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APEM Group

Dinawan Solar Farm Biodiversity Development Assessment Report

Response to submissions

Prepared for EMM

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Glossary

Assessment Area	All land within a 1500 m of the subject land
BAM	NSW Biodiversity Assessment Method
BAM-C	BAM Calculator
BC Act	*Biodiversity Conservation Act 2016*
BCS	Biodiversity Conservation and Science, part of NSW DCCEEW
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
BSSAR	Biodiversity Stewardship Site Assessment Report
Biosecurity Act	*Biosecurity Act 2015*
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DNG	Derived native grassland – Sometimes known as secondary grasslands, are native grasslands that remain after the removal or dieback of previous woody canopy vegetation, with a present woody vegetation cover generally less than 10%.
Cth DCCEEW	Australian Government Department of Climate Change, Energy, the Environment and Water
DBH	Diameter at Breast Height
DCDB	Digital cadastral database
Development footprint	The area of land that is directly impacted by the project
Development site	The broader area in which the subject land is located.
DoIW	Directory of Important Wetlands
DP	Deposited Plan
DPHI	NSW Department Planning, Housing and Infrastructure
DPI	NSW Department of Primary Industries
DTDB	Digital topographic databases
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development
Ecosystem credit species	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. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.
EEC	Endangered Ecological Community
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999

GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
IBRA	Interim Biogeographic Regionalisation of Australia
LEP	Local Environmental Plan
LGA	Local Government Area
Locality	Area located within 50 km radius from the subject land
LPI	NSW Land and Property Information
MNES	Matters of National Environmental Significance protected by a provision of Part 3 of the EPBC Act
Natural grassland	Native grasslands that are considered to have had less than 10% woody vegetation cover at the time of European settlement.
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
NPW Act	*National Parks and Wildlife Act 1974*
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
Study area	The broader project area boundary that was initially investigated and assessed for constraints and opportunities, and to guide avoid and minimisation of impacts based on biodiversity values
SALIS	NSW Soil and Land Information System
SEARs	Secretary's Environmental Assessment Requirements
SEPP	NSW State Environmental Planning Policy
Species credits	A class of biodiversity credits required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates
Species credit species	Threatened species for which vegetation surrogates and/or landscape features cannot reliably predict the likelihood of their occurrence or components of their habitat. A targeted survey or an expert report is required to confirm the presence of these species on the subject land. Alternatively, the proponent may elect to assume the species is present for development/clearing projects only.
SSD	State Significant Development
SSDA	State Significant Development Application
Subject land	A buffered area beyond the development footprint including areas of any potential indirect and prescribed impacts., based on biodiversity values present, to which the BAM has been applied
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
TPZ	Tree Protection Zone
VEC	Vulnerable Ecological Community
WM Act	*NSW Water Management Act 2000*
WHS	Work Health and Safety

Certification and Declarations

I certify that this report has been prepared on the basis of the requirements of, and information provided under the Biodiversity Assessment Method (DPIE 2020) and s6.15 of the *Biodiversity Conservation Act 2016*.

In preparing this assessment I have acted in accordance with the Accredited BAM Assessor Code of Conduct.

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

Signature:

Date: 12/09/2024

BAM Assessor Accreditation Number: BAAS17051

Summary

Spark Renewables Pty Limited (Spark Renewables) proposes to develop the Dinawan Solar Farm, a large-scale solar photovoltaic (PV) generation facility and battery energy storage system (BESS), supported by associated infrastructure (the project). The project is proposed on land between the towns of Coleambally and Jerilderie (hereafter referred to as the development site) (Figure 1). The project will involve the removal of native vegetation within the development footprint.

The project is considered State Significant Development (SSD) and is being assessed under Part 4 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act). A SSD triggers the Biodiversity Offsets Scheme (BOS), and an assessment is required in accordance with the NSW *Biodiversity Assessment Method* (BAM) (DPIE 2020a) and the *Biodiversity Conservation Act 2016* (BC Act). This Biodiversity Development Assessment Report (BDAR) has been prepared by Mitchell Palmer, an Accredited BAM Assessor (BAAS17051), to accompany the State Significant Development Application (SSDA). This BDAR describes the outcome of the development assessment case (00034896/BAAS17051/22/00042134) conducted consistent with the BAM.

The SSDA for the project and scoping report was lodged in November 2022, with Secretary's Environmental Assessment Requirements (SEARs) issued on the 14 December 2022. The project is consistent with NSW Government policy for development of renewable energy generation and storage infrastructure. It will assist in meeting NSW and Australian Government renewable energy generation and emissions reduction targets. The Environmental Impact Statement (EIS) (EMM 2023) was lodged in November 2023 with Response to Submission Letter (RTS) and associated agency responses issued on the 19 December and 21 December respectively.

Since the public exhibition of the Dinawan Solar Farm EIS (EMM 2023), the development footprint has been reduced by approximately 28%, down to 1,792 hectares. This includes the removal of large portions of the development footprint west of Kidman Way, as well as smaller areas adjacent to Kidman Way and Liddles Lane, that contain BC Act and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened ecological communities (TECs). These refinements are described in detail in the project's Amendment Report (AR) and subject to assessment in this amended BDAR. A summary of the amended project's reduced impacts to native vegetation and associated biodiversity values is provided in the table below.

Vegetation zone	Area (ha) - EIS lodgement	Area (ha) - amended project	% reduction
13_Moderate	0.2	0.12	40
15_Mod_Good	0.2	0.16	20
15_Moderate	0.8	-	100
17_Mod_Good	3.0	1.06	75
17_Moderate	6.2	0.08	99
26_DNG	884.3	860.04	3
26_Intact	20.2	0.42	98
26_Sparse	1550.8	919.19	41
45_Mod_Good	5.2	0.05	99
46_Moderate	6.3	1.68	75

Vegetation zone	Area (ha) - EIS lodgement	Area (ha) - amended project	% reduction
Southern Bell Frog	332.30	122.16	64
Plains Wanderer	0.94 (Indirect/prescribed)	-	100
Swainsona murrayana	5.5	5.5	-
Swainsona murrayana	5.5	5.5	-
Austrostipa wakoolica	220.50 (Assumed)	-	100
Pilularia novae-hollandiae	229.50 (Assumed)	-	100

Field investigation, undertaken in accordance with the BAM, recorded 3,362.93 hectares of native vegetation within the subject land, representing two TECs, Weeping Myall Woodlands (BC Act and EPBC Act listed) and Natural Grasslands of the Murray Valley (EPBC Act listed).

Avoidance of impacts to native vegetation, TECs and threatened species habitat have been undertaken to restrict impacts to 1,782.81 hectares of native vegetation within the development footprint, representing six Plant Community Types (PCTs) and two TECs. A high level of consideration has been given to avoiding and minimising impacts to biodiversity where possible during the assessment and detailed design phases. During initial phases of the project feasibility, multiple properties and regions within the broader Riverina and South West Renewable Energy Zone (REZ) were considered. The South West REZ as a whole was chosen for multiple reasons including renewable energy resource potential, existing (and planned) electricity network (i.e. Project EnergyConnect), low human population densities and existing land use patterns. Many of the proposed renewable energy developments in the South West REZ are sited in areas that support native vegetation cover, particularly in the central to eastern portions of the REZ. The prevalence of native vegetation in these areas is due to land use practices and patterns of agricultural development. This has made complete avoidance of biodiversity impacts at a landscape and site selection level challenging within the South West REZ. The site selection process has therefore focused on avoiding higher quality woodland and forested areas, as well as areas of TEC and habitat of highest value that are likely to contain, or have recorded, threatened species, and utilising land previously disturbed by low intensity agriculture. Whilst avoidance of native vegetation is challenging in the South West REZ, a key focus was the avoidance and minimisation of impacts woody vegetation, highest quality grasslands and maintaining connectivity,

Mitigation and management measures will be put in place to adequately address and continue to minimise impacts associated with the project, including direct, indirect and prescribed impacts.

The six PCTs recorded within the development footprint are listed below, and as such, in accordance with Section 10 of the BAM, offsets are to be secured for the project.

- PCT 13 Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.

- PCT 45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion.
- PCT 46 Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion.

For impacts that are unavoidable, the following table outlines biodiversity credits that are required for the project, in accordance with Section 10 of the BAM. A consideration of partial loss of biodiversity values associated with areas of retained ground stratum beneath solar arrays has been included in this assessment and is discussed within the BDAR. All measures to avoid, minimise and mitigate impacts have been taken into account prior to the consideration of partial loss in the areas of the solar array. A process for scoring of partial loss must be ecologically valid and representative, and must consider the resulting outcome and condition of vegetation over time, which has been presented in this assessment, however the main purpose of considering partial loss is to incentivise further diligence and encourage the maintenance of a level of biodiversity value during construction primarily, as well as during operation, and enhance conservation outcomes in retained areas. Spark Renewables are committed to monitoring and the amelioration of vegetation within the subject land during construction and operation of the solar farm to maintain biodiversity values beneath and between solar arrays and other areas of temporary disturbance.

Vegetation zone	Area (ha)	Impact	Credit requirement
13_Moderate	0.12	Direct	4
15_Mod_Good	0.16	Direct	5
17_Mod_Good	1.06	Direct	36
17_Moderate	0.08	Direct	1
26_DNG	381.44	Direct – Complete loss	4,784
26_DNG	478.6	Indirect – Partial loss	3,692
26_Intact	0.42	Direct	10
26_Sparse	386.09	Direct – Complete loss	6,271
26_Sparse	533.10	Indirect – Partial loss	6,086
45_Mod_Good	0.05	Direct	3
46_Moderate	1.68	Direct	93

Additionally, 14 threatened species were recorded in total during field surveys in the subject land and broader locality including

- *Swainsona murrayana.*
- *Swainsona sericea.*
- Superb Parrot *Polytelis swainsonii.*
- Southern Bell Frog *Litoria raniformis*.
- Southern Whiteface *Aphelocephala leucopsis.*
- Painted Honeyeater *Grantiella picta*.
- Black Falcon *Falco subniger.*

- Spotted Harrier *Circus assimilis.*
- White-fronted Chat *Epthianura albifrons.*
- Grey-crowned Babbler *Pomatostomus temporalis.*
- Dusky Woodswallow *Artamus cyanopterus cyanopterus.*
- Inland Forest Bat *Vespadelus baverstocki.*
- Yellow-bellied Sheathtail bat *Saccolaimus flaviventris.*
- Little pied bat *Chalinolobus picatus.*

Avoidance of direct impacts to these species has been a key consideration in design refinement and has led to reduced impacts. Impacts are still considered to occur to two threatened flora species, *Swainsona murrayana* and *Swainsona sericea*. Although not recorded on site, a portion of the subject land is mapped as important habitat for Plains Wanderer *Pedionomus torquatus*, but this area has been subject to clear avoidance measures. Due to the dynamic nature of natural and derived grasslands, other areas of the subject land may provide habitat for Plains Wanderer at certain times pending fluctuating long term environmental conditions. Southern Bell Frog *Litoria raniformis* was also recorded in high numbers throughout the subject land during surveys as result of above average rainfall and flooding events throughout 2022. A summary of the reduced impacts to threatened species (listed as BAM species credit species) is provided in the table below.

Species	Impact	Area (ha)	Credit requirement
Swainsona murrayana	Direct	5.5	76
Swainsona sericea	Direct	5.5	76
Southern Bell Frog	Direct/ Prescribed buffer	122.15	1,647

The project was considered likely to result in a significant impact to species or communities listed under the EPBC Act, and as such a referral to the Minister of the Environment was undertaken (EPBC 2023/09516), and the project was deemed a controlled action on the 12 July 2023. Following this, supplementary SEARs were issued by DPHI on the 12 July 2023. All EPBC Act requirements have been addressed and assessed in this BDAR in accordance with the NSW Assessment Bilateral Agreement. Residual significant impacts to Weeping Myall TEC, Plains Wanderer and *Swainsona murrayana* are considered likely or possible despite detailed avoidance during the design process.

In order to secure the biodiversity offset liability expected to be required for the project's residual unavoidable impacts, Spark Renewables has commenced investigations into the establishment of local Biodiversity Stewardship Sites. Prior to works commencing for each of the construction stages proposed, the biodiversity offsets associated with that stage will be secured through the creation and/or transfer of (followed by the retirement of) biodiversity credits, or via payment to the Biodiversity Conservation Fund.

STAGE 1 – BIODIVERSITY ASSESSMENT

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1 Introduction

Biosis Pty Ltd (Biosis) was commissioned by EMM Consulting (EMM) on behalf of Spark Renewables to undertake a biodiversity assessment for the Dinawan Solar Farm, a large-scale solar photovoltaic (PV) generation facility and battery energy storage system (BESS), supported by associated infrastructure (the project). The project is on the traditional lands of the Wiradjuri people and several smaller nations of the Murrumbidgee plains, about halfway between the towns of Coleambally and Jerilderie and lies within the Murrumbidgee local government area (LGA) in New South Wales (NSW).

The project is within the South-West Renewable Energy Zone (South-West REZ) a region selected by the NSW Government due to its significant potential for renewable energy infrastructure and regional development. The project will connect to the Dinawan Substation, which will be built by Transgrid as part of the Project EnergyConnect interconnector that will run between Robertstown in South Australia and Wagga Wagga in NSW.

The purpose of this assessment is to apply the NSW Biodiversity Assessment Method (BAM) (DPIE 2020a) to the project. This Biodiversity Development Assessment Report (BDAR) was submitted to the Minister for Planning and Public Spaces as part of Environmental Impact Statement (EIS) and State Significant Development Application (SSDA), under Part 4 of the *Environmental Planning and Assessment Act* (EP&A Act) on the November 2023. A Response to Submission letter (RTS) and associated agency responses were issued on the 19 December and 21 December respectively. Due to the number of submissions received, the project will be determined by the Independent Planning Commission (IPC).

Since the public exhibition of the Dinawan Solar Farm EIS (EMM 2023), the development footprint has been reduced by approximately 28% to 1,792 total hectares. This includes the removal of large portions of the development footprint west of Kidman Way, as well as smaller areas adjacent to Kidman Way and Liddles Lane, that contain BC Act and EPBC Act listed threatened ecological communities (TECs). These refinements are described in detail in the project's Amendment Report (AR) and subject to assessment in this amended BDAR.

1.1 Project description

The project will have a generation capacity of up to approximately 800 megawatts (MW) (AC), equivalent to the needs of 300,000 NSW households per year. The BESS will have a capacity of up to approximately 300 MW (AC or DC coupled) and will have provision for up to 2 hours of storage (600 MWh). The project is consistent with NSW Government policy for development of renewable energy generation and storage infrastructure. It will assist in meeting NSW and Australian Government emissions reduction targets.

The project is part of the Dinawan Energy Hub, which comprises a hybrid wind, solar and battery storage hub. The Dinawan Solar Farm and Dinawan Wind Farm will be delivered through two separate, but related, SSDAs to the NSW Department of Planning, Housing and Infrastructure (DPHI). Field surveys for both the wind development and solar development have been undertaken concurrently since August 2022 and are ongoing.

A full project description is provided in Appendix A of the AR. The project will comprise the following key components:

- a network of approximately 2 million solar PV panels and associated mounting infrastructure

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- a BESS with a capacity of up to 300 MW (AC or DC coupled) and a storage duration of up to 2 hours (600 MWh)
- electrical collection system, substations, switchyards and control room
- operations and maintenance (O&M) infrastructure, including site offices and amenities, buildings, equipment and maintenance sheds, laydown, storage and parking areas
- electricity transmission line infrastructure connecting the project substations to the Dinawan Substation
- site access from Kidman Way and Bundure Road (including associated public road upgrades)
- temporary construction facilities, including construction compounds, site offices and amenities, laydown areas, construction materials storage and parking areas and a temporary worker accommodation facility
- security fencing, with incorporated 'fauna friendly' features as far as practicable.

The project is SSD and entry into the NSW Biodiversity Offset Scheme (BOS) is triggered, and therefore requires the preparation of a BDAR. The scoping report for the project was lodged and Secretary's Environmental Assessment Requirements (SEARs) issued on the 14 December 2022. This BDAR addresses the NSW *Biodiversity Conservation Act 2016* (BC Act), including the BAM, and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

An EPBC Act referral was lodged on the 4 April 2023 and the project was deemed a Controlled Action (EPBC 2023/09516) on the 12 July 2023 with listed threatened species and ecological communities as the relevant controlling provisions. Following this, supplementary SEARs were issued by DPHI on the 12 July 2023. All EPBC Act requirements will be addressed and assessed in this BDAR in accordance with the NSW Assessment Bilateral Agreement.

1.2 Purpose of this assessment

This BDAR has been prepared in accordance with the requirements of the BC Act to address the project's SEARs. Specifically, this BDAR will:

- Address the BAM (DPIE 2020a) and the BOS.
- Identify how Spark Renewables has avoided and minimised impacts to biodiversity.
- Identify any potential impact that could be characterised as serious and irreversible.
- Identify measures to manage identified impacts (including details of adaptive management protocols and ability to obtain achievable offsets).
- Identify measures to avoid, mitigate and offset impacts, with the objective of achieving an overall 'improve or maintain' environmental outcome for the project.
- Describe the offset obligations required to compensate for any unavoidable biodiversity impacts resulting from the project.
- Consider and assess the project in accordance with other relevant legislation such as the Commonwealth EPBC Act.

Biodiversity assessments have been undertaken in accordance with the BAM, and this BDAR has been prepared by Accredited Assessor Mitchell Palmer (BAAS17051), and reviewed by Accredited Assessor Callan

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Wharfe (BAAS18138). This BDAR describes the outcome of the BAM Calculator (BAM-C) development assessment cases. See Section 11 for further details.

- 00034896/BAAS17051/22/00042134. Revision 13 - Total project impacts.
- 00034896/BAAS17051/24/00050987. Revision 0 – Enabling works stage.
- 00034896/BAAS17051/24/00050988. Revision 0 – Stage 1 offsetting.
- 00034896/BAAS17051/24/00050989. Revision 0 – Stage 2 offsetting.

Please see Section 11 for further details, including on associated revisions relating to partial loss.

1.3 Response to submissions

Following submission of the EIS and the accompanying BDAR, NSW Biodiversity Conservation and Science Directorate (BCS) requested further information on 21 December 2024. A summary of the responses to BDAR specific comments is provided in Table 1 below.

