good.

Woodland habitat is associated with most of the threatened bird species known or predicted to occur onsite. However, the fragmented nature of the woodland habitat occurring within the Biodiversity Study Area means that it would be unlikely to support a number of those predicted species which require a well-connected remnant woodland. Species which are known or are likely to occur include species that occupy large ranges, are highly nomadic, or small sedentary woodland birds, such as the little eagle. A representative photograph of this habitat type is present in **Photo 5.1**.

The eucalypt woodland habitat on site is predominantly open, with some scattered patches of dense shrub layer occurring throughout. These habitats feature a low density of hollows and logs of varying diameters, providing a small amount of potential breeding or refuge habitat for hollow and log dependant threatened species.

Photo 5.1 Typical Mallee Woodland Habitat

5.2.3.2 Grassland / Low Shrubland Habitat

Grassland/low shrubland habitat covers a portion of the Development Footprint and provides habitat for both threatened flora and fauna which are known or predicted to occur on site. Grassland/low shrubland habitat occurs in the following vegetation zones:

- Zone 2: PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion: Derived-Weedy.
- Zone 5: PCT 170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones: Derived-Native.
- Zone 6: PCT 170 – Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones: Derived-Weedy.

Threatened birds predicted to occur onsite, use the grasslands/low shrubland predominantly as foraging grounds for seeds, fruits or invertebrates, or hunting grounds for mammals, smaller birds such as quails, reptiles or amphibians. A representative photograph of this habitat type is shown in **Photo 5.2**.

The grasslands on site are generally devoid of logs and have no areas of rocky outcrops.

Photo 5.2 Typical Grassland Habitat

5.2.4 Targeted Flora Surveys

Searches for threatened flora species were completed with reference to the NSW Survey Guide, 'Surveying threatened plants and their habitats' (DPIE 2020c) and any relevant species requirements listed in the Threatened Biodiversity Data Collection (NSW DCCEEW 2024a).

Threatened flora surveys were carried out within the dedicated areas of suitable habitat within the Biodiversity Study Area. The size of the threatened flora survey area totalled approximately 498 ha within the Biodiversity Study Area. Each vegetation zone within the threatened flora survey area forms contiguous patches within the broader Biodiversity Study Area that are greater than 50 ha and as such the two-phase grid-based systematic survey approach was used. Through the design and refinement of the Development Footprint, the total area of suitable habitat was reduced to approximately 54.34 ha across all PCTs. Overall, the survey effort for threatened flora species exceeds the minimum required for the Development Footprint alone.

Candidate threatened flora species and field survey methods are detailed in **Table 5.6**. The locations of surveys completed are shown as an overview in **Figure 5.4** and provided in further detail as figure sets in **Appendix A**.

Table 5.6 Candidate Threatened Flora Species Targeted and Field Survey Methods Used

Common Name	Scientific Name	Species Survey Period	Survey Dates	Survey Method	Survey Effort	Plant Community Type Associations / Areas Surveyed			Development Footprint Area (ha)	Biodiversity Study Area (ha) (portion subjected to detailed threatened species surveys)
						58	170	171		
Harrow Wattle	*Acacia acanthoclada*	Aug – Nov	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 9 days of survey – 2 ecologists.	^	x	x	23.98	195.55
Purple-wood Wattle	*Acacia carneorum*	Year round	October 2022 and February 2023	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 17 days of survey – 2 ecologists.	x	^	^	30.37	302.68
A saltbush	*Atriplex infrequens*	Nov – Feb	February 2023	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 8 days of survey – 2 ecologists.	^	x	^	5.02	115.19
A spear-grass	*Austrostipa metatoris*	Oct – Nov	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 9 days of survey – 2 ecologists.	^	x	^	5.02	115.19

Common Name	Scientific Name	Species Survey Period	Survey Dates	Survey Method	Survey Effort	Plant Community Type Associations / Areas Surveyed			Development Footprint Area (ha)	Biodiversity Study Area (ha) (portion subjected to detailed threatened species surveys)
						58	170	171		
A burr-daisy	*Calotis moorei*	Sep – Nov	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 9 days of survey – 2 ecologists.	^	x	^	5.02	115.19
Bluebush Daisy	*Cratystylis conocephala*	Year round	October 2022 and February 2023	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 8 days of survey – 2 ecologists.	x	x	x	54.35	498.23
Desert Hopbush	*Dodonaea stenozyga*	Year round	October 2022 and February 2023	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 17 days of survey – 2 ecologists.	^	x	x	23.98	195.55
Pink Velvet Bush	*Lasiopetalum behrii*	Year round	October 2022 and February 2023	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 17 days of survey – 2 ecologists.	x	^	^	30.37	302.68

Common Name	Scientific Name	Species Survey Period	Survey Dates	Survey Method	Survey Effort	Plant Community Type Associations / Areas Surveyed			Development Footprint Area (ha)	Biodiversity Study Area (ha) (portion subjected to detailed threatened species surveys)
						58	170	171		
Winged Peppercress	*Lepidium monoplocoides*	Sep – Dec	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 9 days of survey – 2 ecologists.	^	x	^	5.02	115.19
Button Immortelle	*Leptorhynchos waitzia*	Sep – Nov	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 9 days of survey – 2 ecologists.	^	x	^	5.02	115.19
Thyme Rice-Flower	*Pimelea serpyllifolia* subsp. *serpyllifolia*	Jul – Nov	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 9 days of survey – 2 ecologists.	^	x	^	5.02	115.19
Greenhood Orchid	*Pterostylis cobarensis*	Oct	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles. 10 m	Total of 9 days of survey – 2 ecologists.	x	^	^	30.37	302.68

Common Name	Scientific Name	Species Survey Period	Survey Dates	Survey Method	Survey Effort	Plant Community Type Associations / Areas Surveyed			Development Footprint Area (ha)	Biodiversity Study Area (ha) (portion subjected to detailed threatened species surveys)
						58	170	171		
				transects across PCT 171.						
Bitter Quandong	*Santalum murrayanum*	Year round	October 2022 and February 2023	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 8 days of survey – 2 ecologists.	^	x	x	23.98	195.55
Bladder Senna	*Swainsona colutoides*	Year round	October 2022 and February 2023	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 8 days of survey – 2 ecologists.	^	x	x	23.98	195.55
Yellow Swainson-pea	*Swainsona pyrophila*	Sep – Nov	October 2022	Opportunistic surveys during vegetation mapping. Large area survey method used. Parallel traverse within 40 m survey circles.	Total of 9 days of survey – 2 ecologists.	^	x	x	23.98	195.55

KEYS TO SYMBOLS

x = Associated PCT, targeted species survey completed in PCT

^ = Non-associated PCT, opportunistic targeted species survey completed in PCT

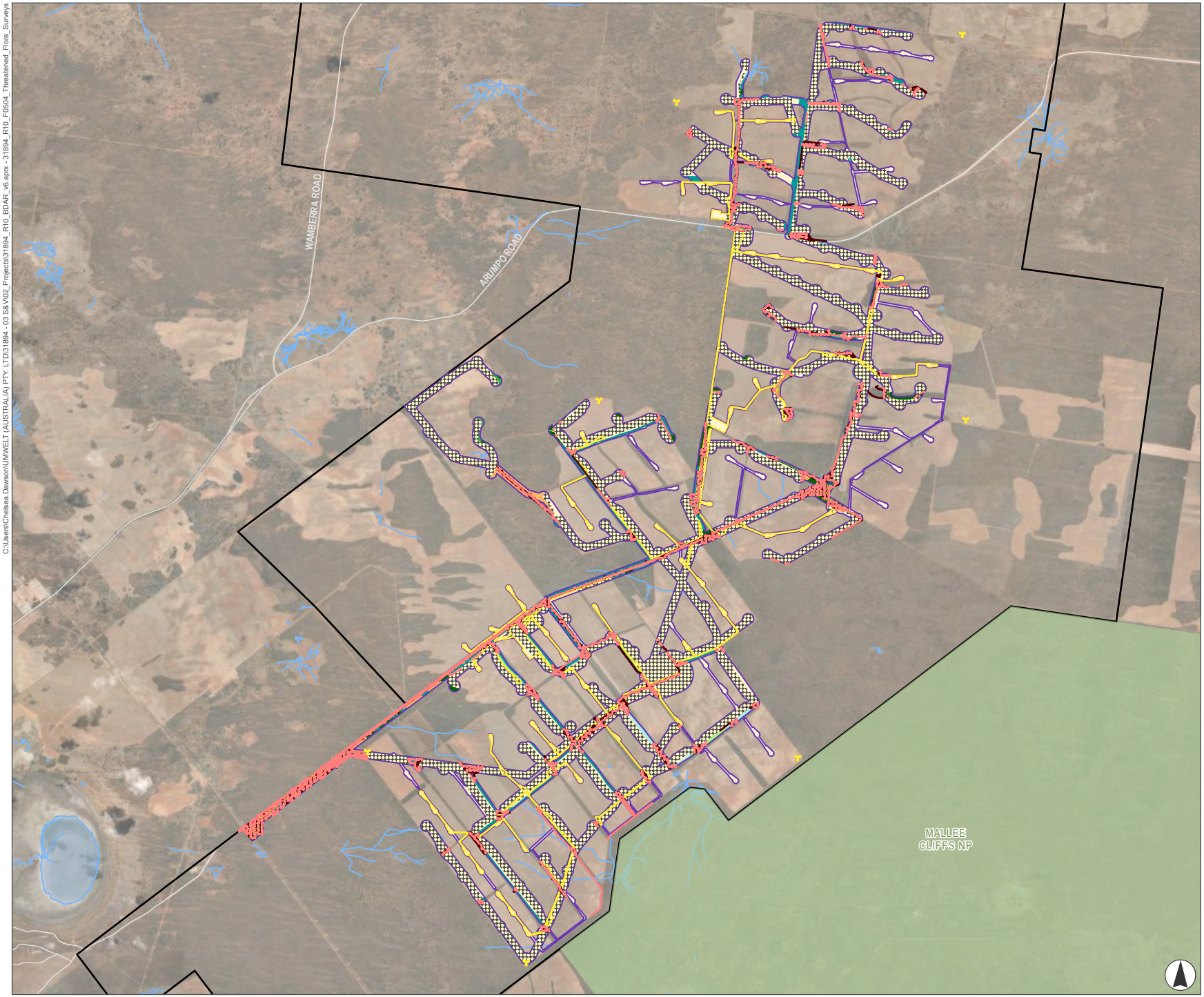


FIGURE 5.4

Threatened Flora Surveys

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates
- Survey Grid
- Threatened Flora Transect Spring (October 2022)
- Threatened Flora Transect Summer (February 2023)

Plant Community Type

- PCT 58 (Moderate-Good)
- PCT 58 (Derived-Weedy)
- PCT 58 (Weedy understory)
- PCT 170 (Moderate-Good)
- PCT 170 (Derived-Native)
- PCT 170 (Derived-Weedy)
- PCT 170 (Weedy Understory)
- PCT 171 (Moderate-Good)
- Dam
- Category 1 – Exempt Land/Cleared/ Structure/ Tracks/ Road

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

5.2.5 Targeted Fauna Surveys

Targeted surveys were carried out for all 12 candidate fauna species as outlined in **Table 5.2** September 2022 and August 2024. An expert report has been prepared for two further candidate threatened fauna species. A summary of the targeted surveys for candidate threatened fauna species completed within the threatened species survey component of the Biodiversity Study Area is provided in **Table 5.7.** The following methods were utilised for targeted fauna surveys:

- Nest searches for candidate raptor species
- Searches and assessment for pink cockatoo and regent parrot breeding trees
- Diurnal bird surveys – general woodland bird surveys
- Bird and bat utilisation surveys (BBUS)
- Reptile habitat searches and walked spotlighting transects
- Targeted call playback for bush-stone curlew and walked spotlighting transects
- Remote camera surveys
- Opportunistic observations.

The details of targeted fauna surveys completed are described in the following sections. The locations of surveys completed are shown as an overview in **Figure 5.5** and provided in further detail as figure sets in **Appendix A.** Additional detail on the survey effort completed for pink cockatoo, regent parrot and candidate raptor species are provided in **Appendix J**.

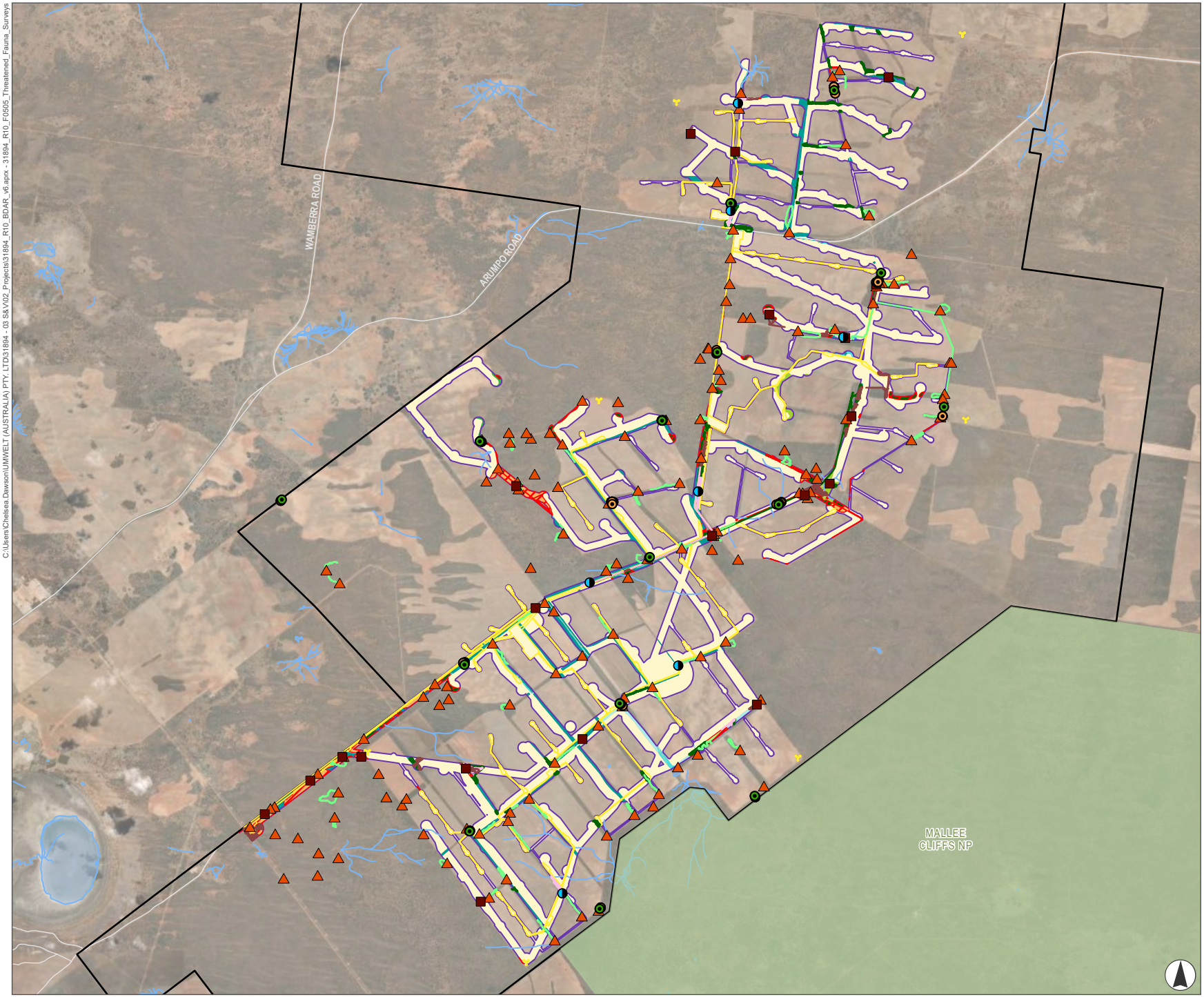


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FIGURE 5.5

Threatened Fauna Surveys

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates
- Call Playback Survey Point Location
- BBUS Vantage Point
- Anabat Location
- Remote Camera
- Diurnal Bird Survey
- Diurnal Bird Survey Transects
- Diurnal Fauna Surveys (March 2023)
- Nocturnal Fauna Survey (March 2023)
- Nocturnal Reptile Surveys (March 2023)

Threatened Ecological Communities - EPBC Act

- Mallee Bird Community of the Murray Darling Depression Bioregion EEC

Plant Community Type

- PCT 58 (Moderate-Good)
- PCT 58 (Derived-Weedy)
- PCT 58 (Weedy understory)
- PCT 170 (Moderate-Good)
- PCT 170 (Derived-Native)
- PCT 170 (Derived-Weedy)
- PCT 170 (Weedy Understory)
- PCT 171 (Moderate-Good)
- Dam
- Category 1 – Exempt Land/Cleared/ Structure/ Tracks/ Road

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

Table 5.7 Candidate Threatened Fauna Species Targeted and Field Survey Methods Used

Common Name	Scientific Name	Seasonal Requirement	Survey Dates	Associated PCTs	Survey Method Utilised
Australian Bustard	*Ardeotis australis*	Year round	September/ October/ November 2022; February/ March/ April/ May/ July/ October 2023; February/ April/ May 2024	58	Opportunistic Diurnal bird surveys Remote camera surveys
Bush Stone-curlew	*Burhinus grallarius*	Year round	October 2022, February/ March 2024	58	Nocturnal call play-back and spotlight surveys Dry habitat search – flushing via walking through suitable habitat (concurrently with flora transects)
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Sep – Nov	September/ October/ November 2022; February/ March/ April/ May/ July/ October 2023; February/ April/ May 2024	58, 170, 171	Opportunistic large stick nest searches BBUS Diurnal bird surveys
Black-breasted Buzzard	*Hamirostra melanosternon*	Sep – Nov	September/ October/ November 2022; February/ March/ April/ May/ July/ October 2023; February/ April/ May 2024	58, 170, 171	Opportunistic large stick nest searches BBUS Diurnal bird surveys
Little Eagle	*Hieraaetus morphnoides*	Aug – Oct	September/ October/ November 2022; February/ March/ April/ May/ July/ October 2023; February/ April/ May 2024	58, 170, 171	Opportunistic large stick nest searches BBUS Diurnal bird surveys
Southern hairy-nosed wombat	*Lasiorhinus latifrons*	Year round	September/ October 2022; February/ March 2023	58, 170, 171	Remote cameras Spotlighting Opportunistic

Common Name	Scientific Name	Seasonal Requirement	Survey Dates	Associated PCTs	Survey Method Utilised
Pink Cockatoo	*Lophochroa leadbeateri*	Sep – Dec	September/ October/ November 2022; February/ March/ April/ May/ July/ October 2023; February/ April/ May 2024	58, 170, 171	Opportunistic habitat searches BBUS Diurnal bird surveys
Square-tailed Kite	*Lophoictinia isura*	Sep – Jan	September/ October/ November 2022; February/ March/ April/ May/ July/ October 2023; February/ April/ May 2024	58	Opportunistic large stick nest searches BBUS Diurnal bird surveys
Crowned Gecko	*Lucasium stenodactylum*	Oct – Mar	March 2023	170	Spotlighting over 7 nights
Black-eared Miner	*Manorina melanotis*	Aug – Jan	November 2022; February/ March/ April/ May/ July/ October 2023; February/May 2024	170, 171	BBUS Diurnal bird survey
Painted Burrowing Frog	*Neobatrachus pictus*	Year round	October 2023	58, 170, 171	N/A – expert report Habitat assessment and nocturnal surveys completed by GHD to support the expert report
Red-lored Whistler	*Pachycephala rufogularis*	Year round	November 2022; February/ March/ April/ May/ July/ October 2023; February/ May 2024	171	BBUS Diurnal bird survey
Regent Parrot (eastern subspecies)	*Polytelis anthopeplus monarchoides*	Aug – Nov	September/ October/ November 2022; February/ March/ April/ May/ July/ October 2023; February/ April/ May 2024	58, 170	BBUS Diurnal bird survey
Desert Mouse	*Pseudomys desertor*	Mar – Dec	N/A	171	N/A – expert report

5.2.5.1 Fauna Habitat Searches for Candidate Species

The following methods were used for fauna habitat searches.

5.2.5.2 Nest Site Searches for Candidate Raptor Species

Candidate Raptor Species:

- Black-breasted Buzzard (*Hamirostra melanosternon*)
- Little eagle (*Hieraaetus morphnoides*)
- Square-tailed kite (*Lophoictinia isura*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*).

Targeted and opportunistic bird of prey nest searches were undertaken across the Biodiversity Study Area. Suitable nest trees and stags were inspected for large nests.

Opportunistic searches were undertaken concurrently during all biodiversity survey effort across the Biodiversity Study Area. Where habitat features were identified, GPS locations and relevant ecological data was recorded within digital survey platforms. Ecologists would investigate the stick nest using 10 x 40 magnification binoculars to identify the size of the stick nest, evidence of occupation, and suspected species.

Any stick nests were revisited often during concurrent biodiversity surveys, to investigate for any changes in occupation with the latest re-visit being in August 2024 concurrent with winter BBUS.

Further detail of nest site searches for candidate raptor species is provided in **Appendix J**.

5.2.5.3 Searches for Pink Cockatoo and Regent Parrot Breeding Trees

Candidate species:

- Pink cockatoo (*Lophochroa leadbeateri*)
- Regent parrot (eastern subspecies) (*Polytelis anthopeplus monarchoides*).

Targeted and opportunistic searches for pink cockatoo and regent parrot breeding sites were undertaken across the Biodiversity Study Area. Opportunistic searches were undertaken concurrently during all biodiversity survey effort across the Biodiversity Study Area. Where suitable habitat was identified, GPS location, tree species, hollow size and location (spout, trunk, branch) were recorded within digital survey platforms.

Any hollows within suitable size for either species were revisited often during concurrent biodiversity surveys, to investigate for any changes in occupation with the latest re-visit being in August 2024 concurrent with winter BBUS.

Further detail of searches for pink cockatoo and regent parrot is provided in **Appendix J**.

5.2.5.4 Searches for Southern Hairy-nosed Wombat Burrows

Consultation with CPHR on 8 March 2023, confirmed that searches for southern hairy-nosed wombat (*Lasiorhinus latifrons*) could be undertaken concurrently during all biodiversity survey effort across the Biodiversity Study Area. Diurnal searches were completed during threatened flora surveys over two seasons as well as subsequent diurnal meanders in areas of the Biodiversity Study Area that were not covered in the threatened flora surveys. Where habitat features were identified, GPS locations and relevant ecological data was recorded within digital survey platforms.

Searches were conducted concurrently during these surveys for Australian bustard (*Ardeotis australis*).

5.2.5.5 Diurnal Bird Surveys

Diurnal bird surveys were conducted across a 20-minute period, the methodology consists of searching woodland habitat across an approximately 2 ha area, meandering slowly and recording all visual and aural observations of birds. Surveys were undertaken by two observers experienced in identifying birds in the region. Given the potential for the presence of the Mallee Bird Community of the Murray Darling Depression Bioregion EEC, focus was made on precise identification of species that are listed within that community according to the approved conservation advice. Flight behaviour of observed birds was not recorded. Temperature, wind speed, cloud cover and precipitation were recorded during each survey.

A total of 152 woodland bird surveys were conducted throughout the Project Area from November 2022–August 2024. Diurnal woodland bird surveys were conducted among higher quality remnant, intact vegetation as well as lower quality strips of intact vegetation that persist as windrows between cropped paddocks. This provides a representative sample of bird assemblages among the various habitat features of the Project Area. Details of the diurnal bird surveys are provided in **Table 5.8**.

Table 5.8 Details of Diurnal Woodland Bird Surveys Completed

Survey Date	Survey Method	Species Targeted	Number of Surveys Completed
November 2022	Minimum 20-minute diurnal bird survey	Complete avifauna census	20
February 2023	Minimum 20-minute diurnal bird survey	Complete avifauna census	5
April/May 2023	Minimum 20-minute diurnal bird survey	Complete avifauna census	34
July 2023	Minimum 20-minute diurnal bird survey	Complete avifauna census	15
October 2023	Minimum 20-minute diurnal bird survey	Complete avifauna census	11
February 2024	Minimum 20-minute diurnal bird survey	Complete avifauna census	24
May 2024	Minimum 20-minute diurnal bird survey	Complete avifauna census	25
August 2024	Minimum 20-minute diurnal bird survey	Complete avifauna census	18
		Total	**152**

5.2.5.6 Bird and Bat Utilisation Survey

Umwelt applied a comprehensive approach to measuring bird and bat utilisation across the Project Area and completed comprehensive BBUS programs over a two-year period from November 2022 to July 2024.

Given Project timing, an eighth season was conducted in August 2024 and the data has since been incorporated into the assessment as part of the Submissions phase of the Project.

5.2.5.7 Vantage Point Surveys

A total of 581 vantage point surveys were conducted across 15 sites in the Project Area from November 2022–August 2024 to assess bird occurrence and flight behaviour across the Project Area. Survey effort is provided in **Table 5.9**. The survey sites were distributed in a manner that maximised spatial coverage of the Project Area. The viewshed across the surrounding landscape, proximity to proposed WTG locations, proximity to different habitat types and access following wet weather were the key factors considered in the survey site selection process. Furthermore, consultation was sought with CPHR on the BBUS methodology used, which was in general agreeance with CPHR with additional input and reference to the suggested BBUS method document provided on 24 July 2023.

Each site was surveyed on six occasions during each seasonal survey round with two surveys falling in each of the following periods (except in cases where wet weather restricted access):

- morning (dawn–9:59 am)
- midday (10.00 am–1:59 pm)
- afternoon (2.00 pm–dusk).

During each survey conducted from November 2022 – July 2023, an observer scanned nearby habitat and the surrounding landscape with the naked eye and binoculars for a period of one hour recording all bird species detected visually or aurally. During each survey conducted from October 2023–August 2024, an observer scanned nearby habitat and the surrounding landscape with the naked eye and binoculars for a period of 30 minutes recording all bird species detected visually or aurally. The following information was recorded for each observation during all surveys from November 2022–August 2024:

- Species and abundance (count of individuals).
- Observation type (visual or aural).
- Distance of the bird from the observer (to the nearest 10 m within 50 m, to the nearest 20 m between 50–100 m, to the nearest 50 m between 100–250 m, to the nearest 100–200 m between 250–1000 m and to the nearest 200–500 m beyond 1000 m).
- Direction of the bird relative to the observer (to the nearest 10° using a compass).
- Estimated flight height when first detected and, where relevant or informative, estimated flight height range (i.e., minimum and maximum height) while the individual was under observation (or perching height). The observer estimates height above ground level (AGL):
    - to the nearest 5 m below 30 m AGL
    - to the nearest 10 m between 30–50 m AGL
    - to the nearest 20 m between 50–100 m AGL

- to the nearest 50 m between 100–300 m AGL
- to the nearest 100 m between 300–500 m AGL
- to the nearest 200 m or 500 m above 500 m AGL.

- Direction of flight (to the nearest 5°).
- Flight pattern (i.e., local movement, directional flight, circling, swooping, varied, other).
- Behaviour (i.e., flight, foraging, perching, mating, aggressive interactions, hollow inspection, nesting, on station).

During each survey temperature, wind speed and direction, cloud cover and precipitation were recorded.

The information detailed above was also recorded for incidental observations of threatened birds in the Project Area.

Following consultation with CPHR on BBUS methods, an additional five vantage points were added to the survey schedule and BBUS commenced at these sites from October 2023. The recommended length of survey also changed at this time from 60 minute to 30 minute surveys which reflected the BBUS guidance document provided by CPHR.