Table 1 Response to Submissions - BCS

Reference	Summary	Concern	Biosis response
BCS			
1	*Ensure important mapped habitat for Plains-wanderer is avoided and not isolated.*	1.1 Include all indirectly impacted areas of the important mapped habitat for the Plains-wanderer in the development footprint within the BAM-C as loss of habitat OR, Consider changing the north eastern boundary of the development footprint so the Plains-wanderer important mapped areas are outside of the development footprint and security fence 1.2 Explain why areas mapped as 'No Go' in the constraints mapping have been included in the development footprint.	This has been addressed within Section 6.3.2 of the BDAR. Areas of important mapped habitat for the Plains Wanderer will not be isolated. Gates and perimeter fencing follow the southern and western portions of important mapped habitat buffer. The portion of the footprint that progresses around the northern and eastern buffer area is for vehicle access only, and links up to, and follows, an existing farm track network that crosses the Coleambally irrigation channel via an existing bridge. Biosis agrees with BCS that impact estimates would require updates should the important mapped habitat be wholly surrounded by the development and fencing requirements. However, as the commitment has been made for this not to occur, Biosis considers that connectivity will still be retained in a northeast direction, and indirect impacts substantially mitigated. The area that contains the important mapped habitat, as well as other areas retained within the subject land, are also under investigation for inclusion as a mosaic network of stewardship sites. Section 5.2 mentions why No Go areas are included within the footprint. Figure 12 and the associated GIS model were produced during the constraints and opportunities assessment initially from a range of parameters and primarily desktop based. This initially and precautionarily picked up

Reference	Summary	Concern	Biosis response
			areas of intact PCT 26 and small wetlands, however upon field verification, determined that it was inaccurate, and that these areas specifically were downgraded to a high constraint. However, the constraints model was not re-run post preliminary field investigations, and therefore the figure was not updated. This has been updated in this amended BDAR. Section 5 aims to demonstrate the methods of avoidance and minimisation of impacts on native vegetation and biodiversity values from project conception and early designs through to the development footprint presented in this amended BDAR.
2	*Serious and Irreversible Impacts (SAII) to Plains-wanderer are underestimated and assumed presence for Austral Pillwort requires survey effort.*	2.1 Complete targeted surveys for assumed Austral Pillwort to inform an updated SAII assessment. 2.2 Update the SAII assessment to include all impacts to Plains-wanderer. Or, alternatively, change the north eastern boundary of the development footprint so the important mapped areas are outside of the development footprint and security fence.	Further targeted surveys were undertaken in November 2023 for Austral Pillwort within suitable gilgais and other areas of moist microhabitats, and similarly for other species such as *Austrostipa wakoolica* and Claypan Daisy. Rainfall requirements and conditions on ground were considered suitable for this survey period, in conjunction with survey that was conducted in November 2022. No individuals were detected. Section 4 and Section 8.2 have been updated. As above, prescribed impacts to Plains Wanderer important mapped habitat have been clarified in Section 6.3.2. This has also been updated within the SAII assessment in Section 8.2 and Appendix 5. The development footprint has been amended to remove all important mapped areas of Plains Wanderer habitat. Biosis considers that connectivity will be maintained to the north east, that indirect and prescribed impacts are adequately managed and mitigated. The previous credit liability for Plains Wanderer has therefore been removed.
3	*The flora survey method used is inconsistent with the Biodiversity Assessment Method 2020 (BAM) guidelines which may mean flora species are under-surveyed*	3.1 Complete flora surveys as per the BAM 'Surveying threatened plants and their habitats' guide or further consult with BCS to seek endorsement to use a different approach. 3.2 Remove driven transects from candidate flora survey effort and reassess completed and required survey effort for each candidate species.	Further surveys were completed in November 2023. The results of threatened flora surveys are provided in Section 4 with survey coverage discussed in detail in Section 4.3.1. Biosis have consulted with BCS regarding an appropriate survey methodology for the project including by facilitating a site visit in June 2023 and providing detailed justification for the methodology employed prior to submission of the EIS. Extensive threatened flora surveys have been carried out providing a high level of certainty as to

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Reference	Summary	Concern	Biosis response
		3.3 Complete supplementary survey effort for candidate flora species in the required survey months for each species to meet minimum survey effort requirements.	the species present. Across two years and four survey periods, over a total of 850 person hours of threatened flora surveys have been undertaken. Surveys were required across a very large area, nearly all of which contains native vegetation, making the implementation of surveys in strict accordance with the guidelines problematic. It is difficult to separate the smaller areas of driving transects from those completed by foot, however, reliance on these driven portions in terms of survey effort is negligible, as it relates to more easily identifiable flowering species such as Swainsona species. A conservative estimate of the total effort represented by slow driving transects has been excluded from any survey calculations. It is noted though that Biosis maintains this method of survey is useful for certain species, particularly trees, shrubs and bright flowering species such as *Swainsona* species, that are easily initially spotted and noted for further detailed investigations and transects on foot. Biosis also notes that moving forward, acceptance of survey methods utilising driving transects will be extremely unlikely, and therefore these will no longer be utilised. Improved methods of GPS track data collection will also be employed. The survey effort in each season accounts for approximately 12-13% of the total area of the habitat and microhabitats, not including the estimated amount of slow driving transects. The survey effort completed is on par with that required by the 100 metre x 100 metre grids stated by the guidelines. The survey effort has been achieved by a combination of both grid searches and transects. Noted limitations in 2022 occurred due to flooding in some sections of the site and are discussed throughout the BDAR, however the extensive threatened flora surveys completed provide a comprehensive understanding of species present informed by the relevant guidelines and responding to the conditions encountered including the homogeneous nature of the vast majority of the site. Smaller microhabitats were targeted on foot, and where species were recorded, microhabitats were thoroughly searched.

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Reference	Summary	Concern	Biosis response
			Given the limitations of flooding events in 2022 and the extensive area requiring survey effort, an adaptive biodiversity management plan would be implemented to protect biodiversity values post approval. This would include measures to address any unexpected instances of threatened flora found to be present during construction or operation. Response measures would include updated avoidance actions, and worst case updated credit liabilities in accordance with the relevant procedure. This would include an incidental threatened species finds protocol to identify the avoid and/or minimise and/or offset options to be implemented if additional threatened species are discovered on site. This risk would remain even with surveys completed in strict accordance of the guidance.
4	*Prescribed and indirect impacts are underestimated.*	4.1 Update the prescribed impacts section to assess all prescribed impacts, including but not limited to impacts to the movement of Southern Bell Frogs, Plains-wanderer, and Superb Parrots. 4.2 Discuss and justify (using evidence) the low and negligible impact ratings given to *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) listed Weeping Myall Threatened Ecological Community (TEC), Natural Grasslands TEC, *Swainsona murrayana*, Plains-wanderer, Southern Bell Frog and Superb Parrot. 4.3 Include observations of Superb Parrots and other threatened fauna to inform prescribed impacts including flight paths for the Superb Parrot.	Prescribed impacts have been updated for the noted species in Section 6.3. Further information has been provided for EPBC Act-listed species in Section 5, 6 and 10.1. Connectivity pathways and flight paths have been mapped on Figure 16.
5	*Mitigation measures lack the necessary detail.*	5.1 Provide specific detail for each mitigation measure in accordance with section 8.4 of the BAM, so these can be incorporated into the relevant post approval plans. 5.2 Identify measures for which there is risk of failure and evaluate the risk and consequence of any residual impact. Where impacts cannot be mitigated, consider the need for an adaptive management	The mitigation table in Section 7 has been updated to provide more detail. Further details around triggers and SMART actions will be implemented in consultation with BCS and other stakeholders following project approval. Discussion has also been added on groundcover management and their relevance to the project within Section 7.

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Reference	Summary	Concern	Biosis response
		plan in accordance with section 8.5 of the BAM. 5.3 Where impacts cannot be mitigated, consider the need for an adaptive management plan in accordance with section 8.5 of the BAM.	
6	*Matters of National Environmental Significance (MNES) requires further assessment.*	6.1 Provide detail on how the proponent proposes to avoid MNES, and include the above MNES tables within the BDAR. 6.2 Include the above MNES tables within the BDAR.	Further information has been provided on EPBC Act-listed species in Section 5 and 10.1. Relevant tables have been included in Section 10.1.
7	*There is insufficient information in the BDAR about the management approach to ensure the loss will be only partial.*	7.1 Update the BDAR to use a total loss assessment approach, which will require the BDAR to be revised to remove all references to partial loss, including Tables 45 and 49, and the partial loss BAM Credit Summary reports to avoid any confusion around the credit requirement **OR**, Provide more information on the management actions that will be put in place to ensure the loss is only partial, making sure all actions are SMART (specific, measurable, achievable, relevant and time bound).	Section 6.4 has been significantly updated to include details on the justification and implementation of partial loss, related to the solar array areas only.
8	*Proposed credit stages are not in separate child cases in the Biodiversity Offsets and Agreement Management System (BOAMS).*	8.1 Create a separate BAM-C child case for each project stage.	Child cases of each of the project stages have been updated. This is explained in detail in Section 11.
9	*The vegetation integrity (VI) plot placements are biased to vegetation zone edges.*	9.1 Collect additional VI plots for '26_Sparse Canopy' and '26 DNG' in accordance with section 4.3.4(3) of the BAM to cover previously unsurveyed parts of these vegetation zones.	Additional plots have been undertaken and detailed in Section 3. An additional six plots were collected, three plots in each of the PCT 26 sparse and DNG zones. Additional plots are DEH_S_90 through to DEH_S_95. The BAM-C and vegetation integrity scores have been updated accordingly.
10	*Several limitations, assumptions and predictions are not documented.*	10.1 Document and discuss any limitations, assumptions and/or predictions made throughout the BDAR. 10.2 Provide justification for each different species polygon buffer and how these were applied	Additional information has been provided where relevant to address species assumptions and predictions made, particularly around indirect and prescribed impacts. Further justification have been added to address specific polygons for Swainsona species and Southern Bell Frog, as shown in Table 36.

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1.4 The subject land, development footprint and assessment area

The terms subject land, development footprint and assessment area are used throughout this BDAR and are defined below.

- The **subject land** is defined as an area of approximately 3,395 ha. The subject land includes the development footprint, and additional areas where indirect and prescribed impacts may occur, and ultimately the areas to which the BAM has been applied.
- The **development footprint** is approximately 1,792 ha and comprises all areas of direct impact arising from vegetation clearing, construction and operation of the project. It includes the solar arrays, access roads, public road upgrades, site access, electrical cabling, perimeter fencing, Asset Protection Zones (APZs) and other associated construction works. Approximately 1,783 ha within the development footprint consists of native vegetation, and approximately 8 ha of non-native or cleared vegetation.
- The **development site** is located along Kidman Way, approximately 29 km south from Coleambally, 30 km north from Jerilderie, approximately 160 km west of Wagga Wagga in south-western NSW. The development site is located within the Murrumbidgee Local Government Area (LGA), and the Murray Local Land Services (LLS) Region, and is zoned as RU1 Primary Production with Kidman Way zoned SP2 Infrastructure (Classified Road) under the Jerilderie Local Environmental Plan 2012 (LEP).
- The **assessment area** includes the subject land and the area of land within a 1500m buffer zone surrounding the subject land that is determined as per the BAM.
- The **study area** is the broader project area boundary that was initially investigated and assessed for constraints and opportunities, and importantly used to guide avoid and minimisation of impacts, based on biodiversity values identified. This area comprises approximately 4,620 ha.

1.5 Offset staging plan

The development footprint has been broken up into three main areas to facilitate the staged retirement of the project's biodiversity credit liability. Prior to works commencing in each area, the biodiversity offset associated with that area will be secured. Further detail is provided in Section 9.4.

Indicative offset areas are defined in Table 2 and Table 65 and are considered to be discrete packages of work for which staging of offset obligations is feasible, with resultant offset credit liabilities for each of these stages provided in Section 9.4 and illustrated on Figure 19.

Table 2 Offset staging plan

Offset staging area	Location	~Area (ha)
Early/Enabling works area	Small areas predominantly located off Kidman Way to initiate site access intersection works and facilitate construction of accommodation, office and maintenance facilities	22
Stage 1	Primarily east of Kidman Way (including public road upgrades)	734
Stage 2	West of Kidman Way	1,035

Spark Renewables will confirm the offset staging plan with DPHI prior to the commencement of construction.

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1.6 Sources of information

Sources of information used in the assessment included relevant databases, spatial data, literature and previous site reports.

In order to provide a context for the assessment area, records of flora and fauna from within 10 kilometres (the locality) were collated from the following databases and datasets were reviewed:

- Commonwealth Department of Climate Change, Energy, the Environment and Water (Cth DCCEEW) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Department of Climate Change, Energy, Environment and Water (NSW DCCEEW)) BioNet - the database for the Atlas of NSW Wildlife for species, populations and ecological communities listed under the BC Act.
- NSW BAM Calculator.
- Biodiversity values map (DPE 2023a).
- Native vegetation regulatory map.
- BAM Important Areas maps (DPE 2023b).
- PlantNET (The Royal Botanic Gardens and Domain Trust).
- BirdLife Australia, the New Atlas of Australian Birds 1998-2015.

Other sources of biodiversity information relevant to the assessment area were sourced from:

- The NSW Plant Community Types (PCTs), as held within the BioNet Vegetation Classification database (DPE 2023c).
- Relevant vegetation mapping:
- State Vegetation Type Map: Riverina Region Version v1.2 – VIS_ID 4469 (DPIE 2016).

The following reports were also reviewed and relied on to provide additional information:

- Dinawan Energy Hub Biodiversity Constraints and Opportunities Assessment (Biosis 2021).
- Preliminary field assessments of biodiversity values and impacts, Dinawan Energy Hub (Biosis, 2022)
- Dinawan Solar Farm Scoping Report (EMM 2022).
- Dinawan Solar Farm Planning Secretary's Environmental Assessment Requirements SSD-50725959 (DPE 2022).

Basemap data was obtained from NSW Land and property information (LPI) 1:25,000 digital topographic databases (DTDB), with cadastral data obtained from LPI digital cadastral database (DCDB).

The following spatial datasets were utilised during the development of this report:

- Catchment Boundaries of New South Wales dataset.
- Mitchell Landscapes Version 3.0.
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7.
- Directory of Important Wetlands (DoIW).

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- Mapping has been produced using a Geographic Information System (GIS). The following maps and data have been provided:
  - Digital mapping with aerial photography showing 1:1000 or finer.
  - Site map as described in subsection 3.1.1 of the BAM (DPIE 2020a).
  - Location map as described in subsection 3.1.2 of the BAM (DPIE 2020a).
  - Landscape map with features including 1,500 metre buffer, as described in section 3.1.3 of the BAM (DPIE 2020a).
  - LiDAR DEM (Digital Elevation Model) and DSM (Digital Surface Model).

1.7 Legislative requirements

The project has been assessed against relevant biodiversity legislation and government policy, including:

- *Environment Protection and Biodiversity Conservation Act 1999*.
- *Environmental Planning and Assessment Act 1979*.
- *Biodiversity Conservation Act 2016*.
- *Fisheries Management Act 1994*.
- *Biosecurity Act 2015*.
- *State Environmental Planning Policy (Biodiversity and Conservation) 2021*.
- Jerilderie Development Control Plan (DCP) 2012.
- Jerilderie Local Environmental Plan (LEP) 2012.

A key objective of this BDAR is to address the requirements of the BAM, as required in the SEARs and summarised below in Table 3.

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Table 3 Summary of SEARs and supplementary SEARs

Biodiversity requirements	Relevant section
SEARS	
An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW) (BC Act), 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;	The BDAR has been prepared in accordance with the BC Act and BAM. Avoid and minimise is discussed throughout and is a key focus for the project, discussed in detail within Section 5 and Section 7. Biodiversity values to be impacted are discussed throughout and summarised in Section 8. A variation to flora survey methods outside of relevant guidelines is proposed in Section 3.1.5 and 4.3.1. Residual offsets are considered in Section 8.3 and Section 9. Impacts to grasslands are considered in Section 3.1.7, Section 6 and Section 6.4.
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, including impacts to the Yanco Creek and Cooinbil Creek and unnamed watercourses flowing across the site;	The BDAR has discussed potential impacts to aquatic environments in Section 2 and Section 10.
A cumulative impact assessment of biodiversity values in the region from nearby developments	The BDAR has discussed cumulative impacts in Section 6.5.
If an offset is required, details of the measures proposed to address the offset obligations.	Residual offsets are considered in Section 8.3 and Section 9.
Supplementary SEARs	
Impacts - *The EIS/BDAR must include an assessment of the relevant impacts of the action on the matters protected by the controlling provisions*	The BDAR has discussed relevant EPBC Act listed entities in Section 6, Section 10.1 and Appendix 6.
Avoid and minimise - F*or 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*	Avoid and minimise is discussed throughout and is a key focus for the project, discussed in detail within Section 5 and Section 7.
Key biodiversity issue - *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.*	The BDAR has discussed relevant EPBC Act listed entities in Section 10.1 and Appendix 6.

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1.8 Consultation

Consultation was carried out with the DPHI, NSW DCCEEW and BCS as well as assessing officers from the Cth DCCEEW on multiple occasions during the assessment phase of the project. A summary of the consultation undertaken is demonstrated below in Table 4.

Table 4 Consultation

Date	Consultation	Purpose
15/09/2022	BCS, Spark Renewables, EMM and Biosis	Project overview and introductions Initial discussions around varying flora surveys
15/11/2022	Cth DCCEEW, EMM, Spark Renewables and Biosis	Pre-referral meeting and project overview
09/09/2022	BCS, Spark Renewables, EMM and Biosis	Project updates including - Flora/fauna surveys undertaken to date, methods and results. - PCT mapping. - Update on timing.
03/04/2023	DCCEEW and Biosis	Site visit attended by DCCEEW assessing officers and Biosis ecologists Considerations of referral requirements
25/05/2023	BCS and Biosis	Updates regarding relevant guidelines
20/06/2023	BCS and Biosis	Site visit attended by BCS assessing officers and Biosis ecologists
01/08/2023	BCS and Biosis	Updates and detailed information provided in regard around varying flora surveys
08/09/2023	BCS and Biosis	Updates and detailed information provided in regard around varying flora surveys and changes following BCS review
29/09/2023	BCS, Biosis and EMM	Final update with information provided in regard around varying flora surveys and results of implementation of the varied methodology
26/06/2024	Biosis, EMM, Spark Renewables and DPHI	Discussion around RTS amendments, specifically avoidance/minimise, Serious and Irreversible Impact species and application of partial loss

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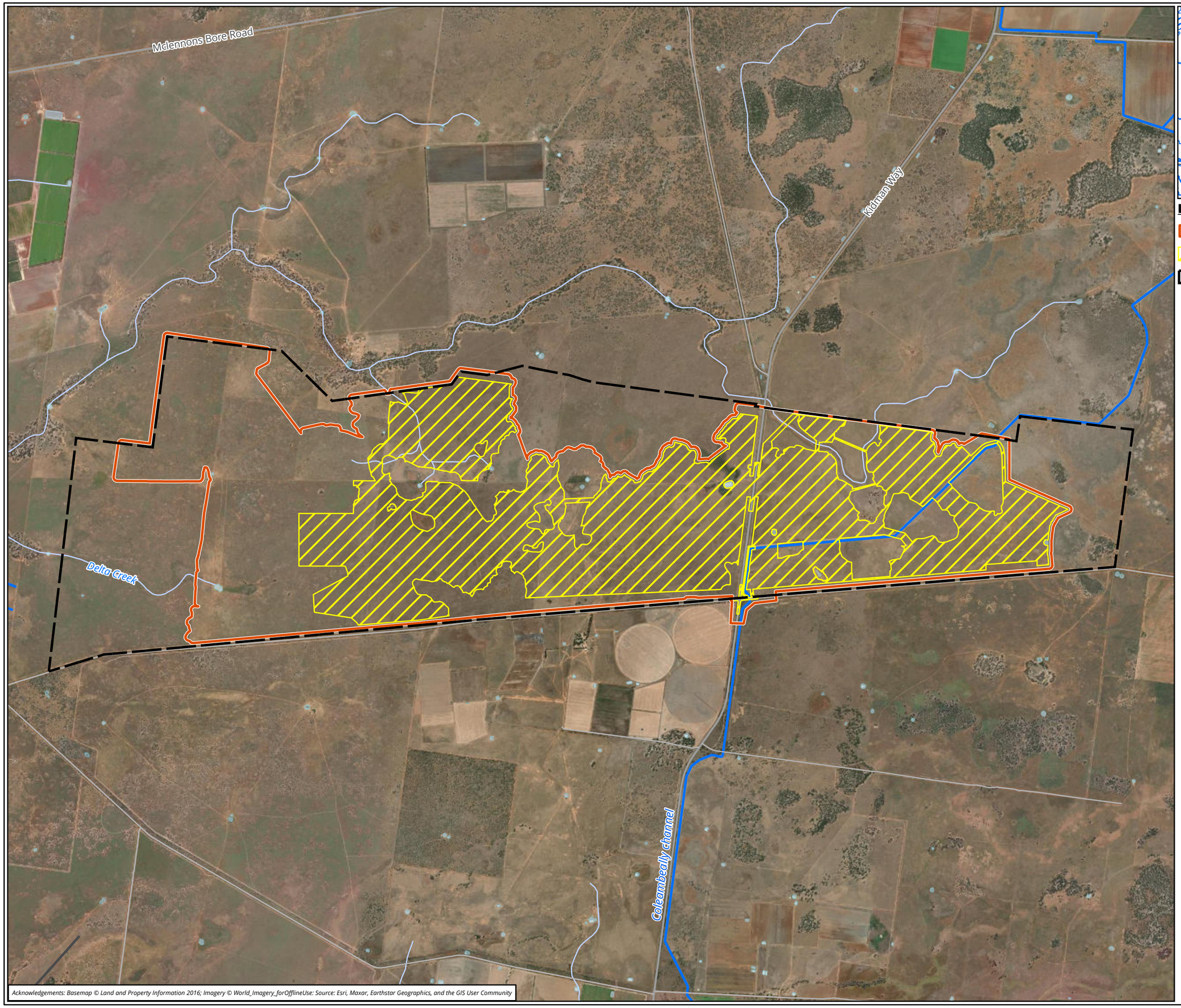

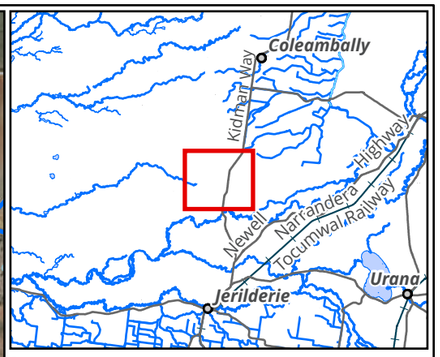

Legend

- Subject land
- Development footprint
- Study area

Figure 1 Subject land

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 08 August 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F1-4.aprx
Layout: 37263_F1_SubjectLand

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

2 Landscape Context

This chapter describes the landscape and site context of the subject land, describing the landscape features present within the subject land and within a 1500 metre buffer, as required by the BAM (DPIE 2020a). Figure 1 shows the location of the subject land and landscape features within the 1500 metre buffer.

2.1 Subject land description

The subject land is located along Kidman Way, between the township of Coleambally and Jerilderie. The current land use is sheep and cattle grazing, with the Coleambally irrigation channel running through the development footprint east of Kidman Way.

The subject land is privately owned and predominantly comprised of farmland, with two rural residences within the immediate vicinity. Vegetation within the subject land is dominated by native vegetation in varying conditions due to historical overstorey removal and livestock grazing, resulting in large tracts of derived native grasslands, areas of natural grasslands and fragmented and regenerating woodlands. The subject land is characterised by low-lying flood prone terrain and includes five first order water courses and one second order ephemeral watercourse.

2.1.1 Native vegetation cover

Vegetation within the assessment area (within the 1500 metre buffer area) was assessed using aerial photographic interpretation, field survey results and existing vegetation mapping.

Much of the vegetation modelled for the Riverina region (DPIE 2016) was confirmed during the field investigation. However, a greater area of PCT 44 Forb-rich Speargrass - Windmill Grass - White Top grassland was modelled when compared to the vegetation mapped in the field. For example, a large area modelled as PCT 44 grassland within the south-east of the subject land was confirmed as PCT 26 Weeping Myall derived grassland zone. This is described further in Section 3.1.7.

The total assessment area is 9,377 hectares, with the area of native vegetation mapped within the buffer being 8,513 hectares. This is a native vegetation cover of 90% (Class D >70% class) as defined in Section 3.2.3 of the BAM (DPIE 2020a)) and this value was entered into the BAM calculator.

Cleared areas within the subject land are limited but comprise of approximately 31.67 hectares, that meets the criteria of Category one exempt land, including the Coleambally irrigation channel and old borrow pits/quarry sites. Sealed and non-sealed areas relating to public roads have also been excluded.

2.1.2 IBRA Bioregions and subregions

The assessment area occurs within the Riverina IBRA bioregion and the Murrumbidgee IBRA subregion. The Riverina IBRA region lies in south-west NSW, extending into central-north Victoria and covers approximately 9,576,964 ha. The region occupies 8.86% of NSW and extends from Ivanhoe in the Murray Darling Depression Bioregion south to Bendigo, and from Narrandera in the east to Balranald in the west. The bioregion also includes outlying remnants of the Murray Darling Depression Bioregion in its western boundary, and the Victorian Midlands Bioregion in the south. The Murray and Murrumbidgee Rivers and their major tributaries,

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the Lachlan and Goulburn Rivers, flow from the highlands in the east, westward across the Riverina plain (NSW National Parks and Wildlife Service 2003).

2.1.3 Rivers and streams

The subject land is located within the Murray LLS Region and the Murrumbidgee and Murray catchments. The closest river is the Murrumbidgee River located approximately 60 kilometres to the north of the development site. The development site is situated between two waterways, Yanco Creek to the south and Cooinbil Creek to the north. Yanco Creek is a major perennial waterway which flows south-west toward the Murray River. To the west of the project is Coleambally Creek and Delta Creek. Coleambally Creek is a minor waterway that is part of the Coleambally Outfall Drain. Delta Creek is a minor, ephemeral waterway which also drains in a south-westerly direction during significant rainfall, although does not connect to any downstream major channel unless the area is flooded. Several ephemeral watercourses associated with Delta Creek are located within the subject land, including five first order watercourses and one second order watercourse (Figure 2). There are no Key Fish Habitats as mapped by the NSW Department of Primary Industries (DPI) within the subject land (DPI 2013).

2.1.4 Wetlands

The subject land is largely flat with some minor drainage depressions that temporarily hold water during and following rainfall before eventually flowing in a south-westerly direction. Several minor topographic depressions on the floodplain hold water for longer, creating scattered swamp environments within the subject land. Several parts of the subject land, and development footprint, are mapped as floodplain or local wetlands (Figure 3), however none of these wetlands are included in the DoIW of Australia (DAWE 2004). Several inland wetlands included in the DoIW occur downstream of the development site, including Black Swamp and Coopers Swamp Wetlands, Millewa Forest Wetland and Werrai Forest Wetland which occur approximately 80-100 kilometres from the development site.

Within the subject land, ephemeral wetlands occur as PCT 17 Lignum swamps or PCT 45 Plains Grass dominated ephemeral drainage lines. These areas generally occur in moderate ecological condition and are subject to cattle and sheep congregating causing pugging and compaction of these wetlands. The Coleambally irrigation channel dissects the eastern portion of the subject land, and acts a conduit of irrigation water for grazing and opportunistic irrigation cropping from Coleambally to western parts of the Riverina. It is a perennial channel, however in low condition with limited vegetation present.

2.1.5 Connectivity

Much of the subject land consists of derived native grassland (DNG), having been historically modified due to cattle and sheep grazing. However, large tracts of natural grassland and woodland occur within the subject land, with wetlands scattered throughout. These wetlands and associated vegetation in floodprone areas may provide movement and dispersal areas for waterbirds and semi-terrestrial species, such as frogs, which was evident during the spring 2023 flooding event. In addition, although highly ephemeral, tributaries of Delta Creek provide transient aquatic habitat corridors for frog and fish species across the subject land during more optimal environmental conditions, such as significant rainfall and flooding events.

Woodland, primarily Black Box dominated riparian areas and Weeping Myall woodlands provide connectivity to larger patches of native vegetation, as well as reserves including the South West Woodland Nature Reserve and Oolambeyan National Park, located to the west and north of the subject land. These connectivity features provide breeding, foraging and dispersal resources for terrestrial and arboreal mammals, flying mammals, and avifauna (Figure 2).

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2.1.6 Geological features of significance

The assessment area is characterised by flat terrain and is subject to periodic inundation (anecdotally once every 5 to 7 years). There were no recorded karst, caves, crevices, cliffs or other areas of geological significance within the development site or within the assessment area.

2.1.7 Areas of outstanding biodiversity value

Under the BC Act, the Minister for the Environment has the power to declare Areas of Outstanding Biodiversity Value (AOBVs). To date no AOBVs have been declared within the development footprint or subject land.

2.1.8 NSW (Mitchell) Landscape

The development site occurs within the Murrumbidgee Scalded Plains Mitchell Landscape (Mitchell 2002). This landscape is characterised by quaternary alluvial plains with extensive scalding interpreted as relic floodplains or terraces. Soils are comprised of grey, brown and red cracking clays, red brown texture-contrast soils with scalds. Levees traces are evident, and relief is generally <1 metre, up to 5 metres on associated pans, swamps and lunettes. Vegetation associated with this landscape consists of Weeping Myall Woodlands, Black Box *Eucalyptus largiflorens* riparian areas and low shrublands and grasslands of Bladder Saltbush *Atriplex vesicaria*, other annual saltbushes *Atriplex* sp., numerous burrs *Sclerolaena* sp., Cottonbush *Maireana aphylla*, Bush Minuria *Minuria cunninghamii*, White-top Grass *Austrodanthonia caespitosa*, Windmill grass *Chloris truncata*, and Hill Wallaby Grass *Austrodanthonia eriantha* (Mitchell 2002).

2.1.9 Additional landscape features

The subject land and 1,500 metre assessment area do not contain any soil hazard features or other additional features that are required to be assessed according to the SEARs.

2.1.10 Hydrology

The site is mapped as containing areas of Groundwater Vulnerability (Jerilderie LEP 2012). In deciding whether to grant development consent for development on land to which this clause applies, the consent authority must consider the following:

- The likelihood of groundwater contamination from the development (including from any on-site storage or disposal of solid or liquid waste and chemicals).
- Any adverse impacts the development may have on groundwater dependent ecosystems (GDEs).
- The cumulative impact the development may have on groundwater (including impacts on nearby groundwater extraction for a potable water supply or stock water supply).
- Any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

- The development is designed, sited and will be managed to avoid any significant adverse environmental impact, or

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- If that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or
- If that impact cannot be minimised—the development will be managed to mitigate that impact.

There are three Cenozoic sedimentary units that contribute to the subject land. Alluvial floodplain deposits (CZ_af) are the main unit with aeolian sand plains (Q_ds) protruding into the north-east corner. There is an alluvial strip (Q_a) that underlies the drainage paths into Delta Creek. A total of 43 groundwater bores are within 2 kilometres of the development footprint. Six of these are within the development footprint. Groundwater levels from registered bores located within the study area are generally between 20 mbgl and 30 mbgl. It is noted that water levels from registered bores are typically recorded at bore construction and so represent a broad temporal spread (EMM, 2023).

2.2 Land categorisation assessment

Section 6.8(3) of the BC Act provides that the BAM is to exclude the assessment of the impacts of clearing of native vegetation on Category 1-Exempt Land (within the meaning of Part 5A of the *Local Land Services Act Amendment Act 2016*).

- **BC Act s6.8(3):** The biodiversity assessment method is to exclude the assessment of the impacts of any clearing of native vegetation and loss of habitat on Category 1-Exempt Land (within the meaning of Part 5A of the LLS Act), other than any impacts prescribed by the regulations under section 6.3;
- **BAM cl1.5 (BAM2020):** Biodiversity values not assessed under the BAM include: (d) biodiversity values associated with the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1-Exempt Land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC regulation; (that being prescribed impacts)

A detailed land category assessment (LCA) and review of desktop vegetation mapping to PCT was undertaken to inform the extent of the area subject to assessment under the BAM and BC Act, as well as preliminary PCT mapping and field validation. This also included reviewing historical imagery for the 1950s and 1990. This was then compared to the Native Vegetation Regulatory (NVR) mapping provided by NSW DCCEEW for the subject land under licence.

Category 1-exempt land is classified broadly as

- Land cleared of native vegetation as at 1 January 1990 or lawfully cleared after 1 January 1990 and before 25 August 2017.
- Land containing low conservation value grasslands or groundcover.
- Native vegetation identified as regrowth in a Property Vegetation Plan (PVP) under the repealed Native Vegetation Act 2003 only where the PVP specifies a regrowth date
- Land bio-certified under the BC Act.

Category 2-regulated land is classified broadly as

- Vulnerable and sensitive regulated land.
- Land not cleared of native vegetation before 1 January 1990 or unlawfully cleared of native vegetation after 1 January 1990.
- Land containing native vegetation grown or preserved using public funds.

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- Land subject to an expired remedial action to restore or protect the biodiversity values.
- Land in the proximity area of a coastal wetland or littoral rainforest areas of the coastal zone under the Coastal Management Act 2016..
- Land subject to (or previously subject to) a private native forestry plan under either the *Forestry Act 2012* or the *Native Vegetation Act 2003*.
- Land containing medium conservation value grasslands.
- Land containing low conservation grasslands beneath the canopy or drip line of woody vegetation.
- Land is a travelling stock reserve (unless the land is located in the Western Division).
- The land is otherwise prescribed by the Local Land Services Regulation as category 2–regulated land.

There are no areas of Critically Endangered Ecological Communities (CEEC) or habitat for Critically Endangered species at Category 1-exempt land that are required to be re-categorised as Category 2-regulated land within the subject land.

Areas identified as non-native vegetation or Category 1-exempt land are shown on Figure 6.

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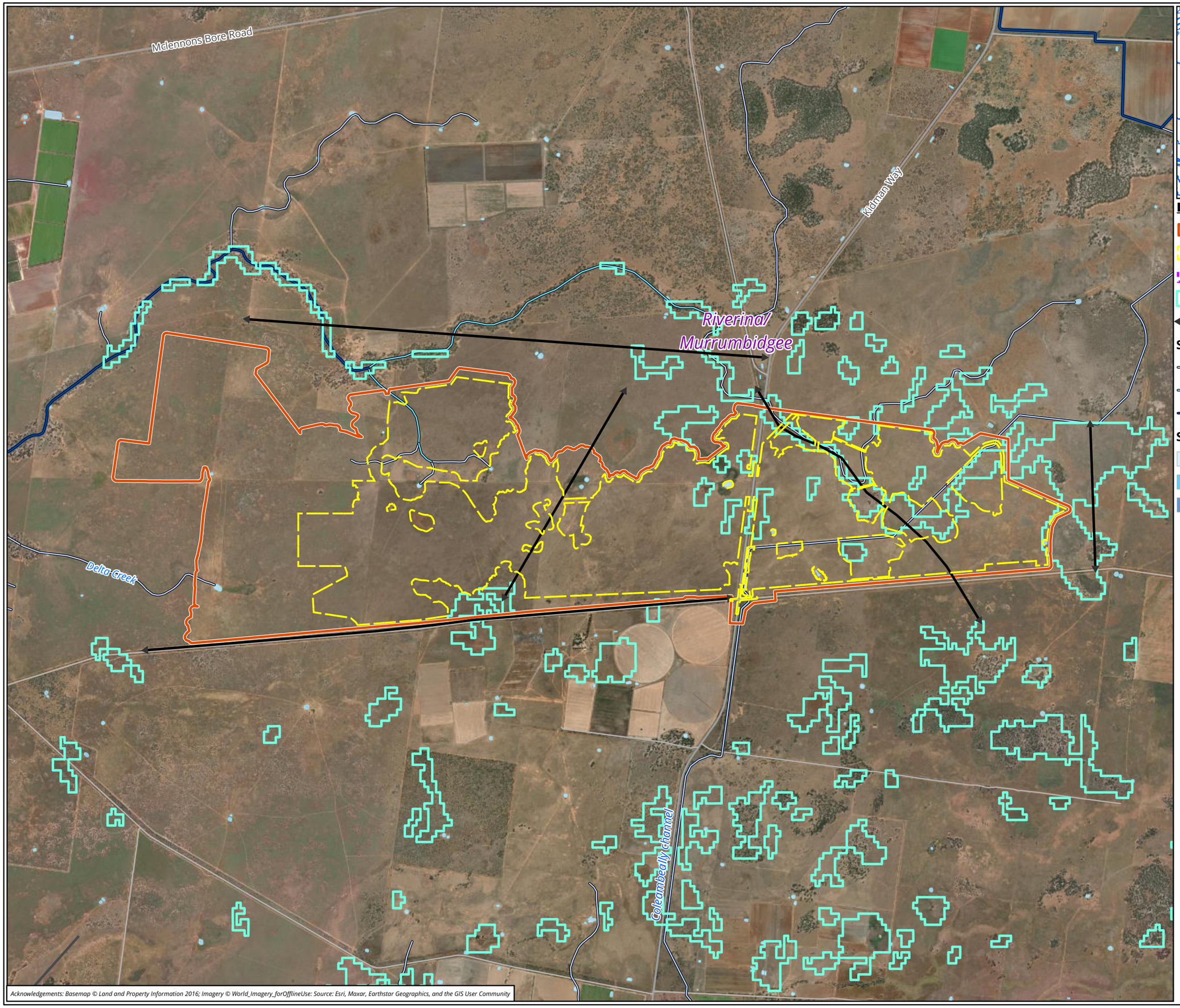

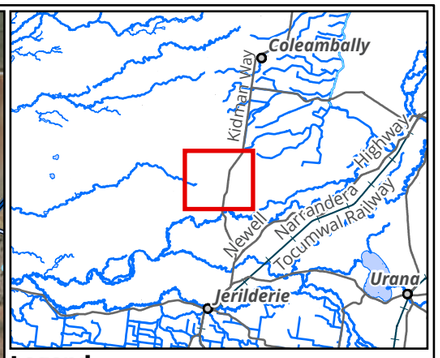

Legend

- Subject land
- Development footprint
- IBRA Region/Sub-region
- Local wetlands
- Habitat connectivity

Strahler stream order

- 1
- 2
- 3

Strahler stream order buffers

- 1
- 2
- 3

Figure 2 Site map

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 08 August 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
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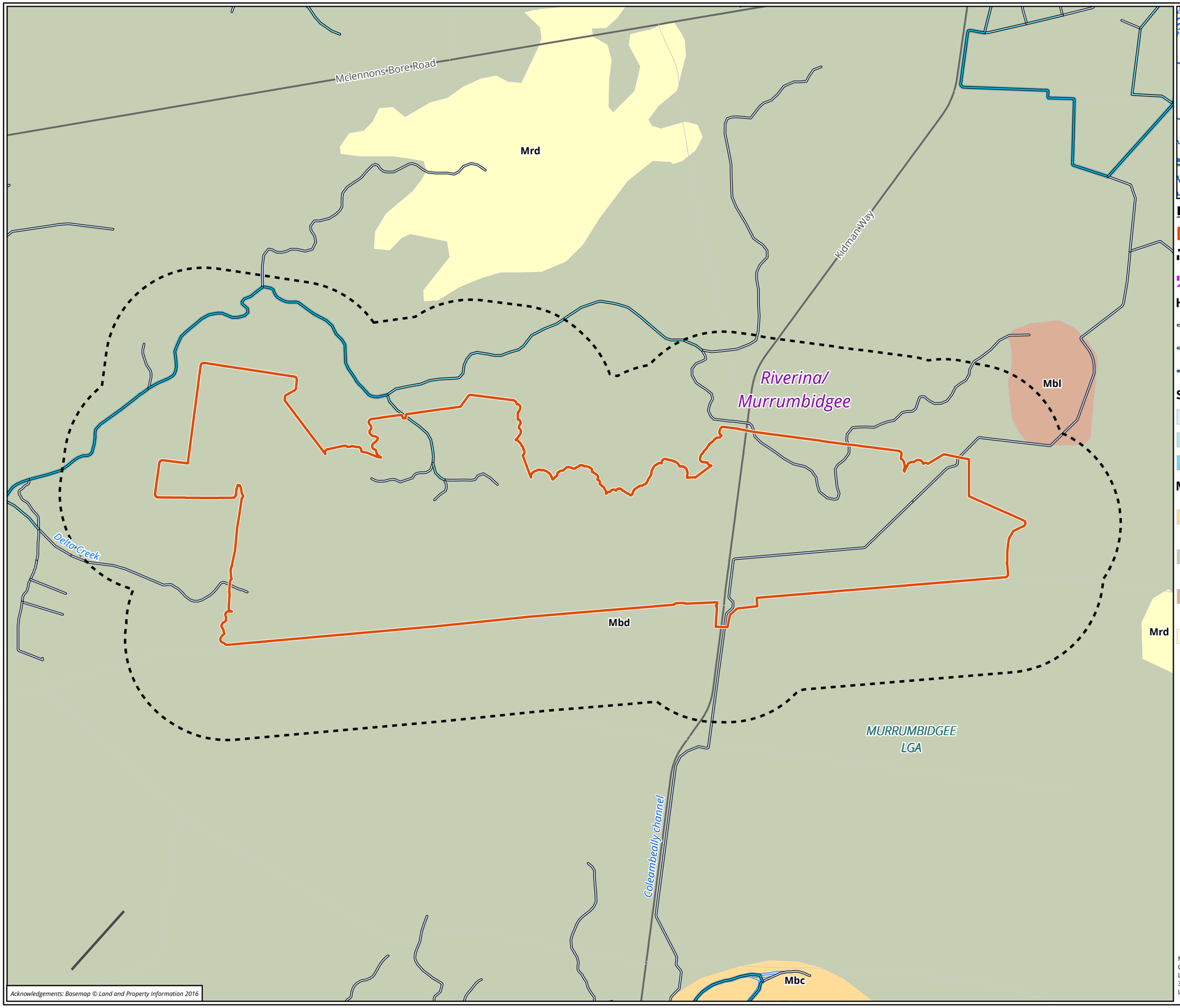
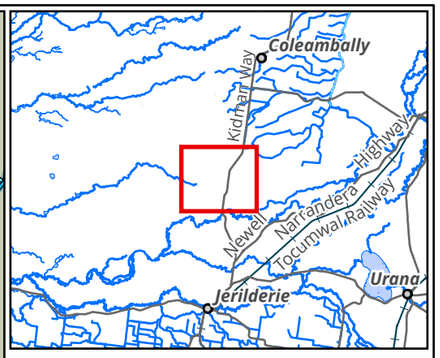
Layout: 37263_F2_Sitemap

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community





Legend

- Subject land
- Assessment area
- IBRA Region/Sub-region

HydroLine stream order

- 1
- 2
- 3

Strahler stream order buffers

- 1
- 2
- 3

Mitchell landscapes

- Mbc,Murrumbidgee Channels and Floodplains
- Mbd,Murrumbidgee Scalded Plains
- Mbl,Murrumbidgee Lakes, Swamps and Lunettes
- Mrd,Murrumbidgee Source-bordering Dunes

Figure 3 Location map

0 1 2

Kilometers

Scale: 1:55,000 @ A3

Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 08 August 2024
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\37263_Dinawan_BDAR_F1-4.aprx
Layout: 37263_F3_Location

3 Native vegetation

The subject land is comprised of 3,394.60 hectares of vegetation (approximately 3,362.93 of native vegetation and 31.67 hectares of non-native or cleared vegetation) subject to varying levels of disturbance. Most of the vegetation within the subject land is comprised of natural and derived native grassland (DNG). DNG occurs in a modified condition due to historic clearing of overstorey woodland species and grazing by cattle and sheep. The remainder of the vegetation consists of woodland and wetland communities which occur in moderate to good condition.

3.1 Native vegetation and habitat assessment

3.1.1 Native vegetation extent

The extent of native vegetation, threatened ecological communities, and vegetation integrity within the subject land was determined using the results of site investigations, previous studies undertaken at the site by Biosis (Biosis 2022) and EMM (EMM 2022) as well as Section 4 of the BAM (DPIE 2020a).

Figure 4 provides a map of the native vegetation extent recorded within the subject land and development footprint, as assessed during preliminary field investigations undertaken in February 2022. The figure includes all areas of native vegetation (native ground cover and areas with canopy) within the subject land. Areas not shown as native vegetation cover within Figure 4, are considered cleared / Category 1 – exempt land or non-native vegetation, and are addressed further below.