Table 5.9 Number of Surveys Conducted at Each Vantage Point Survey Site

Site	Nov 2022	Feb 2023	Apr / May 2023	July 2023	Oct 2023	Feb 2024	May 2024	August 2024	Total no. of surveys	Total survey hours
Survey Length	1 hr	1 hr	1 hr	1 hr	30 mins	30 mins	30 mins	30 mins		
VP1	6	5	6	5	5	6	6	6	45	33.5
VP2	6	6	6	6	6	6	6	6	48	33
VP3	6	7	6	6	5	6	6	6	48	33.5
VP4	6	7	6	6	6	6	6	6	49	34
VP5	6	6	6	6	6	5	6	6	47	32.5
VP6	6	7	6	6	6	6	6	6	49	34
VP7	6	8	6	7	6	6	6	6	51	36
VP8	6	5	6	6	-	6	6	6	41	29
VP9	6	6	6	6	6	6	6	6	48	33
VP10	6	6	6	6	6	6	6	6	48	33
VP11	-	-	-	-	7	6	6	6	25	9.5
VP12	-	-	-	-	6	6	6	6	24	9
VP13	-	-	-	-	4	6	6	6	22	8
VP14	-	-	-	-	-	6	6	6	18	6
VP15	-	-	-	-	-	6	6	6	18	6
Total no. of surveys	60	63	60	60	69	89	90	90	581	-
Total survey hours	**60**	**63**	**60**	**60**	**34.5**	**44.5**	**45**	**45**	**-**	**412**

Bat Utilisation Surveys

Microbat (*microchiropteran*) echolocation calls were sampled using various bat detector units (Chorus units). Microbat survey sites were established in proximity to vantage point locations. A total of 10 survey points were surveyed during the first year of BBUS. From October 2023, an additional five survey points were added in response to consultation with CPHR regarding BBUS methodology.

Two bat detector units were installed on a met mast at heights of 50 m and 75 m. At height data was collected during every survey period since November 2022, except for October 2023 as a safety exclusion zone was established around the met mast which meant bat detectors could not be deployed during that period.

The bat detectors were set out for a minimum of four nights, during each bird and bat survey event. Bat detectors were placed approximately 2 m above ground level, positioned to face a cleared area or flyway. The bat detectors were set to night mode, where they recorded for a 12-hour period from 6 pm–6 am.

To assess bat utilisation relative to turbine height, bat detectors were fastened and raised to a meteorological mast within the Project Area to survey 'at height' locations. The meteorological masts used a temporary pulley system technique, which is described below:

- Temporary pulley systems were installed at the start of a survey program and dismantled at the end of the survey program.
- This technique uses the outermost anchoring guy wires rather than the meteorological mast itself to deploy the Anabat device at height. A pulley system was placed onto one of the outer anchoring guy wires, attaching a long length of rope to the pulley system.
- An Anabat device was then attached securely to the length of rope before being connected to another pulley system placed on the next outer anchoring guy wire.
- The rope is then walked away from the meteorological mast (diagonally), in turn hoisting the device up to installation height of 30 m AGL.

Table 5.10 below provides a summary of the bat utilisation survey effort. It presents the number of survey nights the bat detectors were deployed as well as the number of nights with calls indicating the number of survey nights with recorded bat calls to be analysed.

Call data analysis was undertaken externally by Echo Ecology and Surveying and Balance! Environmental, using Anabat Insight (Titley Electronics, Version 2.0.8) software.

Table 5.10 Bat Survey Effort

Survey Program and Bat Recorder	Unit	Survey Height	Number of Survey Nights	Number of Nights with Data
Spring – 5-11 November 2022				
BBUS1	Chorus 1	~1.5 m	3	3
BBUS3	Chorus 3	~1.5 m	3	3
BBUS4	Chorus 4	~1.5 m	3	3
Met mast	Chorus 5	50 m	6	6
BBUS2	Chorus 6	~1.5 m	3	3
BBUS5	Chorus 7	~1.5 m	3	2

Survey Program and Bat Recorder	Unit	Survey Height	Number of Survey Nights	Number of Nights with Data
Met mast	Chorus 9	75 m	6	6
BBUS6	Chorus 1	~1.5 m	3	3
BBUS10	Chorus 3	~1.5 m	3	3
BBUS7	Chorus 4	~1.5 m	3	3
BBUS9	Chorus 6	~1.5 m	3	3
BBUS8	Chorus 7	~1.5 m	3	3
		Subtotal	42	41
Summer – 16-20 February 2023				
BBUS1	Chorus 11	~1.5 m	7	7
BBUS2	Chorus 10	~1.5 m	7	7
BBUS3	Chorus 13	~1.5 m	7	7
BBUS4	Chorus 16	~1.5 m	7	7
BBUS5	Chorus 18	~1.5 m	7	7
BBUS6	Chorus 17	~1.5 m	7	Error*
BBUS7	Chorus 19	~1.5 m	7	7
BBUS8	Chorus 12	~1.5 m	7	7
BBUS9	Chorus 14	~1.5 m	7	7
BBUS10	Chorus 8	~1.5 m	7	7
Met mast	Chorus 15	50 m	7	6
Met mast	Chorus 9	75 m	7	7
		Subtotal	84	76
Autumn – 26 April – 2 May 2023				
BBUS1	Chorus 11	~1.5 m	7	7
BBUS2	Chorus 10	~1.5 m	7	7
BBUS3	Chorus 13	~1.5 m	7	7
BBUS4	Chorus 16	~1.5 m	7	7
BBUS5	Chorus 18	~1.5 m	7	7
BBUS6	Chorus 17	~1.5 m	7	Error*
BBUS7	Chorus 19	~1.5 m	7	7
BBUS8	Chorus 12	~1.5 m	7	7
BBUS9	Chorus 14	~1.5 m	7	7
BBUS10	Chorus 8	~1.5 m	7	7
Met mast	Chorus 15	50 m	7	6
Met mast	Chorus 9	75 m	7	7
		Subtotal	84	76
Winter – 3-8 July 2023				
BBUS1	Chorus 2	~1.5 m	6	5

Survey Program and Bat Recorder	Unit	Survey Height	Number of Survey Nights	Number of Nights with Data
BBUS2	Chorus 6	~1.5 m	6	6
BBUS3	Chorus 13	~1.5 m	6	4
BBUS4	Chorus 8	~1.5 m	6	6
BBUS5	Chorus 12	~1.5 m	6	6
BBUS6	Chorus 9	~1.5 m	6	Error*
BBUS7	Chorus 4	~1.5 m	6	5
BBUS8	Chorus 7	~1.5 m	6	4
BBUS9	Chorus 3	~1.5 m	6	4
BBUS10	Chorus 10	~1.5 m	6	6
Met mast	Chorus 11	50 m	6	3
Met mast	Chorus 1	75 m	6	Error*
		Subtotal	72	49
Spring – 16-21 October 2023				
BBUS1	Chorus 6	~1.5 m	5	5
BBUS2	Chorus 9	~1.5 m	5	5
BBUS3	Chorus 8	~1.5 m	5	5
BBUS4	Chorus 5	~1.5 m	5	5
BBUS5	Chorus 1	~1.5 m	5	5
BBUS6	Chorus 3	~1.5 m	5	5
BBUS7	Chorus 13	~1.5 m	5	5
BBUS8	n/a^	n/a^	n/a^	n/a^
BBUS9	Chorus 12	~1.5 m	5	5
BBUS10	Chorus 7	~1.5 m	5	5
BBUS11	Chorus 4	~1.5 m	5	4
BBUS12	Chorus 2	~1.5 m	5	5
BBUS13	Chorus 11	~1.5 m	5	5
		Subtotal	60	59
Summer – 23-28 February 2024				
BBUS1	Chorus 1	~1.5 m	7	7
BBUS2	Chorus 6	~1.5 m	6	6
BBUS3	Chorus 19	~1.5 m	6	6
BBUS4	Chorus 18	~1.5 m	7	7
BBUS5	Chorus 20	~1.5 m	6	6
BBUS6	Chorus 4	~1.5 m	6	6
BBUS7	Chorus 16	~1.5 m	7	7
BBUS8	Chorus 2	~1.5 m	6	6
BBUS9	Chorus 22	~1.5 m	6	Error*

Survey Program and Bat Recorder	Unit	Survey Height	Number of Survey Nights	Number of Nights with Data
BBUS10	Chorus 15	~1.5 m	6	6
BBUS11	Chorus 7	~1.5 m	6	6
BBUS12	Chorus 21	~1.5 m	6	6
BBUS13	Chorus 24	~1.5 m	6	6
BBUS14	Chorus 8	~1.5 m	6	6
BBUS15	Chorus 5	~1.5 m	6	
Met mast	Chorus 17	50 m	6	2
Met mast	Chorus 3	75 m	6	6
		Subtotal	99	89
Autumn – 13-19 May 2024				
BBUS1	Chorus 1	~1.5 m	7	6
BBUS2	Chorus 17	~1.5 m	7	7
BBUS3	Chorus 8	~1.5 m	7	6
BBUS4	Chorus 2	~1.5 m	7	6
BBUS5	Chorus 3	~1.5 m	7	6
BBUS6	Chorus 6	~1.5 m	7	6
BBUS7	Chorus 14	~1.5 m	7	6
BBUS8	Chorus 5	~1.5 m	7	6
BBUS9	Chorus 4	~1.5 m	7	2
BBUS10	Chorus 10	~1.5 m	7	6
BBUS11	Chorus 13	~1.5 m	7	7
BBUS12	Chorus 18	~1.5 m	7	7
BBUS13	Chorus 7	~1.5 m	7	6
BBUS14	Chorus 11	~1.5 m	7	6
BBUS15	Chorus 9	~1.5 m	7	6
Met mast	Chorus 16	50 m	7	4
Met mast	Chorus 15	75 m	7	7
		Subtotal	119	100
Winter – 13-19 August 2024				
BBUS1	Chorus 13	~1.5 m	7	7
BBUS2	Chorus 4	~1.5 m	7	6
BBUS3	Chorus 14	~1.5 m	7	7
BBUS4	Chorus 8	~1.5 m	7	7
BBUS5	Chorus 2	~1.5 m	7	7
BBUS6	Chorus 12	~1.5 m	7	7
BBUS7	Chorus 6	~1.5 m	7	Error*
BBUS8	Chorus 16	~1.5 m	7	7

Survey Program and Bat Recorder	Unit	Survey Height	Number of Survey Nights	Number of Nights with Data
BBUS9	Chorus 29	~1.5 m	7	7
BBUS10	Chorus 7	~1.5 m	7	7
BBUS11	Chorus 3	~1.5 m	7	7
BBUS12	Chorus 15	~1.5 m	7	7
BBUS13	Chorus 9	~1.5 m	7	7
BBUS14	Chorus 5	~1.5 m	7	7
BBUS15	Chorus 17	~1.5 m	7	7
Met mast	Chorus 1	50 m	7	Error*
Met mast	Chorus 18	75 m	7	Error*
		Subtotal	119	97
		Grand total	**655**	**567**

*Errors have been noted for units that were deployed for survey programs and identified to have had recording issues during deployment, resulting in no data being recorded. Following each occurrence, the particular unit was reviewed by Umwelt, including microphones, and servicing requirements was sought from Titley *(unit manufacturer) where necessary.

n/a^ unable to be surveyed due to property access constraints.

5.2.5.8 Nocturnal Spotlighting and Call Playback

Bush stone-curlew

Nocturnal call playback surveys and subsequent spotlighting surveys were undertaken targeting bush stone-curlew (*Burhinus grallarius*) within the associated PCT 58. Each survey would be undertaken by a pair of observers experienced in identifying nocturnal birds and their calls.

Each survey would comprise a 10-minute listening period followed by two minutes of bush stone-curlew call broadcast before concluding with two minutes of quiet listening for any response.

Following call playback sessions, nocturnal spotlighting searches were conducted at each site. This involved walking a meandering transect and recording any fauna species seen or heard calling. Species were visually identified using 10 x 40 magnification binoculars or by call recognition.

Crowned gecko

Nocturnal walked searches were completed for the crowned gecko (*Lucasium stenodactylum*) in the associated PCT 170. Surveys for the crowned gecko were in accordance with the “threatened reptiles biodiversity assessment method survey guide” (DPE, 2022).

Southern hairy-nosed wombat

Consultation with CPHR on 8 March 2023, confirmed that nocturnal spotlighting could be employed to survey for the southern hairy-nosed wombat (*Lasiorhinus latifrons*). Nocturnal walked searches were completed for the southern hairy-nosed wombat within PCTs 58 and 170 as part of the surveys for the aforementioned bush stone-curlew and crowned gecko.

Details of the fauna surveys completed for the bush stone-curlew, crowned gecko and southern hairy-nosed wombat are provided in **Table 5.11**.

Table 5.11 Details of Nocturnal Threatened Fauna Surveys Completed

Species Targeted	Survey Date	Survey Methods	Weather conditions	Survey Effort / Time
Bush Stone-curlew (*Burhinus grallarius*)	17 Mar 2023 – 23 Mar 2023	Nocturnal searches / call playback	Refer to **Section 5.2.2**	Spotlighting – 2 people, 2 hours, 7 nights = 1680 survey minutes
Crowned Gecko (*Lucasium stenodactylum*)	17 Mar 2023 – 23 Mar 2023	Nocturnal searches in potential habitat	Refer to **Section 5.2.2**	Call play back – 7 locations over 4 nights.
Southern hairy-nosed wombat (*Lasiorhinus latifrons*)	17 Mar 2023 – 23 Mar 2023	Nocturnal searches	Refer to **Section 5.2.2**	Spotlighting – 2 people, 2 hours, 7 nights = 1680 survey minutes

5.2.5.9 Remote Detection Fauna Surveys

Remote cameras were deployed in suitable areas across the Biodiversity Study Area, in order to determine the presence of the following species:

- Australian bustard (*Ardeotis australis*)
- Bush Stone-curlew (*Burhinus grallarius*)
- Southern hairy-nosed wombats (*Lasiorhinus latifrons*).

Umwelt utilised various camera models throughout the course of remote camera surveys, including, Bushnell Trophy Cam HD, Swift Enduro, Reconyx and Nextech.

Remote cameras were ground based, mounted on tree trunks <1 m above the ground, where possible. Remote cameras were set to both day and night mode, when movement was detected, three photos were captured in quick succession.

A total of 20 remote cameras were deployed within the Biodiversity Study Area from 17 March 2023 to 2 May 2023, which equates to 45 nights and a total survey effort of 900 trap nights.

5.2.5.10 Opportunistic Observations

During biodiversity surveys conducted across the Biodiversity Study Area, ecologists would opportunistically detect for important ecological features that may help identify threatened and otherwise significant species, endangered populations and threatened ecological communities within the Project.

Opportunistic and incidental observations of threatened flora and fauna were recorded during all biodiversity surveys. In these instances, GPS locations and relevant ecological data was recorded within digital survey platforms. Potential habitat and or habitat features for threatened flora and fauna was key data captured during biodiversity surveys, which informed further assessment and surveys within the Biodiversity Study Area. Opportunistic and incidental data captured includes, but not limited to:

- Hollow bearing trees:
    - Tree species and DBH

- Hollow diameter, and abundance of hollows.

- Stick nests:
  - Size of the nest
  - Evidence of occupation
  - Suspected species.
- Evidence of fauna presence:
  - Large burrows.

These data were recorded within digital survey platform, along with the GPS locations, relevant ecological information, and photographs where applicable.

5.3 Expert Reports

As stated in Section 5.3 of the BAM, an expert report can be used instead of a species survey for all proposals to determine whether a species is present or not present on the subject land. As part of consultation with CPHR early in the Project, it was confirmed that an expert report would be required for painted burrowing frog (*Neobatrachus pictus*) and desert mouse (*Pseudomys desertor*) given the difficult survey requirements for these species.

An expert report detailing the likely occurrence of painted burrowing frog (*Neobatrachus pictus*) and desert mouse (*Pseudomys desertor*) was prepared by approved expert, Dr John Read (Ecological Horizons Pty Ltd 2024) with supporting material from Mildura-based Ecologist Alex Holmes (GHD) (GHD, 2024), in accordance with the Section 5.3 (Box 3) of the BAM.

It should be noted that Mr Holmes (GHD) was specifically nominated by the approved expert (Dr John Read). This nomination was based on his direct experience with the candidate fauna species, strong local and regional knowledge, and a long-standing technical working relationship with Dr Read. On this basis, Mr Holmes (GHD) holds the appropriate credentials to deliver a comprehensive analysis and survey that met all requirements specified by the approved expert, and is valid for use under the BAM in support of the expert report.

This approach was accepted by CPHR following consultation on 19 January 2026.

The expert report determined that the painted burrowing frog (*Neobatrachus pictus*) and desert mouse (*Pseudomys desertor*) are unlikely to be present in the Biodiversity Study Area and Development Footprint.

The full expert report is included in **Appendix H**.

5.4 Use of More Appropriate Local Data

This assessment has not relied upon alternative data (more appropriate local data) to assess habitat suitability.

5.5 Limitations

As with all biodiversity surveys, there are inherent limitations of time, weather and location and the biodiversity surveys completed for this project form a point in time sample. Whilst surveys have been completed in accordance with the BAM and all applicable survey guidelines available at the time of survey, the results still represent a sample of the diversity.

5.6 Threatened Species Results

5.6.1 Presence of Ecosystem Credit Species

The details of ecosystem credit species recorded within the Biodiversity Study Area and wider Project Area are provided in **Table 5.12**. Locations of ecosystem credit species recorded are shown in **Figure 5.6**.

Table 5.12 Threatened Species Credit (Ecosystem) Species Survey Results

Species Name	Common Name	BC Act	EPBC Act	Observation Details
Aphelocephala leucopsis	Southern whiteface	V	V	This species was frequently observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, vegetation assessments and targeted threatened species surveys.
Artamus cyanopterus cyanopterus	Dusky woodswallow	V	-	This species was frequency observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, vegetation assessments and targeted threatened species surveys.
Certhionyx variegatus	Pied honeyeater	V	-	This species was recorded on four occasions during diurnal bird surveys within the Project Area.
Circus assimilis	Spotted harrier	V	-	This species was frequently observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, vegetation assessments and targeted threatened species surveys.
Chalinolobus picatus	Little pied bat	V	-	The calls of this species were frequently recorded on bat detectors placed within the Project Area.
Cinclosoma castanotum	Chestnut Quail-thrush	V	-	This species was recorded on six occasions within the Project Area and Biodiversity Study Area during diurnal bird surveys and incidentally.

Species Name	Common Name	BC Act	EPBC Act	Observation Details
Daphoenositta chrysoptera	Varied Sittella	V	-	This species was frequently observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, vegetation assessments and targeted threatened species surveys.
Epthianura albifrons	White-fronted Chat	V	-	This species was frequently observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, vegetation assessments and targeted threatened species surveys.
Falco subniger	Black falcon	V	-	This species was observed six (6) times foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys and incidentally.
Hieraaetus morphnoides	Little Eagle	V	-	This species was incidentally observed once foraging within the Project Area.
Hylacola cautus	Shy heathwren	V	-	This species was recorded on one occasion within the Biodiversity Study Area during BBUS surveys.
Lophoictinia isura	Square-tailed Kite	V	-	This species was incidentally observed on one occasion within the Biodiversity Study Area.
Melanodryas cucullata cucullata	Hooded Robin	E	E	This species was frequently observed foraging within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys and targeted threatened species surveys.
Pachycephala inornata	Gilbert's Whistler	V	-	This species was recorded on six occasions within the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys, diurnal bird surveys and incidentally.
Polytelis anthopeplus monarchoides	Regent parrot (eastern subspecies)	E	V	Two flocks of regent parrots were recorded flying over the Project Area and Biodiversity Study Area during field surveys including BBUS Surveys and incidentally. These records were in May 2024, which is outside the breeding period for the species.
Vespadelus baverstocki	Inland forest bat	V	-	The calls of this species were frequently recorded on bat detectors placed within the Project Area.

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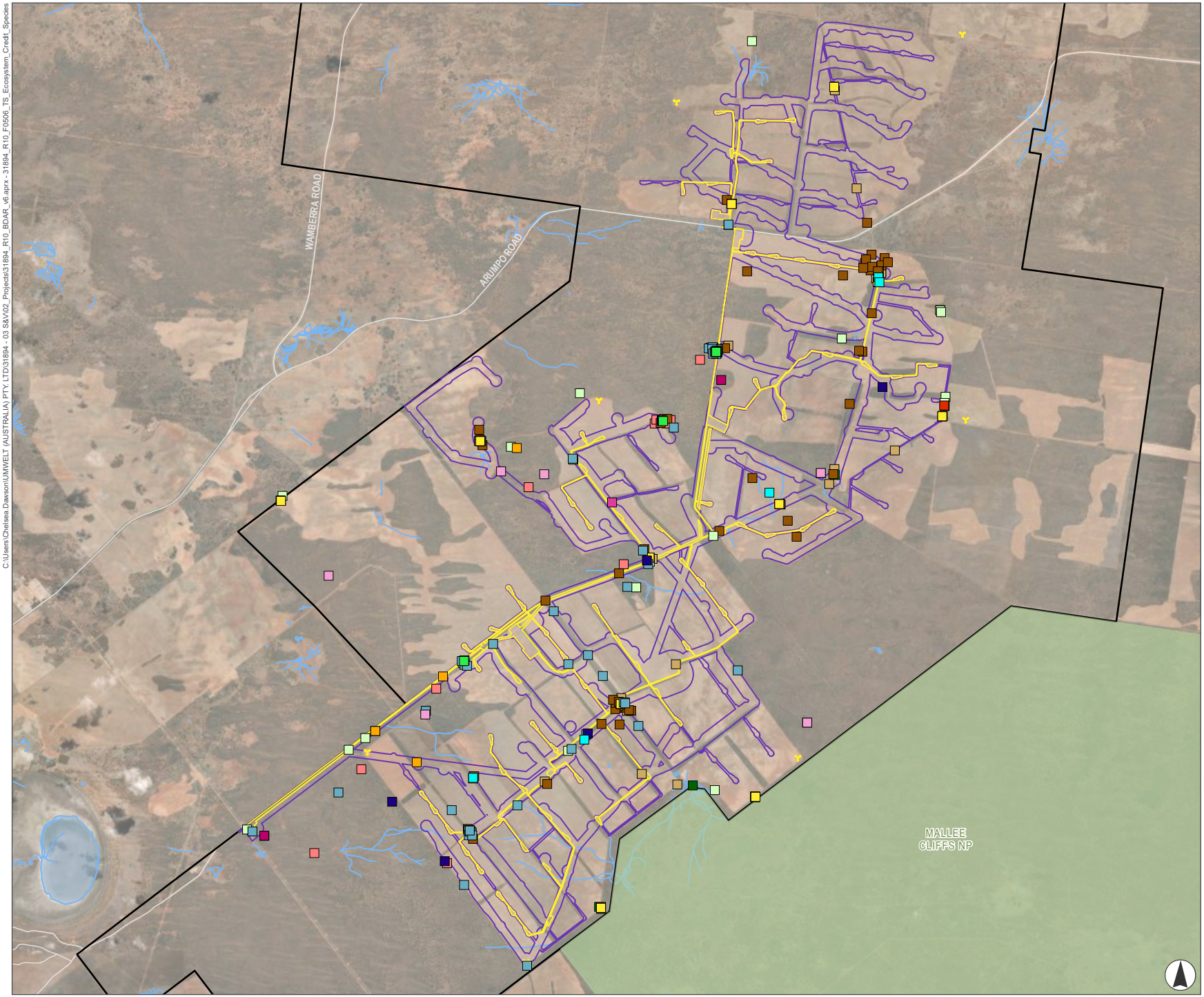

FIGURE 5.6

Threatened Species Recorded within the Development Footprint and Biodiversity Study Area - Ecosystem Credit Species

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates

Ecosystem Credit Species

- Black Falcon
- Chestnut Quail-thrush
- Dusky Woodswallow
- Gilbert's Whistler
- Hooded Robin
- Inland forest bat
- Little Eagle
- Little Pied Bat
- Pied Honeyeater
- Regent Parrot
- Shy Heathwren
- Southern Whiteface
- Spotted Harrier
- Square-tailed Kite
- Varied Sittella
- White-fronted Chat

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

5.6.2 Presence of Candidate Species Credit Species

5.6.2.1 Threatened Flora Species

No threatened flora species were observed within the Biodiversity Study Area or Development Footprint. Targeted surveys have been completed for all candidate threatened flora species.

Umwelt considers that all candidate flora species have been adequately surveyed within suitable survey windows as per the BAM, in addition to numerous supplementary surveys attributable to the overall survey effort across the Development Footprint.

As a result, no species polygons have been prepared for candidate flora species.

5.6.2.2 Threatened Fauna Species

No threatened fauna species credit species were observed within the Development Footprint, Biodiversity Study Area or wider Project Area during the targeted surveys completed. Three dual credit species were recorded during surveys, comprising the regent parrot, little eagle and square-tailed kite, however the species-credit component (breeding habitat) was not recorded.

Analysis of micro-bat calls from the first two (2) BBUS seasons (spring 2022 and summer 2023) identified a species complex consisting of southern myotis/Corben's long-eared bat/lesser long-eared bat/Gould's long-eared bat. The calls of these species are difficult to differentiate which is why they were assigned to a species complex. The southern myotis is a species credit species because it is dependent on waterways with pools greater than 3 m wide for foraging and habitat surrounding waterways is used for breeding and roosting. Given that there is no suitable habitat in the Development Footprint or within 200 m of the Development Footprint, in addition the nearest record for the southern myotis is more than 20 km from the Development Footprint, it is considered highly unlikely that this species occurs within the Development Footprint.

As noted above for threatened flora species, the level of survey effort in the wider Project Area represents suitable coverage for the candidate fauna species credit species.

As a result, no species polygons have been prepared for candidate fauna species.

6.0 Identification of Prescribed Impacts

Prescribed impacts which are predicted to occur as a result of the proposed development are documented in **Table 6.1**.

Table 6.1 Prescribed Impacts Identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	There are no karst, caves, crevices, cliffs, rocks or other geological features of significance within the Development Footprint.	Based on the results of completed surveys, no such features have been identified, therefore there will be no known threatened entities using the characteristics features.
Human-made structures	☐Yes / ☒No	There are no human-made structures within the Development Footprint.	Based on the results of completed surveys, no such structures have been identified in the Development Footprint, therefore there will be no known threatened entities using the human-made structures.
Non-native vegetation	☒Yes / ☐No	Most of the non-native vegetation has been attributed to Category 1 – Exempt Land. This consists of land used primarily for agriculture cropping.	A number of the raptor species observed during field surveys may forage within agricultural grazing land on occasion.
Habitat connectivity	☒Yes / ☐No	There will be clearing of native vegetation including canopy trees, native shrubland and derived native grassland within the Development Footprint. This equates to approximately 55 ha of native vegetation. These are primarily located adjacent to existing access tracks and paddocks comprising of Category 1 – Exempt Land.	The majority of the threatened fauna recorded during field surveys are highly mobile species, capable of flying over the areas proposed for development. It is likely that these species will also utilise the retained areas of connectivity across the Project Area.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Waterbodies, water quality and hydrological processes	☐Yes / ☒No	There are no farm dams within the Development Footprint.	N/A
Wind turbine strikes (wind farm development only)	☐Yes / ☐No	Up to 76 wind turbines and the associated infrastructure are proposed for construction throughout the Development Footprint. These would have various direct and indirect impacts to protected fauna species.	Refer to **Section 8.3.3** and **Appendix B**.
Vehicle strikes	☒Yes / ☐No	Vehicle movements must utilise existing access tracks and local roads within the Development Area. In addition to standard vehicle movements across the Project Area, Oversized Over Mass Movements (OSOM) will also be frequenting the site during the construction phase of the project. These vehicles coincide with peak construction activity where traffic volume is expected to be at its highest. As these vehicles often travel in convoys with escort vehicles, they may contribute to increased traffic density and fauna strike risk.	A low-speed limit would be enforced for vehicles traveling through the Development Footprint. Reduced vehicle speeds will be applied on newly formed access tracks to reduce the risk of vehicle strikes to fauna specifically in areas adjacent to intact native vegetation, surrounding permanent waterbodies and close to farm dams, particularly after periods of rain. Speed limits will be specified in the BMP and will be determined having regard to vehicle strike risk levels to fauna across the Project Area, work health and safety considerations, and interactions with agricultural operations. Despite the implementation of the speed limit, some threatened species may still be suspectable to vehicle strike including: • Malleefowl, which is vulnerable to collisions when crossing access tracks. • Blue-winged Parrot may be at risk when foraging near roads. • Corben's Long-eared Bat (*Nyctophilus corbeni*) – low but possible risk during night movements near roads. • Other fauna such as small mammals, reptiles, birds including the Pink Cockatoo, Regent Parrot and Western Blue-tongue Lizard. • Amphibian species may also be impacted, particularly during wet conditions when amphibians disperse across roads.

7.0 Avoid and Minimise Impacts

7.1 Avoid and Minimise Direct and Indirect Impacts on Native Vegetation, Threatened Species, Threatened Ecological Communities and their Habitats

This section describes the efforts made to avoid and minimise impacts to biodiversity in accordance with Chapter 7 of the BAM. Biodiversity impacts have been avoided and minimised through iterative refinements to the Project Area and Development Footprint, in response to key site constraints and feedback from key stakeholders. Consideration of the adjacent Mallee Cliffs National Park being an aspect contemplated during this iterative process. The key stages are set out below.

At each stage of the design process, from Project inception, through Project Scoping and the development of the BDAR (and broader EIS), Spark Renewables has applied the following hierarchy (in order of priority):

- **Avoid** – in the first instance, all efforts were made to avoid potential environmental, cultural and social impacts.
- **Minimise** – where potential impacts could not be avoided, design principles sought to minimise impacts, as far as reasonably practicable.
- **Mitigate** – mitigation strategies have been identified and will be implemented to manage the extent and severity of the remaining impacts, refer to **Section 9.0**.
- **Offset** – environmental offsets are only used following all efforts to first avoid, minimise and mitigate impacts, refer to **Section 12.0**.

In addition, the following specific principles related to biodiversity were adopted:

- Minimise vegetation clearing and prioritise avoidance of significant biodiversity values – multiple biodiversity surveys over several seasons (2022–2024) have enabled the progressive refinement of the Development Footprint, with avoidance of areas of higher conservation value, identified threatened species habitat, high and medium value vegetation, remnant vegetation areas and areas of threatened ecological communities. As biodiversity fieldwork progressed and a more detailed understanding of the biodiversity values of the Project Area became available, further design adjustments were made to minimise disturbance.

- Focus on the minimising disturbance to the Mallee Bird Community of the Murray Darling Depression Bioregion EEC listed under the EPBC Act.
- Consideration of the Turbine Risk Assessment and Avoidance Guidance (released July 2023) to inform WTG buffers to adjacent native vegetation and Mallee Cliffs National Park.
- Avoidance of an active wedgetail eagle nest, with the closest WTG over 1000 m from this active nest. Note this active wedgetail nest as of August 2024 is no longer in use as the tree supporting it has fallen over.
- Relocation of WTGs away from the larger remnant native vegetation on the periphery of the Project Area.
- Minimise land disturbance – design footprints for WTG hardstands, site compounds, substations and ancillary infrastructure were limited to the minimum area required.
- Maximise use of previously disturbed land – the Development Footprint has been selected to maximise the use of land previously modified by agricultural operations, including cleared areas, established access tracks and local roads.
- Align the Development Footprint with the boundary of existing agricultural operations to minimise the impact on ongoing operations in consultation with landholders.
- Minimise disturbance – footprints for project infrastructure will be limited to the minimum area required.
- An ongoing flexible approach to design, enabling continual refinement of the Disturbance Footprint from 2022 to 2024, responding to identified environmental impacts and constraints.

7.1.1 Overview of Refinements

From the Scoping Report (November 2022) to the present, the Project Area and Development Footprint have reduced in size to respond to the emerging understanding of site-specific biodiversity constraints and to prioritise the avoidance of impacts on areas of high biodiversity values. Key design refinements which took place, over four (4) key phases, between the exhibition of the scoping report (November 2022), design revision A (December 2023), design revision B (May 2024) and the final design (June 2024) include:

- During the Scoping phase of the Project, a Development Corridor was used as the assessment area for technical studies to determine potential design constraints. As the confidence in the design footprint increased over time, the Disturbance Footprint was used as the assessment area. Changes to the Project Boundary and internal Project layout has been an iterative process in response to consultation and advice from technical specialists.
- A reduction from up to 150 WTGs proposed at the Scoping stage to up to 76 WTG locations assessed in the EIS. The reduction in WTGs is based on Spark Renewables analysis of the available transmission capacity in this section of the NSW South West REZ and consideration of avoidance and minimisation principles.
- Refinement to a Disturbance Footprint of 444.69 ha as described in the EIS. Based on avoidance strategies implemented to reduce and minimise clearing of native vegetation, and host landholder feedback regarding the layout within the existing agricultural site setting, Spark Renewables have significantly reduced the level of direct impacts.

- A reduction of the capacity of the wind farm from up to 1,000 MW to a 402 MW capacity reducing the number of WTG and associated extent of disturbance.
- A reduction of the capacity of the BESS from 300 MW to 100 MW.
- Refinement of the WTG specifications (280 m blade-tip height, 180 m hub height and 200 m blade diameter) noting the blade-tip height of 280 m remains unchanged from Scoping Report to Final Design.

The inclusion of an onsite TWA facility. Based on the outcomes of the Social Impact Assessment and consultation with local stakeholders, the TWA facility is proposed to minimise impacts to local housing and accommodation service providers.

Additional detail is included in **Table 7.1**, **Table 7.2**, and **Table 7.3** and depicted in **Table 7.1a** to **Table 7.1c** below.

Table 7.1 Refinement of Project Design from Scoping to Design Revision A

Project Element	Description (Revision A WTGs used as reference point)	Justification
Project Area	Increase Project Area from 18,566 ha to 59,463 ha.	Increase Project Area to encompass landholder agreements and cadastre boundaries.
Development Corridor Area	Reduced Development Corridor from 3,575 ha to 1,094 ha.	Revised Development Corridor to reflect increased confidence in the area required to site Project, all proposed Project infrastructure and all Project related ground disturbance. Note: the Development Corridor was removed and has not been assessed in the final design of the Project.
Disturbance Footprint	Not specific in the Scoping Phase although mapped as 633 ha for Design Revision A.	Revised Disturbance Footprint to reflect increased confidence in the area required to site Project, all proposed Project infrastructure and all Project related ground disturbance.
WTG 85, WTG 91, WTG 102, WTG 108	Removal of one WTG and moved the remaining WTGs south west by 550 m.	Increase buffer from native vegetation from 50 m to more than 200 m.
WTG 70, WTG 76	Removal of one WTG and moved the remaining WTG to at least 140 m from native vegetation.	Increase buffer from native vegetation from 50 m to more than 140 m.
WTG 76, WTG 73, WTG 78, WTG 84, WTG 93	Moved WTG and Disturbance Footprint to a more centralised location within cleared agricultural land.	Increase buffer from native vegetation from 50 m to more than 110 m.

Project Element	Description (Revision A WTGs used as reference point)	Justification
WTG 58	Moved WTG 600 m to the east.	Increase buffer from native vegetation and reduce required clearing of native vegetation between WTGs.
WTG 100, WTG 107, WTG 101	Moved WTG and Disturbance Footprint to a more centralised location within cleared agricultural land.	Increase buffer from WTG to native vegetation to more than 400 m.
WTG 96	Moved WTG and Disturbance Footprint to a more centralised location within cleared agricultural land.	Increase buffer from WTG to native vegetation to more than 550 m.
WTG 71, WTG 77	Moved WTGs and Disturbance Footprint to a more centralised location within cleared agricultural land.	Increase buffer from WTG to native vegetation to more than 550 m.
WTG 29, WTG 31, WTG 34	Moved three (3) WTGs to a more centralised location within cleared agricultural land.	Increase buffer from WTG to native vegetation to more than 350 m.
WTG 55, WTG 52, WTG 60, WTG 54, WTG 56, WTG 61	Moved WTG and Disturbance Footprint to a more centralised location within cleared agricultural land.	Increase buffer from WTG to native vegetation to more than 250 m.
WTG 33, WTG 27, WTG 23, WTG 15, WTG 06, WTG 08, WTG 22, WTG 26, WTG 30	Removal of nine WTGs and moved remaining WTGs to a more centralised location within cleared agricultural land.	Increase compatibility with existing agricultural land use in consultation with landholders and Increase buffer from WTG to native vegetation.

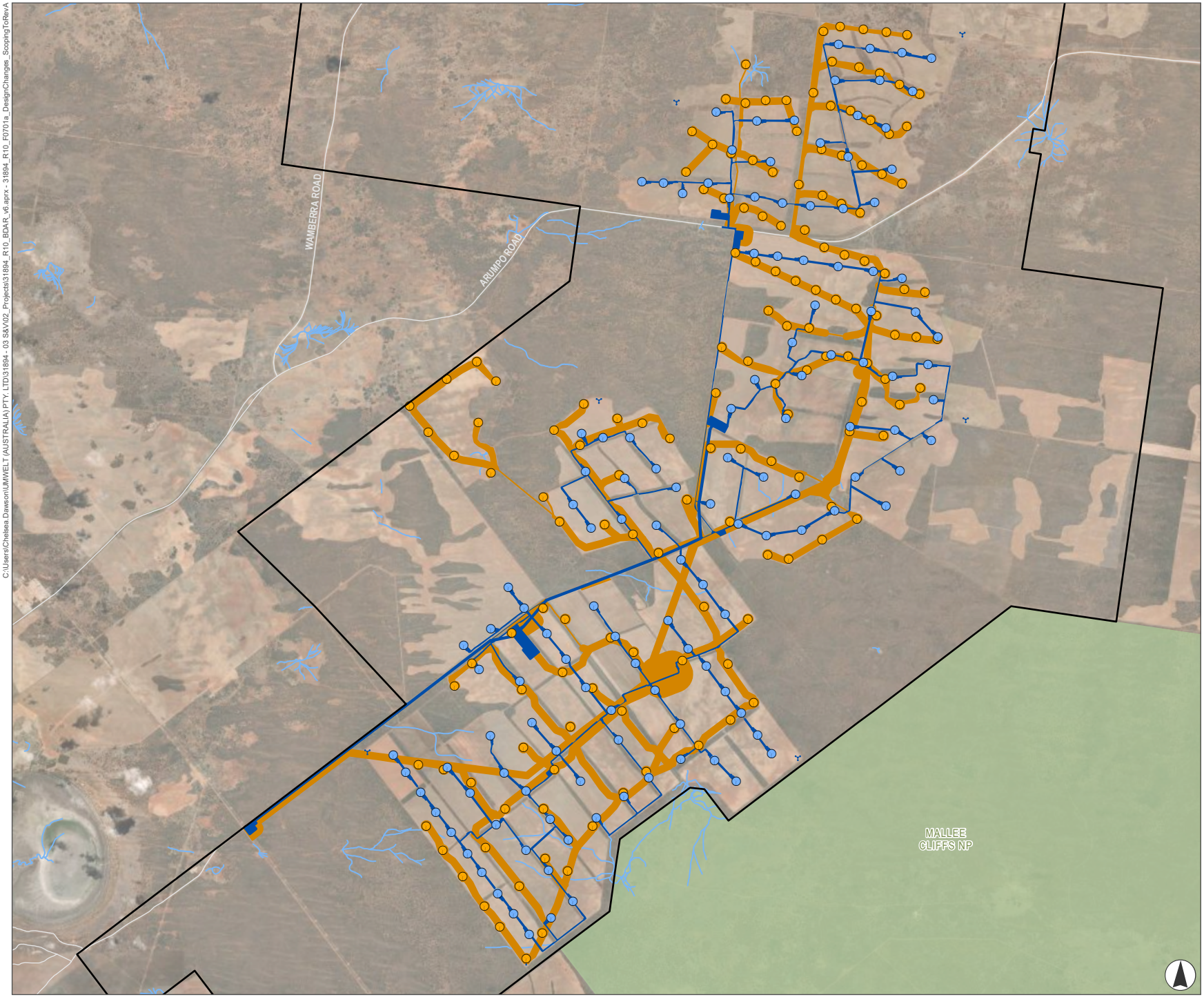

FIGURE 7.1A

Summary of Design Changes (Scoping to Revision A)

Legend

- Project Boundary
- Road
- Watercourse
- NPWS Estates

Scoping (November 2022)

- Scoping Development Footprint
- Scoping Wind Turbine Location

Revision A (December 2023)

- Revision A Development Footprint
- Revision A Wind Turbine Location

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

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Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

Table 7.2 Summary of Design Refinements from Design Revision A to Design Revision B

Project Element	Description (Revision B WTGs used as reference point)	Justification
Project Area	Decreased Project Area from 59,463 ha to 57,335 ha.	Removal of Mallee Solar Farm from the Project Area.
Development Corridor	Decreased Development Corridor from 1,094 ha to 974 ha.	Reduction in the number of WTGs being assessed from 129 to 110.
Disturbance Footprint	Decreased Disturbance Footprint from 633 ha to 586 ha.	Reduction in the number of WTGs being assessed from 129 to 110.
WTG 78	To the north west, west and south west of WTG 78, three WTGs were removed.	Reduce the number of WTGs that border native vegetation and reduce the total impact of the Project on existing agricultural operations.
WTG 100	To the west of WTG 100, one WTG was removed.	Reduce the number of WTGs that border native vegetation and reduce the total impact of the Project on existing agricultural operations.
WTG 65	To the north of WTG 65, three WTGs were removed.	Reduce the number of WTGs that border native vegetation and reduce the total impact of the Project on existing agricultural operations.
WTG 50	To the west of WTG 100, one WTG was removed.	Reduce the requirement to clear native vegetation and reduce the total impact of the Project on existing agricultural operations.
WTG 54	To the north west of WTG 54, one WTG was removed.	Reduce the total impact of the Project on existing agricultural operations and increase the distance between WTGs and native vegetation.
WTG 51	To the north of WTG 51, three WTGs were removed.	Reduce the number of WTGs that border native vegetation and reduce the total impact of the Project on existing agricultural operations.
WTG 45	To the south west of WTG 66, one WTG was removed.	Reduce the number of WTGs that border native vegetation and reduce the total impact of the Project on existing agricultural operations.

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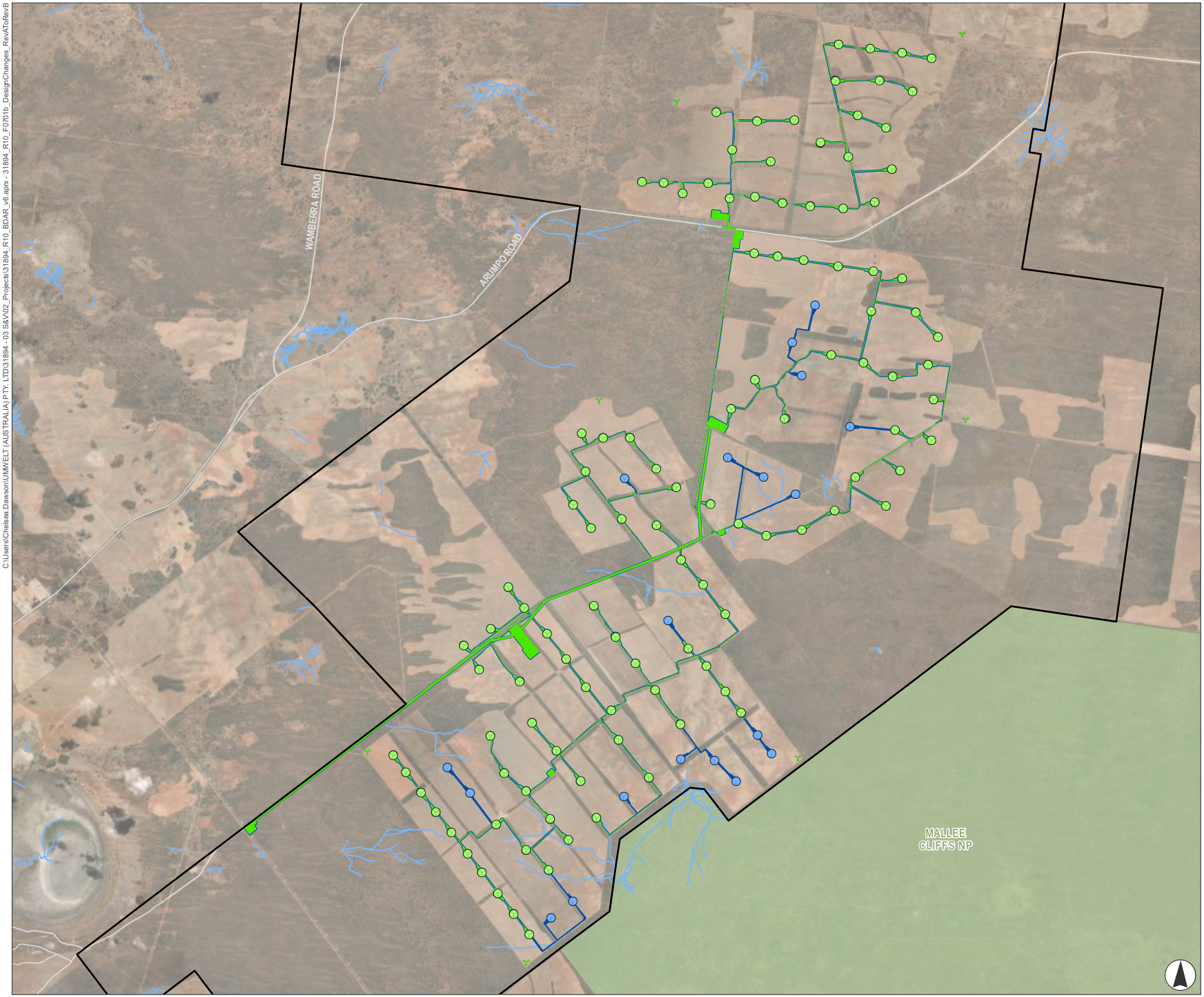

FIGURE 7.1B

Summary of Design Changes (Revision A to Revision B)

Legend

- Project Boundary
- Road
- Watercourse
- NPWS Estates

Revision A (December 2023)

- Revision A Development Footprint
- Revision A Wind Turbine Location

Revision B (May 2024)

- Revision B Development Footprint
- Revision B Wind Turbine Location

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Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

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Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

Table 7.3 Summary of Design Refinements from Design Revision B to the Final Design

Project element	Description	Justification
Project Area	No Change	No Change
Disturbance Footprint	Decreased Disturbance Footprint from 586 ha to 444.87 ha	Reduction in the number of WTGs being assessed from 110 to 76.
WTG 127, WTG 121, WTG110, WTG 103, WTG 123, WTG114, WTG 101, WTG 116, WTG 114, WTG 101, WTG116, WTG 98, WTG 105, WTG 117, WTG 113, WTG 104, WTG 96, WTG 88, WTG 78.	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 129, WTG 124	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 97, WTG 90	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 93	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 128, WTG 126, WTG 119, WTG 106, WTG 120, WTG 107, WTG 115	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 83, WTG 92, WTG 71	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 48, WTG 53, WTG 57, WTG 47	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 86, WTG 82, WTG 77, WTG 70, WTG 64, WTG 75, WTG 67, WTG 59, WTG 56	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 46	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 32	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 9, WTG 5	Removed	Remove potential impact to unsurveyed native vegetation.
WTG 1, WTG 2	Removed	Remove potential impact to unsurveyed native vegetation.

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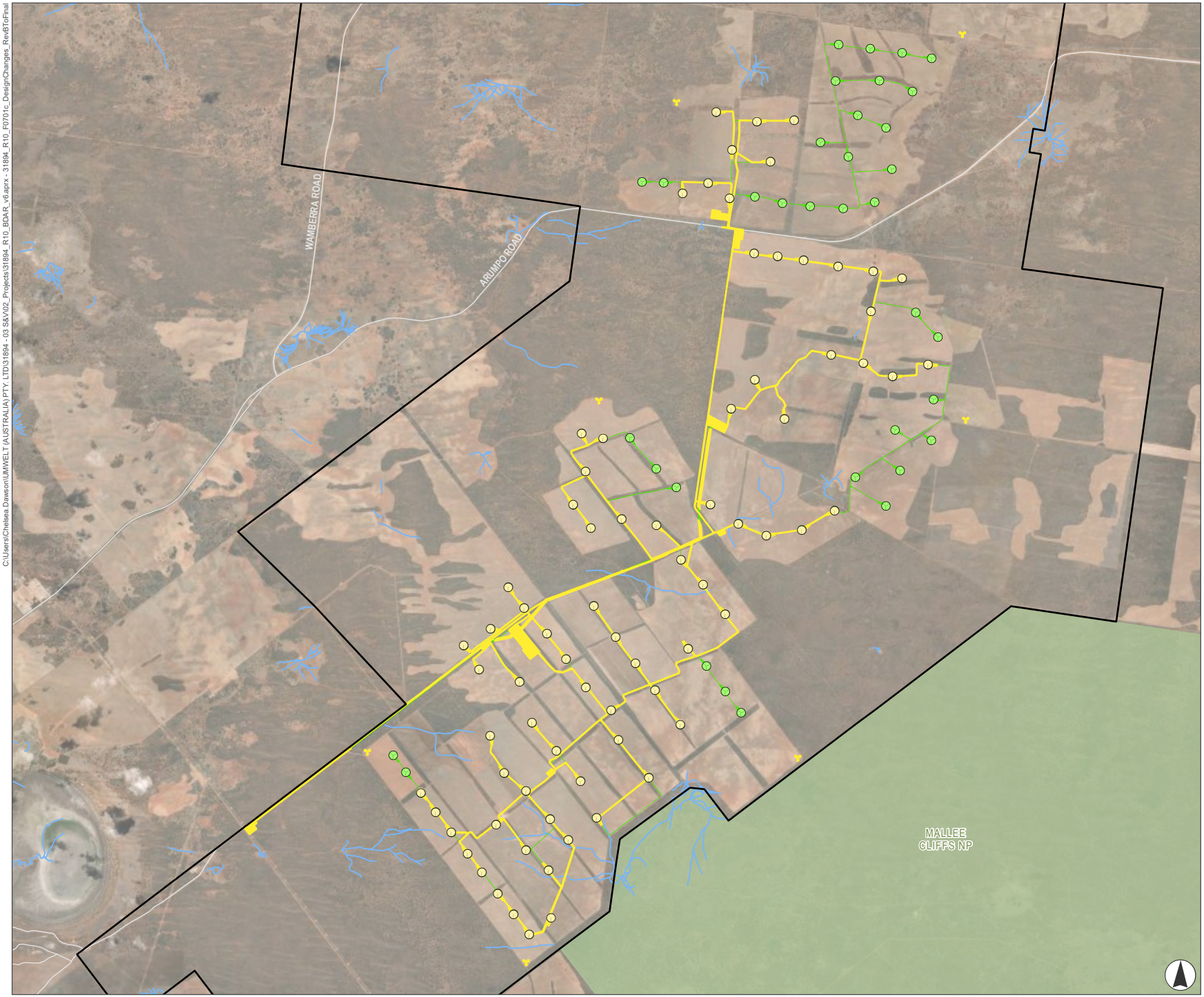

FIGURE 7.1C

Summary of Design Changes (Revision B to Final)

Legend

- Project Boundary
- Road
- Watercourse
- NPWS Estates

Revision B (May 2024)

- Revision B Development Footprint
- Revision B Wind Turbine Location (110)

Final Design (June 2024)

- Final Design Development Footprint
- Final Design Wind Turbine Location (76)

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

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Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

7.1.2 Project Location

The Project location was selected based on a range of factors primarily relating to suitability of the location for wind energy generation and landholder by in, specifically:

- its strategic position within the South West REZ
- the reliability of the wind resource
- the low density of potentially affected dwellings within the surrounding area
- proximity to approved transmission infrastructure and the existing road network
- mostly supportive or neutral attitudes towards the Project from potentially affected landholders.

The Project Boundary was subsequently refined down to the area subject to this BDAR based on several factors, the following being those relevant to biodiversity:

- The presence of other environmental constraints such as potential impacts to biodiversity values.
- Avoiding and minimising impacts to native vegetation, particularly threatened ecological communities.
- From Project inception, vegetation surveys were commenced early so that the results of these could be used to inform WTG placement to focus on avoiding high and medium value vegetation and areas of threatened ecological communities. As biodiversity fieldwork progressed and a more detailed understanding of the biodiversity values of the Project Area became available, the Development Corridor was progressively refined and the Development Footprint was developed such that impacts to native vegetation, and particularly impacts to threatened ecological communities were reduced as far as reasonably practicable.

7.1.3 Project Design and Planning

Following lodgement of the Scoping Report and EPBC Act referral, further environmental and social impact assessments and community consultation activities occurred. As a result, Spark Renewables developed the design, an approximate 445 ha Development Footprint, to the area subject to this BDAR based on several factors, the following being those relevant to biodiversity as discussed in **Table 7.4**. The biodiversity which has been avoided as a result of changes to design are shown in **Figure 7.2**.

Table 7.4 Design Refinements that have Avoided and/or Minimised Impacts

Design Aspect	Options Considered	Rationale for Design Refinement
WTG and associated ancillary infrastructure	Avoidance of larger remnant native vegetation	Relocation of WTGs away from the edges of the larger remnant native vegetation on the periphery of the Project Area. Minimising interaction with higher quality vegetation on the margins of the Project Area. WTGs have been located within the central portions of the Project Area which cropped paddocks and closer to lower quality native vegetation within the agricultural windrows.
WTG and associated ancillary infrastructure	Minimising impacts to remnant native vegetation	Spark Renewables has sought to make use of existing access tracks and local roads.

Design Aspect	Options Considered	Rationale for Design Refinement
Access roads	Increasing distance from Mallee Cliffs National Park	The Development Footprint (present day) maintains a minimum of approximately 700 m buffer (from blade tip) between the eastern-most WTGs and Mallee Cliffs National Park. This buffer has increased from the scoping stage of 300 m.
WTG and associated ancillary infrastructure	Minimisation of impacts to remnant native vegetation	Transmission line in the southern portion of the Development Footprint has been designed to minimise overall footprint. The transmission line has been co-located adjacent to an existing access road to minimise any increase in edge effects to the remnant vegetation.
Transmission line	Avoidance of *Pterostylis jeanesii*	Although not currently listed under the NSW BC Act or Commonwealth EPBC Act, the record of *Pterostylis jeanesii* in the Biodiversity Study Area represents the second record for NSW and first record for the National Herbarium of NSW. Spark Renewables have avoided all known records of this species in the transmission line easement given how rare this species is in NSW.