3.1.2 Review of existing information

Existing information regarding native vegetation was reviewed to inform field investigations including:

- Regional vegetation mapping:
- State Vegetation Type Map: Riverina Region Version v1.2 – VIS_ID 4469 (DPIE 2016).
- Dinawan Energy Hub Biodiversity Constraints and Opportunities Assessment (Biosis 2021).
- Dinawan Solar Farm Scoping Report (EMM 2022).
- Native vegetation of the Riverine Plain, NSW (Benson, et.al, 1995)
- Evidence for the natural occurrence of treeless grasslands in the Riverina region of south-eastern Australia (McDougall, 2008)

Based on the results of the background review and the requirements of the BAM with respect to this BDAR, appropriate surveys were designed for the subject land and development footprint.

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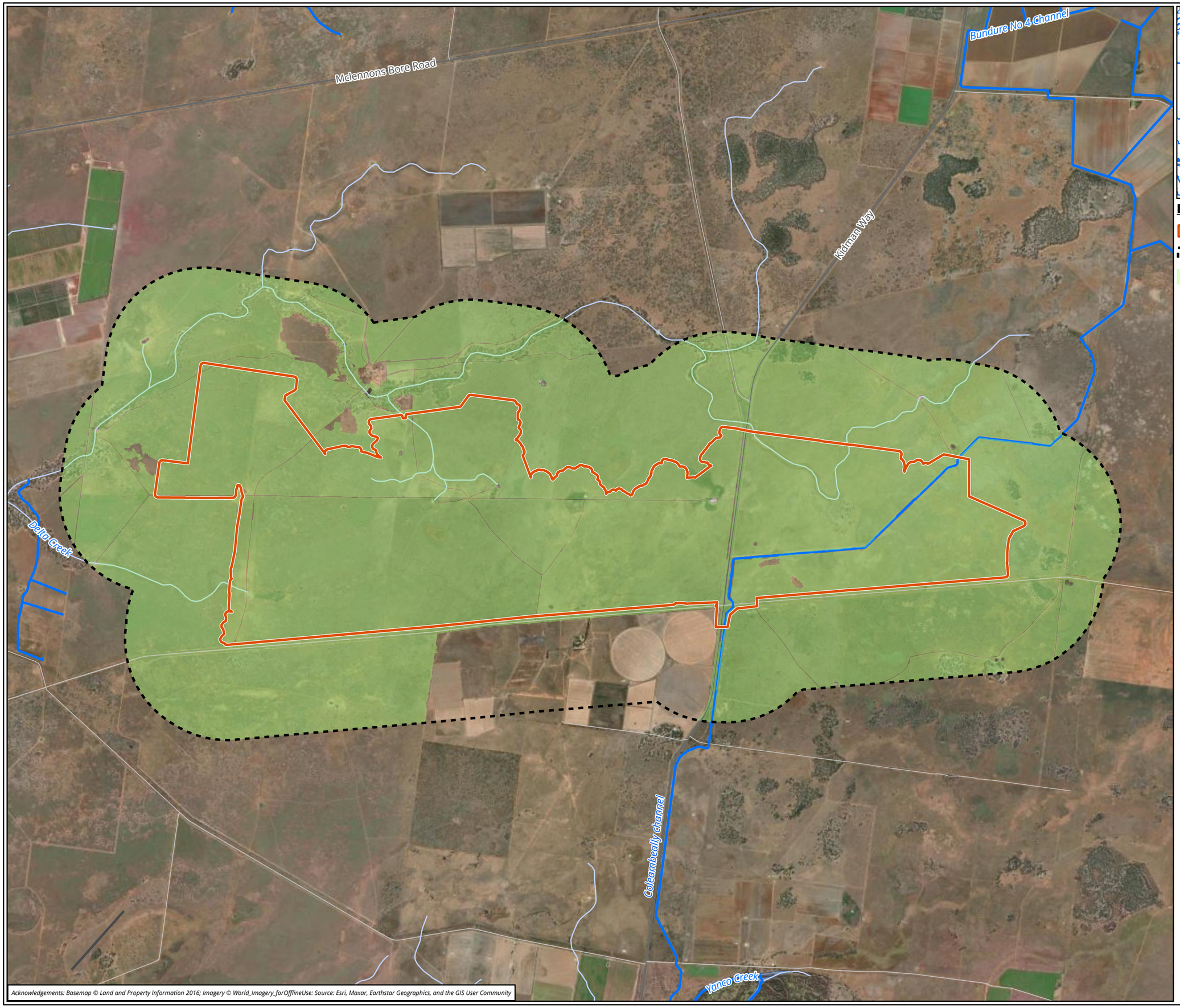

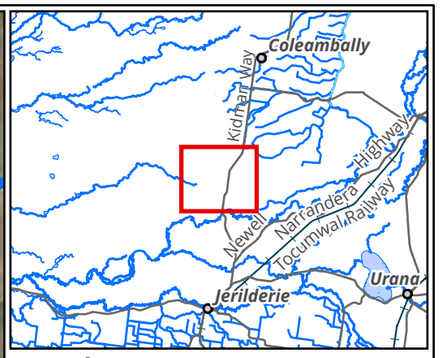

Legend

- Subject land
- Assessment area
- Native vegetation

Figure 4 Native vegetation cover

0 1 2

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

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Matter: 37263, Date: 08 August 2024,
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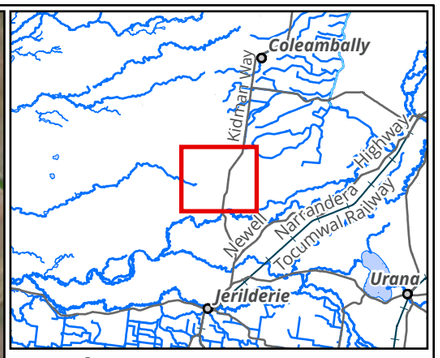

Legend

Subject land

Assessment area

Patch size

≥100ha (VZ1-VZ10)

Coleambally channel

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Figure 5 Patch size locations

0 1 2

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

N

biosis

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3.1.3 Field investigation of biodiversity values

Opportunistic and rapid assessment surveys of vegetation and habitat to inform the initial biodiversity constraints and opportunities assessment were conducted in February 2022. Following the constraints assessment, systematic biodiversity assessments were conducted during the following times:

- February 2022 – Rapid assessment and vegetation mapping of study area.
- August 2022 – Rapid assessment and vegetation mapping, targeted fauna surveys and hollow bearing tree mapping.
- September 2022 – Targeted flora and fauna surveys, Opportunistic/incidental surveys.
- November 2022 - BAM Plots, targeted flora and fauna surveys, Opportunistic/incidental surveys.
- January 2023 – BAM Plots, targeted flora and fauna surveys, Opportunistic/incidental surveys.
- February 2023 – BAM Plots, targeted flora and fauna surveys, Opportunistic/incidental surveys.
- April 2023 – Targeted fauna surveys, opportunistic/incidental surveys.
- July 2023 – BAM plots, vegetation mapping of additional areas.
- September 2023 – Targeted flora and fauna surveys.
- November 2023 - Targeted flora surveys.
- January 2024 - Targeted fauna (Amphibian) surveys and additional BAM plots.

These surveys were under the terms of Biosis' Scientific Licence issued by the EHG under the National Parks and Wildlife Act 1974 (SL100758, expiry date 31 May 2025). Fauna survey was conducted under approval CSB 17/892 from the NSW Animal Care and Ethics Committee (expiry date 31 January 2025).

Assessment in accordance with the BAM was planned, overseen and carried out by Accredited Assessor Mitchell Palmer (BAAS17051).

The development site was surveyed in accordance with the BAM (DPIE 2020a), which involved:

- The identification and mapping of PCTs according to the structural definitions held in the BioNet Vegetation Classification database, with reference to information provided in State Vegetation Type Map: Riverina Region Version v1.2 – VIS_ID 4469 (DPIE 2016).
- Undertaking floristic plots within each vegetation zone in accordance with Section 4 of the BAM (DPIE 2020a), considering varying condition states and avoidance of ecotones, areas of disturbance, and edges.
- The identification of native and exotic plant species, according to the Flora of NSW (Harden 1992, 1993, 2000, 2002) with reference to recent taxonomic changes.
- Targeted searches for plant species of conservation significance according to Surveying Threatened Plants and Their Habitats (DPIE 2020b).
- Incidental observations using the "random meander" method (Cropper 1993).
- Identification of previous and current factors threatening the ecological function and survival of native vegetation within and adjacent to the development site.
- An assessment of the natural resilience of the vegetation of the site.

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- Identifying and mapping fauna habitats (e.g., hollow-bearing trees, rock outcropping etc.), assessing their condition and value to threatened fauna species, and considering threatened species' habitat constraints.
- Observations of animal activity and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings).
- Targeted surveys for threatened fauna species in accordance with relevant guidelines.

The conservation significance of plant species and plant communities was determined according to:

- BC Act for significance within NSW
- EPBC Act for significance within Australia.

Detailed field mapping and collection of GPS point locations were conducted using hand-held (uncorrected) tablet units (Samsung Galaxy Tab X) running the ArcGIS Field Maps application, using the inbuilt GPS, and aerial photo interpretation. Spatial locations are therefore considered to have an accuracy of generally ±5 metres.

Areas of native vegetation for which a PCT could validly be assigned were identified and delineated in the field, and their condition determined and assigned. Identification of PCTs within the subject land was confirmed with reference to the community profile descriptors (and diagnostic species tests) held within NSW BioNet Vegetation Classification database (DPE 2022a). Locations of floristic plots surveyed are shown on Figure 3.

Further details of targeted survey for threatened species are provided in Section 4.3.1 below.

3.1.4 Local appropriate data

No local appropriate data or non-standard benchmark has been used in the preparation of this BDAR or added to the BAM Calculator.

3.1.5 Limitations

Field surveys were undertaken in accordance with the BAM (DPIE 2020a) and relevant guidelines as far as practicable. Field surveys have been conducted across multiple seasons and across multiple years, however due to the size of some vegetation zones, scale-based variations to methods have been applied and discussed further in Section 4.3.

Ecological surveys provide a sampling of flora and fauna at a given time and season. Factors influencing detectability of species during survey include species dormancy, seasonal conditions, seasonal condition of waterbodies/wetlands, and migration and breeding behaviours of some fauna. In many cases, these factors do not present a significant limitation to assessing and characterising the overall biodiversity values of a site.

Due to the large size of the subject land and implication of flooding events, application of the *Surveying Threatened Plants and Their Habitats* (DPIE 2020b) guidelines to their fullest intent was not practical or considered achievable. During the initial field plans, and based on the size of the subject land, application of the two-phased grid method as outlined in the guidelines would result in over 3,150, 100 metre x 100 metre grid intersection points requiring survey in Weeping Myall vegetation zones alone, and approximately 3,364 grid intersection points across all zones >50 hectares in area, and not including areas <50 hectares that require parallel flora transects. Within the amended development footprint, approximately 1,778 grids would

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need to be completed. In consultation with BCS, a modified approach to threatened flora surveys has been implemented; however, it is acknowledged that BCS have not provided support for the modified approach.

The vegetation mapping found relatively uniform and repeated vegetation patterns and land use history across the subject land. Based on the landscape features, the largely homogenous nature of vegetation/habitat present and very large nature of the subject land, a lower survey intensity than that prescribed by the guidelines was considered warranted and appropriate to sufficiently survey the habitat present, whilst remaining representative and scientifically robust. This represents a comprehensive survey effort commensurate with the scale and impacts of the project, with the method implemented described further in Section 4.3. Compounding the issue of the enormity of prescribed survey effort, was the above average rainfall and significant flooding events that rendered large portions of the subject land inaccessible for most of the spring 2022 seasonal window, which covered the majority of threatened species requiring survey, and areas that were accessible contained standing water. Additional surveys have been undertaken in September and November 2023 to supplement reduced survey coverage in 2022.

Generally, surveys undertaken across various methods, combined with habitat assessments and desktop analysis are considered sufficient to reach the conclusions herein regarding species' likelihood of occurrence and level of expected impacts within the subject land. Reference has also been made to survey effort undertaken for the Project EnergyConnect BAM assessment (WSP, 2022) and the findings of that work with regards to new threatened flora records and detectability. Database searches, and associated conclusions on the likelihood of species to occur within the assessment area, are reliant upon external data sources and information managed by third parties.

3.1.6 Non-native vegetation

Category 1 exempt land does occur along the Coleambally irrigation channel, and former quarry or borrow pits within the subject land, and therefore are the only areas excluded from the assessment. These areas cover approximately 31.67 hectares, or 0.94% of the subject land.

3.1.7 Plant community types

The subject land is effectively entirely covered with native vegetation in the form of predominantly DNG, precautionarily identified natural grasslands, Weeping Myall woodland, Black Box woodland patches and wetlands (Lignum or sedge-dominated wetlands).

The vast majority of the subject land is dominated by highly dynamic native grassland vegetation that aligns with PCT 26 (DNG), PCT 44, PCT 45 or PCT 46, however, following detailed assessment of historical imagery (1958 and 1990), LIDAR and DSM, landscape and floristic data, it was determined the majority of these native grasslands are likely derived from the original cover of Weeping Myall Woodland (PCT 26) that occurs extensively to the north and south of the development site, as well on local roadsides. Weeping Myall *Acacia pendula* is also recruiting in derived grassland areas as grazing-suppressed individuals indicating the propensity of these areas to support woodland vegetation. This means the natural tree cover has been historically removed, or died out, as a result of land use practices, fire and/or drought and only the native ground layer vegetation remains (e.g. grasses, sedges, forbs and small shrubs with scattered Weeping Myall recruits). This grassland vegetation now supports livestock grazing (i.e. native pasture).

A key diagnostic of determining derived or natural grasslands, and to which the original PCT may have been in heavily modified landscapes, is the presence of woody vegetative recruitment and standing or fallen timber. As mentioned above, throughout the subject land, where grasslands are considered to occur, or mapped on Riverina STVM mapping as PCT 44, evidence of the recruitment of sparse Weeping Myall

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throughout, along with frequent coarse woody debris, determined that much of the area was in fact, derived from former Weeping Myall communities as a direct result of historical land use and agricultural practices. However, where grey clay loam soils occur in lower lying areas and/or drainage lines, generally transitioning towards lignum dominated seasonal wetlands, changes in the dominant floristics occur and these areas may be natural grassland. A precautionary approach was taken in assigning the PCT of these areas, being PCT 45 and PCT 46. These are described in more detail in the following tables.

The following PCTs were assessed as present within the subject land:

- PCT 13 Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Table 5).
- PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Table 6).
- PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Table 7).
- PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (Table 8).
- PCT 45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion (Table 9).
- PCT 46 Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion (Table 10).

Table 5 to Table 10 provide detailed descriptions and justification for the six PCTs and their condition states recorded within the subject land. PCTs recorded within the subject land are shown in Figure 6.

Table 5 PCT 13 Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

PCT 13: Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
Common name	Black Box - Lignum woodland wetland
Vegetation formation	Semi-arid Woodlands (Grassy sub-formation)
Vegetation class	Inland Floodplain Woodlands
Extent	Subject land - 8.14 ha Development footprint – 0.12 ha (Figure 6, Figure 9)
Condition	This community at the subject land was recorded in a moderate condition.
Description	Black Box - Lignum woodland wetland typically exists as a woodland, open forest or open woodland averaging about 15 metres high dominated by a sparse to dense stands of Lignum *Muehlenbeckia florulenta*, Nitre Goosefoot *Chenopodium nitrariaceum* and River Cooba *Acacia stenophylla*. The upper stratum is dominated by Black Box *Eucalyptus largiflorens* and *Eucalyptus camaldulensis* subsp. *camaldulensis* and Cooba *Acacia stenophylla*. The understorey is dominated by a mixture of low shrubs and grasses, with dominant species including *Sclerolaena muricata var. muricata*, various saltbush species, Curly Windmill Grass *Enteropogon acicularis*, *Walwhalleya proluta* and Wallaby grasses *Austrodanthonia* spp. Within the subject land, moderate condition Black-Box – Lignum woodland contains sporadic Black Box and consisted of understorey species including shrub and forb

PCT 13: Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
	species such as Creeping Saltbush *Atriplex semibaccata*, Black Rolypoly *Scleroleana muricata* and Lignum *Duma florulenta,* Quena *Solanum esuriale,* Common Nardoo *Marsilea drummondii*, and grass species Curly Windmill Grass *Enteropogon acicularis*, *Walwhalleya proluta* and *Austrostipa* spp.
Survey effort	Three BAM plots were collected over the course of the field assessment (Figure 9).
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. Black Box - Lignum woodland wetland within the subject land meets the PCT description (DPE 2023c) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on alluvial loams and clays. • Landform – occurs on floodplains. • Dominant species – Overstorey dominated by Black Box, understorey of Lignum, Creeping Saltbush, Black Rolypoly, and a mix of grasses and forbs including Common Nardoo, Curly Windmill Grass and *Walwhalleya proluta*. Other PCTs considered were PCT 15 and PCT 16, however the abundance of sparse to dense stands of Lignum, high Nardoo cover and was present on more consistent gilgaied grey loam/clay soil that is frequently inundated considered PCT 13 the best fit.
TEC Status	**NSW BC Act:** This community is not associated with a TEC listed under the BC Act. **Commonwealth EPBC Act:** This community is not associated with a TEC listed under the EPBC Act.
Estimate of percent cleared value of PCT (BioNet)	57% (DPE 2023c).
PCT 13– Moderate condition	

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Table 6 PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

PCT 15: Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
Common name	Black Box open woodland wetland
Vegetation formation	Semi-arid Woodlands (Grassy sub-formation)
Vegetation class	Inland Floodplain Woodlands
Extent	Subject land - 2.47 ha in total *Moderate condition – 1.04 ha* *Mod_Good Condition – 1.43 ha* Development footprint – 0.16 ha in total *Moderate condition – 0 ha* *Mod_Good Condition – 0.16 ha* (Figure 6, Figure 9)
Condition	This community at the subject land was recorded in Moderate and Mod_Good condition classes.
Description	Black Box open woodland wetland typically occurs a woodland or open woodland dominated by Black Box *Eucalyptus largiflorens* with an understorey of chenopod shrubs such as Black Bluebush *Maireana pyramidata*, *Maireana decalvans*, Nitre Goosefoot *Chenopodium nitrariaceum* and Old Man Saltbush *Atriplex nummularia* with the latter mostly disappeared due to grazing. Small shrubs include Bladder Saltbush *Atriplex vesicaria* and Cotton Bush *Maireana aphylla* with a ground cover of annual or perennial saltbushes, copperburrs, grasses and forbs. Common copperburrs include *Sclerolaena obliquicuspis*, *Sclerolaena stelligera*, *Sclerolaena divaricata*, *Sclerolaena brachyptera*. Lignum *Muehlenbeckia florulenta* may be absent or very sparse. Weed species include Black Nightshade *Solanum nigrum* and Paddy Melon *Cucumis myriocarpus subsp. leptodermis*. Occurs on alkaline brown or grey clay soil on alluvial plains or sandy-loam soils on the flood plain of river systems. Within the subject land, Black-Box open woodland contained a sparse canopy of Black Box, with an understorey dominated by Black Rolypoly, Nitre Goosefoot, Crested Goosefoot *Dysphania cristata*, sparse occurrences of Old Man Saltbush and a variety of weeds including African Boxthorn *Lycium ferocissimum*, Black Nightshade, Wild Melon *Citrullus lanatus var. lanatus*, Smooth Mustard *Sisymbrium erysimoides*. The understorey includes grasses Curly Windmill Grass and *Walwhalleya proluta*, with sporadic occurrences of forb species such as Corrugated Sida *Sida corrugata* and Quena *Solanum esuriale*. Evidence of thinning of woody vegetation was observed in this PCT and was the main driver between differentiating the condition zones as well as the increased diversity of exotic species.
Survey effort	One BAM plot was collected over the course of the field assessment in the moderate condition class. Two BAM plots were collected over the course of the field assessment in the Mod_good condition class (Figure 9).
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. Black Box open woodland wetland within the subject land meets the PCT description (DPE 2023c) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on clays and sandy-loams. • Landform – occurs on floodplains.