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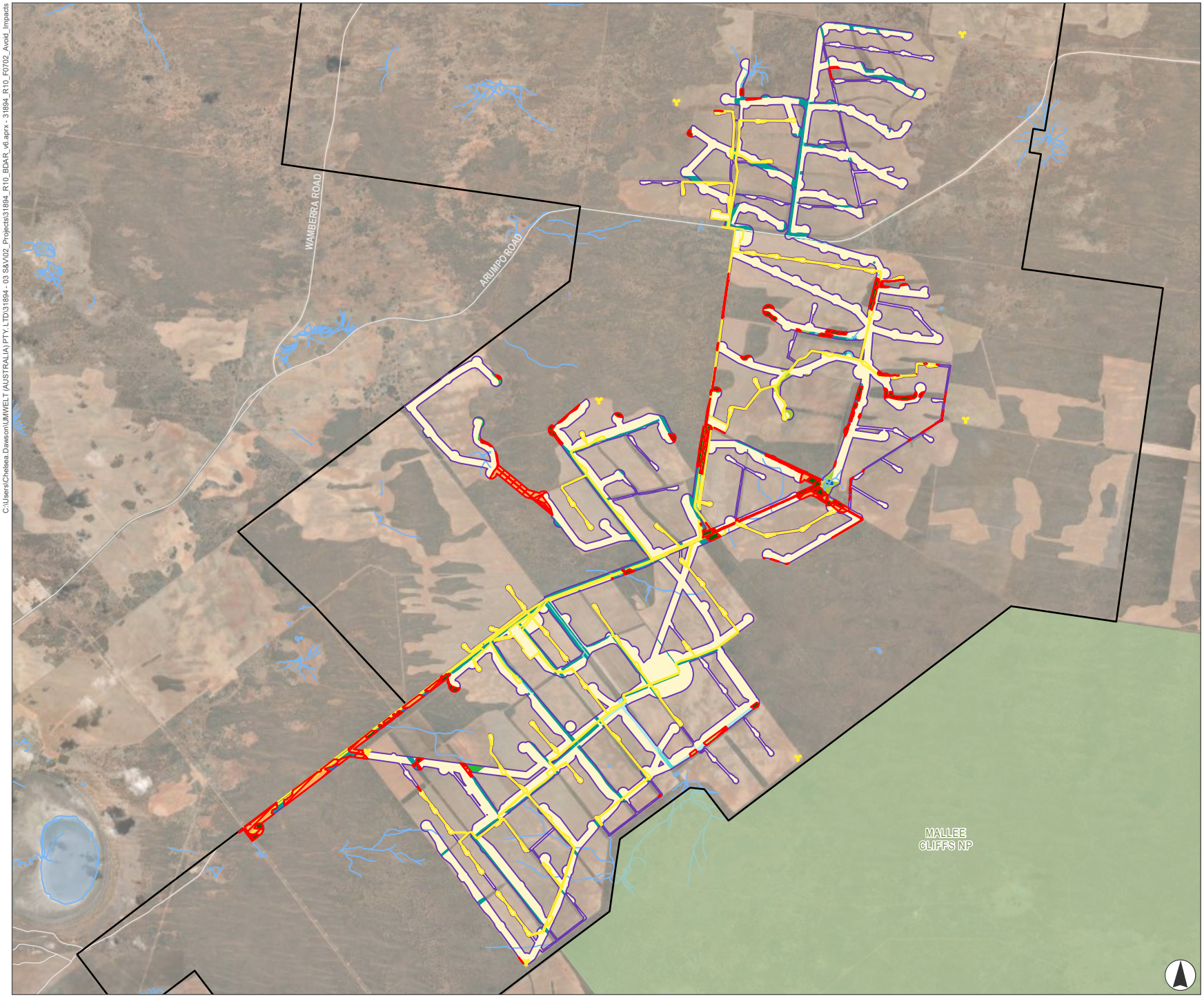

FIGURE 7.2

Avoid and Minimise Impacts

Legend

- Project Boundary
- Development Footprint
- Biodiversity Study Area
- Road
- Watercourse
- Waterbody
- NPWS Estates

Threatened Ecological Communities - EPBC Act

- Mallee Bird Community of the Murray Darling Depression Bioregion EEC

Plant Community Type

- PCT 58 (Moderate-Good)
- PCT 58 (Derived-Weedy)
- PCT 58 (Weedy understory)
- PCT 170 (Moderate-Good)
- PCT 170 (Derived-Native)
- PCT 170 (Derived-Weedy)
- PCT 170 (Weedy Understory)
- PCT 171 (Moderate-Good)
- Dam
- Category 1 – Exempt Land/Cleared/ Structure/ Tracks/ Road

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

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Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

7.2 Avoidance and Minimisation of Prescribed Impacts

Prescribed Impacts are additional impacts which require assessment; however, they are not impacts which require consideration when calculating the number and classes of biodiversity credits required. Clause 6.1 of the Biodiversity Conservation Regulation defines Prescribed Impacts as:

- The impacts of development on the following habitat of threatened species or ecological communities:
    - karst, caves, crevices, cliffs and other geological features of significance
    - rocks
    - human made structures
    - non-native vegetation
    - the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
    - the impacts of development on movement of threatened species that maintains their lifecycle
    - the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development)
    - the impacts of wind turbine strikes on protected animals
    - the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

7.2.1 Project Location

Potential prescribed impacts of relevance to the Project are identified in **Section 6.0** of this report and comprise disturbances to non-native vegetation and excluded areas assessed as Category 1 Land. Areas of non-native vegetation and excluded areas are not likely to provide habitat of importance to threatened entities which should be avoided through modification to the project location.

7.2.2 Project Design

Potential prescribed impacts of relevance to the proposal are identified in **Section 6.0** of this Report and comprise disturbances to non-native vegetation and excluded areas assessed as Category 1 – Exempt Land. Areas of non-native vegetation and excluded areas are not likely to provide habitat of importance to threatened entities which should be avoided through modification to the project design.

Efforts made to avoid and minimise prescribed impacts to biodiversity values (as defined by Section 8.3 of the BAM) in accordance with Section 7.2 of the BAM are summarised in **Table 7.5**.

Table 7.5 Design Refinements that have Avoided and/or Minimised Prescribed Impacts

Prescribed Impacts	Rationale for Design
Karst, caves, crevices, cliffs, rocks and other geological features of significance	Not applicable.
Human-made structures or non-native vegetation	No human-made structures were recorded within the Development Footprint. Non-native vegetation may be used as hunting grounds for threatened raptor species which occur on site. As a majority of the Project Area and surrounding habitat contains suitable raptor hunting grounds, it is unlikely that this loss will have a significant impact on the threatened raptor population.
Habitat connectivity	The Project has sought to avoid impacts to habitat connectivity. The Project does not require large areas of clearing or the erection of barriers that would affect fauna movement or the disruption of ecosystem services (e.g. pollination, seed dispersal). While the turbines create strike risk for flying fauna (birds and bats), this is unlikely to be sufficient to cause a loss of habitat connectivity. Strike risk can be reduced by understanding flight patterns on the site and applying this knowledge to adaptive management (e.g. targeted turbine shut-downs and curtailment). The Development Footprint (present day) maintains a variable buffer between the south eastern-most WTGs and Mallee Cliffs National Park. This buffer was established throughout the evolution of the Project design and then increased during the final design phase to a minimum distance of approximately 800 m.
Water bodies, water quality and hydrological processes	No water bodies, streams or groundwater dependent ecosystems occur within the Development Footprint.
Vehicle strikes	Vehicle strikes are a potential impact, particularly during construction when traffic volumes are high. Thus, the maximum intensity of this impact will only be a relatively short amount of time during the construction phase. Another period of potentially high intensity impact is during periods of high intensity rain, particularly in warmer months, as threatened amphibians are likely to disperse widely across the landscape, likely crossing roads in the process. The impacts of vehicle strike can be further reduced by: • Use of existing public and private roads. • Apply reduced vehicle speeds (limit to be set in BMP) along internal (private) roads, and 80 km/hr along proximal public roads including Dansons Road and Arumpo Road. • Avoiding or minimising driving at dawn and dusk when fauna activity is highest (e.g. macropods). • Avoiding or minimising driving during periods of high rainfall and warm temperatures. If driving is required, vehicle speed should be reduced when passing by waterbodies.

Prescribed Impacts	Rationale for Design
	• Worker induction to include driving protocols, including promoting driver awareness of fauna road behaviour. • Monitoring of tracks and roads for evidence of fauna collisions and reporting of Vehicle strikes by site personnel • Applying thresholds for acceptable strike numbers based on relevant literature, where exceeding these triggers the adaptive management measures.

7.3 Other Measures Considered

7.3.1 Do Nothing Option

The 'Do nothing' option was considered as part of environmental impact assessment for this Project. The Project Area is currently used primarily for broad-acre grain cropping activities. The 'do nothing option' would allow for the continued use of the whole Project Area for agricultural purposes. The 'do nothing option' would also mean that the Project is not developed and would therefore forgo the Project's identified benefits, namely:

- assisting in meeting the NSW and Commonwealth government's objectives of transitioning to renewable electricity generation
- increased energy security and supply into the NEM
- significant social and economic benefits created through capital investment and provision of direct and indirect employment opportunities during the construction and operation of the Project
- Project related agreements and community benefit sharing initiatives
- lost opportunity for the landholders to diversify their revenue streams.

The 'do nothing option' would avoid the environmental and social impacts associated with the construction, operation and decommissioning of the Project, such as biodiversity impacts, noise, traffic, social amenity and visual impacts. However, these impacts are considered to be manageable through the implementation of the management and mitigation measures.

As the NSW government has identified the South West REZ as an area suitable for renewable energy projects and has identified the need for this area to provide a certain energy generation output, should this Project not proceed, an alternative project would need to proceed within the South West REZ to deliver the required energy generation capacity.

Considering the benefits of the Project, that the Project satisfies the principles of ecologically sustainable development (ESD) (refer to Section 7.0 of the EIS) and that effective management, mitigation and offsets can be implemented to address the predicted impacts of the Project, the 'do nothing option' is not proposed.

7.4 Minimisation and Management of Impacts

Spark Renewables has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to minimise the unavoidable impacts of the Project. The following Management Plans will be prepared post approval as part of the Biodiversity Management strategy:

- Development and implementation of biodiversity management measures as part of the Construction Environmental Management Plan (CEMP).
- Bird and Bat Adaptive Management Plan (BBAMP).
- Biodiversity Management Plan (BMP), which will include the following subplans:
    - Threatened Species Sub-plan
    - Rehabilitation Management Subplan.

The key biodiversity management controls that Spark Renewables will include in these management plans to minimise and manage biodiversity impacts are outlined in the following sections.

7.4.1 Bird and Bat Adaptive Management Plan

A Bird and Bat Adaptive Management Plan (BBAMP) will be implemented to measure any impacts on avifauna (aerial fauna) by the Project. The development and implementation of the BBAMP is an integral part of managing impacts to bat and bird species and a key mitigation measure to address the prescribed impacts associated with turbine strike outlined in **Section 8.3.4** and **Appendix B**.

The draft BBAMP will be prepared to meet the requirements of Section 8.4 of the BAM where appropriate and will consider the following:

- Documentation of mitigation measures proposed to manage impacts, including techniques, timing, frequency and responsibility for implementing each measure
- Identification of any measures for which there is a risk of failure
- Evaluation of risk and consequence of any impacts likely to remain after mitigation measures are applied
- Documentation of any proposed adaptive management strategies, including:
    - Baseline data against which monitoring will occur
    - Any seasonal changes to the resource that are relevant to the impacts being monitored
    - Monitoring methods, including frequency, timing and reporting
    - Trigger values for when adaptive management actions should be initiated
    - Adaptive management actions proposed to reduce or eliminate the impact, which may include actions to retire additional biodiversity credits
    - Information that will be necessary to measure the impact over time
    - How the results of the adaptive management strategy will be applied to the ongoing management of the proposed to reduce the extent of indirect and/or prescribed impact.

The BBAMP will provide guidance to develop a framework for monitoring impacts and will include baseline and ongoing monitoring.

The BBAMP will also include trigger levels for particular species and groups of species and mitigation measures designed to manage impacts, in consultation with Spark Renewables. Proposed mitigation measures that may be adopted should the Project trigger impact on a species or species' include:

- Carrion removal program
- In consultation with landowners and where feasible, modifications to agricultural land management activities
- Additional monitoring of sensitive fauna habitats i.e. confirmed active nest sites
- Pest animal control
- Raptor perch management
- Lighting and deterrents
- Curtailment of turbines based on specific wind speeds and/or environmental conditions and/or seasons known to constitute a higher risk of bird and bat strike
- Alternation of cut-in speeds
- Temporary shutdown of turbines
- Acoustic deterrents
- Transmission line warning markers
- Triggers for the deployment of radars to inform the need for curtailment and shutdown in real time
- Offset requirements.

Formal commitment to any particular mitigation measures will only be made in consultation with CPHR and/or Commonwealth DCCEEW following activated triggers and associated impact reporting has been completed.

The BBAMP will be prepared following approval of the Project in consultation with relevant government agencies, however, a comprehensive conceptualisation of the BBAMP is provided in **Table 7.6**.

Table 7.6 Conceptual BBAMP Components

Component	Description	Timeframe
Purpose and objectives of the BBAMP	The BBAMP will present a strategy to monitor and mitigate impacts to birds and bats attributable to the construction and operation of the wind farm development. The overall objective of the BBAMP will be to ensure the wind farm development does not result in a significant impact on birds and bats by retaining viable local populations of threatened species.	Operational life of the Project
Baseline Survey Programs		
Bird Utilisation Surveys	As agreed to with CPHR, the commitment to completing a two year BBUS program through the impact assessment will satisfy the requirements of the baseline survey program for bird utilisation. The methodology of this program is detailed in **Appendix B**.	Spring 2022 Summer 2023 Autumn 2023 Winter 2023 Spring 2023 Summer 2024 Autumn 2024 Winter 2024
Bat Utilisation Survey	As agreed to with CPHR, the commitment to completing a two year BBUS program through the impact assessment will satisfy the requirements of the baseline survey program for bird utilisation. The methodology of this program is detailed in **Appendix B**.	Spring 2022 Summer 2023 Autumn 2023 Winter 2023 Spring 2023 Summer 2024 Autumn 2024 Winter 2024
Habitat Assessments for Avifauna	Meandering transects in proximity to wind turbines, recorded suitable habitat for aerial species, such as large stick nests for raptors, abundance of winter flowering gums, hollow bearing trees, and hollows with an aperture of >20 cm and suitable depth for barking owls, masked owls and cockatoos.	Spring 2022 Summer 2023 Autumn 2023 Winter 2023 Spring 2023

Component	Description	Timeframe
		Summer2024 Autumn 2024 Winter 2024
Operational Monitoring		
Bird Utilisation Surveys	Replication of the BBUS program that was undertaken during the impact assessment. In the absence of any substantial Project design changes, the same BBUS sites should be used for operational monitoring for statistical robustness.	First year, third year and fifth year within three months of commencement of wind farm operation, that is, once all of the following have occurred: • all turbines are commissioned and tested (including testing dependent on wind conditions) • all turbines have been handed over from the Contractor to Spark Renewables • Australian Energy Market Operator (AEMO) testing is complete (grid compliance testing).
Bat Utilisation Survey	Replication of the of the BBUS program that was undertaken during the impact assessment. In the absence of any substantial Project design changes, the same BBUS sites should be used for operational monitoring for statistical robustness.	First year, third year and fifth year within three months of commencement of wind farm operation, as described above.
Targeted Bird Surveys	Replication of the surveys described above.	First year, third year and fifth year within three months of commencement of wind farm operation, as described above.
Carcass Search Program	Carcass searches will be undertaken to estimate the frequency of bird and bat mortality due to collision at the Project, from which the total number of collisions can be determined. Searches are undertaken to identify and record any carcasses beneath wind turbines. Carcass searches will be undertaken at approximately 50% of the constructed wind turbines, with the same wind turbines being monitored each event.	First and second year initially, starting within commencement of operation, as described above. The search program will be reviewed for efficacy after two years, with the possibility of extension for a further three years, potential total five-year program.

Component	Description	Timeframe
	Carcass searches will be conducted once per month throughout the survey years, involving surveying inner (120 m diameter) and outer (240 m diameter) search zones beneath a subset of wind turbines. Transect intensity varies between the inner (6 m apart) and outer (12 m apart) search zones and will be completed preferentially by conservation dogs (and handler) with human searches being permissible where conservation dogs are not available. All carcasses recorded as part of this program will be subject to a strict reporting (and timeframe) commitment. All carcasses will be reported to the Environmental Representative (Spark Renewables) as well as to CPHR and/or Commonwealth DCCEEW in the event of the impacted species being listed as a threatened species.	Requirement for extension of the program if there is clear discrepancy between estimated and realised frequency of bird and bat mortality.
Carcass Persistence Trial	Carcass persistence trials are undertaken to estimate persistence rates of different sized carcasses beneath turbines (to aid estimation of mortality rates of birds and bats impacted by turbines). The trial will occur at a subset of wind turbines. A pre-determined number of bird and bat carcasses, varying in size, will be used in the trial. Carcass persistence trials can either be undertaken by human searches or use of remote survey cameras.	Completed during the first- and second-year carcass search program, but once per season (not each month).
Carcass Detectability Trials	Carcass detectability varies depending on a range of factors such as efficacy of the observer, size of the carcass and type of ground cover. Given this, carcass detectability trials will be undertaken to determine the efficacy of the conservation dog and handler; or the ecologist undertaking searches at finding carcasses. Determining the probability of the selected trained dog or observers detecting a carcass and how it may vary depending on turbine site ground conditions or carcass size is important to ascertain the correction factor needed to accurately estimate total number of collisions.	During the first-year carcass search program, but one per season (not each month).
Incidental Finds Protocol	Any carcass or feather spot discovered incidentally by site personnel or any contractor during the operational lifetime of the Project will be formally recorded and the find reported to the Environmental Representative as well as to CPHR and/or Commonwealth DCCEEW in the event of the impacted species being listed as a threatened species.	Operational lifetime of the Project.

Component	Description	Timeframe
Mortality Estimation	All data will be analysed to estimate annual number of collisions for birds and bats overall and species. This will be estimated in consideration of the carcass search area and effort, and the observed carcass persistence times and observer detectability rates. Estimates of the number of carcasses per turbine per year will also be determined and 95% confidence intervals around total annual estimates and rates of mortality calculated.	During the reporting periods, described below.
Impact Triggers and Response Procedure		

Threatened Species	• Impact triggers will be determined for threatened species listed under the EPBC Act and/or BC Act, which will relate to a particular number of carcasses, injured individual or featherspot recorded through formal searches or incidentally.
	• Impact trigger criteria will be based on the combination of the following factors:
	  ○ BC Act listing status
	  ○ EPBC Act listing status
	  ○ number of individuals impacted
	  ○ number of turbines where the species has been impacted
	  ○ frequency of impacts for the particular species across monitoring events (i.e., has the impact been recorded in two consecutive monitoring events)
	  ○ particular season the impact was recorded (i.e., breeding season for the particular species).
	• In the event of a trigger being recorded, it is the responsibility of the person who discovered the carcass, injured individual or featherspot to notify the Environmental Representative* upon discovery (allowing for identification if required). The Environmental Representative* must then notify CPHR and/or Commonwealth DCCEEW of the trigger event within two working days.
	• Additional actions and mitigation measures may be required in the event of an impact trigger being recorded, these would be determined through consultation with CPHR and/or
		Not applicable.

Component	Description	Timeframe
	Commonwealth DCCEEW. It is not considered suitable to specify particular mitigation measures for a potential impact at this point in time due to the large number of variables that should be considered to assess the severity of a particular impact. Rather, following notification of the initial impact trigger consultation with CPHR/ Commonwealth DCCEEW will include (but not be limited to) the following: ○ An initial online or in-person meeting within five working days (excluding government shutdown periods and subject to the availability of government agency personnel) of the impact trigger being recorded, with the consultation stakeholders specified above. Should the impact trigger or consultation period occur during government shutdown periods, this meeting is required to occur within five working days following conclusion of the shutdown period (subject to the availability of government agency personnel), and ○ Additional online or in-person meetings may be required depending on the nature of the consultation. The specific timeframe of this additional consultation will be determined in the initial meeting. • The BBAMP will not ascribe numerical values to what should be considered an adverse impact at the total population and/or the local population scale. Rather, the BBAMP will describe an assessment process through which an ecologist first prepares an impact investigation that examines whether the event may be regular or may constitute, or lead to, an adverse impact on the species' local or total population. The findings of this impact investigation will determine whether consultation with CPHR and/or Commonwealth DCCEEW regarding the need for additional monitoring or mitigation action is required. The minimum requirements of the impact investigation report are detailed below: ○ Specify the particular impact trigger level that was recorded including the species and number of individuals.	

Component	Description	Timeframe
	○ Specify the date/s and location/s of recovered carcasses/featherspot. ○ Discuss any potentially influential ecological factors that may have contributed to the impact trigger such as recent climate, weather, presence of prey species/foraging opportunities or seasonal factors (i.e., migration). ○ Estimate whether the event is likely to be rare or regular. ○ Verify whether or not the species has been impacted (including number of individuals and frequency) at neighbouring wind farms within a 10 km radius of the Project by accessing their publicly available annual BBAMP reports. Neighbouring wind farms within this radius will be considered at the time the impact trigger is recorded to consider any future wind farms. • For the purposes of the BBAMP, post-trigger assessment of impacts on threatened and/or migratory species is to be conducted with reference to the species' total population and local population. ○ Total population refers to the estimated total Australian population or, in the case of international migrants, the relevant subspecies' entire population. Local population refers to the estimated population in the Project Site. Density is to be estimated using data from the pre-construction surveys in combination with existing density estimates from primary literature (preferably from temperate woodland in south-eastern Australia where distinction is made between different habitat types). ○ Local population estimates are to be derived using vegetation mapping for the Project. Estimates should take into consideration population dynamic assumptions such as, but not limited to, seasonal or inter-annual fluctuations in abundance in the Project Site. The local population of a given species is to be estimated by the contracted ecologist if an impact trigger for that species is met.	

Component	Description	Timeframe
Non-threatened Species	• Impact triggers will not be required for all non-threatened species and common species such as the sulphur-crested cockatoo and little corella will not be included. • Impact triggers will be determined separately for wedge-tailed eagle and other non-threatened species in recognition of increased susceptibility of wedge-tailed eagles to turbine strike. • No management actions are triggered following mortality of introduced species. • In the event of a trigger species being recorded, it is the responsibility of the person who discovered the carcass, injured individual or featherspot to notify the Environmental Representative upon discovery (allowing for identification if required). The Environmental Representative must then notify CPHR of the trigger event within five working days. • The BBAMP will not ascribe numerical values to what should be considered an adverse impact at the total population and/or the local population scale. Rather, the BBAMP will describe an assessment process through which an ecologist first prepares an impact investigation that examines whether the event may be regular or may constitute, or lead to, an adverse impact on the species' local or total population. The findings of this impact investigation will determine whether consultation with CPHR and/or Commonwealth DCCEEW regarding the need for additional monitoring or mitigation action is required. The minimum requirements of the impact investigation report are detailed below: ○ Specify the particular impact trigger level that was recorded including the species and number of individuals. ○ Specify the date/s and location/s of recovered carcasses/featherspot. ○ Discuss any potentially influential ecological factors that may have contributed to the impact trigger such as recent climate, weather, presence of prey species/foraging opportunities or seasonal factors (i.e., migration).	Not applicable.

Component	Description	Timeframe
	○ Estimate whether the event is likely to be rare or regular. ○ Verify whether or not the species has been impacted (including number of individuals and frequency) at neighbouring wind farms within a 10 km radius of the Project by accessing their publicly available annual BBAMP reports. Neighbouring wind farms within this radius will be considered at the time the impact trigger is recorded to consider any future wind farms. ○ For the purposes of the BBAMP, post-trigger assessment of impacts on non-listed species, is to be conducted with reference to the species' local population only. ○ Local population estimates are to be derived using vegetation mapping for the Project. Estimates should take into consideration population dynamic assumptions such as, but not limited to, seasonal or inter-annual fluctuations in abundance in the Project Site. The local population of a given species is to be estimated by the contracted ecologist if an impact trigger for that species is met.	
Mitigation Measures	Mitigation measures may include consideration of the following, amongst others: • Carrion removal program • Pest animal control • Raptor perch management • Lighting and deterrents • Alteration of cut-in speeds • Temporary shutdown of turbines • Acoustic deterrents • Transmission line warning markers • Radar consideration • Offset requirements	Operational lifetime of the Project.

Component	Description	Timeframe
	• Formal commitment to any particular mitigation measures will only be made in consultation with CPHR and/or Commonwealth DCCEEW.	
Reporting Requirements	• Carcass search programs will be reported annually for two years. Review of the program will be undertaken following two years of operation. • Impact trigger reporting will be required as described above. Annual reports will be prepared for three years and once following the fifth year of bird and bat monitoring. • Minor review of the BBAMP will occur once after the first year, following completion of the first annual report. • Major review of the BBAMP will occur after the third year, following completion of the first annual report. After the fifth year, following the completion of the annual report.	Not applicable.

*Environmental Representative - refers to Spark Renewables Environment Manager or appropriate delegate.

7.4.2 Construction Environmental Management Plan

Prior to construction a Construction Environmental Management Plan (CEMP) will be prepared and implemented as part the Project's construction. A detailed description of the mitigation measures proposed to avoid and minimise direct, indirect and prescribed impacts associated with the Project is provided in **Table 9.1** in **Section 9.1**.

Mitigation measures proposed to be included within the CEMP is summarised below:

- Non-inhibiting fauna fencing (where appropriate)
- Traffic control including limiting speeds on internal roads
- Water management
- Weed management
- Fencing and access control
- Bushfire management
- Erosion and sediment control
- Workforce education and training.

7.4.3 Biodiversity Management Plan

A BMP will be implemented to minimise and mitigated impacts to the biodiversity values found within the Development Footprint and broader Project Area. The BMP would be prepared in consultation with CPHR and include three sub-plans as follows:

- Threatened Species Management Sub-plan
- Rehabilitation Sub-plan.

A detailed description of the mitigation measures to be included within the BMP are provided in **Table 9.1** in **Section 9.1**. A summary of the measures to be included within the BMP are as follows:

- Protection of vegetation and threatened species habitat outside of approved disturbance areas, measures to minimise unnecessary disturbance associated with construction and operation.
- Protection of fauna and their habitat through vegetation clearing and fauna management protocols.
- Maximising the salvage of natural resources, including soil, soil seed bank, logs, and rocks for rehabilitation and habitat enhancement.
- Rehabilitation and restoration of temporary disturbance areas.
- Protocols to control and manage weeds, pests, and pathogens.
- Incidental and unexpected finds protocol.
- Enhancement of remnant vegetation and threatened species habitat.
- Minimising impacts to entities at risk of SAII.
- Monitoring and reporting program.

8.0 Impact Assessment

8.1 Impacts Associated with the Removal of Native Vegetation, Threatened Ecological Communities, Threatened Species and Their Habitat

8.1.1 Direct Impacts on Native Vegetation and Threatened Ecological Communities

The Project would directly impact up to 54.34 ha of native vegetation within the Development Footprint. The 54.34 ha of direct impacts to native vegetation represents approximately 5.5% of native vegetation within the Biodiversity Study Area, or 1.7% of the native vegetation within the Assessment Area (500 m buffer to the Development Footprint).

The native vegetation to be directly impacted within the Development Footprint comprises three PCTs across 7 vegetation zones, including:

- Zone 1 PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – Moderate-good.
- Zone 2 PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – Derived-weedy.
- Zone 3 PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – Weedy-understory.
- Zone 4 PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – Moderate-good.
- Zone 5 PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – Derived-native.
- Zone 6 PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – Derived-weedy.
- Zone 8 PCT 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion – Moderate-good.

The Project has avoided direct impacts to Zone 7 PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – Weedy Understory.

Two PCTs to be directly impacted by the Project were found to conform to a single TEC listed under the EPBC Act. PCT 170 Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones and PCT 171 Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion in moderate-good and weedy understorey condition conform to the Mallee Bird Community of the Murray Darling Depression Bioregion listed as endangered under the EPBC Act. The Project would result in direct impacts to approximately 22.76 ha of *Mallee Bird Community of the Murray Darling Depression Bioregion* EEC.

The direct impacts associated with the Project are summarised in **Table 8.1** below and shown on **Figure 8.1** and **Figure 8.2**. A summary of the expected impacts to vegetation integrity as a result of the Project are detailed in **Table 8.2**.

Table 8.1 Summary of Impacts to Native Vegetation

Vegetation Zone	PCT	Broad Condition State	TEC	BC Act	EPBC Act	SAII	Area to be Impacted (ha)	Change (Loss) in Vegetation Integrity Score
Zone 1	PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate-good	-	-	-	No	26.81	-79.4
Zone 2	PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Derived-weedy	-	-	-	*No*	*3.39*	*-35.9*
Zone 3	PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Weedy-understory	-	-	-	*No*	*0.17*	*-75.2*
Zone 4	PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Moderate-good	Mallee Bird Community	-	*E*	*No*	*3.81*	*-61.9*
Zone 5	PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived-native	-	-	-	*No*	*1.15*	*-38.3*
Zone 6	PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived-weedy	-	-	-	*No*	*0.06*	*-44*
Zone 7	PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Weedy Understorey	Mallee Bird Community	-	*E*	*No*	*0*	*0*
Zone 8	PCT 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	Moderate-good	Mallee Bird Community	-	*E*	*No*	*18.95*	*-74.5*
						Total	***54.34***	**-**

Table 8.2 Impacts to Vegetation Integrity

Vegetation Zone	PCT	Broad Condition State	Before Development				After Development				Change (Loss) in Vegetation Integrity Score
			Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score	
Zone 1	PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate-good	90	99.6	55.8	79.4	0	0	0	0	-79.4
Zone 2	PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Derived-weedy	48.3	61.6	15.6	35.9	0	0	0	0	-35.9
Zone 3	PCT 58: Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Weedy-understory	85.6	98.8	50.4	75.2	0	0	0	0	-75.2
Zone 4	PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Moderate-good	84.9	75.1	37.3	61.9	0	0	0	0	-61.9
Zone 5	PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived-native	84.4	37.1	17.9	38.3	0	0	0	0	-38.3
Zone 6	PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived-weedy	66.3	36.7	35	44	0	0	0	0	-44
Zone 8	PCT 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	Moderate-good	99.8	97.8	42.3	74.5	0	0	0	0	-74.5

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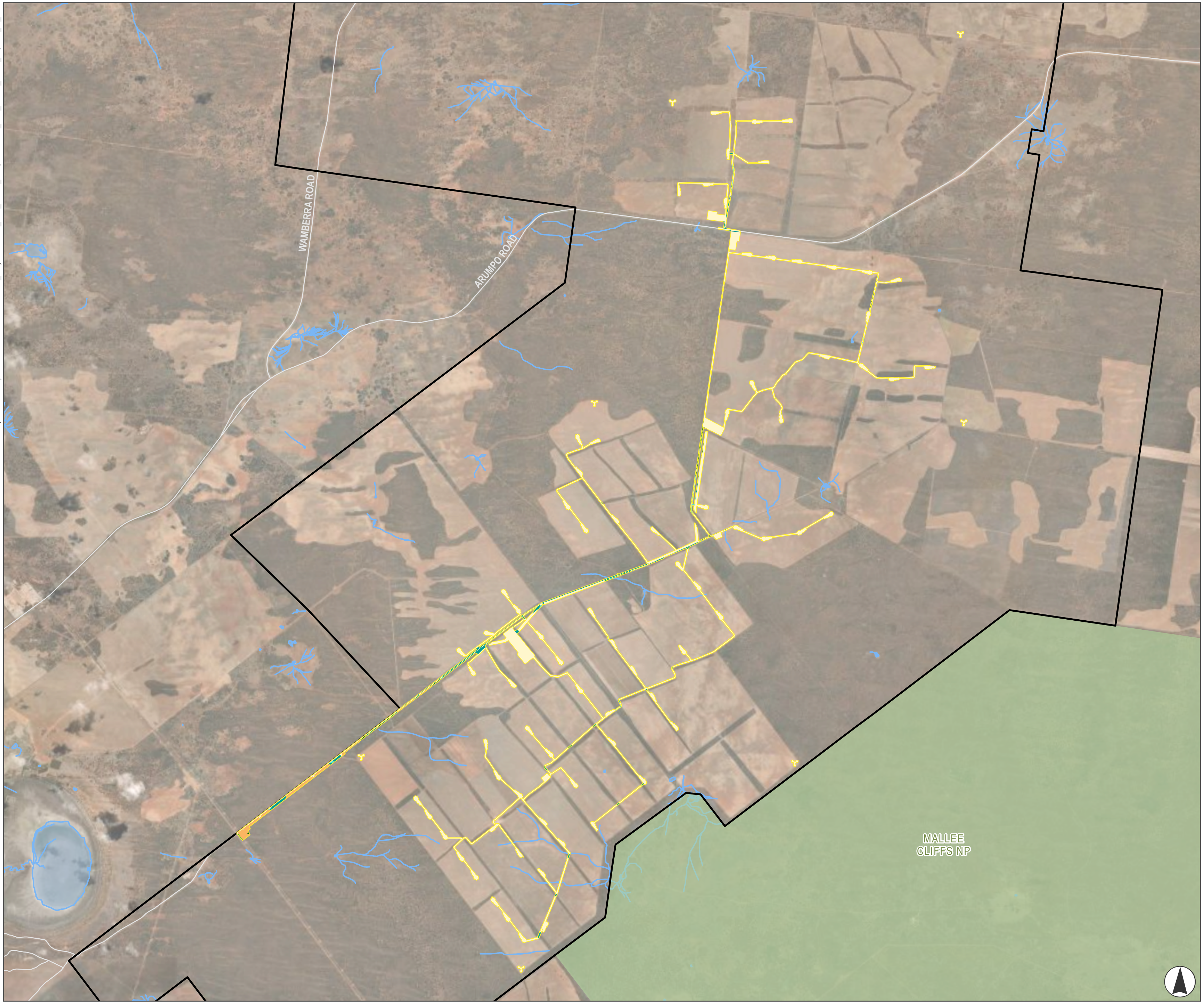

FIGURE 8.1

Direct Impacts to PCTs

Legend

- Project Boundary
- Development Footprint
- Road
- Watercourse
- Waterbody
- NPWS Estates

Plant Community Type

- PCT 58 (Moderate-Good)
- PCT 58 (Derived-Weedy)
- PCT 58 (Weedy understory)
- PCT 170 (Moderate-Good)
- PCT 170 (Derived-Native)
- PCT 170 (Derived-Weedy)
- PCT 171 (Moderate-Good)
- Category 1 – Exempt Land/Cleared/ Structure/ Tracks/ Road

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

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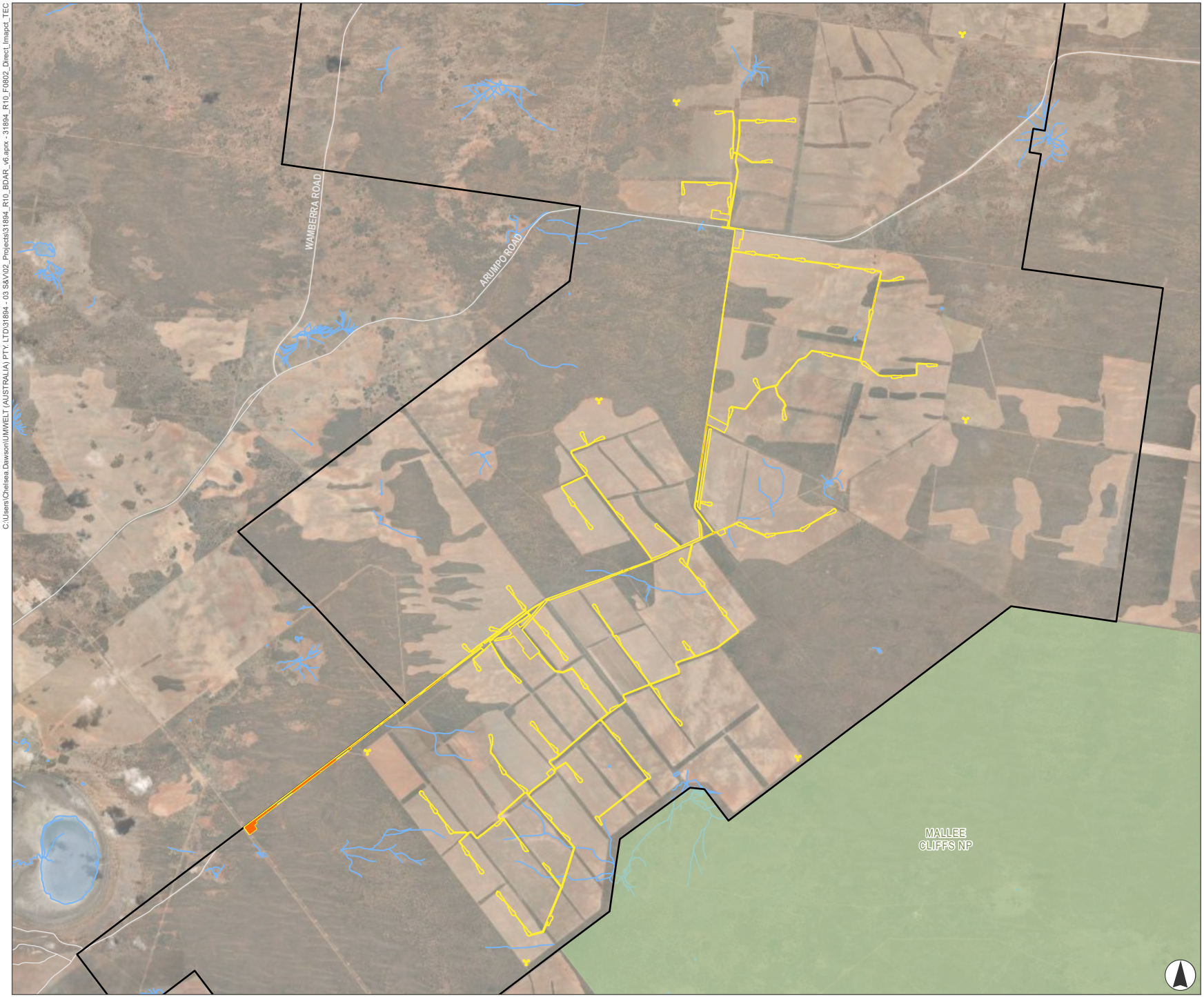

FIGURE 8.2

Direct Impacts to TEC

Legend

- Project Boundary
- Development Footprint
- Road
- Watercourse
- Waterbody
- NPWS Estates

Threatened Ecological Communities - EPBC Act

- Mallee Bird Community of the Murray Darling Depression Bioregion EEC

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

8.1.2 Direct Impacts to Threatened Species

There are no direct impacts to threatened species-credit species or their habitats as none were recorded within the Biodiversity Study Area or Development Footprint during surveys.

8.2 Indirect Impacts

8.2.1 Indirect Impacts

Indirect impacts are those 'that occur when the proposal affects native vegetation and threatened species habitat beyond the Development Footprint or within retained areas. This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts'.

A risk matrix (**Table 8.3** and **Table 8.4**) was applied to indirect impacts, as specified in the BAM, to assess the likelihood of each occurring following the implementation of all mitigation measures. The potential consequences to biodiversity during the construction and operational phases of the Project are described in **Table 8.5**.

Table 8.3 Risk Matrix Criteria

Score	Description
Likelihood of Impact	
Almost certain	Very high or certain probability that impact will occur or event is of continuous nature
Likely	Likely probability that impact will occur or event is frequent (1–5 years)
Possible	Moderate probability that the impact will occur or the event is infrequent (5–20 years)
Unlikely	Low probability that impact will occur or event is very infrequent (100+ years)
Remote	Very low probability that impact will occur or may occur under extenuating circumstances. Event is very rare and stochastic in nature (frequency 1000+ years)
Likelihood of Consequence	
Significant	An impact that is widespread, permanent and may result in large-scale loss of 'critical' habitat
Major	An impact that is widespread, long lasting and may result in large-scale loss of important habitat
Moderate	Large-scale conversion of natural habitat or small-scale conversion of important habitat
Minor	Temporary and localised impact to natural habitat
Insignificant	No measurable impact

Table 8.4 Risk Matrix

		Likelihood of Consequence					
		Unknown	Insignificant	Minor	Moderate	Major	Significant
Likelihood of Impact	Remote	Unknown	Negligible (N)	Negligible (N)	Very Low (VL)	Low (L)	Medium (M)
	Unlikely	Unknown	Negligible (N)	Very Low (VL)	Low (L)	Medium (M)	High (H)
	Possible	Unknown	Very Low (VL)	Low (L)	Medium (M)	High (H)	Very High (VH)
	Likely	Unknown	Low (L)	Medium (M)	High (H)	Very High (VH)	Extreme (E)
	Almost Certain	Unknown	Medium (M)	High (H)	Very High (VH)	Extreme (E)	Extreme (E)
	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

Table 8.5 Potential Indirect Impacts to Biodiversity Including their Extent, Frequency, Timing, Duration and Consequence

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Reduced viability of adjacent habitat due to edge effects	Native vegetation Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term, permanent)	Zones 1-8	During clearing	Likely	Minor	M	Edge effects refer to the changes in ecological conditions that occur at the boundary between two different habitat types, typically where native vegetation meets cleared or disturbed land. Project actions that may contribute to edge effects include earthworks, foot traffic, plant or vehicle movements may lead to introduction or spread of weed species that would reduce the quality and integrity of adjacent native vegetation and habitat. Edge effects may result in increased competition between native fauna species for resources and displacement of native fauna species.
		Operational phase (long-term, permanent)	Unknown	Throughout operational phase	Possible	Minor	L	
Reduced viability of adjacent habitat due	Native vegetation	Construction phase (short-term)	Zones 1-8	Throughout construction phase	Possible	Minor	L	Noise, light and dust will be managed during construction to relevant standards. There is potential

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
to noise, dust or light spill	Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion				Possible		L	for retained areas of habitat in close proximity to construction works to be affected by noise, dust and light spill as follows: Noise and light spill may lead to altered behaviour in fauna species. Increased dust may result in health impacts to fauna and reduced photosynthetic capacity for flora. Any residual noise, light and dust is likely to have negligible impacts on threatened and non-threatened fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Minor			
Transport of weeds and pathogens from the site to adjacent vegetation	Native vegetation Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Moderate	M	Earthworks may result in the movement of weeds across the site and into adjacent vegetation. Vehicle movement may lead to weeds being spread across the site or lead to the introduction of weed species to the site. Increased weed and pathogens may reduce the quality of native vegetation and habitat for native fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Possible	Moderate	M	

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Increased risk of starvation or exposure, and loss of shade or shelter	Native vegetation Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term, permanent)	Unknown	During clearance	Possible	Minor	L	Loss of vegetation may increase the risk of exposure. The removal of foraging habitat may increase competition between native fauna species for remaining resources. Loss of sheltering or breeding habitat may lead to increased competition for remaining resources.
		Operational phase (long-term, permanent)	Unknown	Throughout operational phase	Remote	Minor	N	
Loss of breeding habitat	Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term, permanent)	Zones 1-8	During clearance	Possible	Moderate	M	Loss of vegetation may increase the risk of exposure. The removal of foraging habitat may increase competition between native fauna species for remaining resources. Loss of sheltering or breeding habitat may lead to increased competition for remaining resources.
		Operational phase (long-term, permanent)	Unknown	Throughout operational phase	Remote	Minor	N	

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Rubbish dumping	Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term)	Zones 1-8	Throughout construction phase	Likely	Minor	M	The dumping of rubbish may reduce the quality of native vegetation. May result in injury or mortality to native fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Likely	Minor	M	
Wood collection	Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term)	Unknown	Throughout construction phase	Unlikely	Minor	VL	Unlawful harvesting of timber and fallen logs may reduce quality of native vegetation and the amount of habitat available for native species. Injury or mortality of native fauna species as a result of the removal.
		Operational phase (long-term)	Unknown	Throughout operational phase	Unlikely	Minor	VL	
Removal and disturbance of rocks, including bush rock	Native fauna species and their habitat. Rocks not recorded as part of survey of the Biodiversity Study Area	Construction phase (short-term)	Unknown	During clearance	Remote	Insignificant	N	Reduced availability of habitat or shelter for ground-dwelling native fauna. Injury or mortality of native fauna species as a result of removal or disturbance.
		Operational phase (long-term)	Unknown	Throughout operational phase	Remote	Insignificant	N	

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Increase in predatory and pest species populations	Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Minor	L	Increased human presence, and therefore increased presence of rubbish/food, may result in an increase in the presence of pest species, including predators, in the area. Clearing of vegetation causing a reduction in the area available for fauna species to occupy, resulting in an increased concentration of pest species in an area.
		Operational phase (long-term)	Unknown	Throughout operational phase	Unlikely	Minor	VL	
Increased fire risk	Native vegetation Native fauna species habitat, including the TEC Mallee Bird Community of the Murray Darling Depression Bioregion	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Moderate	M	The use of machinery, particularly in summer, can increase the risk of fire. Storage and utilisation of flammable materials on site can increase fire risk. Human-caused fires may be detrimental to native vegetation and cause injury or mortality to native fauna species.
		Operational phase (long-term)	Unknown	Throughout operational phase	Possible	Moderate	M	

Indirect Impact	Impacted Biodiversity	Timing and Duration	Extent	Frequency	Likelihood of Impact	Likelihood of Consequence	Indirect Impact Level	Summary and Potential Consequences
Pollutant spills	Native vegetation	Construction phase (short-term)	Unknown	Throughout construction phase	Possible	Minor	L	Pollutant spill may contaminate and change the composition of soils, resulting in detrimental impacts to native vegetation.
		Operational phase (long-term)	Unknown	Throughout operational phase	Possible	Minor	L	

8.2.2 Proximity of Wind Turbines to Large Intact Patches of Woody Vegetation

Given the proximity to of the Project to Mallee Cliffs National Park, this assessment has considered a EUROBAT Publication article by Rodrigues et al (2015) regarding the proximity of wind turbines to the National Parks Estate.

This article suggests that wind turbines should be located a minimum of 200 m away from woodlands and forests (or structures that would provide substantial habitat for microbats) to minimise potential turbine strike impacts to microbats.

Importantly, the Rodrigues et al (2015) 200 m distance is to be measured from the tip of the WTG blade, not the WTG tower itself. Considering the precautionary assessment (and 100 m long WTG blade) adopted in this BDAR, the recommended buffer is in the order of 300 m from the WTG locations.

It is noted that whilst a 200 m blade diameter (incl. nacelle) is considered in this BDAR, the blade length for the Project is limited to 85 m based on the Traffic and Transport Impact Assessment (Access Traffic Consulting, 2024).

8.2.2.1 Consideration of Mallee Cliffs National Park

The Rodrigues et al (2015) article focuses on the minimisation of impacts to microbats; however this assessment has considered both bird and bat species that are known, likely or with the potential to inhabit Mallee Cliffs National Park.

Mallee Cliffs National Park provides high quality habitat for woodland birds, and due to its size and lack of ongoing disturbances, provides better habitat than the habitats present within the Project Area. The Project Area contains extensive cropping and a large portion of the impacts associated with the Development Footprint occur to windrow remnants of native vegetation with large edge effects.

Mallee Cliffs National Park may also provide suitable foraging and breeding habitat for hollow dependant microbats species, predicted to occur within the Development Footprint. The habitat buffer described in the Rodrigues et al (2015) article was considered by the Project during the design phase of the Project.

No WTGs are located within the 300 m recommended buffer (established as above with due regard to Rodrigues et al (2015)) of the Mallee Cliffs National Park.

The closest WTG is located approximately 800 m (700 m from the assumed worst-case blade tip) away from the boundary of the National Park, exceeding the recommended buffer by at least 400 m. The location of WTGs being situated beyond the 800 m buffer from the National Park is a result of careful and considered avoidance and minimisation of the Project design following direct feedback from the biodiversity assessment (refer to **Section 7.0**).

It is understood that habitat fragmentation from project disturbance can result in increased predatory movements, that may result in predator species congregating into intact environments, including National Parks. However, with consideration to the disturbed nature of the existing site, works are not expected to influence the number of predators impacting the Mallee Cliffs National Park and the feral predator-free area. This expected negligible impact is further justified by the implementation of the 800 m (increased from 300 m) site impact buffer between the southeastern WTG and the Mallee Cliffs Natural Park, and the existence of the 37.2 km feral predator-proof fence surrounding the perimeter of the Mallee Cliffs National Park.

Detailed consideration of appropriate buffers to the National Park are also provided in **Section 7.0** of the Project's EIS (Umwelt, 2024). **Figure 8.3** shows the proximity of the WTGs to Mallee Cliffs National Park.

8.2.3 Consideration of Local Waterbodies in the Greater Landscape

Indirect impacts to waterbirds from the Project are primarily associated with operational turbine strike risk. No significant waterbodies are present within the Development Footprint, and the only aquatic environment consists of minor farm dams within the broader study area. It is noted that the greater landscape surrounding the Project contains several waterbodies including Etiwanda Wetlands (9 km west of the Project Area), Gol Gol Swamp (2 km north-west of the south-west boundary of the Project Area), Lake Gol Gol (7 km west of the Project Area) and (Mildura Wastewater Treatment Plant (12 km west of the Project Area). However, the Project design incorporates substantial setbacks from property boundaries and intact native vegetation to avoid and minimise impacts to these migratory species. The closest turbines to Gol Gol Swamp, Lake Gol Gol and Milduran Wastewater Treatment Plant are 8.7 km, 11.8 km and 17.6 km, respectively.

Species listed under the BC Act and/or EPBC Act that have been recorded or are predicted to occur within Lake Gol Gol and Gol Gol swamp that may be subject to turbine strike through movement among waterbodies include:

- Australasian bittern (*Botaurus poiciloptilus*)
- Australian painted snipe (*Rostratula australis*)
- Blue-billed duck (*Oxyura australis*)
- Caspian tern (*Hydroprogne caspia*)
- Common greenshank (*Tringa nebularia*)
- Curlew sandpiper (*Calidris ferruginea*)
- Freckled duck (*Stictonetta naevosa*)
- Marsh sandpiper (*Tringa stagnatilis*)
- Pectoral sandpiper (*Calidris melanotos*)
- Pink cockatoo (*Lophochroa leadbeateri*)
- Purple-crowned lorikeet (*Glossopsitta porphyrocephala*)
- Latham's Snipe (*Gallinago hardwickii*)
- Red-necked Stint (*Calidris ruficollis*)
- Sharp-tailed Sandpiper (*Calidris acuminata*).

These species are not considered resident within the Project Area but may occasionally fly over as they move between the Murray River and associated wetlands. The risk of impact to the above species has been further assessed in Table 3.1 and Table 8.26 of **Appendix B**.

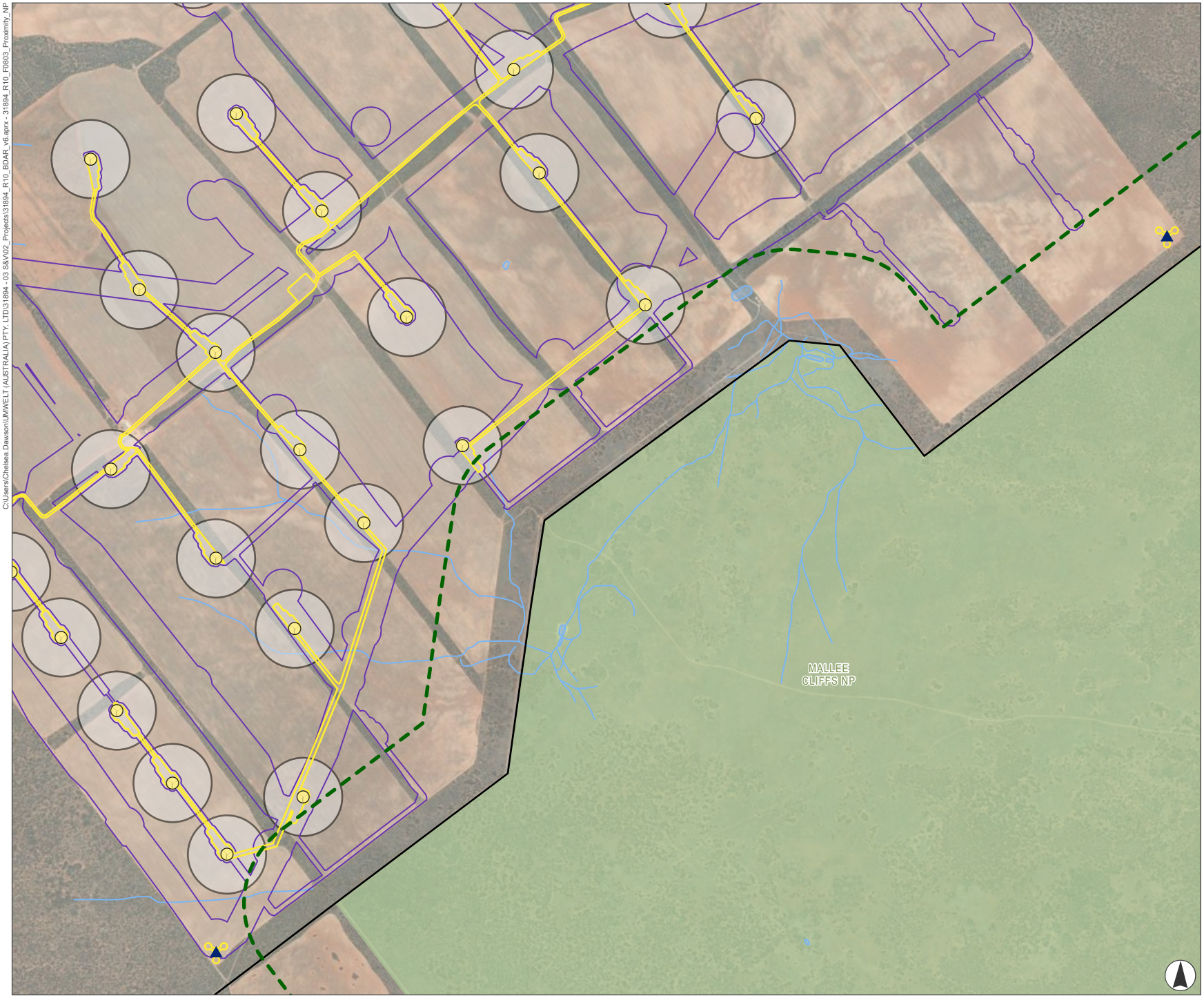

FIGURE 8.3

Mallee WF - Proximity to Mallee Cliffs National Park

Legend

- Project Boundary
- Disturbance Footprint
- Biodiversity Study Area
- Watercourse
- Waterbody
- NPWS Estates
- NPWS Estate 700m Buffer
- 300m Turbine Buffer
- Wind Turbine Generators
- Permanent Meteorological Masts

0 1 2

Kilometres

Scale 1:40,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

8.3 Prescribed Biodiversity Impacts

Prescribed impacts are described in **Section 6.0** and an assessment of prescribed impacts is provided in the following sections.

No threatened entities are considered likely to be dependent upon or may use habitat features associated with any of the prescribed impacts. The impacts of wind turbine strike on protected animals are considered in detail in **Appendix B**.

8.3.1 Human-Made Structures and Non-Native Vegetation

No human-made structures would be affected by the Development Footprint. An assessment of non-native vegetation is provided in **Table 8.6**.

Table 8.6 Potential Impacts on Threatened Entities Associated with Human-Made Structures and Non-Native Vegetation

Threatened entity	Human-made structures and/or non-native vegetation with potential to be habitat	Nature, extent and duration of short and long-term impacts due to removal of structures and/or non-native vegetation	Importance within the bioregion of the habitat to the threatened entity	Consequences of the impacts for the local and bioregional persistence
Raptor species	The non-native vegetation consists of extensive areas of cropped paddocks, with the northern property also grazed.	Approximately 290 ha of non-native will be permanently removed during construction for the life of the Project.	Raptor species forage over vast areas and a wide variety of habitat. Given this, it is unlikely that the non-native vegetation to be removed within the Development Footprint is significantly important to these threatened entities. A substantial amount of cropped paddocks will remain within the Project Area.	As the non-native vegetation within the Development Footprint is not considered important to the threatened entities, it is unlikely that the removal will impact the local and bioregional persistence of these species.

8.3.2 Habitat Connectivity

As assessment of the impacts of the Project on habitat connectivity, which facilitates the movement of threatened species across their range, within the Development Footprint and Biodiversity Study Area is provided in **Table 8.7**. Habitat connectivity represented by woody vegetation is displayed on **Figure 3.4**.

Table 8.7 Potential Impacts on Connectivity of Habitat of Threatened Entities

Threatened entity	Nature, extent and duration of short and long-term impacts to connectivity	Importance of the area of connectivity within the bioregion and to the lifecycle of the species	Consequences of the impacts for the local and bioregional persistence
All threatened fauna species, recorded or predicted to occur in the Development Footprint	During construction 54.34 ha of native vegetation will be permanently removed from the Development Footprint.	A large portion of the impacts to native vegetation are associated with windrows between paddocks. Spark Renewables has designed the Project to make use of existing cleared areas (cropped, existing tracks) to minimise impacts on native vegetation. These windrows would provide movement for local populations of fauna species. The southern portion of the Development Footprint includes the construction of a transmission line. This has been designed to be located adjacent to an existing cleared access road with intent of minimising further fragmentation of habitat in the region. This transmission line runs through a large area of remnant vegetation being used by local populations of fauna species.	The minor impacts to remnant vegetation associated with the windrows would result in negligible loss of connectivity and movement corridors for native fauna species. The majority of the windrow vegetation will remain and facilitate fauna movement across the Project Area. The transmission line easement will result in approximately 50 m of native vegetation being removed and further fragmenting large remnant habitat to the north and south. All threatened fauna species recorded within the Biodiversity Study Area are highly mobile (bird and bat species) and the consequences to connectivity of habitat is considered to be minor. Additionally the easement will be maintained as low vegetation which will still facilitate movement of fauna species across this area.

8.3.3 Water Bodies, Water Quality and Hydrological Processes

No waterbodies are present within the Development Footprint. Three farm dams were identified within the Biodiversity Study Area; however these will not be impacted by the Project. As a result there will be no impacts to waterbodies, water quality or hydrological processes.

Water and erosion management controls will be employed to minimise erosion and discharge of sediment and other pollutants during construction.

8.3.4 Wind Turbine Strike

Umwelt has prepared a detailed Prescribed Impact Assessments to consider the potential impacts from turbine strikes on significant bird and bat species. These assessments have been prepared in accordance with Section 6.1.5 and 8.3.5 of the BAM (DPE 2020a). The prescribed impacts assessment is provided in full in **Appendix B**.