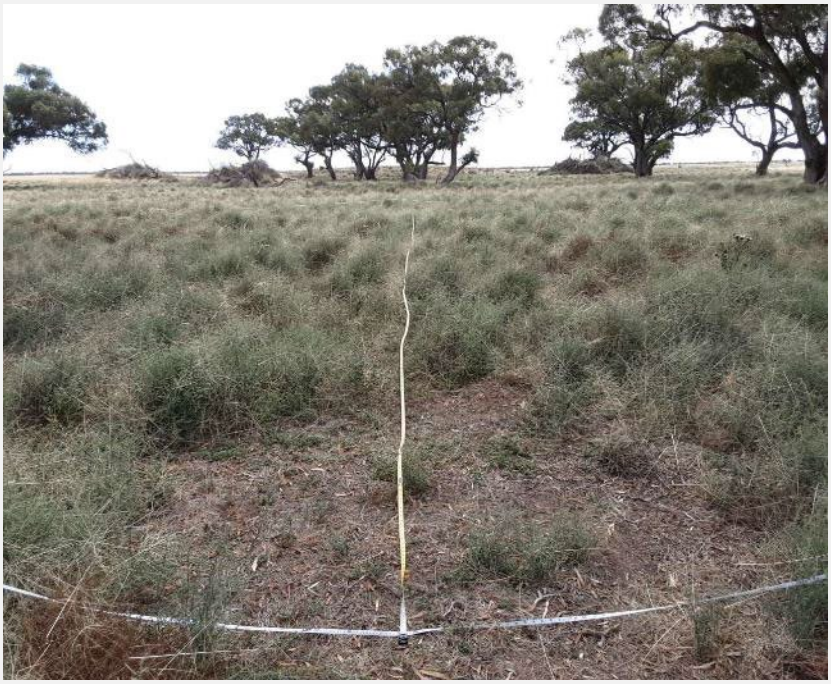
PCT 15: Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
	• Dominant species – Overstorey dominated Black Box, understorey of Black Rolypoly, sporadic occurrences of and a mix of grasses and forbs including Curly Windmill Grass and *Walwhalleya proluta*. Other PCTs considered were PCT 13 and PCT 16, however the abundance of chenopods more so than grass cover, such Nitre Goosefoot and Black Roly-poly, and observed more consistently on the red and brown soils that are less frequently inundated, considered PCT 15 the best fit.
TEC Status	**NSW BC Act:** This community is not associated with a TEC listed under the BC Act. **Commonwealth EPBC Act:** This community is not associated with a TEC listed under the EPBC Act.
Estimate of percent cleared value of PCT (BioNet)	50% (DPE 2023c).
PCT 15– Mod_Good condition (with evidence of thinning)	
PCT 15– Moderate	

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Table 7 PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

PCT 17: Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
Common name	Lignum shrubland wetland
Vegetation formation	Freshwater Wetlands
Vegetation class	Inland Floodplain Shrublands
Extent	Subject land - 64.09 ha in total *Moderate condition – 21.3 ha* *Mod_Good Condition – 42.79 ha* Development footprint – 1.14 ha in total *Moderate condition –0.08 ha* *Mod_Good Condition – 1.06 ha* (Figure 6, Figure 9)
Condition	This community at the subject land was recorded in Moderate and Mod_Good condition states, subject to a light to moderate level of grazing. Mod_Good condition Lignum shrubland wetland contains a slightly higher level of structural and floristic diversity than the moderate condition of the community.
Description	Lignum shrubland wetland typically occurs as an open shrubland usually up to 2 m high dominated by Lignum often with Nitre Goosefoot *Chenopodium nitrariaceum* and low cover of Canegrass *Eragrostis australasica*. Scattered trees of Black Box may be present. Cooba *Acacia salicina* and River Cooba may be present as tall shrubs. Ground cover species include small shrubs such as Giant Redburr *Sclerolaena tricuspis*, Roly Poly, *Atriplex lindleyi*, *Salsola tragus* subsp. *tragus*, the fern *Marsilea drummondii*, the rush *Juncus flavidus*, the forbs *Rumex tenax, Einadia nutans subsp. nutans*, Bulbine bulbosa, *Senecio glossanthus* and *Senecio cunninghamii*. Grass species include *Walwhalleya proluata* and *Enteropogon ramosus*. Weed species include *Lolium perenne*, *Hordeum leporinum* and *Rapistrum rugosum*. Occurs in river channels and depressions on floodplains subject to regular flooding in south-western NSW. Within the subject land, Mod_Good condition Lignum shrubland wetland included a high cover and abundance of native species, with a diverse understorey consisting of a mixture of shrub species; Lignum, Black Rolypoly, forb species; Common Nardoo, Lesser Joyweed *Alternanthera denticulata* fern species; Common Nardoo and sedge species Pale Spike Sedge *Eleocharis acuta* and *Eleocharis pallens* and *Juncus* spp.. This community contained little to no weed ingress within the understorey and occasional Weeping Myall individual. Moderate condition Lignum shrubland wetland contained a slightly less diverse understorey and impacted further by grazing activities, but with a similar suite of dominant species including Lignum, Common Nardoo, *Walwhalleya proluta* and Pale Spike Sedge, however with a higher presence and diversity of weed species such as Potato Weed *Heliotropium europaeum* and Bathurst Burr.
Survey effort	Three BAM plots were collected over the course of the field assessment in the moderate condition class. Seven BAM plots were collected over the course of the field assessment in the Mod_good condition class (Figure 9).
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. Lignum shrubland wetland within the subject land meets the PCT description (DPE 2023c) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion.

PCT 17: Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
	• Soil - occurs on clays. • Landform – occurs on flood plains. • Dominant species – Lignum, Creeping Saltbush, Black Rolypoly, Common Nardoo, and a mix of grasses and forbs including Curly Windmill Grass, Pale Spike Sedge and Ringed Wallaby Grass and *Walwhalleya proluta*. The presence and dominance of Lignum on grey clay loam soils, compared to other grassy swampy PCTs, or Nitre Goosefoot dominated PCT 160, make PCT 17 the best fit. The PCTs intergrade with PCT 13 when more consistent Black Box occurs.
TEC Status	**NSW BC Act:** This community is not associated with a TEC listed under the BC Act. **Commonwealth EPBC Act:** This community is not associated with a TEC listed under the EPBC Act.
Estimate of percent cleared value of PCT (BioNet)	63% (DPE 2023c).
PCT 17 – Moderate condition (with occasional myall)	
PCT 17 – Mod_Good condition	

Table 8 PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	
Common name	Weeping Myall open woodland
Vegetation formation	Semi-arid Woodlands (Grassy sub-formation)
Vegetation class	Riverine Plain Woodlands
Extent	Subject land – 3,134.11 ha in total *Intact condition – 248.51 ha* *Sparse Condition – 1,775.0 ha* *DNG – 1,110.59 ha* Development footprint – 1,779.65 ha in total *Intact condition – 0.42 ha* *Sparse Condition – 919.19 ha* *DNG – 860.04 ha* (Figure 6, Figure 9)
Condition	This community within the subject land was recorded in DNG, sparse, and intact condition classes and is the dominant community within the subject land on red and brown clay soils. This community can be variable, with both grassy and chenopod dominated understorey depending on levels of subjected disturbance historically.
Description	Weeping Myall open woodland typically occurs as a mid-high open woodland up to 8 m high dominated by Weeping Myall, with other tree species including Belah *Casuarina cristata*, while Black Box and River Red Gum may occur in depressions. Chenopod shrubs may be common or absent. They include Spiny Saltbush, and *Maireana decalvans*, The ground cover may be dense or sparse depending on rainfall. It is dominated by grass species such as *Austrodanthonia* spp., *Austrostipa* spp. and *Sporobolus caroli*. Saltbush species include *Atriplex* spp. and forb species include Lesser Joyweed. Occurs on brown clays or loam soils on alluvial plains. Prior to European settlement this community probably contained a dense understorey of saltbush. Much of its original extent has now altered to be a derived native grassland dominated by native grasses and forbs. Myall woodland in intact condition is characterised by an overstorey of Weeping Myall, generally >5% cover with sporadic occurrences of Miljee *Acacia oswaldii*. The understorey is dominated by grasses and shrubs including Black Rolypoly, Grey Copperburr *Sclerolaena diacantha*, Windmill Grass *Chloris truncata*, *Sporobolus carolii,* Ringed Wallaby Grass, and Hairy Bluebush *Maireana pentagona*. Weed ingress tended to be relatively low but included species such as African Boxthorn and Wild Oats *Avena* spp. Sparse Myall open Woodland condition class contained a sporadic canopy of mature and regenerating Weeping Myall, generally below 3-5% cover, with an understorey containing dominant species Plains Grass, Yanganbil *Austrostipa bigeniculata*, Wallaby Grass, Windmill Grass and *Walwhalleya proluta*. Numerous weed species occurred within this form of the community including Wimmera Ryegrass *Lolium rigidum*, Burr Medic and Barley Grass *Hordeum* spp. DNG condition of Myall open woodland lacked an overstorey, generally <1% cover, and comprised grass and forb species including *Walwhalleya proluta,* Yanganbil, Windmill Grass, Curly Windmill Grass. Weed species including a higher number of weeds including Wild Oats and Burr Medic and Patterson's Curse *Echium plantagineum*. DNG areas also sparse recruitment of Myall seedlings and contained standing and fallen woody debris throughout adding confidence to the derived nature of this community as opposed to natural grassland areas.

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PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	
Survey effort	30 BAM plots were collected over the course of the field assessment (Figure 9). Intact – Six BAM plots were collected over the course of the field assessment in the Intact condition class. Sparse – 12 BAM plots were collected over the course of the field assessment in the Sparse condition class. DNG – 12 BAM plots were collected over the course of the field assessment in the DNG condition class.
Justification of PCT	Myall open woodland within the subject land meets the PCT description (DPE 2023c) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on clays. • Landform – occurs on plains and alluvial plains. • Dominant species – overstorey of Weeping Myall and an understorey of Black Rolypoly, Windmill Grass, Speargrass, Ringed Wallaby Grass and *Walwhalleya proluta.* The presence and dominance of the Weeping Myall in this region considers PCT 26 the best fit. Where Weeping Myall canopy becomes largely absent it has been identified as PCT 26 DNG. For the designated PCT26 DNG, as discussed previously, the floristics in conjunction with occasional Weeping Myall seedling recruitment and standing and/or fallen woody debris determined a more appropriate fit than a grassland PCT, such as PCT 44, which occurs as areas of natural grasslands across the Hay Plain to the West. Small areas of microrelief do occur on occasion that form small mosaic alterations with the introduction of some additional species, more consistent with other vegetation types, and the overall structure. The two main examples of this are an increase in Lignum *Duma florulenta* and Nitre Goosefoot *Chenopodium nitrariaceum* in areas still dominated by Weeping Myall, or have evidence of previous woody Weeping Myall vegetation and occurs on the more gilgai grey soils within the PCT 26 Intact and sparse zones. Additionally, slight changes occur on the red loam soils where an increase in forb richness occurs in PCT 26 DNG. The latter does contain some relevance to PCT 44 Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion however, as previously stated, the vegetation has been mapped as derived version of PCT 26, due to evidence of woody debris, scattered recruitment and nearby roadside vegetation. PCT 26 DNG does intergrade and becomes ecotonal with PCT 45 and PCT 46, with similar floristic composition, albeit changes in dominance, however there is generally a discernible change in soil type. PCT 26 was found to occur on the more red/brown sandy alluvial and clay soils, and PCT 46 and PCT 45 occurring on more of the grey loam to cracking clay soils in slight depressions or drainage lines.
TEC Status	**NSW BC Act:** All Sparse and Intact condition patches were determined to meet the criteria for *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* (EEC). DNG areas were not considered to meet the determination of the TEC due to a lack of woodland structure in the DNG areas, and only limited recruitment of Weeping Myall individuals as a result of historical land use as evident from historical imagery from 1958 and beyond. This is consistent with the scientific determination that states "in many areas of the Riverina, Myall Woodland has been eliminated and replaced by a grassland of *Chloris*, *Austrodanthonia* and *Austrostipa*, that lacks the woody components of the original woodland vegetation." This would particularly be the case if these areas were simplified grasslands, lacking the midstorey and understorey shrubs. This is discussed further in Section 4.3. **Commonwealth EPBC Act:** Patches in an Intact condition and some Sparse patches

PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	
	(approximately 4%) meet the condition thresholds outlined in the Listing Advice for the EPBC Act listed EEC *Weeping Myall Woodlands* (Threatened Species Scientific Committee 2009) as: • These patches contain a tree canopy dominated (at least 50% of trees present) by living, dead or defoliated Weeping Myall trees and; • The overstorey contains at least 5% tree canopy cover or at least 25 dead or defoliated mature Weeping Myall trees/ha. Patches in DNG and majority of Sparse condition patches (approximately 96%) did not meet condition thresholds outlined in the Listing Advice for the EPBC Act listed community (TSSC 2009), principally because: • The overstorey does not contain at least 5% tree canopy cover or at least 25 dead or defoliated mature Weeping Myall trees/ha. Additionally, as it is considered that the DNG zones are derived from previous myall communities, they are not consistent with that of the Natural Grasslands of Murray Valley TEC. State and Commonwealth TECs are mapped on Figure 7and Figure 8.
Estimate of percent cleared value of PCT (BioNet)	90% (DPE 2023c).
PCT 26– DNG **a) Higher grass cover, less forb, however coarse woody debris and recruitment still present (November 2022)** **b) Less grass cover, higher forb richness (similar to PCT 44), however contains myall recruitment and occasional coarse woody debris (September 2023)** **c) Myall recruitment in DNG zones (February 2023)** **d) Fallen timber and coarse woody debris in DNG zones (February 2023)**	

PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	
PCT 26– Sparse	

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PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	
PCT 26–Intact condition	

Table 9 PCT 45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion

PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	
Common name	Plains Grass grassland
Vegetation formation	Grasslands
Vegetation class	Riverine Plain Grasslands
Extent	Subject land - 86.55 ha Development footprint – 0.05 ha (Figure 6, Figure 9)

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PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	
Condition	This community at the subject land was recorded in Mod_Good condition class. This community is highly dynamic across the subject land but mostly occurring within lower lying depressions of alluvial grey clays and clay loams.
Description	Plains Grass Grasslands typically occurs as tussock grasslands dominated by Plains Grass and/or *Walwhalleya proluta* with *Rytidiosperma duttonianum*, *Enteropogon ramosus*, *Sporobolus caroli* and *Chloris truncata*. Nardoo is common throughout, along with forbs such as *Wurmbea dioica subsp. dioica, Rumex dumosus, Arthropodium minus*, *Leptorhynchos squamatus* subsp. A, *Crassula decumbens var. decumbens* and *Goodenia fascicularis*. The sedge *Eleocharis pallens* is often present. Lignum may occur as scattered shrubs. Weed species are common and at some sites may be dominant due to grazing and cropping. Occurs in slightly low lying areas of the floodplains and alluvial plains of central NSW. Within the subject land Mod_Good condition Plains Grass grassland is dominated by *Walwhalleya proluta or* Plains Grass, along with Curly Windmill Grass, *Austrostipa bigeniculata* Yanganbil, Pale Spike Sedge with sporadic occurrences of Lignum and Black Rolypoly. Common Everlasting *Chrysocephalum apiculatum*, *Oxalis perennans* and Corrugated Sida occurred. Exotic species were also present including Wimmera Grass, Annual Rye Grass and *Medicago* spp..
Survey effort	Five plots were collected over the course of the field assessment (Figure 9).
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. Riverine Plain Grasslands within the subject land meets the PCT description (DPE 2023c) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on clays. • Landform – occurs on flood plains and alluvial plains. • Dominant species – Plains Grass, *Walwhalleya proluta*, Yanganbil, Spear Grasses (Austrostipa spp.) on grey clay soils. PCT 45 differs from the other grassland PCT within the subject land (PCT 46), as a taller grassland generally >0.6m and the dominance of Plains Grass and *Walwhalleya proluta,* with Yanganbil also common, as well numerous other spear grasses and Rytidiosperma spp. and forbs on the grey loam to cracking clay soils. PCT 46 is less tall <0.5m and dominated by *Enteropogon acicularis*, *Walwhalleya proluta*, co-dominated with numerous other spear grasses. There is a general absence of, or very occasional presence of Myall recruitment and fallen timber on edges. This PCT does intergrade with PCT 46 and PCT 26 DNG, but is generally not dominated by *Enteropogon acicularis.*
TEC Status	**NSW BC Act:** This community is not associated with a TEC listed under the BC Act. **Commonwealth EPBC Act:** As a precautionary measure, the PCT and condition class condition states are determined to meet the condition thresholds outlined in the Listing Advice for the EPBC Act listed CEEC *Natural Grasslands of the Murray Valley Plains* (Threatened Species Scientific Committee 2012) as: • 10 or more native vascular plant species are present in the patch and; • The size of the grassland patch is at least 1 ha in size. This is discussed further in Section 3.1.8 and 9.1. Commonwealth TECs within the subject land are mapped on Figure 8.

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PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	
Estimate of percent cleared value of PCT (BioNet)	60% (DPE 2023c).
PCT 45 – Moderate condition showing Plains Grass dominated grassland	

Table 10 PCT 46 Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion

PCT 46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	
Common name	Curly Windmill grassland
Vegetation formation	Grasslands
Vegetation class	Riverine Plain Grasslands
Extent	Subject land - 67.55 ha Development footprint – 1.68 ha (Figure 6, Figure 9)
Condition	This community at the subject land was recorded in moderate condition class. This community is highly dynamic across the subject land but mostly occurring within lower lying depressions of alluvial grey clays and clay loams.
Description	Curly Windmill Grassland also typically occurs as tussock grasslands to 0.3-0.5m in height however dominated *Enteropogon ramosus* and/or *Enteropogon acicularis* with occasional *Walwhalleya proluta, Austrostipa nodosa*, and Rytidiosperma species. Forbs such as *Rhodanthe corymbiflora, Crassula colorata var. acuminata, Oxalis perennans, Sida corrugata, Goodenia pusilliflora* are common. Lignum may occur as scattered shrubs along with various Maireana spp. Within the subject land, moderate condition Curly Windmill dominated grasslands is dominated by Curly Windmill Grass, along with *Walwhalleya proluta or* Plains Grass, Rytidosperma spp. *Austrostipa nodosa* and *Austrostipa scabra* with sporadic occurrences of *Maireana aphylla*. Common Everlasting *Chrysocephalum apiculatum*, *Oxalis perennans* and Corrugated Sida occurred frequently. Exotic species were also present including Annual Rye Grass and *Medicago* spp..
Survey effort	Four plots were collected over the course of the field assessment (Figure 9). One dummy plot with benchmark values was substituted into the BAM-C to ensure the required number of plots were met for the size of the zone.

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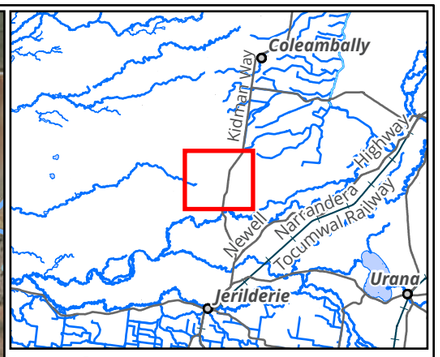
PCT 46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. Curly Windmill Grassland within the subject land meets the PCT description (DPE 2023c) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on grey to brown loam and cracking clays soils • Landform – occurs on flood plains and alluvial plains. • Dominant species – Curly Windmill grass with co dominant Walwhalleya proluta, Speargrasses (Austrostipa spp.) on grey clay soils. PCT 46 differs from PCT 45 as being a less tall <0.5m grassland, dominated by *Enteropogon acicularis, Walwhalleya proluta* and co dominated with numerous other spear grasses. PCT 45 is taller (generally >0.6m) and dominated by Plains Grass and *Walwhalleya proluta*, with Yanganbil also common. There is a consistent absence of Myall recruitment and fallen timber in PCT 46, and an absence of Yanganbil and a lower cover of Plains Grass was evident.
TEC Status	**NSW BC Act:** This community is not associated with a TEC listed under the BC Act. **Commonwealth EPBC Act:** As a precautionary measure, the PCT and condition class condition states are determined to meet the condition thresholds outlined in the Listing Advice for the EPBC Act listed CEEC *Natural Grasslands of the Murray Valley Plains* (Threatened Species Scientific Committee 2012) as: • 10 or more native vascular plant species are present in the patch and; • The size of the grassland patch is at least 1 ha in size. This is discussed further in Section 3.1.8 and 9.1. Commonwealth TECs within the subject land are mapped on Figure 8.
Estimate of percent cleared value of PCT (BioNet)	50% (DPE 2023c).
PCT 46 – Moderate condition *Walwhalleya* and *Enteropogon* dominated grassland	



Legend

- Subject land
- Development footprint
- Hollow-bearing tree

Plant Community Type

- 13 - Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- 15 - Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW
- 17 - Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- 26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- 45 - Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- 46 - Curly Windmill Grass speargrass wallaby grass grassland on alluvial clay and loam on the Hay Plain Riverina Bioregion
- Cat 1 Exempt Land

Figure 6 Vegetation within the subject land

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 08 August 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F6_PCTs

Delta Creek
Kidman Way
Coleambally Channel
Liddles Lane

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

3.1.8 Threatened ecological communities

Vegetation within the subject land was found to represent one TEC listed under the NSW BC Act, and two TECs listed under the Commonwealth EPBC Act, as outlined in Table 11 and Table 12 below and illustrated on Figure 7and Figure 8. A considerable effort has been made to avoid and minimise impacts to the highest value areas of these TECs, with amendments to the development footprint following public exhibition of the EIS further reducing the project's impacts on TECs. Figure 8 provides an overview and estimate using the SVTM for the Riverina (OEH, 2017) as well as verified vegetation recorded as part of surveys for both the wind and solar developments. This enables an assessment of impacts more broadly on TECs. To enable a like for like comparison with PCT and condition zones within the subject land, and estimate of potential TECs and condition zones have been grouped together based on plot data and rapid points collected during surveys. This is also linked to avoidance measures discussed in Section 5. Further assessment and descriptions are provided below.