The following data sources were examined to assess which species, in addition to those recorded in the Project Area in 2022 to 2024, may occur in the Project Area:

- Ecosystem credit predicted species database (BAM-C).
- PMST for MNES (DCCEEW 2024).
- BioNet Atlas Threatened Biodiversity Profile Data Collection (NSW DCCEEW 2024a).
- SEARs issued on 17 February 2023 and Supplementary SEARs dated 7 June 2023 (as varied by Spark Renewables under Section 156B of the EPBC Act and accepted by Commonwealth DCCEEW on 4 September 2024).

Candidate bird and bat species lists comprising species that were either recorded or are predicted to occur in the vicinity of the Project Area are provided in **Appendix B**. The candidate lists comprise 166 bird and 16 bat species, respectively, and the Mallee Bird Community of the Murray Darling Depression EEC.

Of these, a further 147 bird and 16 bat species were considered for further assessment due to their known presence in the Project Area or their likelihood of occurrence being moderate or high. A summary of recorded threatened or key bird and bat species that detailed risk assessments were conducted for is provided in **Table 8.8**. This includes 16 bird species, 16 bat species and the ten bird species included the Mallee Bird Community of the Murray Darling Depression EEC that were recorded in the Project Area. Details of the additional 150 bird species that were assessed are provided in **Appendix B**.

Umwelt has prepared the prescribed impact assessment in a consistent approach to the assessment of turbine strike that Umwelt prepared for the Rye Park Wind Farm project which was granted approval to modify the Development Consent in April 2021 (SSD-6693). In addition, the method has been used for Thunderbolt Wind Farm (SSD-10807896), Spicers Creek Wind Farm (SSD-41134610), Liverpool Range Wind Farm (SSD-6696-Mod-1), and Bullawah Wind Farm (SSD-50505215). Thunderbolt, Spicers Creek and Liverpool Range wind farms have received approval whereas, the Bullawah Wind Farm (SSD-50505215) EIS (incl. BDAR) has completed its response to submissions phase and is currently (as at 16 March 2025) undergoing assessment. The approach was initially designed in consultation with the Queanbeyan BCS (of the NSW DCCEEW) but has been applied to the aforementioned wind farms and this Project to maintain consistency in the preparation of assessment material as we believe this is critical to ensuring consistent assessment of projects throughout NSW. The methodology adopted to complete the qualitative collision risk assessment, including an explanation of the likelihood and consequence scores and overall risk rating matrix, is set out in **Appendix B**.

Table 8.8 Potential Impacts of Wind Turbine Strikes on Threatened and other Specified Fauna

Common Name	Species Name	Likelihood	Consequence	Risk Rating
Threatened / Migratory Birds				
black falcon	*Falco subniger*	High	Moderate	High
chestnut quail-thrush	*Cinclosoma castanotum*	Low	Low	Negligible
dusky woodswallow	*Artamus cyanopterus cyanopterus*	Moderate	Low	Minor
Gilbert's whistler	*Pachycephala inornata*	Low	Low	Negligible
hooded robin (south-eastern subspecies)	*Melanodryas cucullata cucullata*	Low	Low	Negligible
little eagle	*Hieraaetus morphnoides*	High	Moderate	High
Pacific swift	*Apus pacificus*	High	Low	Moderate
pied honeyeater	*Certhionyx variegatus*	Low	Low	Negligible
regent parrot (eastern subspecies)	*Polytelis anthopeplus monarchoides*	Moderate	Moderate	Moderate
shy heathwren	*Hylacola cautus*	Low	Low	Negligible
southern whiteface	*Aphelocephala leucopsis*	Low	Low	Negligible
spotted harrier	*Circus assimilis*	High	Moderate	High
square-tailed kite	*Lophoictinia isura*	Moderate	Moderate	Moderate
varied sittella	*Daphoensitta chrysoptera*	Low	Low	Negligible
white-fronted chat	*Epthianura albifrons*	Low	Low	Negligible
Mallee Bird Community EEC: regent parrot		Moderate	Moderate	Moderate
Mallee Bird Community EEC: chestnut quail-thrush, crested bellbird, Jacky winter, shy heathwren, splendid fairy-wren, spotted pardalote, white-eared honeyeater, white-fronted honeyeater and yellow-plumed honeyeater		Low	Low	Negligible
Non-listed Birds				
wedge-tailed eagle	*Aquila audax*	High	Low	Moderate

Common Name	Species Name	Likelihood	Consequence	Risk Rating
Bats				
Corben's long-eared bat	*Nyctophilus corbeni*	Moderate	Moderate	Moderate
inland forest bat	*Vespadelus baverstocki*	Moderate	Moderate	Moderate
little pied bat	*Chalinolobus picatus*	Moderate	Moderate	Moderate
yellow-bellied sheathtail bat	*Saccolaimus flaviventris*	Moderate	Moderate	Moderate
Non-listed Bats				
chocolate wattled bat	*Chalinolobus morio*	Moderate	Low	Minor
Gould's long-eared bat	*Nyctophilus gouldi*	Moderate	Low	Minor
Gould's wattle bat	*Chalinolobus gouldii*	High	Low	Moderate
inland broad-nosed bat	*Scotorepens balstoni*	High	Low	Moderate
inland free-tailed bat	*Ozimops petersi*	High	Moderate	High
lesser long-eared bat	*Nyctophilus geoffroyi*	Moderate	Low	Minor
little broad-nosed bat	*Scotorepens greyii*	Moderate	Low	Minor
little forest bat	*Vespadelus vulturnus*	High	Low	Moderate
Ride's free-tailed bat	*Ozimops ridei*	High	Moderate	High
southern forest bat	*Vespadelus regulus*	Moderate	Low	Minor
southern free-tailed bat	*Ozimops planiceps*	Moderate	Moderate	Moderate
white-striped freetail-bat	*Austronomus australis*	High	Moderate	High

The prescribed impact assessment for turbine strike, assessed those aerial species considered to have a Moderate or High risk rating furth in the context of mitigation measures that would be considered and applied in the event of an impact trigger. In the event of such an impact trigger, through the BBAMP, the Project would be required to implement species-specific mitigation measures to manage the risk of turbine strike on the species. The intended result of implementing species-specific mitigation measures is that the risk rating for the species is reduced, i.e. residual risk rating. Full details of the impact trigger thresholds, post trigger responses and mitigation measures would be prepared and finalised in the BBAMP through consultation with CPHR and/or Commonwealth DCCEEW.

The residual risk ratings are presented in **Table 8.9**.

Table 8.9 Residual Risk Ratings

Common Name	Species Name	Likelihood	Consequence	Unmitigated Risk Rating	Residual Risk Rating
Threatened / Migratory Birds					
black falcon	*Falco subniger*	High	Moderate	High	Moderate
chestnut quail-thrush	*Cinclosoma castanotum*	Low	Low	Negligible	Negligible
dusky woodswallow	*Artamus cyanopterus cyanopterus*	Moderate	Low	Minor	Minor
Gilbert's whistler	*Pachycephala inornata*	Low	Low	Negligible	Negligible
hooded robin (south-eastern subspecies)	*Melanodryas cucullata cucullata*	Low	Low	Negligible	Negligible
little eagle	*Hieraaetus morphnoides*	High	Moderate	High	Moderate
Pacific swift	*Apus pacificus*	High	Low	Moderate	Minor
pied honeyeater	*Certhionyx variegatus*	Low	Low	Negligible	Negligible
regent parrot (eastern subspecies)	*Polytelis anthopeplus monarchoides*	Moderate	Moderate	Moderate	Minor
shy heathwren	*Hylacola cautus*	Low	Low	Negligible	Negligible
southern whiteface	*Aphelocephala leucopsis*	Low	Low	Negligible	Negligible
spotted harrier	*Circus assimilis*	High	Moderate	High	Moderate
square-tailed kite	*Lophoictinia isura*	Moderate	Moderate	Moderate	Minor
varied sittella	*Daphoensitta chrysoptera*	Low	Low	Negligible	Negligible
white-fronted chat	*Epthianura albifrons*	Low	Low	Negligible	Negligible
Mallee Bird Community EEC: regent parrot		Moderate	Moderate	Moderate	Minor

Common Name	Species Name	Likelihood	Consequence	Unmitigated Risk Rating	Residual Risk Rating
Mallee Bird Community EEC: chestnut quail-thrush, crested bellbird, Jacky winter, shy heathwren, splendid fairy-wren, spotted pardalote, white-eared honeyeater, white-fronted honeyeater and yellow-plumed honeyeater		Low	Low	Negligible	Negligible
Non-listed Birds					
wedge-tailed eagle	*Aquila audax*	High	Low	Moderate	Minor
Bats					
Corben's long-eared bat	*Nyctophilus corbeni*	Moderate	Moderate	Moderate	Minor
inland forest bat	*Vespadelus baverstocki*	Moderate	Moderate	Moderate	Minor
little pied bat	*Chalinolobus picatus*	Moderate	Moderate	Moderate	Minor
yellow-bellied sheathtail bat	*Saccolaimus flaviventris*	Moderate	Moderate	Moderate	Minor
Non-listed Bats					
chocolate wattled bat	*Chalinolobus morio*	Moderate	Low	Minor	Minor
Gould's long-eared bat	*Nyctophilus gouldi*	Moderate	Low	Minor	Minor
Gould's wattle bat	*Chalinolobus gouldii*	High	Low	Moderate	Minor
inland broad-nosed bat	*Scotorepens balstoni*	High	Low	Moderate	Minor
inland free-tailed bat	*Ozimops petersi*	High	Moderate	High	Moderate
lesser long-eared bat	*Nyctophilus geoffroyi*	Moderate	Low	Minor	Minor
little broad-nosed bat	*Scotorepens greyii*	Moderate	Low	Minor	Minor
little forest bat	*Vespadelus vulturnus*	High	Low	Moderate	Minor
Ride's free-tailed bat	*Ozimops ridei*	High	Moderate	High	Moderate
southern forest bat	*Vespadelus regulus*	Moderate	Low	Minor	Minor

Common Name	Species Name	Likelihood	Consequence	Unmitigated Risk Rating	Residual Risk Rating
southern free-tailed bat	*Ozimops planiceps*	Moderate	Moderate	Moderate	Minor
white-striped freetail-bat	*Austronomus australis*	High	Moderate	High	Moderate

8.4 Serious and Irreversible Impacts

8.4.1 Assessment for Serious and Irreversible Impacts on Biodiversity Values

The determination of a Serious and Irreversible Impact (SAII) is to be made by the decision maker in accordance with the principles set out in the BC Regulation 2017. Under Clause 6.7 (2) of the BC Regulation 2017, an impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because of one of the following four principles:

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

The Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact (DPIE 2019b) and the Threatened Biodiversity Profile Data Collection was reviewed to determine the SAII candidates relevant to the assessment. Following this review and biodiversity assessment for the Project, there are no SAII candidate species present and as such no SAII assessment is required or presented in this revised BDAR.

8.4.2 Additional Impact Assessment Provisions for TECs at Risk of an SAII

No TECs present in the Biodiversity Study Area (including the Development Footprint) are listed as SAII entities and no further assessment has been undertaken.

8.5 Matters of National Environmental Significance

An EPBC Act referral was submitted to Commonwealth DCCEEW in March 2023 regarding Matters of National Environmental Significance (MNES). A 'Controlled Action' decision was made by the Minister for the Environment and Water (formerly Department of Agriculture, Water and the Environment) in June 2023. To meet the requirements of the Supplementary SEARs (as varied under Section 156B of the EPBC Act and accepted by Commonwealth DCCEEW on 4 September 2024), a detailed MNES Report for threatened and migratory entities listed under the EPBC Act is provided in **Appendix C**.

Species included for assessment in the report include those that are listed within the Supplementary SEARs (as varied under Section 156B of the EPBC Act and accepted by Commonwealth DCCEEW on 4 September 2024) as being potentially impacted by the Project, and any other that have a moderate to high likelihood of occurrence. Assessments of Significance for threatened and migratory entities were undertaken and are included in Appendix A of the MNES Report (**Appendix C**).

In Summary:

- One (1) TEC, Mallee Bird Community of the Murray Darling Depression, listed under the EPBC Act was recorded in the Development Footprint.
- Three (3) threatened species and one (1) migratory species listed under the EPBC Act were recorded within the Development Footprint.
- An additional five (5) species that were not recorded during surveys have potential to use habitat within the Development Footprint and have potential to be impacted by the Project during construction and operational phases.
- A further 12 threatened species were identified that do not have habitat within the Development Footprint, but have potential to be impacted by the Project during the operational phase.

A summary of the impacts of the Proposed Action, their nature and consequences to MNES are provided in **Table 8.9**.

Table 8.10 Summary of the Impacts of the Project, their Nature and Consequences to MNES

MNES	Nature and consequence of impact (direct and indirect)	Duration of Impact	Quantum of Impact	Consequence of Impact (local, state or national)
Mallee Bird Community EEC	Direct removal of habitat	Construction	• PCT 170: Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (Moderate-good, Zone 4) = 3.81 ha • PCT 171: Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion (Moderate-good, Zone 8) = 18.95 ha. Total = 22.76 ha.	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for these ten species recorded ranges from Negligible (for the nine passerines) – Minor (regent parrot).	Local
Australasian bittern	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Moderate.	Local
curlew sandpiper	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
pink cockatoo	Direct removal of habitat	Construction	54.34 ha (Foraging habitat).	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Moderate.	Local

MNES	Nature and consequence of impact (direct and indirect)	Duration of Impact	Quantum of Impact	Consequence of Impact (local, state or national)
south-eastern hooded robin	Direct removal of habitat	Construction	54.34 ha.	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Negligible.	Local
Australian painted snipe	Australian painted snipe	Prescribed impacts – turbine strike	Operational.	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Moderate.
common greenshank	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
southern whiteface	Direct removal of habitat	Construction	54.34 ha.	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Negligible.	Local
sharp-tailed sandpiper	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
grey falcon	Direct removal of habitat	Construction	54.34 ha.	Local

MNES	Nature and consequence of impact (direct and indirect)	Duration of Impact	Quantum of Impact	Consequence of Impact (local, state or national)
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum.	Local
Latham's snipe	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum.	Prescribed impacts – turbine strike
painted honeyeater	Direct removal of foraging habitat	Construction	30.37 ha.	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
Malleefowl	Direct removal of foraging habitat	Construction	23.98 ha.	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
blue-winged parrot	Direct removal of foraging habitat	Construction	54.34 ha.	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
Corben's long-eared bat	Direct removal of foraging habitat	Construction	54.34 ha.	Local
	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
	Direct removal of foraging habitat	Construction	54.34 ha (Foraging habitat).	Local

MNES	Nature and consequence of impact (direct and indirect)	Duration of Impact	Quantum of Impact	Consequence of Impact (local, state or national)
regent parrot (eastern subspecies)	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Moderate.	Local
fork-tailed swift or Pacific swift	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Moderate.	Local
pectoral sandpiper	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum.	Prescribed impacts – turbine strike
red-necked stint	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Minor.	Local
gull-billed tern	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Negligible.	Local
Caspian tern	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Negligible.	Local
marsh sandpiper	Prescribed impacts – turbine strike	Operational	The indirect impacts are difficult to quantify, as such their quantum has not been estimated. The overall risk rating for this species is Negligible.	Local

8.6 Aquatic Impacts

There are limited mapped watercourses within the Project Area, all of which are of a minor nature. The only aquatic habitat associated with the Biodiversity Study Area comprises three farm dams, these however will not be impacted by the Project as part of the Development Footprint. No other aquatic habitats are present within the Biodiversity Study Area. No habitat for any threatened species listed under the FM Act is present within the Development Footprint.

Water and erosion management controls will be employed to minimise erosion and discharge of sediment and other pollutants during construction.

8.7 Cumulative Impacts

The Energy Corporation of NSW (EnergyCo), a NSW statutory authority, seeks to maximise opportunities created by the transformation of the NSW electricity system by coordinating investment in REZs across NSW. A REZ is the equivalent of modern-day power stations, combing new renewable energy infrastructure, including generators (such as solar and wind farms), storage (such as batteries and pumped hydro) and then high-voltage transmission infrastructure. Five (5) dedicated REZs have already been identified in NSW. As discussed in Section 2.0, the Project is located wholly within the South West REZ.

Because of this, and the REZ benefits anticipated by EnergyCo, the South West REZ has the potential to see strong interest for renewable energy development. Cumulative impacts occur when the impacts from multiple projects or developments combine and the compounding effects are larger than any one of the projects itself has quantified and assessed.

The Project will contribute to cumulative impacts on biodiversity during construction and operation from all major projects (operational, under construction, approved and proposed) in the vicinity within the South West REZ. It is considered likely that cumulative impacts will increase the loss of similar native vegetation and threatened species habitat to the Project in the region.

A review of publicly available relevant clean energy projects and other major projects known at the time of finalisation of this BDAR and within the South West REZ has been undertaken. Potential cumulative biodiversity impacts are provided in **Table 8.10**.

The final composition of renewable energy development in the South West REZ will largely be determined by the NSW Government allocation of access rights to the limited transmission infrastructure present. The intended capacity of the South West REZ is 2.5 GW with registered interest well in excess of this. It is therefore expected that there will be more proposed projects than the intended capacity and cumulative impacts required to build the South West REZ to its maximum capacity will potentially be less than that predicted for the full extent of all projects currently proposed.

Impact information compiled from projects in initial planning stages are not accurate and the final impacts may be more or less than the data presented.

Table 8.11 Past, Present and Future Projects

DRAFTING NOTE: Spark - please note that the status of these projects will be check and updated with the draft final revised BDAR i.e. closer to submission to DPHI

Project	Duration	Biodiversity Value Impacted			Construction Impacts	Operational Impacts
		PCTs and TECs	Threatened Flora	Threatened Fauna		
Gol Gol Energy Hub (SEARs requested)	Less than 3 km	Three TECs have a moderate-high potential to occur on the subject land, these include: Acacia loderi shrublands, Acacia melvillei shrublands in the Riverina and Murray Darling Depression bioregions and Mallee Bird Community of the Murray Darling Depression Bioregion, EPBC Act.	No targeted flora survey undertaken yet. Two threatened flora species are known to occur on or nearby the project investigation area.	No targeted fauna survey undertaken. 34 threatened fauna species are known to occur on or nearby the project investigation area.	Installation of PV panels with a generation capacity of up to 600 MW, accommodated within an area of approximately 1,500 ha • Associated infrastructure (underground powerlines, access tracks)Up to 120 WTG's, with 840 MW capacity • Total Generation capacity = 1440 MW	120 WTGs and associated infrastructure – collision and traffic risks
Euston Wind Farm (Prepare EIS Stage)	Nearest boundary is approximately 30 km away	Six PCTs confirmed within the Study Area (PCTs 13, 57, 58, 170, 170, 172). One confirmed TEC (Mallee Bird Community of the Murray Darling Depression Bioregion, EPBC Act) and a further four possible TECs require additional floristic surveys to confirm presence. The four possible TECs include: Plains mallee box woodlands of the Murray Darling Depression and Riverina and Naracoorte Coastal Plain Bioregions, EPBC Act, Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions, Porcupine Grass— Red Mallee—Gum Coolabah hummock grassland/low sparse woodland in the Broken Hill Complex Bioregion, Acacia loderi shrublands.	No threatened flora.	Seven threatened species include brown treecreeper, chestnut quail-thrush, hooded robin, little eagle, pink cockatoo, spotted harrier and white-fronted chat.	~96 WTGs, Generation Capacity = 700 MW (AC)	96 WTGs and associated infrastructure
Euston Mineral Sands (Prepare EIS stage)	Overlapping boundaries	Similar to Mallee Wind Farm.	Similar to Mallee Wind Farm.	Similar to Mallee Wind Farm.	6000 ha of open cut mining	Dust, noise, traffic

Project	Duration	Biodiversity Value Impacted			Construction Impacts	Operational Impacts
		PCTs and TECs	Threatened Flora	Threatened Fauna		
Koorakee Energy Park (Prepare EIS Stage)	Nearest boundary is approximately 45 km south east	Ten PCTs noted as potentially present. Four TECs are considered with a moderate to high likelihood of occurring: Acacia loderi shrublands EEC, Acacia melvillei shrublands in the Riverina and Murray-Darling Depression bioregions EEC, Mallee Bird Community of the Murray Darling Depression Bioregion EEC and Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions EEC.	2 flora species are known to occur on or nearby the site according to NSW BioNet Atlas database records and preliminary surveys conducted for the Euston Wind Farm Scoping Report.	17 fauna species are known to occur on or nearby the site according to NSW BioNet Atlas database records and preliminary surveys conducted for the Euston Wind Farm Scoping Report.	up to 167 WTGs, 3 blade system ~2.2 million solar panels	up to 167 WTGs and associated infrastructure
Keri Keri Wind Farm (EIS submitted)	Nearest boundary is approximately 150 km away	The subject land comprises 1,130.93 ha of native vegetation (PCTs 26, 44, 160, 163, 164).	Candidate flora species recorded include *Brachyscome papillosa*, *Maireana cheelii* and Swainsona murrayana.	One candidate fauna species was recorded within the subject land – little eagle.	884 MW wind farm comprising up to 155 WTGs, and a solar farm with 400 MW solar PV and 200 MW/ 800 MW/hour BESS	155 WTGs and associated infrastructure
Lake Victoria Wind Farm (prepare EIS Stage)	Nearest boundary is approximately 65 km away	19 PCTs were mapped within the proposed works footprint. Pct 154 makes up of ~70% of the works footprint. Two TECs were identified within the Project area, these include Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions and Mallee Bird Community of the Murray Darling Depression Bioregion, EPBC Act.	The initial survey identified one threatened flora species (*Austrostipa nullanulla*). Additional survey still to be completed.	The initial survey identified three threatened fauna species (Pink Cockatoo, Southern Whiteface and White-fronted Chat). Additional survey still to be completed.	203 wind turbine generators (WTGs) with generation capacity of up to 1.5 GW	203 WTGs with generation capacity of up to 1.5 GW
Junction Rivers Wind Farm (formerly Burrawong WF) (EIS submitted)	Nearest boundary is approximately 120 km away	The subject land comprises 2,248 ha of native vegetation (PCTs 16, 21, 23, 57, 58, 163, 170). Two TECs: *Acacia melville*i Shrubland in the Riverina and Murray-Darling Depression bioregions EEC and Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions EEC.	Assumed presence have been included for • Menindee nightshade (*Solanum karsense*) • mossgiel daisy (*Brachyscome papillosa*) • winged peppercress (*Lepidium monoplocoides*). Bitter quandong (*Santalum murrayanum*) and *Austrostipa metatoris* were both recorded on the subject land but have been avoided by the project.	Two candidate fauna species was recorded within the subject land (pink cockatoo and regent parrot). Regent parrot was not recorded breeding, as such species credits are not required for this species.	96 WTGs and associated infrastructure, Capacity 750 MW.	96 WTGs and associated infrastructure.

Project	Duration	Biodiversity Value Impacted			Construction Impacts	Operational Impacts
		PCTs and TECs	Threatened Flora	Threatened Fauna		
Wilan Energy Park (Prepare EIS stage)	Nearest boundary is approximately 140 km away	Areas of non-native vegetation and Category 1 land occur in places subject to previous irrigated and dryland cropping or heavy grazing.	Threatened species known or predicted to include: *Austrostipa metatoris*, *Brachyscome papillosa*, *Maireana cheelii*, *Lepidium monoplocoides*, *Solanum karsense, Swainsona murrayana*. Mossgiel Daisy and Chariot Wheels have been recorded in the project area.	There are 31 threatened fauna species that have potential to occur in the project area.	Up to 138 WTGs. Ancillary electrical equipment and operations and maintenance facilities. Capacity ~1000 MW	Up to 138 WTGs and associated infrastructure
Baldon Wind Farm (Prepare EIS stage)	Nearest boundary is approximately 160 km away	The SVTM mapping shows 17 PCTs on the subject land, these include (PCTs 13, 15, 17, 24, 28, 46, 57, 153, 157, 159, 160, 163, 164, 166, 216, 236, 238). This mapping is yet to be verified.	One flora species were recorded within the Project Boundary – *Maireana cheelii*. An additional 3 species have the potential to occur.	Two fauna species are recorded within the Project Boundary: Spotted Harrier, Plains-wanderer. Another 20 threatened species have the potential to occur.	Construction of 162 WTGs and associated infrastructure providing about 1,000 MW	162 WTGs and associated infrastructure
Bullawah Wind Farm (under assessment)	Nearest boundary is approximately 250 km away	10 PCTs identified in the Subject Land with estimated impacts to 637.99 ha of native vegetation. Impacts to three TECs being: • Weeping Myall Woodlands • Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions • Sandhill Pine Woodland.	Four threatened flora species were recorded within the Project Area: • *Maireana cheelii* • *Swainsona sericea* • *Swainsona murrayana* • *Lepidium monoplocoides*. Two threatened flora species have been assumed present within the Subject Land – • *Austrostipa wakoolica* • *Cullen parvum*.	14 threatened fauna species were recorded within the Subject Land: • plains-wanderer • black falcon • Southern whiteface • little eagle • spotted harrier • blue-winged parrot • barking owl • diamond firetail • flame robin • grey-crowned babbler • white-fronted chat • yellow-bellied sheathtail-bat • southern bell frog.	Construction of up to 143 WTGs and approximately 815.1 MW capacity	Includes up to 143 WTGs and associated infrastructure
Pottinger Wind Farm (Determined)	Nearest boundary is approximately 235 km away	Estimated impacts to 1,004.60 ha of native vegetation comprised of 19 PCTs identified in the Project Area. Three TECs (BC Act) and one TEC (EPBC Act) recorded in the Subject Land, including: • Weeping Myall Woodland EEC • Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions EEC • Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Four threatened flora species were recorded: • *Maireana cheelii* • *Swainsona sericea* • *Swainsona murrayana* • *Brachyscome papillosa*.	Fifteen threatened fauna species were recorded or assumed present including: • southern bell frog • southern whiteface • black falcon • grey-crowned babbler • Spotted harrier • white-fronted chat. One threatened fauna species has been assumed present being plains-wanderer.	Construction of up to 247 WTGs with approximately 1.3 GW capacity. Up to six substations and 13 transformers. One BESS and an internal electrical reticulation network. Construction impact area of 379 ha	Operation of 247 WTGs impact area of approx. 379 ha

Project	Duration	Biodiversity Value Impacted			Construction Impacts	Operational Impacts
		PCTs and TECs	Threatened Flora	Threatened Fauna		
		• *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions.				
Pottinger Solar Farm (EIS stage)	Nearest boundary is approximately 200 km away	Impacts to approximately 600 ha of native vegetation, including potential impacts to Weeping Myall Woodland and Sandhill Pine Woodland.	Impacts expected to a similar suite of species as Pottinger Wind Farm.	Impacts expected to potential Plains-wanderer habitat.	Construction of 300 MW solar farm and 500 MW BESS, across approximately 1,600 ha	Operation of 300 MW solar farm and 500 MW BESS
Project EnergyConnect (NSW – Western Section) (Approved project)	<1 km	Direct impacts to 1,615.20 ha of native vegetation comprised of 38 PCTs. Impacts 232.16 ha of TECs, including: • Weeping Myall Woodlands • Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions • Sandhill Pine Woodland.	Five threatened flora species were recorded including: • *Acacia acanthoclada* • *Atriplex infrequens* • *Austrostipa nullanulla* • *Dodonaea stenozyga* • *Santalum murrayanum*. One threatened flora species was assumed present: • Cullen parvum.	Direct impacts to 18 threatened fauna species, including: • Regent parrot • Spinifex slender blue-tongue lizard • Black-breasted buzzard • Chestnut quail-thrush • Greater sand plover • Hooded robin • Little eagle • Pink cockatoo • Malleefowl • Redthroat • Square-tailed kite • white-bellied sea-eagle • White-fronted chat • Bolam's mouse • Southern nungaui • Inland forest bat • Little pied bat • Corben's long-eared bat.	Construction of 330 kV and 500 kV transmission line and Dinawan Substation	Operation of 330 kV and 500 kV transmission line and Dinawan Substation