Table 11 Summary of BC Act TECs within the subject land

BC Act TEC	Listing status	Potential TEC within 50km of subject land (Figure 8) (Ha)	Subject land (Ha)	Development footprint (Ha)
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Endangered	277,054 *Woodland – 44,064* *Sparse or potential DNG – 232,990*	2,024	919.62

Table 12 Summary of EPBC Act TECs within the subject land

EPBC Act TEC	Listing status	Subject land (Ha)	Development footprint (Ha)
Weeping Myall Woodlands	Endangered	387.45	0.48
Natural Grasslands of the Murray Valley Plains	Critically Endangered	154.11	1.73

Weeping Myall Woodland TEC

Weeping Myall Woodlands is listed as endangered under the EPBC Act and BC Act. The community occurs in small pockets throughout the inland alluvial plains west of the Great Dividing Range in NSW and QLD and is dominated by Weeping Myall *Acacia pendula*. The main threats to this community are clearing for cropping, ongoing degradation, weed invasion and herbivory by the Bag-shelter Moth (*Ochrogaster lunifer*) (TSSC 2009). There is no adopted or made Recovery Plan for this ecological community.

Intact Weeping Myall woodland and sparse canopy woodlands (represented by PCT26) occur patchily across the subject land. This woodland vegetation is composed of semi-mature and younger regrowth stands of Weeping Myall. PCT 26 typically occurs on fertile red top brown clay soils and sometimes moderate to extensive gilgai that are subject to seasonal waterlogging. Weeping Myall patches can also include areas of adjacent derived grassland within 10 metres of the dripline of a patch (TSSC 2009). The scientific criteria states in many areas of the Riverina, Myall Woodland has been eliminated and replaced by a grassland of *Chloris,*

Austrodanthonia and Austrostipa, that lacks the woody components of the original woodland vegetation (TSSC 2009). DNG areas within the subject land are simplified grasslands and do not conform with the determination reference to "Myall Woodlands". Historic and current grazing and agricultural practices would continue to inhibit the recovery of these areas to a potential woodland state. Likewise, future grazing regimes and maintenance of the solar farm requirements within the DNG areas would also inhibit the natural recovery of a woodland community, but not beyond that would which occur under the current agricultural regimes.

The EPBC Act listing advice and the supporting policy statement provide a clear definition of this community where some stands of PCT 26 may not conform to the threatened community due to modification and degradation, including stands that otherwise conform to the NSW BC Act community definition. DNG beyond 10 metres from the dripline of treed Weeping Myall patches would also not meet the EPBC Act definition of the community. The decision process for attributing a patch of PCT 26 to the TEC relies on observations of dominant canopy species and cover, native understorey cover, patch size and presence of Weeping Myall regeneration cohorts.

Within the subject land, treed patches of Weeping Myall woodland and immediately adjacent derived grasslands (within 10 metres of the treed dripline) may meet the EPBC Act definition. The BC Act does not contain key diagnostics or condition thresholds for this community, but instead relies on a general description of the community and a list of characteristic plant species. The Weeping Myall treed patches have been concluded to meet the general description of the BC Act definition, however it has been determined that DNG areas do not.

An assessment of the different condition states of Weeping Myall Woodland present in the subject land, and how they align with TEC requirements are presented in Table 13 (BC Act) and Table 14 (EPBC Act) below.

Table 13 Weeping Myall BC Act TEC summary

Final Determination Key Criteria	Vegetation zone		
	Intact	Sparse	DNG
NSW occurrences within the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes bioregions, and occurs on the eastern parts of alluvial plains of the Murray-Darling river system	Yes. All zones. The subject land occurs within the Riverina Bioregion and Murrumbidgee sub region.		
The community is characterised by the assemblage of species listed in the Final Determination	Yes. All zones. Characteristic species as listed in the Final Determination were recorded in all zones.		
Occurs on red-brown earths and heavy textured grey and brown alluvial soils	Yes. All zones. These vegetation zones predominantly occur on red to brown alluvial soils throughout the subject land		
The structure is either low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history.	Yes. Both Intact and Sparse zones contain an overstorey structure as an open woodland with semi-mature and younger regrowth stands.		No. The DNG zone is a simplified grassland that does not contain structure consistent with that of a woodland as per the scientific determination. This has been the case

Final Determination Key Criteria	Vegetation zone		
	Intact	Sparse	DNG
			across this zones since 1958 as evident by historic imagery. Some recruitment and fallen timber occurs, but is highly sporadic across the zone and would be greater the 1%.
The tree layer grows up to a height of about 10 metres and invariably includes Acacia pendula (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs	Yes. Regular or semi-regular Weeping Myall individuals (>2-5% cover) with variable groundcover dominated by chenopods and grass cover, depending on disturbance history.		No. DNG zones are largely devoid of any mature individuals, but do contain sporadic recruitment
BC Act Listed Weeping Myall TEC	**YES**		**NO**

Table 14 Decision process for Weeping Myall stands to determine alignment with EPBC Act listed TEC

Decision steps (from TSSC 2009b & CoA 2009)	Response	Justification
Are Weeping Myall trees present?	Yes for treed areas (intact and sparse). No for DNG.	• Weeping Myall treed patches are scattered throughout the subject land, particularly west of Kidman Way. • DNG would not meet this requirement as Weeping Myall trees are generally absent or only present as stunted grazed regrowth less than 1 metre tall (i.e. not as trees).
Does the patch have a native understorey?	Yes for all areas.	• Floristic data and general observations indicate all patches have a native understorey.
Does the patch have at least 5% tree canopy cover or at least 25 dead or defoliated mature Weeping Myall trees per hectare?	Yes for treed areas (sparse). - Yes for all intact areas - Yes for ~4% of sparse - No for ~96% of sparse No for DNG.	• Weeping Myall cover varies but is consistently recorded above 5% in treed patches (intact and some sparse areas). • DNG would not meet this requirement as tree canopy cover is less than 5% and tree density is less than 25 trees per hectare.
Is the tree canopy dominated (at least 50%) by living, dead or	Yes for treed areas (intact and sparse). No for DNG.	• Weeping Myall is the dominant tree within treed patches of PCT 26 (intact and sparse).

Decision steps (from TSSC 2009b & CoA 2009)	Response	Justification
defoliated Weeping Myall trees?		• DNG would not meet this requirement as Weeping Myall trees are generally absent or only present as stunted grazed regrowth less than 1 metre tall (i.e. not as trees).
Is the patch 0.5 hectares or greater in size?	Yes for treed areas (intact and sparse). No for DNG.	• Treed patches (intact and sparse) are generally greater than 0.5 hectares.
Does the patch have more than two layers of regenerating Weeping Myall present?	Yes for treed areas (intact and sparse). No for DNG.	• Treed patches (intact and sparse) have multiple regeneration cohorts recorded during floristic sampling and general observations. • DNG generally have a very scattered single cohort of regenerating Weeping Myall (i.e. grazed individuals).
EPBC Act listed Myall Woodlands	• Treed (intact and sparse) patches – Yes • DNG patches - No	As above.

Murray Valley Plains Natural Grassland TEC and native grasslands

Due to the seasonal and dynamic aspects of determining natural and derived grasslands in the Riverina, a precautionary approach was undertaken. Areas of PCT 45 and PCT 46 that are located within slightly lower lying grey loam to cracking clay loosely fit the description of the EPBC Act listed *Murray Valley Plains Natural Grassland* TEC despite the region being on the north western edge of the TEC distribution. These native grasslands are in moderate condition due to long term grazing. The grasslands are dominated by native Spear-grasses *Austrostipa* spp., Wallaby-grasses *Rytidosperma* spp., Windmill Grass *Chloris truncata*, Panic-grass *Walwhalleya proluta* and Curly Windmill Grass *Enteropogon acicularis*. A range of grazing tolerant native herbs are present and some less grazing-tolerant native plant species occur at low densities. There is no NSW BC Act equivalent of the EPBC Act grassland TEC.

As indicated above, these grasslands are likely to be a combination of naturally occurring grasslands and grasslands derived from Weeping Myall woodlands where the woody vegetation cover has been historically cleared, or died out. Defining natural and derived grasslands within the subject land (and in the general region north of Jerilderie) is very difficult due to tree clearing and historical land use and grazing practices. The listing advice for the *Murray Valley Plains Natural Grassland* TEC provides guidance on separating natural and derived grasslands in this region based on indicator species. We have compared field results in the subject land with the key diagnostics and condition thresholds for the *Murray Valley Plains Natural Grassland* TEC in Table 15.

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Table 15 Comparison of site observations, key diagnostic characteristics and condition thresholds for the EPBC Act listed Murray Valley Plains Natural Grassland TEC, Solar Farm investigation area (based on TSSC 2012a)

Feature/threshold	Site observations and notes
Key diagnostic characteristics	
Distribution is primarily in the Riverina Bioregion and the Wimmera plains of the Murray Darling Depression Bioregion. Other outlying occurrences are also in the Murray Darling Depression Bioregion and the NSW South Western Slopes Bioregion. The approximate northern limit of the ecological community is in the Murrumbidgee subregion (IBRA RIV2), approximately near the northern boundary of the Murray Catchment Management Authority (CMA) in NSW.	• The subject land occurs in the IBRA Riverina Bioregion and Murrumbidgee sub-region. • The subject land is within the former boundary of the Murray Catchment Management Authority which lies within the jurisdiction of the Murray LLS region.
It typically occurs on a landscape of flat alluvial lowland plains with heavy-textured grey, brown and red clays.	• PCT 45 and 46 occur in a flat lowland plain with heavy-textured grey, brown clays.
The ecological community is typically dominated by a range of perennial grasses and/or forbs or co-dominated by small shrubs. Sites are not necessarily dominated by any particular plant species. Characteristic genera present typically include: • **for grasses – *Rytidosperma* (formerly *Austrodanthonia*), *Austrostipa, Chloris and Enteropogon*.** • **for forbs – *Arthropodium, Bulbine, Calotis, Chrysocephalum, Leptorhynchos, Minuria, Ptilotus, Rhodanthe, Sida and Swainsona*.** • **or small shrubs – *Atriplex* and *Maireana*.**	• The native grasslands within the subject land are dominated by native grasses, forbs and small shrubs including characteristic species listed in TSSC (2012a).
Trees and large shrubs (>1 m tall) are generally absent to sparse, amounting to less than 10% projective foliage cover for emergent trees or shrubs.	• Tree cover and woody vegetation is mostly absent from grassland areas with very occasional evidence of dead scattered trees. • Woodland vegetation is clearly defined in most areas and has been separated from treeless native grassland areas in preliminary mapping. PCT 26 DNG areas have been mapped out by presence of fallen timber and recruitment of Acacia pendula. This is generally absent of the grey soils and areas defined as PCT 45 and 46, with a few minor ecotone and exceptions on occasion.
In addition to the vegetation and other characteristics, above, presence of the ecological community may also be indicated by the presence or past records of 'diagnostic' indicator fauna species in the patch, such as the	• There are local historical and recent records of Plains Wanderer (a native grassland bird species) in the local area from the Atlas of NSW Wildlife. • Although important mapped habitat is known, the nearest recent record is from 2019, more than 15km to the South of Yanco Creek

Feature/threshold	Site observations and notes
plains-wanderer, striped legless lizard, hooded scaly-foot or curl snake.	
Distinguishing natural and derived grasslands in the Murrumbidgee IBRA subregion	
The patch should contain at least as many, preferably more, of the plant species considered more frequent in the TEC than plant species more frequent in grassland vegetation not considered to be the ecological community in NSW when assessed at an appropriate time (e.g. late winter spring and not soon after disturbance such as grazing).	• Using Table 1 in the listing advice (TSSC 2012a) the grassland vegetation (PCT45 and 46) contains a mix of characteristic and non-characteristics species. • Numerous characteristic species were recorded in grassland floristic plots as part of the preliminary field assessments. • PCT 26 DNG areas have been mapped out by presence of fallen timber and recruitment of *Acacia pendula* on the more red brown alluvial clay soils.
Determining whether grassland vegetation meets the condition thresholds to be considered the EPBC Act listed TEC	
All patches - The percentage cover of native vascular plants (annual and perennial) in the patch is greater than the percentage cover of perennial exotic species	• Native annual and perennial vascular plant cover in grassland floristic plots was recorded to be higher than exotic species.
Category A. For patches with high diversity or that are relatively undisturbed • **A1. 15 or more native vascular plant species are present in the patch** • **A2. The patch contains one or more indicator species indicative of high quality remnants, characteristic of sites that are relatively undisturbed (e.g. have little to no history of cultivation).** • **A3. The size of the grassland patch is at least 0.04 ha or more in size (i.e. at least 400 m^2 or a 20 m x 20 m square or equivalent area in any shape).**	The grasslands meet the Category A condition state as: • Floristic plots all had greater than or equal to 15 native vascular plant species (see species list for grassland plots in Appendix 2). • The grasslands contained the following indicator native plant species indicative of high quality remnants: – Asperula conferta – Calotis scabiosifolia var. scabiosifolia – Cheilanthes spp. – Chenopodium desertorum – Goodenia gracilis – Goodenia pusilliflora – Leiocarpa panaetioides – Maireana excavata – Maireana pentagona – Swainsona procumbens. – Thysanotus tuberosus • The size of the grassland patch is much larger than 0.04 ha.
Category B. For larger patches that have good ground layer diversity: • **B1. 10 or more native vascular plant species are present in the patch.** • **B2. The size of the grassland patch is at least 1 ha or more in size (i.e. at least** • **10 000 m^2 or a 100m x 100 m square or equivalent area in any shape).**	• PCT 45 and PCT 46 meet Category A condition state.

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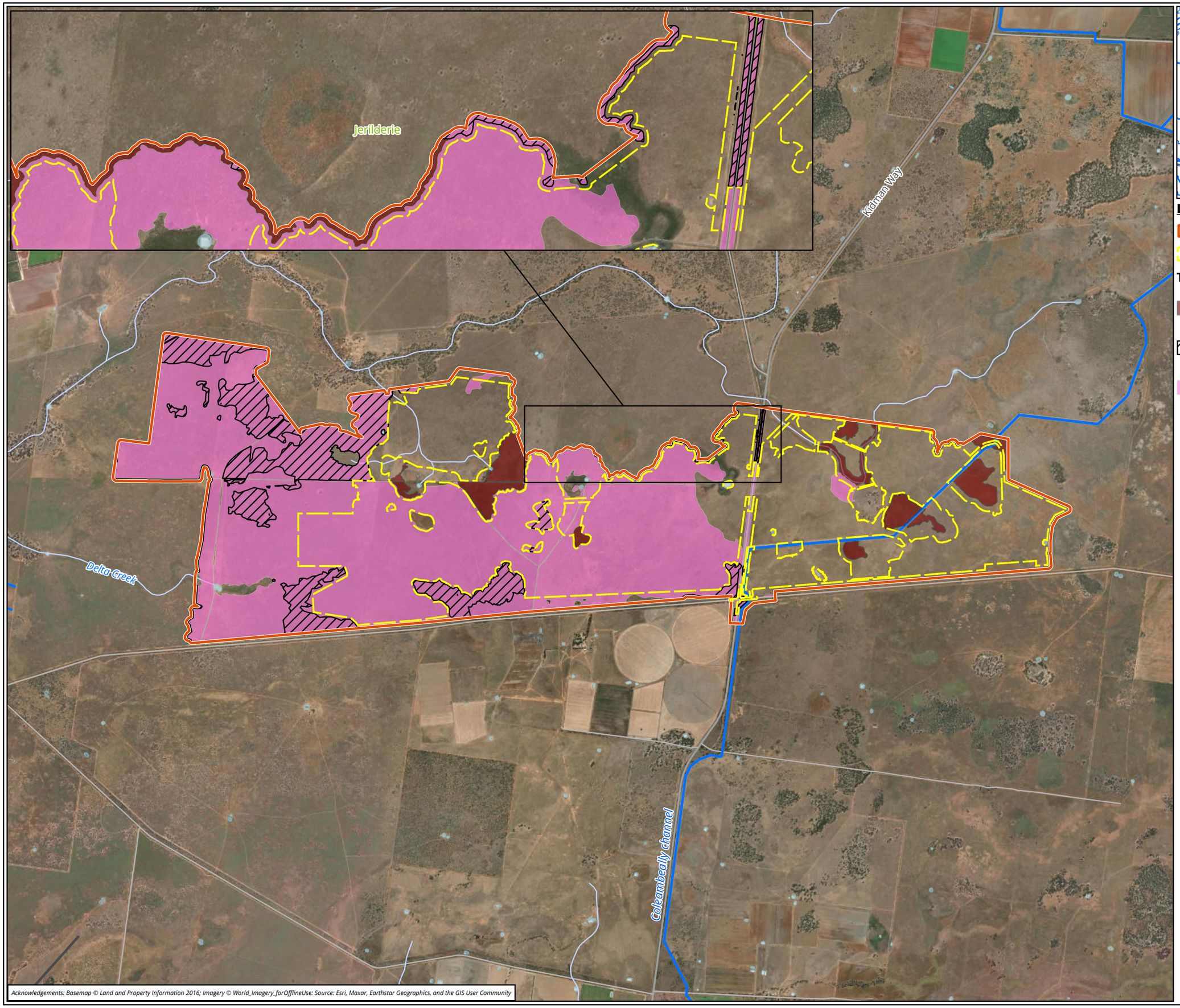

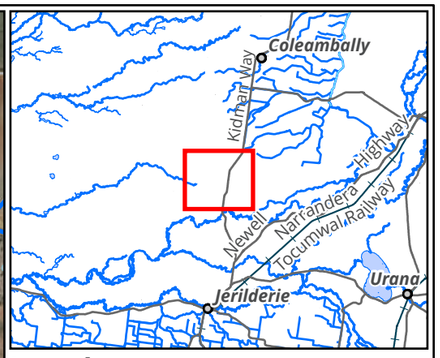

Legend

- Subject land
- Development footprint

Threatened ecological communities

- Natural Grasslands (EEC, EPBC Act)
- Weeping Myall Woodland (EEC, EPBC Act)
- Weeping Myall Woodland (EEC, BC Act)

Figure 7 Threatened ecological communities within the subject land

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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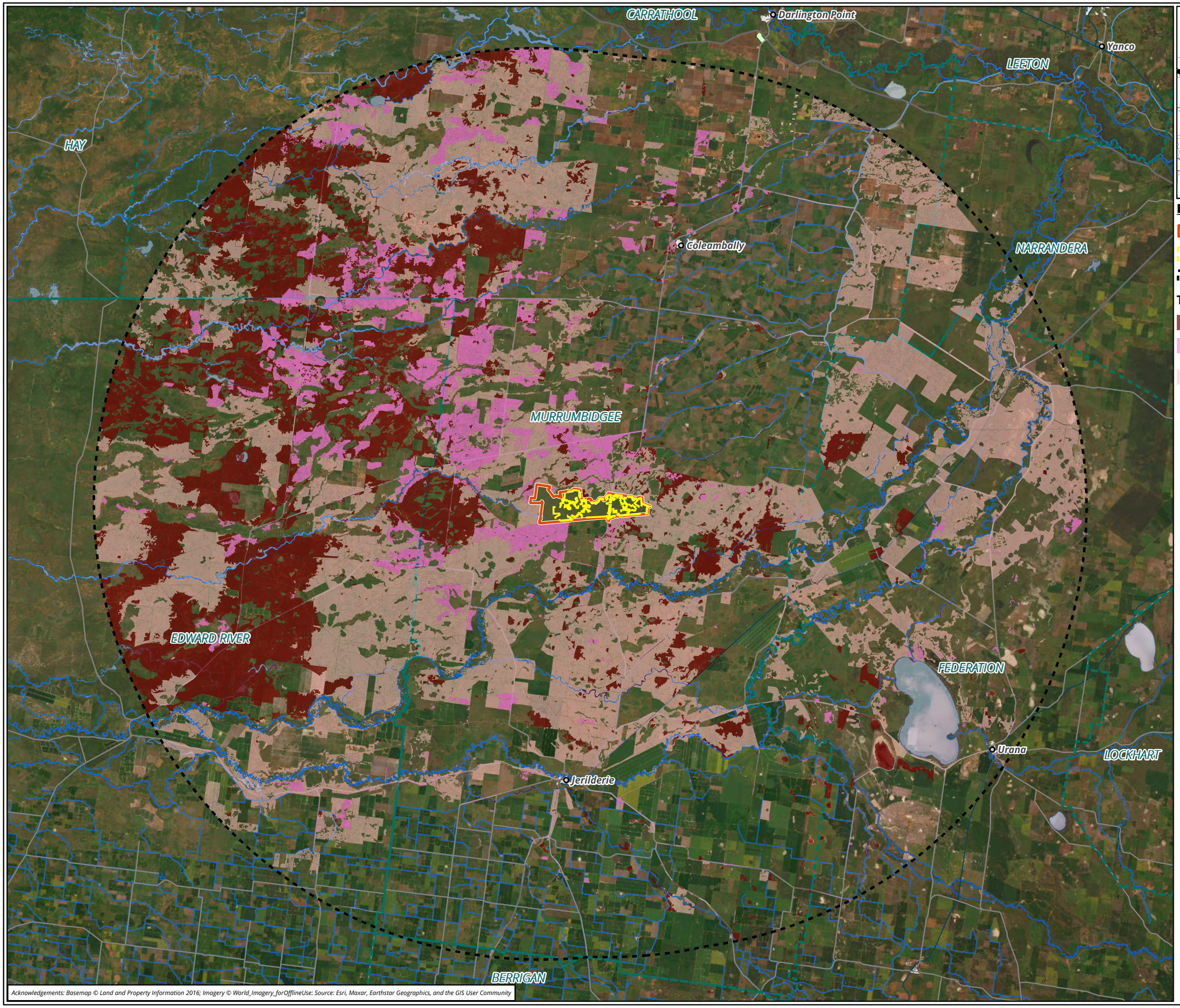
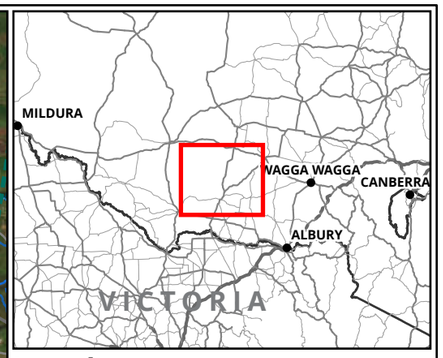
Matter: 37263, Date: 28 August 2024,
Prepared by: LH, Prepared for: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F7_TECs_Local

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community





Legend

- Subject land
- Development footprint
- Subject land buffer (50km)

Threatened ecological communities

- Natural Grasslands
- Weeping Myall Woodland
- Weeping Myall Woodland (Sparse or DNG)

Figure 8 Threatened ecological communities within the broader locality

0 5 10 15

Kilometers
Scale: 1:400,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 08 August 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
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Layout: 37263_F8_TECs_50km

3.2 Groundwater dependent ecosystems

Review of the Groundwater Dependent Ecosystem (GDE) Atlas (BOM, 2020) indicates the presence of low potential GDEs within and immediately adjacent to the subject land. From the results of the field surveys and observations made of the location and topography, it is considered unlikely that any of these ecosystems are actually dependent on the subsurface or surface expression of groundwater.

Review of groundwater bores carried out as part of the EIS identified a total of 43 groundwater bores within 2 kilometres of the subject land. Six of these are within the development footprint. Groundwater levels from registered bores within the broader study area are generally between 20 mbgl and 30 mbgl. It is noted that water levels from registered bores are typically recorded at bore construction and so represent a broad temporal spread.

Overall, the project has been assessed to not have any material impact on groundwater flows, so impacts to GDEs are considered unlikely to occur.

3.3 Vegetation integrity assessment

3.3.1 Vegetation zones and patch size class

PCTs within the subject land were assessed and stratified, based on broad condition state, into vegetation zones in accordance with Section 4.3 of the BAM, and as described in Table 5 to Table 10 above. This resulted in 10 vegetation zones being identified within the development footprint. Table 16 describes each of the zones, and provides details on the numbers of BAM floristic plots undertaken in each zone.

Patch size classes for each vegetation zone present within the subject land were assessed as per Section 4.3.2 of the BAM (DPIE 2020a) using a select process in ArcGIS. All native vegetation with a gap of less than 100 metres for woody vegetation or ≤30 metres for non-woody vegetation from the next area of native vegetation, is considered a single patch, with a patch able to extend onto adjoining land.

Native vegetation within the subject land was mapped sequentially and it was found to form part of a very large patch of connecting vegetation with an area of approximately 8,512 hectares within the assessment area. The connected vegetation comprises open woodland patches of Weeping Myall, DNG and smaller patches of low lying Black box woodland/wetlands.

Patch size classes for each vegetation zone are also outlined in Table 16 below.

Table 16 Vegetation zones within the subject land

Vegetation zone	Plant Community Type	Condition	BAM plots completed	Area (ha)	Max. patch size within development footprint (m)
1	PCT 13 Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate	3	8.14	>100

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Vegetation zone	Plant Community Type	Condition	BAM plots completed	Area (ha)	Max. patch size within development footprint (m)
2	PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Mod_Good	2	1.43	>100
3		Moderate	1	1.04	>100
4	PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Mod_Good	7	42.79	>100
5		Moderate	3	21.30	>100
6	PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	DNG	12	1,110.59	>100
7		Intact	6	248.51	>100
8		Sparse	12	1,775.03	>100
9	PCT 45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Mod_Good	5	86.55	>100
10	PCT 46 Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	Moderate	5	67.55	>100

3.3.2 Vegetation integrity

Vegetation integrity, or condition, was assessed using data obtained from undertaking BAM plots within the vegetation zones, as per Section 4.3.4 of the BAM (DPIE 2020a). Plot data was collected via:

- A 20 metre x 50 metre quadrat and 50 metre transect for assessment of site attributes and function.
- A 20 metre x 20 metre quadrat, nested within the larger quadrat for full floristic survey to determine composition and structure of the PCT.

The minimum number of BAM plots per vegetation zone was determined using Table 3 of the BAM (DPIE 2020a). In total, 56 BAM plots have been completed within the vegetation zones present within or adjacent to the development footprint, details are provided in Table 17 and shown on Table 18. Several BAM plots included in the assessment are no longer within the development footprint as a result of design refinements over the course of the project, however, are still within the subject land. These plots have been retained for use in the assessment as they are adjacent to the development footprint and are still considered to be representative of the vegetation present within the development footprint.

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Table 17 BAM plots completed within the subject land

BAM plot reference	Vegetation zone	BAM plot reference	Vegetation zone
DEH_S_6	13_Moderate	DEH_S_24	26_Intact
DEH_S_7	13_Moderate	DEH_S_25	26_Intact
DEH_S_8	13_Moderate	DEH_S_27	26_Intact
DEH_S_5	15_Mod_Good	DEH_S_28	26_Intact
DEH_S_555	15_Mod_Good	DEH_S_50	26_Intact
DEH_S_4	15_Moderate	DEH_S_51	26_Intact
DEH_S_11	17_Mod_Good	DEH_S_16	26_Sparse
DEH_S_12	17_Mod_Good	DEH_S_17	26_Sparse
DEH_S_13	17_Mod_Good	DEH_S_29	26_Sparse
DEH_S_14	17_Mod_Good	DEH_S_3	26_Sparse
DEH_S_15	17_Mod_Good	DEH_S_32	26_Sparse
DEH_S_2	17_Mod_Good	DEH_S_33	26_Sparse
DEH_S_1	17_Mod_Good	DEH_S_34	26_Sparse
DEH_S_48	17_Moderate	DEH_S_35	26_Sparse
DEH_S_31	17_Moderate	DEH_W_820	26_Sparse
DEH_S_52	17_Moderate	DEH_S_90	26_Sparse
DEH_S_93	26_DNG	DEH_S_91	26_Sparse
DEH_S_94	26_DNG	DEH_S_92	26_Sparse
DEH_S_95	26_DNG	DEH_S_43	45_Mod_Good
DEH_S_20	26_DNG	DEH_S_44	45_Mod_Good
DEH_S_22	26_DNG	DEH_S_45	45_Mod_Good
DEH_S_23	26_DNG	DEH_S_46	45_Mod_Good
DEH_S_36	26_DNG	DEH_S_47	45_Mod_Good
DEH_S_37	26_DNG	DEH_S_300	46_Moderate
DEH_S_38	26_DNG	DEH_S_49	46_Moderate
DEH_S_39	26_DNG	DEH_S_53	46_Moderate
DEH_S_40	26_DNG	DEH_S_9	46_Moderate
DEH_S_41	26_DNG	DEH_S_1000	46_Moderate

Assessment of vegetation integrity was undertaken using standard benchmark data as outlined in the BAM and held in the BioNet Vegetation Classification database. A list of flora species was compiled for each BAM plot completed and is included in Appendix 3. Records of all flora species will be submitted to NSW DCCEEW for incorporation into the Atlas of NSW Wildlife.

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3.3.3 Vegetation integrity score

Plot data was entered into the BAM calculator to determine vegetation integrity score for the subject land. Plot data are presented in Appendix 3, with vegetation integrity scores for each vegetation zone provided in Table 18.

Table 18 Vegetation zone integrity scores and condition

Vegetation zone	Composition score	Structure score	Function score	VI score*	Hollow-bearing trees present
13_Moderate	75.2	62.3	72.3	70.8	Yes
15_Mod_Good	81.9	82.4	50.7	70.0	Yes
15_Moderate	86.9	36.2	62.6	58.2	Yes
17_Mod_Good	62.6	95.4	-	77.3	No
17_Moderate	56.1	30.0	-	41.0	No
26_DNG	79.9	32.6	6.1	25.1	No
26_Intact	76.6	41.7	35.5	48.4	No
26_Sparse	68.8	32.4	15.4	32.5	No
45_Mod_Good	96.9	85.7	-	91.1	No
46_Moderate	91.0	86.2	-	88.6	No

As outlined in Section 9.2.1 of the BAM (DPIE 2020a), an offset is required for impacts on native vegetation where the vegetation integrity score is:

- ≥15 where the PCT is representative of an endangered or critically endangered ecological community.
- ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or is representative of a vulnerable ecological community.
- ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

As such, ecosystem credit offsets are required for all zones.

3.3.4 Scattered paddock trees

There are no scattered paddock trees being impacted within the subject land and therefore were not entered into the scattered tree calculator as being present within the development footprint.

Any proposed clearing of native vegetation that does not meet the definition of scattered trees was assessed with Section 4 of the BAM (DPIE 2020a).

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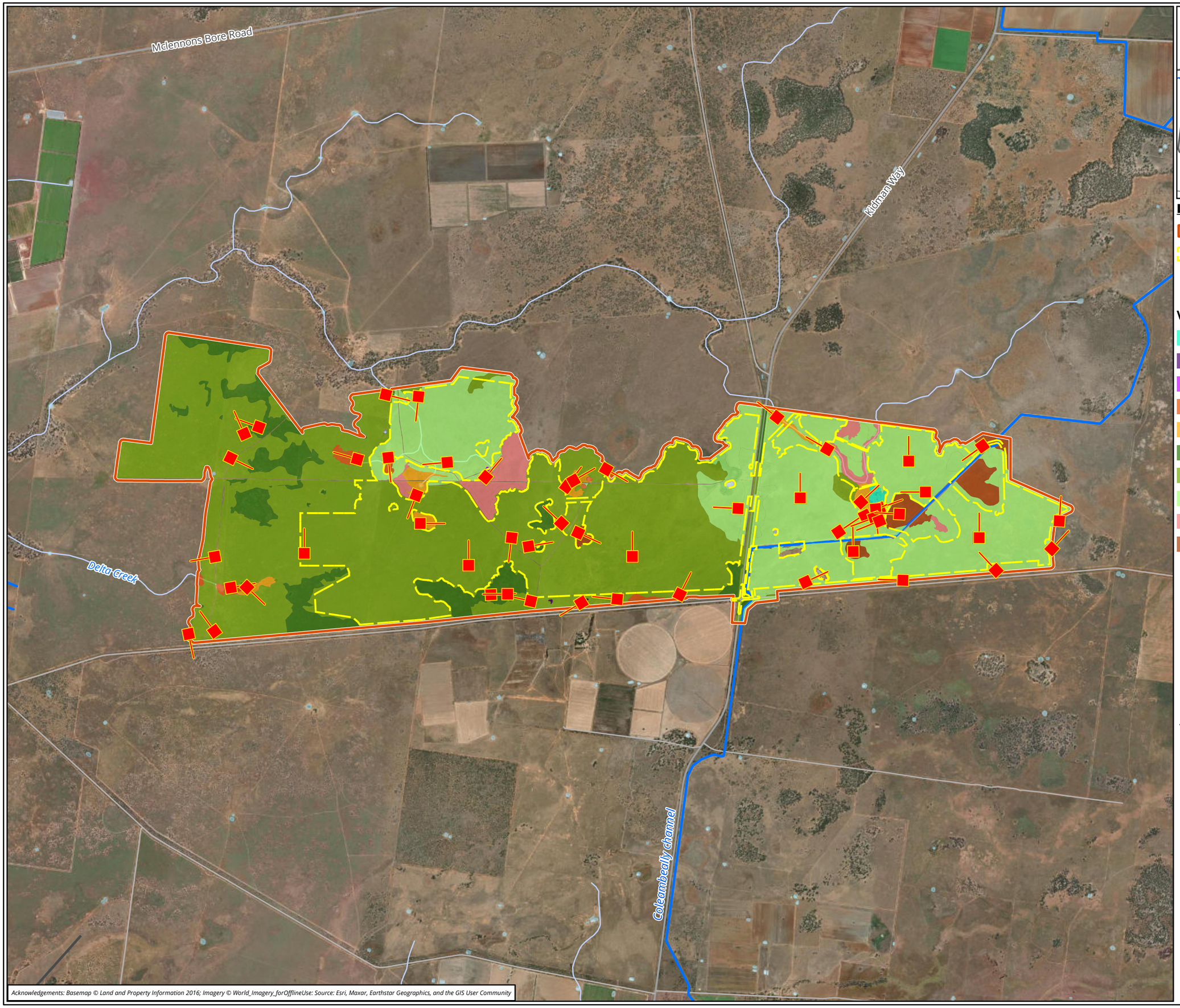

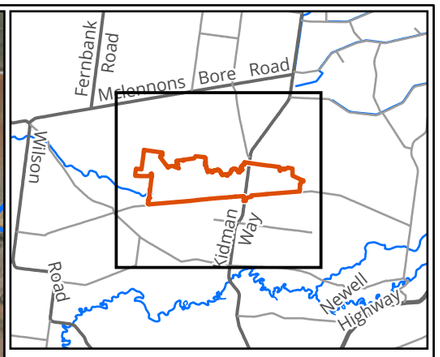

Legend

- Subject land
- Development footprint
- BAM Plot

Vegetation zone

- VZ1 - 13_Moderate
- VZ2 - 15_Moderate
- VZ3 - 15_Moderate_Good
- VZ4 - 17_Moderate
- VZ5 - 17_Moderate_Good
- VZ6 - 26_Intact
- VZ7 - 26_Sparse_Canopy
- VZ8 - 26_DNG
- VZ9 - 45_Moderate_Good
- VZ10 - 46_Moderate

Figure 9 - Overview Vegetation zones and plot locations

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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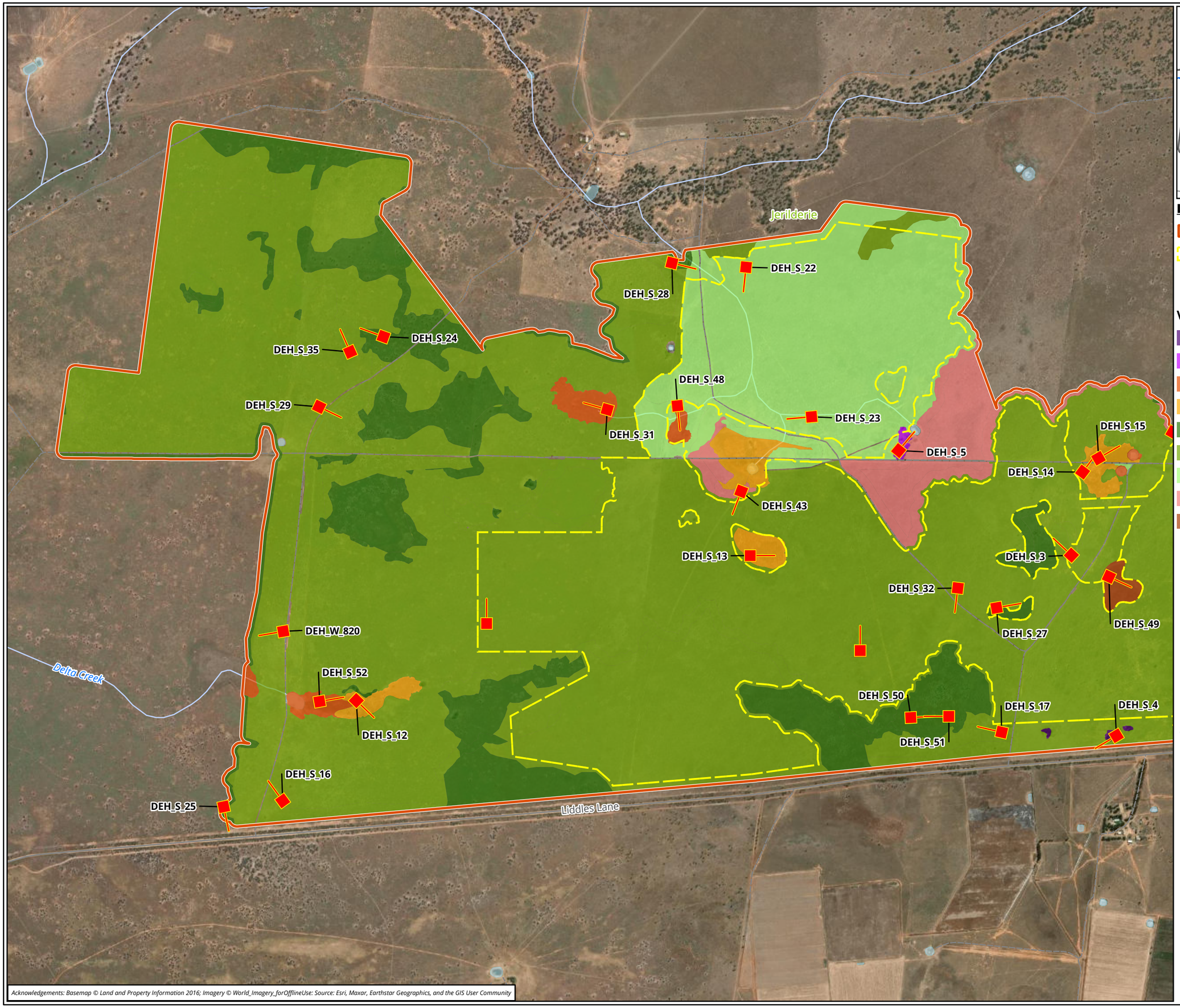
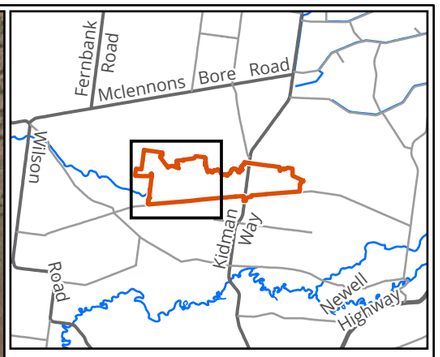




Legend

- Subject land
- Development footprint
- BAM Plot

Vegetation zone

- VZ2 - 15_Moderate
- VZ3 - 15_Moderate_Good
- VZ4 - 17_Moderate
- VZ5 - 17_Moderate_Good
- VZ6 - 26_Intact
- VZ7 - 26_Sparse_Canopy
- VZ8 - 26_DNG
- VZ9 - 45_Moderate_Good
- VZ10 - 46_Moderate