Project	Duration	Biodiversity Value Impacted			Construction Impacts	Operational Impacts
		PCTs and TECs	Threatened Flora	Threatened Fauna		
The Plains Solar Farm and BESS (Submissions stage)	Nearest boundary is approximately 200 km away	Impacts to ~1,000 ha of native vegetation comprised of six PCTs.	Three threatened flora species were recorded: • *Lepidium monoplocoides* • *Maireana cheelii* • *Swainsona murrayana*. *Eight threatened flora species were assumed present, including:* • *Austrostipa wakoolica* • *Calotis moorei* • *Brachyscome papillosa* • *Cullen parvum* • *Leptorhynchos orientalis* • *Sclerolaena napiformis* • *Swainsona plagiotropis* • *Swainsona sericea*.	Two threatened fauna species were recorded: • black falcon, • white-fronted chat. One threatened fauna species was assumed present – plains-wanderer.	Includes 900,900 PV panels, 400 MW capacity and BESS	Includes 900,900 PV panels, 400 MW capacity and BESS
The Plains Wind Farm (Submissions stage)	Nearest boundary is approximately 210 km away	Impacts to 1,997.03 ha of native vegetation comprised of 10 PCTs. Impacts to one TEC - Sandhill Pine Woodland	A species polygon was developed for seven flora species credit species within the Subject Land, including: • A Spear-grass (*Austrostipa wakoolica)* • Winged Pepper-cress (*Lepidium monoplocoides*) • Chariot Wheels (*Maireana cheelii*) • Mossgiel Daisy (*Brachyscome papillosa*) • A burr-daisy (*Calotis moorei*) • Slender Darling Pea (*Swainsona murrayana*) • Small Scurf Pea (*Cullen parvum*). A species polygon was developed for a single species credit species within the Haul Route DF, being: • Creeping Darling Pea (*Swainsona viridis*).	Six ecosystem credit species were recorded: • Black Falcon (*Falco subniger*) • Spotted Harrier (*Circus assimilis)* • Yellow-bellied Sheath-tailed Bat (*Saccolaimus flaviventris*) • White-fronted Chat (*Epthianura albifrons*) • Redthroat (*Pyrrholaemus brunneus*) • Southern Whiteface (*Aphelocephala leucopsis*) • Once species credit species was recorded/assumed present. • Plains-wanderer (*Pedionomus torquatus*).	Includes up to 188 wind turbines and approximately 1,350 MW capacity	Includes up to 188 wind turbines and approximately 1,350 MW capacity
Dinawan Wind Farm (assessment stage)	Nearest boundary is approximately 280 km away	Estimated impacts to 780 ha of native vegetation, including nine PCTs and three TECs. Weeping Myall and Natural Grasslands impacts are anticipated.	Suitable habitat potentially present for 11 threatened flora species.	Suitable habitat potentially present for 16 threatened fauna species.	Construction of 1.5 GW wind farm, comprising of up to 250 WTGs, on approximately 22,000 ha	Operation of 1.5 GW wind farm, comprising of up to 200 WTGs, on approximately 22,000 ha

Project	Duration	Biodiversity Value Impacted			Construction Impacts	Operational Impacts
		PCTs and TECs	Threatened Flora	Threatened Fauna		
Dinawan Solar Farm (recommendation stage)	Nearest boundary is approximately 230 km away	Impacts to 2,477 ha of native vegetation, including: 1571 ha of Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions and 137 ha Weeping Myall Woodland.	Two threatened flora species were recorded: • *Swainsona murrayana* (5.5 ha) • *Swainsona sericea* (5.5 ha). Two threatened flora species are assumed present: • *Austrostipa wakoolica* (220.5 ha) and • *Pilularia novae-hollandiae* (229.5 ha).	Twelve threatened fauna species were recorded, including: • Southern Bell Frog • Plains Wanderer • Black Falcon • Spotted Harrier • Southern Whiteface • Redthroat • White-fronted chat • Yellow-bellied sheathtail bat • Painted honeyeater • Pied honeyeater • Grey-crowned Babbler. One threatened fauna species is assumed present: Plains-wanderer.	Construction of 800 MW solar farm, 300 MW BESS on approximately 2,500 ha	Operation of 800 MW solar farm, 300 MW BESS on approximately 2,500 ha
Argoon Wind Farm (EIS Stage)	Nearest boundary is approximately 300 km away	Potential impacts to up to native vegetation comprised of 19 PCTs. Up to nine TECs listed under both the BC Act and EPBC Act may be present within the Project Area.	Suitable habitat potentially present for 18 threatened flora species.	Suitable habitat potentially present for 55 threatened fauna species.	Construction of 901 MW wind farm, 460 MW/2300 MWh BESS with a Project Area of approximately 10,885 ha	Operation of 901 MW wind farm, 460 MW/2300 MWh BESS with a Project Area of approximately 10,885 ha
Yanco Delta Wind Farm (Approved)	Nearest boundary is approximately 290 km away	Impacts to 173.39 ha of native vegetation, including four TECs: • Weeping Myall Woodlands; Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions • Sandhill Pine Woodland and Natural Grasslands of the Murray Valley Plains.	Two threatened flora species were recorded: • *Swainsona murrayana* • *Swainsona sericea*. Twelve threatened flora species are assumed present, including: • *Austrostipa wakoolica* • *Lepidium monoplocoides* • *Cullen parvum* • *Maireana cheelii*.	Eleven threatened fauna species recording, including: • Spotted Harrier • White-fronted Chat • Little Eagle • Grey-crowned Babbler • Diamond Firetail • Flame Robin • Black Falcon. • Three threatened fauna species are assumed present, including: • Plains Wanderer.	Construction of 208 WTGs, 800 MW/800 MWh BESS with a disturbance of approximately 238 ha	Operation of 208 WTGs, 800 MW/ 800 MWh BESS with a disturbance of approximately 238 ha
Tchelery Wind Farm	Nearest boundary is approximately 170 km away	Potential impacts to up to native vegetation comprised of 16 PCTs. Four BC Act listed TECs are potentially within the project site.	Potential impacts to seven threatened flora species identified within the Project Area including: • *Swainsona murrayana* • *Brachyscome papillosa* • *Maireana cheelii* • *Lepidium monoplocoides* • *Cullen parvum*.	Potential impacts to seven threatened fauna species identified within the Project Area including: • Southern Bell Frog • Plains-wanderer • Little Eagle.	Construction of 120 WTGs with a total capacity of 800 MW across a 27,400 ha Project Area	Operation of 120 WTGs with a total capacity of 800 MW across a 27,400 ha Project Area

9.0 Mitigation

9.1 Mitigation Measures

Spark Renewables has committed to the design and implementation of a comprehensive biodiversity mitigation strategy to minimise the residual impacts of the Project.

A Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP), Biodiversity Management Plan (BMP) and Bird and Bat Adaptive Management Plan (BBAMP) will be prepared for the Project. Suitable biodiversity management planning documentation would be determined, as part of overall decommissioning works plans for the Project, and will include aspects of the CEMP and BMP, where relevant.

All plans will describe the avoidance, mitigation and management measures that will be undertaken to manage potential environmental impacts of the Project. They will be prepared to meet the specific requirements of the Project to avoid and minimise impacts on biodiversity values, in accordance with best practice.

The following specific control measures are recommended for the mitigation of impacts on the biodiversity features of the Development Footprint:

- Salvage of biodiversity features, including habitat resources (e.g., hollow logs, tree hollows, fallen timber and rocks/boulders).
- A pre-clearing procedure will be implemented to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of hollow-bearing trees. The pre-clearing procedure is designed to minimise impacts to hollow-dependent and ground-dwelling fauna.

Weed management including biosecurity controls to prevent importation weeds and weed management measures.

- Fencing and access control
- Bushfire management
- Erosion and sedimentation control
- Workforce education and training.

Each of these minimisation measures will be included in the CEMP and where relevant, OEMP.

Proposed mitigation measures are summarised in **Table 9.1**.

Table 9.1 Mitigation Measures

Impact	Action ID	Mitigation Measure	Timing	Likely Efficacy of Mitigation	Outcome	Responsibility
Removal of native vegetation	B01	The proponent must minimise native vegetation removal through detailed design and demonstrative compliance in pre-construction plans. An initial corridor was established to identify areas of highest quality vegetation. Where feasible the Development Footprint has been placed within non-native and lowest quality native vegetation. Areas of high quality vegetation have been avoided. To avoid and minimise further clearing of vegetation the Development Footprint has utilised existing tracks, existing paddocks/crops and cleared areas.	Detailed design and Project surveys	Effective	The avoidance and minimisation of vegetation and habitat clearing during the Project planning	The Proponent
	B02	Buffer mapping for habitats will provide the construction and maintenance teams with the information necessary for OEMP and the CEMP.	Detailed design	Effective	Pre-construction	The Proponent
The clearing of habitat, native vegetation and TECs	B03	Threatened fauna habitat removal must be minimised through detailed design.	Detailed design	Effective	Identify the residual threatened species impacts	The Proponent
	B04	The preparation and approval of a BMP prior to construction which will be prepared by a qualified ecologist with CPHR consultation. Prior to clearing, the operational management component will be approved with CPHR consultation. The BMP will include but not limited to: • Implementing mitigation measures • Evaluating mitigation measures • Objectives for monitoring • Performance of proposed measures • Informing an adaptive management method for additional offsets which further impacts are identified • Remedial action.	Pre-clearing, pre-construction, construction and operation	Effective	Planning and management to avoid, minimise and mitigate biodiversity impacts	The Proponent and contractors
	B05	If any unexpected threatened species (flora or fauna) are found during construction, work must be halted immediately in the vicinity of the discovery, and the onsite manager should be notified.	Pre-clearing, pre-construction, construction and operation	Effective		The Proponent and contractors
	B06	Barbed wire must be avoided for fencing where practicable to avoid entrapment of fauna on fences. Fences will be designed to ensure that fauna are not funnelled toward dead ends or to create barriers between areas of habitat across the Project Area.	Detailed design	Effective		The Proponent and contractors
	B07	Mitigation measures for harm to threatened hollow dependent fauna and live animals during pre-clearing surveys and translocation activities will be detailed in the BMP. This includes, but is not limited to: • Validation and mapping of all hollow bearing trees within the Development Footprint will be undertaken at least one month prior to vegetation removal. • Qualified and licenced ecologist or wildlife handler to rescue and re-located fauna during the pre-clearing surveys. • Protocols in place when hollow bearing trees and stick nests are being removed. Furthermore, mitigation protocols for mitigating harm to hollow or stick nest dependent threatened fauna or dependent habitat known in the Development Footprint.	Pre-clearance	Effective	Mitigating, avoiding and minimising impacts to biodiversity	The Proponent and contractors
	B08	During vegetation and habitat clearance work a qualified ecologist will conduct on-foot pre-clearance surveys at the start of each day prior to daily construction. This is to confirm there is no wildlife present in the area to be cleared. A qualified ecologist or qualified wildlife handler will also be present during vegetation and habitat clearing works to rescue and relocate fauna if required in the event individuals are present at the time of clearing. Additionally: • Contracted environmental representatives are to regularly conduct sweeping by regular driving through areas of the planned construction in the Development Footprint prior to planned clearance works to disturb the area and deter fauna from utilising these areas. • In the situation that an animal or threatened species is located in the construction area during other construction works, the Project Management Site Representative and Delivery Manager must be immediately notified. Work must immediately stop within the	During clearing and construction	Effective	Avoiding and minimising impacts to fauna during the clearing and construction processes	The Proponent and contractors

Impact	Action ID	Mitigation Measure	Timing	Likely Efficacy of Mitigation	Outcome	Responsibility
		construction area with an ecologist or a local wildlife rescuer to be brought on-site for handling and to follow the rescue procedures listed in the BMP.				
	B09	Exclusion zones within the Development Footprint will be marked by a qualified surveyor on site with the boundary of clearing limits. There will be specific exclusion zones included of known areas of threatened flora and fauna habitat.	Pre-clearance, during construction and early operation	Effective	Avoiding and minimising impacts to fauna during the clearing and construction processes	The Proponent and contractors
	B10	Measures to mitigate the impacts associated with construction activities on retained native vegetation and habitat will include: • Prior to all vegetation removal, pre-clearance inspections will be undertaken by a qualified ecologist. • Where possible, trim vegetation rather than clear or removal whole plants. • Retain tree roots where possible. • Retain dead trees and tree trunks where practical.	During construction	Effective	Avoiding and minimising impacts to fauna during the clearing and construction processes	The Proponent and contractors
	B11	The preparation and approval of a Rehabilitation Plan (RP) prior to clearing will be prepared in consultation with CPHR. The RP will detail the implementation of rehabilitation in areas of the Development Footprint. The detailed design may include areas requiring rehabilitation prior to operation and areas of disturbance during the construction phase that do not require rehabilitation ahead of the operation of the Project. The RP will include but is not limited to: Soil erosion preventative measures, re-establishing local PCTs, local native flora, habitat and detailed rehabilitation objectives which measure the outcomes for the success over the locations, target landforms and PCTs. • Restoring vegetation in riparian areas implementation measures to protect and improve areas of key habitat. • Remedial actions that have been triggered that includes notifying CPHR through a Trigger Action Response Plan (TARP) with an agreement about the response. • Native indigenous species used for landscaping on pervious surfaces. • Stabilisation of exposed surfaces to prevent soil loss. • Ongoing maintenance which includes but is not limited to weed and pathogen management on rehabilitated areas. • During construction, the topsoil and subsoil generated will be used for rehabilitation and stored on-site.	Pre-construction, pre-clearance, during and post-construction	Effective	The avoidance and minimisation of soil erosion, weeds in disturbed areas and the spread to adjoining edges of native vegetation	The Proponent and contractors
	B12	Weed monitoring and control programs are to be documented in the BMP and Trigger Action Response Plan as part of a Construction Soil and Water Manager Plan (CSWMP) detailed in the CEMP and implemented in consultation with CPHR. Additional monitoring and control measures for introduced plant establishment and spread must be implemented at and around locations utilised for sediment control structures. Weed monitoring and control programs will include adaptive management strategies for priority weed species during construction, and early operational phase.	Pre-clearance, construction and operation	Effective	Spreading of weed controls from the Project	The Proponent and contractors
	B13	All priority weeds, as listed on the DPI NSW WeedWise website – https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=137 for the Wentworth (Western region), are to be managed and controlled, in addition to weed species that have been recorded to commonly occur within the Project Area such as London rocket (*Sisymbrium irio*), Ward's weed (*Carrichtera annua*), smooth catsear (*Hypochaeris glabra*), medics (*Medicargo* sp.) and wiry noon-flower (*Psilocaulon granulicule*).				
	B14	The proponent will enforce vehicle and machinery hygiene measures at all entry/exit points during construction and operation, ensuring removal of soil and plant matter to prevent weed spread. as part of the BMP. This must be implemented during construction and operation. The strategy will include site specific locations, timings, and methods for removing soil and plant matter from vehicles and machinery. Hygiene measures stated in the strategy protocol must be applied during construction and operation to ensure vehicle and machinery hygiene.				

Impact	Action ID	Mitigation Measure	Timing	Likely Efficacy of Mitigation	Outcome	Responsibility
	B15	Weeds will be disposed and managed appropriately during clearing works, to stop the spread of invasive weed species.				
	B16	Construction of wash down stations will occur at suitable locations to wash down vehicles and employee shoes to stop the spread of weeds, pathogens (including *Phytophthora cinnamomi*, amphibian chytrid fungus, agricultural weeds, and exotic rust fungi) and the introduction of new species to the site.				
Increase in predatory and pest species	B17	Refuse and personal waste generated throughout the construction and operational phases will be stored in bins and discarded in a suitable waste storage facility.	During construction and operation	Effective	Controlled action to mitigate, avoid and minimise introduced predators and pests to the area of construction	The Proponent
	B18	Implementation of a monitoring program for feral animals which is based on performance triggers for adaptive management. If an increase in predator activity is identified, it will trigger the need for a control program based on measures related to performance. This will be outlined in the BMP with control done in consultation of host landowners.				
	B19	In addition to Action B18, regularly scheduled monitoring that does not rely on entirely on population spikes in pest species numbers will also occur. These monitoring periods will use predictive indicators such as seasonal trends, habitat disturbance and food availability to predict pest number outbreaks before they occur.	Quarterly during construction and operation	Effective	Controlled action to manage pest species without depending entirely on thresholds being triggered.	The proponent
	B20	The use of control measures including regular baiting and trapping during low pest periods.	Ongoing during construction and operation	Effective	Continues to keep baseline pest species controlled.	The proponent
Impacts on protected animals from wind farm strikes	B21	To measure impacts on bird and bat species, a Bird and Bat Adaptive Management Plan (BBAMP) will be prepared as part of the BMP. Further details are provided below in **Section 9.2.2**.	During construction and operation	Effectiveness with an adaptive response method and management	Monitoring fauna blade strike collision	The Proponent
	B22	Measures taken to protect birds include: • Nests within 200 m of the Development Footprint will be mapped and validated prior to the erection and operation of WTGs. • Nests will be inspected prior to removal for juvenile birds and avoidance or relocation to be undertaken under the guidance of a qualified ecologist. • Regular carcass removal will be undertaken to prevent raptors being attracted to the Project Area. • Reduction of potential perching locations must be incorporated in the Project design. • Power lines will be fitted with species specific measures to avoid unnecessary collisions.				
Fragmentation resulting in reduced connectivity	B23	Clearing/works will be contained within approved areas.	During construction	Effective	No reduction in connectivity	The Proponent and contractor
Wildlife impacts from vehicle strikes	B24	Implement speed limits on newly formed access tracks to reduce the risk of vehicle strikes to fauna specifically in areas surrounding permanent water bodies and close to farm dams, particularly after periods of rain. Speed limits will be specified in the BMP and will be determined having regard to vehicle strike risk levels to fauna across the Project Area, work health and safety considerations, and interactions with agricultural operations.	Pre-construction, during construction and decommissioning	Effective	No wildlife vehicle strikes	The Proponent and contractor
Surface runoff changes resulting in sedimentation changes due to the removal of habitat and vegetation. **Impacts on water quality**	B25	A Construction Soil and Water Management Plan (CSWMP) will be prepared as a part of the CEMP. This will include but not limited to: • Procedures to minimise and manage erosion and sediment transport within the project site and offsite. • The preparation of Erosion and Sediment Control Plan (ESCP) for construction. • Procedures to manage accidental spills with the requirement to maintain spill kits. • Procedures to manage the potential of any acid sulfate soils (ASS) in accordance with the NSW Acid Sulfate Soil Guidelines (Ahern et al. 1998).	Pre-construction, during construction and decommissioning	Effective	Avoiding and minimising impacts to aquatic habitats and threatened fish species	The Proponent and contractor

Impact	Action ID	Mitigation Measure	Timing	Likely Efficacy of Mitigation	Outcome	Responsibility
and hydrological processes that sustain threatened species. **Contaminant pollution**		• Procedures to manage potential tannin leachate. • Procedures to manage stockpiles. • Details of surface water quality monitoring procedures.				
	B26	As part of the CSWMP, a construction ESCP will be prepared. This will detail erosion and sediment control procedures that will be implemented within the Project Area in accordance with the principles and requirements of Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom, 2004).	Pre-construction and during construction	Effective	Control erosion and sediments through implemented procedures	The Proponent and contractor
	B27	To minimise and avoid any impacts threatened species and water quality, the following procedure will be implemented: • The total bare earth exposed at any time will be minimised. • Rehabilitation strategies to be implemented to minimise dust regeneration, soil erosion and weed incursion. • Rehabilitate all areas of the Project Area that are not proposed for future disturbance post construction and when decommissioning.	During construction and decommissioning	Effective	Rehabilitation of total bare earth to minimise run off	The Proponent and contractor
	B28	Prior to, during and following construction and decommissioning, a surface water monitoring program will be prepared and implemented as part of the CSWMP.	Pre-construction, during construction and decommissioning	Effective	Monitoring of committed actions to ensure compliance	The Proponent and contractor
	B29	As part of the CSWMP, Project specific procedures and controls will be prepared and implemented. This is to minimise the risk of spills, litter and leaks entering downstream waterways and/ or leaking into the soil and groundwater table. The CSWMP will include, but is not limited to: • All liquids, chemicals and fuels to be stored in a sealed bunded area and stored on level ground within the construction compound. • Appropriate storage of equipment and hazardous substances during construction and operation. • Designated areas with spill capture and management controls for refuelling and minor activities. • An emergency spill response procedure will be prepared in the CSWMP. • Regular water quality checks to be carried out at waterways within proximity to work being carried out. • Installation and maintenance of control measures such as gross pollutant traps and silt fencing.	During construction and decommissioning	Effective	Minimise the risk of spills, litter and leaks entering downstream waterways or entering groundwater table	The Proponent
	B30	The management of stockpiles to minimise the transport of dust, sediment and leachate runoff. This will include, but is not limited to: • Minimising time that the stockpiles are left exposed, the number of stockpiles and the areas used for stockpiles. • Designating stockpiles away from waterways, drainage lines and areas where they would be susceptible to wind erosion. • Establishing appropriate controls for sediment, stabilising stockpiles and suppressing dust as required.	During Construction	Effective	Minimise dust, sediment and leachate runoff and pollution	The Proponent and contractor
	B31	Measures to avoid ingress from concrete waste into downstream waterways will be incorporated into the detailed design of concrete batch plants and outlined in the CEMP.	During construction and operation	Effective	Prevention of concrete waste entering waterways	The Proponent and contractor
	B32	Stormwater runoff increases during the Project operation will be managed through, but not limited to: • The design of permanent drainage and water management to meet the Project performance outcomes of no pollution of water.	During Operation	Effective	Management of stormwater runoff from the Project	The Proponent and contractor

Impact	Action ID	Mitigation Measure	Timing	Likely Efficacy of Mitigation	Outcome	Responsibility
		• Control procedures and maintenance of access tracks and scour protection to minimise erosion and impacts on water quality. • Potential impacts on channel erosion and scour to be monitored at receiving drainage channels and waterways downstream.				
	B33	Within the detailed design, if the Project excavation exceeds the proposed maximum depth below ground level, potential impacts to GDEs will need to be re-assessed by a qualified hydrogeologist.	Detailed design and during construction	Effective	Avoiding impacts to GDE's	The Proponent
Fire risk during operation	B34	The Project will implement the following permanent bush fire protections: • Asset Protection Zones (APZs) around each WTG • APZs around the BESS and substations • An APZ around the operation and maintenance facility (to be constructed to a BAL-12.5 standard) • Perimeter firebreak • Ongoing vegetation management • Access for emergency response vehicles • A permanent, dedicated firefighting water source • Controls on Project actions to prevent bush fire ignition • Fire suppression systems in substations, BESS and WTGs • A Project fire fighting vehicle.	During construction and operation	Effective	Mitigate risks to biodiversity	The Proponent
	B35	Construction and Operation Bush Fire Emergency Management Plans will be developed in accordance with Planning for Bush Fire Protection (PBP) (NSW Rural Fire Service (RFS), 2019) and in consultation with the NSW RFS (including any requirements in relation to aerial firefighting). These plans will identify all pertinent bush fire risk and mitigation strategies relating to the construction and operation of the Project, including those listed in B29 and: • Actions to prevent bush fire ignition or spread from Project activities. • Work that will not be conducted during total fire bans. • Appropriate safety procedures and storage location for any fuels or other hazardous or flammable materials. • Protocols in place to alert NSW RFS regarding work with the potential to cause a fire to the surrounding vegetation. • Protocols and triggers to shut down WTGs with an approaching fire. • Measures relating to the requirements of NSW RFS or other authorities regarding the management risk to aerial firefighting in the region. • Escalation notifying protocols with contact details for the local NSW RFS Fire Control Centre, local fire brigades, CASA, Air Services Australia, and all other relevant people and / or organisations who will be notified of an emergency at the Project Area. • The locations of any firefighting water along with alternative water supplies that may be available in the case of an emergency (including any other fire suppression equipment held on and off site). • Bush fire emergency planning that includes evacuation routes, evacuation triggers and when and where to take refuge.				
Light and noise vibration impacts during night works	B36	To address noise that is likely to exceed acceptable noise management levels (NMLs) a Construction Noise Management Plan will be implemented as a component of the CEMP.	During construction and operation	Effective	Mitigate risks to biodiversity	The Proponent and Contractor
	B37	Standard noise mitigation measures will be implemented were reasonably practicable, including the following: • Work limited to standard hours of construction unless permitted by the development consent.				

Impact	Action ID	Mitigation Measure	Timing	Likely Efficacy of Mitigation	Outcome	Responsibility
		• Adopt low-noise and plant equipment, where feasible plant and equipment to be fitted out with silencing devices. • Implement less intrusive alternatives to reverse beepers such as 'squawker' or broadband' alarms. • All plant and equipment to be well maintained. • Warrant equipment mufflers are functioning correctly and effectively. • When feasible, employ construction techniques that produce less vibration and are quieter. • Equipment that is on-site be turn-off when not in use. • Only have necessary equipment on-site, including only having necessary size and powered equipment for tasks. • Noisy activities will be concentrated at one location and relocate as soon as possible. • Vehicle movements limited and avoided whenever feasible. • Provide training to acquaint employees with noise sensitivity. • For concentrated, noise-intensive activities implemented temporary construction noise barriers or earth mounds. • Install enclosures around noisy mobile and fixed equipment were reasonably practicable. • Where reasonably practicable avoid coincide operation of two or more noisy plants close to receivers. • Optimise the offset distance between sensitive receivers and noisy plants. • Implement parking, loading/unloading areas and traffic flow management to minimise reversing movements. • Implement routinely monitoring of construction noise levels ensure effectiveness of mitigation measures and whether revision of measures in required.				
	B38	Standard vibration mitigation measures from the Assessing Vibration: a technical guideline (DECC, 2006) will be implemented were reasonably practicable, including the following: • Where reasonably practicable selecting lower-impact equipment or techniques were feasible. • Operating vibration-causing plant and equipment during the least sensitive time of day were reasonably practicable. • Avoid coincide operation of vibration-causing operations. • High-vibration activities to be located as far away from sensitive receiver areas as possible. • All plant and equipment to be well maintained. • Intensive vibration operation to not occur within the recommended safe set back distances. • Receivers to be notified regarding the nature of construction phases and vibrations-generating operations.	During construction	Effective	Mitigate risks to biodiversity	The Proponent and Contractor
	B39	Air quality management measures will be implemented and include but is not limited to: • Haul routes clearly marked. • Maintenance and watering of haul routes. • Vehicle speed restriction. • Immediate clean-up of any material spillage. • During adverse weather conditions e.g. during hot and windy conditions weather will be monitored.	During Construction	Effective	Avoid, minimise and mitigate impacts from dust pollution.	The Proponent and Contractor
Edge effects on adjacent native	B40	Edge effects are expected to occur: • Along the boundaries of retained native vegetation adjacent to construction zones, specifically near access tracks, turbine pads and ancillary infrastructure. • In proximity to vegetation zones within the Development footprint including:	During construction	Effective	Identify residual edge effects	The Proponent

Impact	Action ID	Mitigation Measure	Timing	Likely Efficacy of Mitigation	Outcome	Responsibility
vegetation and habitat		○ PCT 58 (Black Oak – Western Rosewood open woodland), ○ PCT 170 (Chenopod sandplain mallee woodland/shrubland), ○ PCT 171 (Spinifex linear dune mallee). • Near areas supporting the Mallee Bird Community TEC, where disturbance from noise, light spill, and dust during construction and operation may alter fauna behaviour and vegetation health. • Edges adjoining Category 1 – Exempt Land (cropped paddocks), where weed spread and habitat degradation are more likely due to soil disturbance and vehicle movement. Edge effect mitigation measures are to include: • Exclusion zones will be set up at the limit of clearing • Vegetation Integrity (VI) Plot Surveys • Biodiversity Monitoring and Impact Triggers.				

9.2 Adaptive Management for Uncertain Impacts

9.2.1 Monitoring Program and Adaptive Management

Some impacts, typically indirect and prescribed, are difficult to predict or assess prior to the commencement of a development (BAM Section 8.5). The adaptive management plan identifies uncertain impacts and can be used to quantify and respond to these throughout construction and operation.

Table 9.2 provides a suggested framework for the Adaptive Management Plan which includes the uncertain impacts and the potential monitoring activities, examples of appropriate methods to be used and example performance criteria required for each. This plan should be reviewed periodically and adjusted when necessary.

Table 9.2 Proposed Monitoring and Adaptive Management Measures

Impact Being Mitigated	Monitoring Schedule	Example Methods and Triggers to be Applied	Example Performance Criteria
Removal of native vegetation and habitat	During construction	Vegetation clearing reports to verify the area of native vegetation and threatened species habitat cleared. Trigger for compliance should clearing occur outside of Development Footprint.	No clearing outside of approved Development Footprint.
	Operation – over the life of the Project set at 5 yearly intervals	Monitor the impacts of edge effects on TEC outside of the Development Footprint. Carry out floristic plots in adjacent vegetation, at a feasible distance from the Development Footprint, and compare with baseline data collected prior to construction. Trigger for compliance action and revision of mitigation measures should vegetation integrity scores show any reduction.	No negative change in vegetation integrity scores compared with baseline data.
Changes to surface water runoff regimes due to habitat removal	During construction	After heavy rainfall events, sediment controls will be monitored. Should sediment controls be ineffective, mitigation measures will be revised.	Implemented sediment controls are deemed to be effective.

Impact Being Mitigated	Monitoring Schedule	Example Methods and Triggers to be Applied	Example Performance Criteria
Impacts on water quality and hydrological processes	During construction	Testing of water quality indicators (e.g., pH, turbidity) in aquatic habitats occurring downstream of the development. Should a decline in water quality be detected, work will be ceased or scaled back until additional mitigation measures are implemented and effective.	No detected decrease in water quality within downstream aquatic habitats.
Increase in weeds and pathogens within adjacent vegetation	During construction and operation – annually, until no corrective actions have been triggered for three consecutive years	Carry out floristic plots in adjacent vegetation, at a feasible distance from the Development Footprint, and compare with baseline data collected prior to construction. Should the acceptable limit of weed cover be exceeded, weed control and monitoring will be implemented as per the CEMP.	Set an acceptable limit of weed cover. Measures will be considered effective after meeting the performance criteria for three consecutive years post-construction.
Increase in predator and pest species populations	During construction and operation – annually, until no corrective actions have been triggered for three consecutive years	Monitoring of predator and pest species using remote cameras, focusing on areas where there is a potential for increased pest activity i.e. compound sites.	Should an increase in predator and pest species be observed during monitoring, controls will be implemented. Appropriate triggers to be decided in consultation with CPHR and landholders.
Increase in vehicle strikes	During construction and operation	Monitoring of tracks/roads for evidence of fauna collision. Reporting of vehicle strikes on fauna by site personnel. Set a threshold for an acceptable number of vehicle strikes on fauna, based on relevant literature, which will trigger revision of mitigation measures.	The acceptable threshold of vehicle strikes on fauna is not exceeded.

9.2.2 Bird and Bat Adaptive Management Plan

Being a wind energy project, the realised impacts that the Project will have on avifauna species can only be predicted during the impact assessment. The accuracy of these predictions relies on extensive and repetitive surveys relating to bird and bat utilisation which have been undertaken for this Project. Across all wind energy projects, it is considered that some impacts relating to bird and bat strike and barotrauma may be uncertain and therefore, further consideration and an adaptive management strategy is warranted.

All other impacts associated with the Project are considered to be well known.

A BBAMP will be prepared to measure any impacts on avifauna by the Project. The development and implementation of the BBAMP is an integral part of managing impacts to bat and bird species and a key mitigation measure to address the prescribed impacts associated with turbine strike outlined in **Section 8.3** and **Appendix B**.

The plan will develop trigger levels and mitigation measures designed to manage such impacts through Project operation, in consultation with CPHR. The BBAMP will provide guidance to develop a framework for monitoring such impacts. This will include baseline monitoring and ongoing monitoring. The BBAMP will be prepared following approval of the Project, however, detail on the likely components of the plan is provided in **Section 7.4.1**.

An adaptive management strategy will be prepared as part of the BBAMP, which will provide a framework for establishing whether the Project has any impacts that were not predicted as an outcome of this assessment. Additional mitigation measures to address any new, uncertain or residual impact may include consideration of the following, in consultation with CPHR:

- Carrion removal program
- Pest animal control
- Raptor perch management
- Lighting and deterrents
- Alteration of cut-in speeds
- Temporary shutdown of turbines
- Acoustic deterrents
- Radar consideration
- Additional offset requirements.

10.0 Impact Summary

10.1 Determining an Offset Requirement for Impacts

10.1.1 Impacts on Native Vegetation and TECs (Ecosystem Credits)

The PCTs and associated vegetation zones that require ecosystem credits are described in **Table 10.1**. There are no PCTs and associated vegetation zones that do not require an offset as per Section 9.2.1(1) of the BAM. Refer to **Figure 10.1** for areas requiring an offset.

Table 10.1 Ecosystem Credits for Impacts to Native Vegetation and TECs which Require an Offset

Zone	PCT[1]	Zone Name	TEC	Area	Current VI Score	Future VI Score	Change in VI Score	HBT	Biodiversity Risk Weighting	Ecosystem Credits Required[2]
1	PCT 58-Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Mod_good	Not a TEC	26.81	79.4	0	Yes	1.25	1.75	931
2	PCT 58-Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Derived_weedy	Not a TEC	3.39	35.9	0	No	1.25	1.75	53
3	PCT 58-Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Weedy_ understory	Not a TEC	0.17	75.2	0	Yes	1.25	1.75	6
4	PCT 170-Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Mod_good	Not a TEC*	3.81	61.9	0	Yes	1	1.5	89
5	PCT 170-Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived_native	Not a TEC	1.15	38.3	0	No	1	1.5	17
6	PCT 170-Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones	Derived_weedy	Not a TEC	0.06	4.0	0	No	1	1.5	1
8	PCT 171-Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion	Mod_good	Not a TEC*	18.95	74.5	0	Yes	1	1.5	529
									Total	**1,626**

Note 1: the Mallee Bird Community of the Murray Darling Depression Bioregion EEC listed under the EPBC Act cannot be selected in the BAM calculator. As detailed in Section 12.0 offsets for PCT 170 and PCT 171 will include equivalents areas of this EEC.

Note 2: credit values have increased due to updates to the BAM-C that corrected system generated issues associated with biodiversity risk weightings being incorrectly calculated i.e., these credit values have not changed as a result in any increase in impact.

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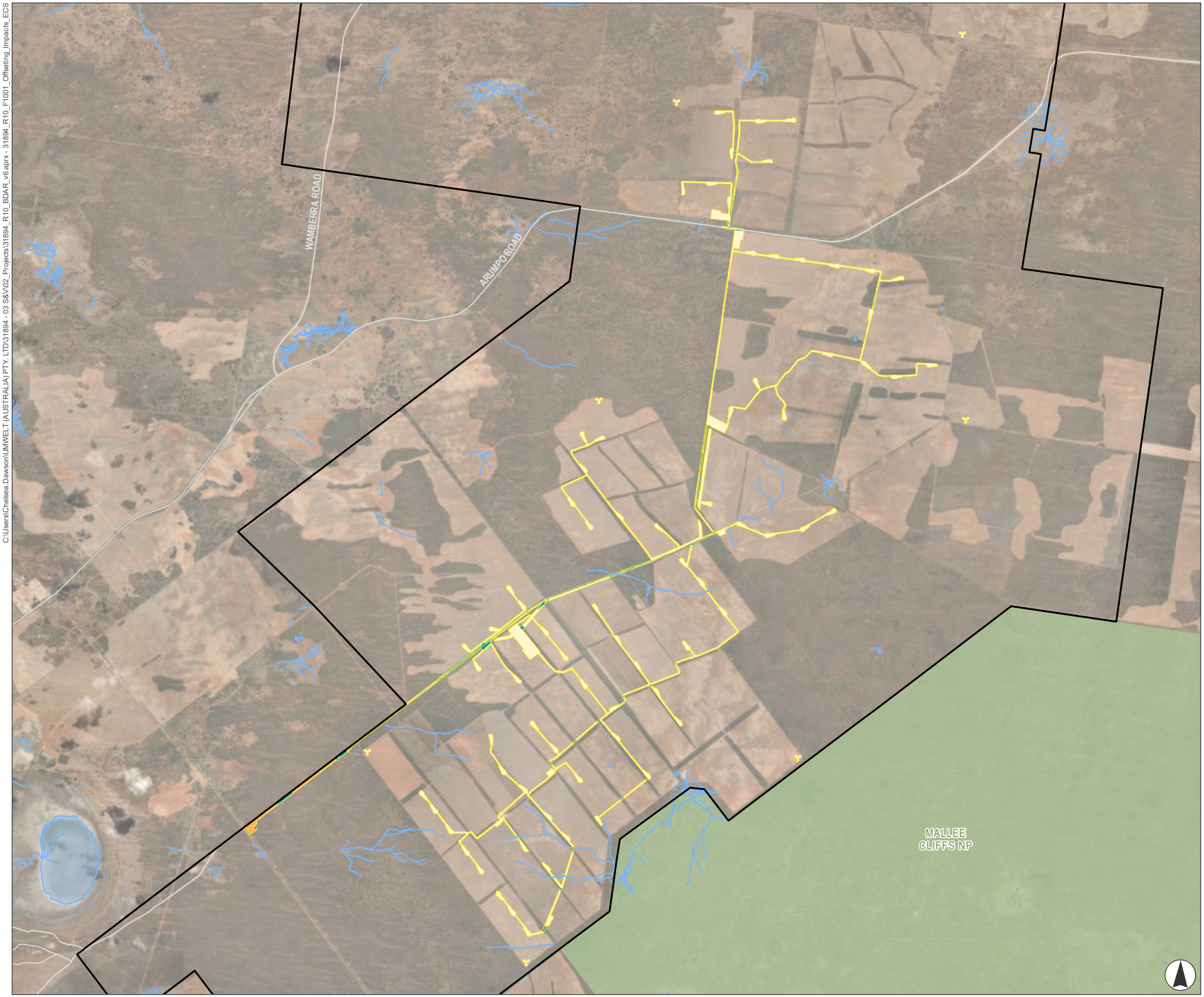


FIGURE 10.1

Thresholds for Assessing and Offsetting Impacts - Ecosystem Credit Species

Legend

- Project Boundary
- Development Footprint
- Road
- Watercourse
- Waterbody
- NPWS Estates

Plant Community Type

- PCT 58 (Moderate-Good)
- PCT 58 (Derived-Weedy)
- PCT 58 (Weedy understory)
- PCT 170 (Moderate-Good)
- PCT 170 (Derived-Native)
- PCT 170 (Derived-Weedy)
- PCT 171 (Moderate-Good)
- Category 1 – Exempt Land/Cleared/ Structure/ Tracks/ Road

0 2.5 5

Kilometres

Scale 1:140,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2024) **Data source:** NSW DFSI (2024), VIC DELWP (2023), Spark (2024)

10.1.2 Impacts in Threatened Species and their Habitat (Species Credits)

No threatened flora or fauna species-credit species were observed within the Development Footprint or wider Biodiversity Study Area during the surveys. Targeted surveys have been completed for all candidate threatened species. Breeding habitat for dual credit fauna species-credit species was not recorded in the Biodiversity Study Area.

There are no direct impacts to threatened species-credit species or their habitats as none were recorded within the Biodiversity Study Area or Development Footprint during surveys.

10.1.3 Indirect Impacts

No offsets are proposed for indirect impacts.

10.1.4 Prescribed Impacts

10.1.4.1 Prescribed Impacts Requiring Offsets

Based on the assessment of prescribed impacts summarised in **Section 8.3** and detailed in **Appendix B**, offsets are proposed for one prescribed impact, being turbine strike on protected animals.

Umwelt does not believe that the biodiversity credit scheme is a suitable mechanism to offset unavoidable prescribed impacts relating to turbine strike that may occur as a result of the Project as described below:

- The credit system does not allow for an equitable credit calculation between species-credit species and ecosystem-credit species. For example, the quantum of credits calculated for two species both listed as vulnerable would vary depending on whether the species is an ecosystem credit species or species credit species.
- The BAM-C does not currently have the necessary functions to generate a credit liability for a Project for each occurrence of a threatened species impacted by turbine strike or barotrauma.
    - For example, the BAM-C does not allow for a specific number of credits to be allocated for a particular species. Rather, impacts to threatened species are calculated based on whether the unit of measure is number of individuals or area. For species assessed by area, the area needs to be linked to a vegetation zone(s) and respective VI scores.
    - The BAM-C does not allow for impacts to be calculated for species in the absence of all other components of the BAM (DPE 2020a) e.g., landscape features, PCTs and respective condition classes. Therefore, the only way that credits could be calculated and linked for these impacts would be through the existing BAM-C assessment for the Project, or a new one. Furthermore, each time additional impacts were recorded, either a new version or child case of the BAM-C assessment would be required.
    - The BAM-C does not allow for potentially ongoing or regular (if that were to eventuate) credits to be generated regularly while still being linked to the existing Project assessment.
    - The impacts, should they occur, are likely to be sporadic and offsetting through the credit scheme is not considered likely to result in meaningful outcomes for the impacted species.

As such, Umwelt recommends these impacts are offset through other mechanisms available under the Biodiversity Conservation Regulation 2017 (BC Regulation 2017) which are not credit based. Specifically, this includes 'funding of a biodiversity conservation action that would benefit the relevant threatened species or ecological community and that is equivalent to the cost of acquiring the required like-for-like biodiversity credits as determined by the offsets payment calculator referred to in section 6.32 of the Act' as per Section 6.2 (2c) BC Regulation 2017.

Ancillary Rules have been published in accordance with clause 6.5 of the BC Regulation so that assessors can interpret and apply the 'like-for-like' and variation offset rules. The Ancillary Rules also prescribe a suite of species for which biodiversity conservation actions are an option to meet an offset obligation instead of, or in combination with, the retirement of species credits for a threatened species. As August 2024, the list of species and prescribed conservations actions do not provide for offsetting impacts associated with turbine strike. Approval of the use of conservation actions which are not currently prescribed by the Ancillary Rules would be required through consultation with the BAM policy team who have ownership over the list of prescribed conservation actions.

The listed biodiversity conservation actions target threatened species that are difficult to effectively manage at a biodiversity stewardship site due to limited understanding of their ecology, threats or management requirements or threatened species with a limited known distribution where research to find more locations where the entity is present will be beneficial. In this instance, we believe the species at risk satisfy the requirements above.

The use of biodiversity conservation actions is considered to be a more appropriate mechanism of offsetting impacts associated with turbine strike than the BAM-C, and given the complexities associated with the BAM-C and credit generation, is considered to result in better conservation outcome for impacted threatened species.

If adopted as an offset mechanism, any biodiversity conservation action proposed would be agreed to through consultation with both CPHR, the Nature Markets and Offsets Division, and DCCEEW where necessary. Examples of biodiversity conservation actions that may be suitable to offset impacts from turbine strike include:

- Funding of a PhD Project
- Funding of existing research programs, such as the Difficult Bird Research Group
- Funding of Saving our Species conservation projects
- Funding of breeding programs
- Funding of local habitat enhancements programs
- Funding of a research project to investigate the long-term effectiveness of operational mitigation measures (such as curtailment) to assess the interaction with birds and bats
- Funding research to investigate technological advancements, such as IdentiFlight, Robin Radar or similar technology.

A proposed approach to implementing this mechanism is identified below:

- Impacts to a threatened bird and/or bat species listed under the BC Act and/or EPBC Act are recorded on the Project through the implementation of the BBAMP.

- Costs of the particular biodiversity conservation action will be based on the listing status of the impacted species in consultation with the relevant agencies. Consultation is to be sought within three weeks of impact confirmation. An example process is identified below; however, costs have not been identified as this needs to occur in consultation with state and/or federal agencies:
    - A monetary contribution (indexed in line with CPI for each year) to the biodiversity conservation action per year for five years for a species listed as critically endangered under the BC Act and/or EPBC Act
    - A monetary contribution (indexed in line with CPI for each year), less than the cost of an impact on a critically endangered species, to the biodiversity conservation action per year for five years for a species listed as endangered under the BC Act and/or EPBC Act
    - A monetary contribution (indexed in line with CPI for each year), less than the cost of an impact on an endangered species, to the biodiversity conservation action per year for five years for a species listed as vulnerable under the BC Act and/or EPBC Act.

The above-described offset mechanism for prescribed impacts is not based on the number individuals but:

- Critically endangered under the BC Act and/or EPBC Act: a single impact event
- Endangered under the BC Act and/or EPBC Act: two impact events
- Vulnerable under the BC Act and/or EPBC Act: three impact events.

Once this offset mechanism is triggered for a species there is no subsequent triggering of the mechanism should additional impacts occur. No offset mechanism is proposed for impacts of turbine strike and/or barotrauma on protected bird or bat species that are not threatened under the BC Act or EPBC Act. It is considered suitable that the generation of ecosystem credit liabilities on the Project through the application of the BAM (DPE 2020a) adequately accounts for any such impacts.

10.1.4.2 Prescribed Impacts Not Requiring Offsets

No offsets are proposed for prescribed impacts relating to non-native vegetation, habitat connectivity, and waterbodies, water quality and hydrological processes.

10.2 Impacts That Do Not Need Further Assessment

Areas within the Development Footprint that do not contain native vegetation do not need to be assessed for ecosystem credits as per Section 9.3 of the BAM. Areas assessed as not containing native vegetation are limited to land which is totally cleared of all vegetation such as frequently used existing vehicle tracks, Category 1 – Exempt Land and three minor off-site road work areas (detailed in **Section 10.2.1** below).

10.2.1 Off-site Road Work Areas

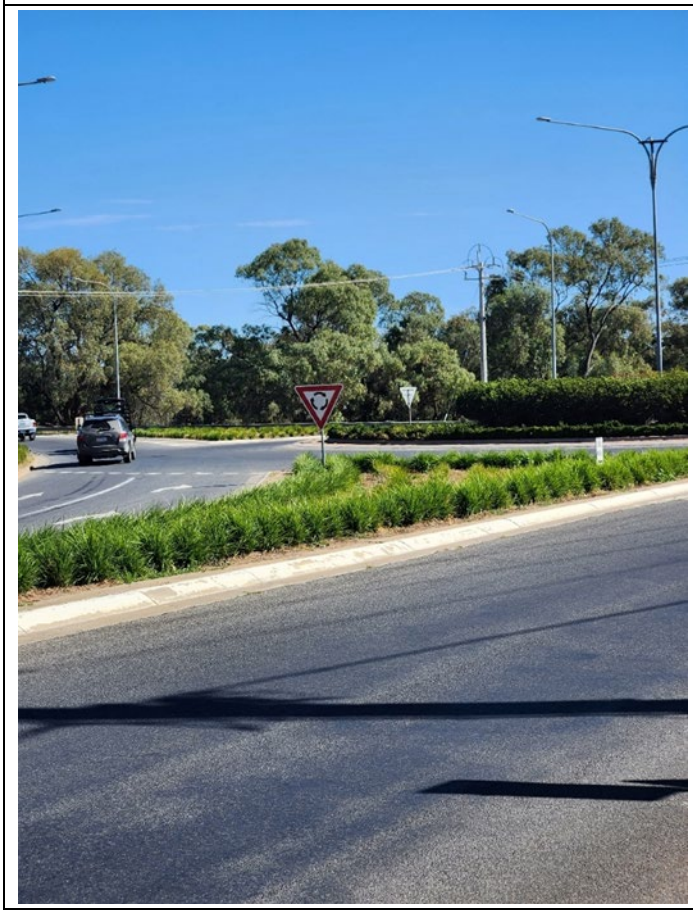
Areas within the Development Footprint that do not contain native vegetation do not need to be assessed for ecosystem credits (as per BAM Section 9.3(1–2.)). There are some minor off-site areas that will be subject to disturbance / road works which are being incorporated into the Project. For the most part, these areas do not contain native vegetation, as they exist as cleared roads, exotic roadside vegetation and exotic planted vegetation.

At one of these off-site road work areas, planted native vegetation was identified within a median strip at the Sturt Highway roundabout onto Silver City Highway, Buronga. This vegetation was identified as being a species widely cultivated and used as plantings. The planted native vegetation assessment module (as per BAM Appendix D) has been used to assess this vegetation; this is presented in **Table 10.2**.

Table 10.2 Streamlined Assessment Module – Planted Native Vegetation

D.1 Decision Making Key	Response
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal? i. Yes... The planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. ii. No... Go to 2	No.
Is the planted native vegetation: a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat? i. Yes... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. ii. No... Go to 3	No.
2. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: a. a species recovery project b. Saving our Species project c. other types of government funded restoration project d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act) f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or g. approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000)? i. Yes... The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. ii. No... Go to 4	No.

D.1 Decision Making Key	Response
Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation? i. Yes... Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). ii. No... Go to 5	No.
Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms? i. Yes... Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). ii. No... Go to 6	Yes. Median strip plantings, D.2.
D.2 Assessment of planted native vegetation for threatened species habitat	
The assessor must assess the suitability of the planted native vegetation for use by threatened species and record any incidental sightings or evidence (e.g., scats, stick nests) of threatened species credit species (flora and fauna) using, inhabiting or being part of the planted native vegetation. If there is evidence that threatened species are using the planted native vegetation as habitat, the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts on these species. Species credits are not required to offset the proposed impacts. The steps taken to assess threatened species habitat and all reasonable measures proposed to be taken to mitigate or minimise impacts must be set out in the BDAR or BCAR. Median strip plantings are present within one of the off-site road work areas associated with the Project at the Sturt Highway roundabout onto Silver City Highway, Buronga. This vegetation was sampled using rapid vegetation surveys and were identified as being a native cultivar commonly used in aesthetic plantings (Dianella sp.), and were therefore unable to be assigned to a PCT. The planted vegetation was surveyed for habitat features and for presence of threatened species, none of which were identified. No further assessment is required. A photograph of the planted native vegetation within the median strip is provided below.	
Decision Making Key	Response

D.1 Decision Making Key	Response
	

11.0 Biodiversity Credit Reports

The Project would directly impact up to 54.34 ha of native vegetation within the Development Footprint.

Additionally, the impacts will be finalised following the completion of the detailed design and micro-siting of turbines and associated infrastructure (within the area of disturbance assessed in this BDAR). In doing so, Spark Renewables will seek to further minimise impacts to biodiversity values. A range of impact mitigation strategies have been implemented and are proposed to minimise the impact on ecological values prior to the consideration of offsetting requirements. Residual impacts that are not able to be managed through mitigation would be offset in accordance with BAM calculations for ecosystem credits, noting that no species credit species credits have been generated.

Biodiversity Credit Reports which identify the like-for-like and variation credit requirements are provided in **Appendix I**.

11.1 Ecosystems Credits

The proposed offset obligation for the Project based on the total area of disturbance assessed in this BDAR has been calculated to require 1,626 ecosystem credits.

A summary of the ecosystem credit requirement of the Project is provided in **Table 11.1**.

Table 11.1 Like-for-like Offset Options for Ecosystem Credits

Ecosystem Credit	Attributes Shared with Matching Credits					
	PCT Name	PCT Vegetation Formation / Class	Associated TEC	Offset Trading Group	Hollow Bearing Trees Present?	IBRA Subregion
58-Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – moderate_good 931 credits	58, 252	Semi-arid Woodlands (Shrubby sub-formation) / Semi-arid Sand Plain Woodlands	Not a TEC	Semi-arid Sand Plain Woodlands >=50% and <70%	Yes	South Olary Plain, Barrier Range Outwash, Darling Depression, Great Darling Anabranch, Lachlan, Menindee, Murray Fans, Murray Scroll Belt, Murrumbidgee, Pooncarie Darling and Robinvale Plains. or Any IBRA subregion that is within 100 km of the outer edge of the impacted site.
58-Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – derived_weedy 53 credits			Not a TEC		No	
58-Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion – weedy_understory 6 credits			Not a TEC		Yes	
170- Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – moderate_good 89 credits	142, 170, 173, 174, 190, 193, 355, 474	Semi-arid Woodlands (Shrubby sub-formation) / Sand Plain Mallee Woodlands	Not a TEC*	Sand Plain Mallee Woodlands <50%	Yes	
170- Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – Derived_native 17 credits			Not a TEC		No	

Ecosystem Credit	Attributes Shared with Matching Credits					
	PCT Name	PCT Vegetation Formation / Class	Associated TEC	Offset Trading Group	Hollow Bearing Trees Present?	IBRA Subregion
170- Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones – Derived_weedy 1 credit			Not a TEC		No	
171- Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion – Moderate_good 529 credits	171, 172, 191	Semi-arid Woodlands (Shrubby sub-formation) / Dune Mallee Woodlands	Not a TEC*	Dune Mallee Woodlands <50%	Yes	

Note the Mallee Bird Community of the Murray Darling Depression Bioregion EEC listed under the EPBC Act cannot be selected in the BAM calculator. As detailed in Section 12.0 offsets for PCT 170 and PCT 171 will include equivalents areas of this EEC.

11.2 Species Credits

No species credit species were recorded within the Development Footprint or Biodiversity Study Area. Therefore, no species credit species credits have been generated.

12.0 Biodiversity Offset Strategy

12.1 Biodiversity Offset Strategy

Spark Renewables is committed to delivering a biodiversity offset strategy that appropriately compensates for the unavoidable loss of ecological values as a result of the Project.

As discussed in **Section 7.0**, the Project has, wherever practicable, optimised the layout to avoid and minimise ecological impacts in the planning and design stages.

A range of impact mitigation strategies are proposed to mitigate the impact on ecological values prior to the consideration of offsetting requirements. The offset requirements for the Project, as calculated in accordance with the BAM are identified in **Section 11.0**.

The offset strategy will be implemented in consideration of the process outlined in the BC Act and the final composition of the offset strategy may evolve as the Project progresses.

Spark Renewables will retire the credits required to offset the impacts of the Project as specified in **Section 11.0**. Spark Renewables is also seeking flexibility to utilise one or more of the offset options available under the BC Act and BC Regulation including:

- Land based offsets through the establishment of new Stewardship Sites (and subsequent retirement of credits) or by retiring credits from existing Stewardship Sites. Spark Renewables would retire the required number and class of credits determined in accordance with the BDAR and the offset rules in the BC Regulation.
- Securing (purchasing) credits through the open credit market. And/or
- Paying into to the Biodiversity Conservation Fund (BCF).

The current base case option for credit retirement will be the establishment of Biodiversity Stewardship Agreements (BSAs) within the local area. Spark Renewables are currently investigating local land holdings in the region to identify suitable sites for the establishment of Biodiversity Stewardship Agreements (BSA). Based on a desktop review using regional mapping there are extensive occurrences of the three impacted PCTs (58, 170 and 171). Other PCTs within relevant offset trading groups which occur to a lesser extent in the local region include PCT 172, 191, 193 and 252.

It is noted that Mallee Bird Community of the Murray Darling Depression Bioregion EEC listed under the EPBC Act cannot be selected in the BAM calculator and therefore does not appear on the offset trading rules for the applicable vegetation zones. Offsets for PCT 170 and PCT 171, in moderate-good condition, will be provided according to the vegetation classes/percent cleared offset trading groups as listed in the credit summary report, as well as meet the requirements of the approved conservation advice for the Mallee Bird Community of the Murray Darling Depression Bioregion EEC.

Initial discussions with some landholders have taken place for the establishment of BSAs, and Spark Renewables are continuing investigations into suitable land holdings for the establishment of BSAs for the Project.

12.2 Bilateral Agreement

The Assessment Bilateral Agreement between the NSW and Commonwealth governments covers major Projects; and streamlines benefits for all NSW proponents that use the NSW Biodiversity Offsets Scheme (BOS) and need approval under the EPBC Act, under the EPBC Act Condition-setting Policy. This means a NSW proponent who needs an EPBC Act approval can use the NSW BOS to assess and meet their biodiversity offset requirements.

Biodiversity assessments for the Project have been designed and executed in accordance with the NSW BAM. The biodiversity assessment has surveyed and mapped all vegetation communities in the Development Footprint and has assigned them to the relevant PCT and, where relevant determined whether the communities conform to any NSW and Commonwealth TEC final determinations. Under the BAM, all PCT and component TECs generate impact credits that need to be retired in accordance with the BOS and all Commonwealth listed entities must be offset in a 'like-for-like' manner.

Threatened species are predicted by the BAM and subject to targeted surveys in accordance with NSW and Commonwealth guidelines. Species-credits are generated for impacts on habitat for threatened species recorded or predicted to occur which are then retired in a 'like-for-like' in accordance with the BOS.

The impacts to MNES associated with the Project will be offset in accordance with the BOS.

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Appendix A

Detailed Figure Set

Appendix B

Turbine Strike Prescribed Impact Assessment

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Appendix C

Bilateral Agreement Assessment of Biodiversity MNES

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Appendix D

BDAR Requirement Compliance

Appendix E

Flora List

Appendix F

Vegetation Integrity Data

Appendix G

Weather

Appendix H

Expert Report

Appendix I

BAM Credit Report

Appendix J

Additional Survey Information to Satisfy CPHR Submission Item 5.1

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