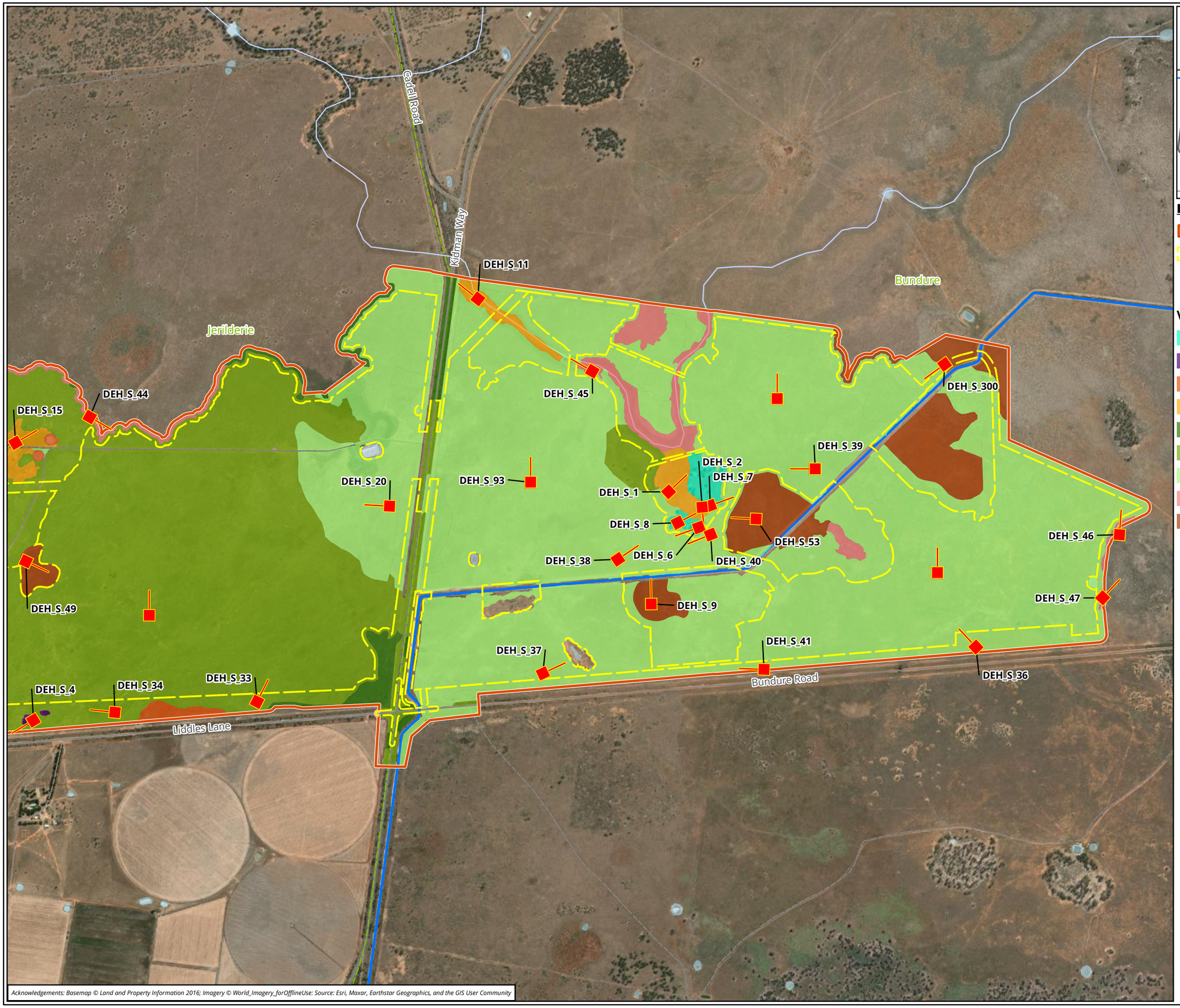
Figure 9.1 Vegetation zones and plot locations

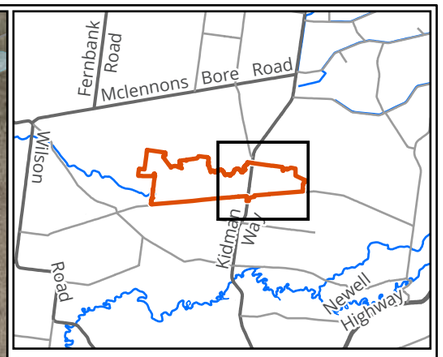
0 1

Kilometers
Scale: 1:22,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

biosis

Matter: 37263, Date: 09 September 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F9_VZs





Legend

- Subject land
- Development footprint
- BAM Plot

Vegetation zone

- VZ1 - 13_Moderate
- VZ2 - 15_Moderate
- VZ4 - 17_Moderate
- VZ5 - 17_Moderate_Good
- VZ6 - 26_Intact
- VZ7 - 26_Sparse_Canopy
- VZ8 - 26_DNG
- VZ9 - 45_Moderate_Good
- VZ10 - 46_Moderate

Figure 9.2 Vegetation zones and plot locations

0 1

Kilometers
Scale: 1:22,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 09 September 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F9_VZs

4 Threatened species

4.1 General habitat types and features

The subject land supports extensive native vegetation cover and does not appear to have a history of cultivation or cropping. Initial conversations with the land owners indicate the paddocks in the subject land are 'natural' and grazed with sheep or cattle. This anecdotal information has been validated by on-ground findings during rapid field assessments. There are no areas in the subject land that have been developed for cropping or irrigation, or where significant pasture improvement has occurred, except for the presence of an irrigation channel that runs through the land to the east of the Kidman Way, small areas possibly utilised as borrow pits and public roads. This land use pattern is typical of the northern part of the NSW Riverina where rainfall is lower, or where access to irrigation water is limited.

The subject land is effectively covered with native vegetation in the form of native grasslands (natural and derived), Weeping Myall Woodland, Black Box woodland and wetlands (Lignum or sedge-dominated wetlands). Mapping by DPE (2017) clearly indicates this and the preliminary field assessment confirmed the presence of extensive native vegetation cover. There are also multiple natural drainage systems, depressional wetlands and farm dams in the subject land that support seasonal and semi-permanent wetland habitats.

Black Box dominated woodlands and drainage lines provide foraging, shelter, movement and breeding resources for native fauna such as superb parrot, other woodland birds and raptor species. Seasonally flooded grassy/sedge drainage lines, wetlands, farm dams and artificial drains and channels in the subject land provide habitat for a range of common fauna, including Southern Bell frog *Litoria raniformis*.

Plains Wanderer *Pedionomus torquatus* (EPBC Act critically endangered, BC Act endangered) habitat is present within the subject land with areas of NSW DCCEEW Mapped Important Habitat Areas identified. The presence of woodland and scattered trees is likely to reduce the extent of possible habitat as this species tends to avoid wooded areas, but open areas of native grassland (natural and derived) may support this species at some time, due to the dynamic nature of the Riverina natural and derived grasslands systems. This is discussed further in 4.3.1

Due to the moderate quality of the native derived grasslands and impacts of grazing, the presence of threatened flora is reduced but isolated individuals and small patches still persist and have been observed (refer Section 4.3.1). More natural grasslands are in high condition, so potential for threatened flora in these areas is greater.

4.2 Ecosystem credit species

A list of predicted species (ecosystem credit species) expected to occur within the subject land was generated as per Section 5 of the BAM (DPIE 2020a). Impacts to these species require assessment, however targeted survey is not required as these species are assumed to occur, based on the occurrence of the PCTs, habitat constraints, native vegetation cover in the landscape and calculated patch sizes. These species are identified as ecosystem credit species in the Threatened Biodiversity Data Collection (TBDC). Table 19 lists the ecosystem credit species that could not be discounted, based on geographical restrictions or a lack of suitable habitat, from using the subject land on occasion. A search of relevant government databases, including the BioNet database and the EPBC Act Protection Matters Search Tool (PMST) was also carried out for a 50

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kilometre radius to the development footprint, to identify any additional threatened species not identified by the BAM calculator that have significant records present or predicted.

These species were considered when prescribing management and mitigation measures for the project, and a number have been specifically considered as part of the assessment under the Commonwealth EPBC Act.

Table 19 Ecosystem credit species (predicted species) with potential to occur

Common name	Species name	Recorded during surveys	Sensitivity to gain class
Australasian Bittern	*Botaurus poiciloptilus*	No	Moderate
Australian Painted Snipe	*Rostratula australis*	No	Moderate
Barking Owl	*Ninox connivens*	No	High
Black Falcon	*Falco subniger*	Yes*	Moderate
Blue-billed Duck	*Oxyura australis*	No	Moderate
Brolga	*Grus rubicunda*	No	Moderate
Diamond Firetail	*Stagonopleura guttata*	No	Moderate
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	Yes	Moderate
Freckled Duck	*Stictonetta naevosa*	No	Moderate
Gilbert's Whistler	*Pachycephala inornata*	No	Moderate
Grey Falcon	*Falco hypoleucos*	No	Moderate
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	Yes	Moderate
Hooded Robin (south-eastern form)	*Melanodryas cucullata cucullata*	No	Moderate
Inland Forest Bat	*Vespadelus baverstocki*	Yes	High
Little Eagle	*Hieraaetus morphnoides*	No	Moderate
Little Pied Bat	*Chalinolobus picatus*	Yes	High
Magpie Goose	*Anseranas semipalmata*	No	Moderate
Major Mitchell's Cockatoo	*Lophochroa leadbeateri*	No	Moderate
Masked Owl	*Tyto novaehollandiae*	No	High
Painted Honeyeater	*Grantiella picta*	Yes*	Moderate
Plains-wanderer	*Pedionomus torquatus*	No	High
Pied Honeyeater	*Certhionyx variegatus*	No	Moderate
Red Throat	*Pyrrholaemus brunneus*	No	Moderate
Regent Parrot (eastern subspecies)	*Polytelis anthopeplus monarchoides*	No	Moderate
Scarlet Robin	*Petroica boodang*	No	Moderate
Spotted Harrier	*Circus assimilis*	Yes*	Moderate
Square-tailed Kite	*Lophoictinia isura*	No	Moderate
Superb Parrot	*Polytelis swainsonii*	Yes	Moderate

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Common name	Species name	Recorded during surveys	Sensitivity to gain class
Swift Parrot	*Lathamus discolor*	No	Moderate
Varied Sittella	*Daphoenositta chrysoptera*	No	Moderate
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	No	High
White-fronted Chat	*Epthianura albifrons*	Yes	Moderate
White-throated Needletail	*Hirundapus caudacutus*	No	High
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Yes	High

*** Species recorded within Dinawan Solar Farm subject land as part of surveys for Dinawan Wind Farm.**

4.3 Species credit species

Species credit species 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 candidate species are identified as species credit species in the TBDC. A targeted survey or an expert report is required to confirm the presence of these species on the subject land, or alternatively the species can be assumed to be present (DPIE 2020a).

Appendix 2 provides the lists of species credit species predicted to occur within the subject land based on the IBRA subregion(s) on/within which the project occurs, the native vegetation cover present within the 1500 metre buffer area, the PCTs present within the subject land, and patch sizes listed in Table 16.

The potential for a species to occur within the subject land was assessed in accordance with Section 5.2 of the BAM (DPIE 2020a) and species with geographical restrictions, or habitat constraints not present, were not required to be assessed. Four predicted species credit species have been excluded from occurring within the subject land based on the following

- Regent Parrot – The subject land not being within 10km of the Murray River.
- *Solanum karsense* – The subject land not being west of Maude.
- Koala – Limited habitat present within the subject land. No evidence of Koalas was found opportunistically within the subject land, however it is noted that preferred Koala feed trees are present on the very rare occasion, River Red Gum *Eucalyptus camaldulensis*, in the subject land. Feed tree species present are predominantly secondary feed trees such as Black Box, and in relatively small, fragmented patches away from key corridors that contain preferred habitat in this region. As a result of the amendments to the development footprint, all River Red Gums will be avoided.
- Swift Parrot - No important mapped areas.

A complete description and justification for inclusion or exclusion is provided in Appendix 2.

A detailed assessment of potential for occurrence, and potential for impact, for all species credit species predicted to occur within the subject land is provided in Appendix 2. Species credit species considered to potentially occur within the subject land, and thus considered 'candidate species credit species' have been either assumed present or the subject of targeted threatened species surveys.

All candidate species credit species considered as part of this assessment, and their associated method of assessment, are listed in Table 20 (flora species) and Table 21 (fauna species).

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Threatened flora

Habitats for threatened flora species within the subject land occur across shrubland, woodland, wetland and grassland communities, including areas of DNG. Some areas of the subject land have been subject to a moderate degree of management, including clearing/thinning and grazing and are less likely to provide threatened flora habitat. This includes open areas of thinned woody vegetation, trees and small areas of lower condition vegetation generally where cattle congregate around gates and dams. However, the vast majority of site is homogeneous in the vegetation condition classes and suitable habitat for threatened flora.

Table 20 provides a list of candidate flora species credit species considered in this assessment, each species' required survey period and the relevant method of assessment. Further detail of the targeted surveys undertaken are provided below.

Table 20 Candidate flora species credit species assessed via targeted survey

Species name	Common name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Austrostipa wakoolica	A spear-grass	Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils within 13_Moderate 17 - All zones 26 – All zones	October – December	Moderate – 2
Pilularia novae-hollandiae	Austral Pillwort	Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils within 13_Moderate 15 – All zones 17 – All zones 26 – All zones 45_Mod_Good 46_Moderate	October – December	Very High – 3
Maireana cheelii	Chariot Wheels	Microhabitats that support heavier grey clay soils and higher chenopod abundance within 26 – All zones 46_Moderate	September – December	High – 2
Brachyscome muelleroides	Claypan Daisy	Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance, within 45_Mod_Good 46_Moderate	September – November	Very High – 3

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Species name	Common name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Brachyscome papillosa	Mossgiel Daisy	Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance, within 13_Moderate 15 - All zones 45_Mod_Good 46_Moderate	September – November	High – 2
Convolvulus tedmoorei	Bindweed	Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils within 17 – All zones 26 – All zones 45_Mod_Good 46_Moderate	June – September	Very High – 3
Leptorhynchos orientalis	Lanky Buttons	Microhabitats with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust within 26 – All zones 45_Mod_Good 46_Moderate	September – November	High – 2
Swainsona sericea	Silky Swainsona-pea	Microhabitats with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust within 26 – All zones 45_Mod_Good 46_Moderate	September – November	High – 2
Swainsona murrayana	Slender Darling Pea	Microhabitats with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust within 15 – All zones 26 – All zones 45_Mod_Good 46_Moderate	September	High – 2
Swainsona plagiotropis	Red Darling Pea	Microhabitats with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust within 26 – All zones 45_Mod_Good 46_Moderate	September	High – 2

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Species name	Common name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Sclerolaena napiformis	Turnip Copperburr	Microhabitats that support heavier grey clay soils and higher chenopod abundance within 26 – All zones 46_Moderate	September – November	High – 2
Lepidium monoplocoides	Winged Peppercress	Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance, within 15 – All zones 26 – All zones 45_Mod_Good 46_Moderate	September – December	High – 2
Eucalyptus leucoxylon subsp. Pruinosa	Yellow Gum	13_Moderate 15 – All zones	All Year	High – 2

Threatened fauna

Fauna habitat assessment was undertaken to determine whether the vegetation to be impacted by the project contained microhabitats suitable to support the candidate fauna species credit species, as outlined in Appendix 2.

The subject land provides suitable habitat values for a number of threatened species credit species. Native vegetation including grasslands, shrublands and woodlands provides foraging and nesting habitat for bird species (including Superb Parrot *Polytelis swainsonii*) and may also provide resources for Major Mitchells Cockatoo *Lophochroa leadbeateri* and Australian Bustard *Ardeotis australis*. Grey-crowned Babblers and Superb Parrots were frequently recorded foraging during multiple survey periods.

Ephemeral waterways, wetlands, farm dams and low-lying areas subject to periodic inundation and adjacent riparian vegetation are known to provide habitat for Southern Bell Frog, particularly the Coleambally irrigation channel, where this species was observed during targeted surveys. Southern Bell Frog was recorded in high numbers throughout the subject land during surveys as a result of above average rainfall and flooding. Further surveys in January 2024 were undertaken to quantify numbers of Southern Bell Frog during more average conditions. For the most part, the subject land provides transient habitat for the Southern Bell Frog, however, may occur in higher numbers during peak flooding events. Permanent habitat, albeit still considered suboptimal due to limited vegetation cover and water quality, are limited to the irrigation channels and farm dams. Additionally, during wet periods, these areas may provide marginal habitat for nomadic species such as Australian Bustard *Ardeotis australis* as well as waterbirds moving into the area on a transient basis.

Open native grassland communities, and DNG areas subject to grazing may provide foraging resources for raptor species such as Little Eagle *Hieraaetus morphnoides,* Square-tailed Kite *Lophoictinia isura*, as well as Owl

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species Barking Owl *Ninox connivens* and Masked Owl *Ninox connivens*. Additionally, a portion of the subject land is mapped as important habitat for Plains Wanderer *Pedionomus torquatus*, but this area has been subject to clear avoidance measures. Due to the dynamic nature of natural and derived grasslands, other areas of the subject land may provide habitat for Plains Wanderer at certain times pending fluctuating long term environmental conditions. Hollow-bearing trees may be utilised as roosting and/or breeding for Owls and bird species such as Major Mitchells Cockatoo.

Table 21 provides a list of candidate fauna species credit species considered in this assessment, each species' required survey period and the relevant method of assessment. Further detail of the targeted surveys undertaken are provided below.

Table 21 Candidate fauna species credit species via targeted survey

Common name	Species name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Australian Bustard	*Ardeotis australis*	13_Moderate 15 – All zones 26 – All zones 45_Mod_Good 46_Moderate	All year	High – 2
Barking Owl (Breeding)	*Ninox connivens*	13_Moderate 15 – Mod_good	May – December	High – 2
Bush Stone-curlew	*Burhinus grallarius*	13_Moderate 15- All zones 26 – All zones	All year	High – 2
Little Eagle (Breeding)	*Hieraaetus morphnoides*	13_Moderate 15 – All zones 17 – All zones 26 – Intact and sparse	August – October	Moderate – 1.5
Major Mitchell's Cockatoo (Breeding)	*Lophochroa leadbeateri*	13_Moderate 15 – All zones 26 – Intact and sparse	September – December	High – 2
Masked Owl (Breeding)	*Tyto novaehollandiae*	13_Moderate 15 – All zones 26 – Intact and sparse	May – August	High – 2
Plains Wanderer	*Pedionomus torquatus*	26_DNG 46_Moderate	All year (important mapped areas)	Very High – 3
Southern Bell Frog	*Litoria raniformis*	13_Moderate 17 – All zones 26_DNG	October – January	High – 2
Square-tailed Kite (Breeding)	*Lophoictinia isura*	13_Moderate 15 – All zones 26 – Intact and sparse	September – January	Moderate – 1.5

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Common name	Species name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Superb Parrot (Breeding)	*Polytelis swainsonii*	13_Moderate 15 – All zones 26 – Intact and sparse	September – November	High – 2
White-bellied Sea-Eagle (Breeding)	*Haliaeetus leucogaster*	13_Moderate 15 – All zones 26 – Intact and sparse	July – December	High – 2

4.3.1 Threatened species survey details

Targeted threatened species surveys of the subject land were undertaken seasonally over a 18 month period from August 2022 through to January 2024. Weather observations for each survey date are shown in Table 22.

Table 22 Weather observations during targeted flora and fauna surveys (Deniliquin, NSW)

Survey undertaken	Survey date	Temperature (°C)		Rain (mm)	Rain preceding month (mm)
		Min.	Max.		
Vegetation mapping, diurnal bird survey and hollow bearing trees	3 August 2022	7.2	21.7	0	17.0
	4 August 2022	10.7	19.2	1.4	
	5 August 2022	7.0	16.7	0.2	
Targeted flora surveys and diurnal bird surveys	19 September 2022	4.5	16.3	3.0	58.0
	20 September 2022	4.0	19.9	0.2	
	21 September 2022	10.6	17.0	11.2	
	22 September 2022	12.2	22.4	1.2	
	23 September 2022	12.5	21.6	0.0	
BAM Plots, targeted flora surveys	21 November 2022	8.8	16.7	0.2	187.0
	22 November 2022	6.8	17.1	1.0	
	23 November 2022	9.3	21.8	0	
	24 November 2022	8.1	24.4	0	
	25 November 2022	8.9	25.6	0	
BAM Plots, targeted flora surveys	29 January 2023	21.8	24.4	0	16.6
	30 January 2023	18.4	32.2	8.8	
	31 January 2023	12.2	31.4	0	
	1 February 2023	11.6	29.3	0	
	2 February 2023	12.6	24.0	0	
	13 February 2023	10.4	30.2	0	32.6

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Survey undertaken	Survey date	Temperature (°C)		Rain (mm)	Rain preceding month (mm)
		Min.	Max.		
BAM Plots, targeted flora surveys, hollow bearing trees	14 February 2023	13.0	34.2	0	
	15 February 2023	15.9	39.0	0	
	16 February 2023	18.8	39.0	0	
	17 February 2023	22.9	41.9	0	
Nocturnal birds surveys, Plains Wanderer surveys, frog surveys	1 April 2023	7.7	19.4	0	9.4
	2 April 2023	4.2	23.5	0	
	3 April 2023	8.4	27.0	0	
	4 April 2023	10.3	29.2	0	
	5 April 2023	11.4	29.5	0	
	11 April 2023	8.9	19.4	0	
	12 April 2023	11.6	20.4	7.2	
	13 April 2023	11.6	21.9	6.8	
	14 April 2023	9.9	25.2	0	
	15 April 2023	14.6	20.7	0	
BAM Plots vegetation mapping additional areas	14 June 2023	5.6	14.1	0.8	15.2
Targeted flora and fauna surveys	11 September 2023	1.5	18.6	0	12
	12 September 2023	3.6	22.4	0	
	13 September 2023	5.7	24.8	0	
	14 September 2023	6.0	26.9	0	
	15 September 2023	10.5	25.8	0	
Targeted flora and fauna surveys	19 November 2023	9.1	33.9	0	14.6
	20 November 2023	16.5	33.5	0	
	21 November 2023	17.9	32.2	0	
	22 November 2023	13.4	30.3	19.4	
	23 November 2023	14.3	32.0	0.2	
	24 November 2023	18.7	26.4	0	
Targeted fauna surveys – Amphibians	15 January 2024	19.0	31.1	0	72.1
	16 January 2024	18.3	27.6	0	
	17 January 2024	18.3	26.3	1.0	
	18 January 2024	10.7	25.4	4.2	
	19 January 2024	9.3	28.1	0.2	

Information from the Australia Government Bureau of Meteorology website.

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Details of surveys undertaken as part of the current assessment are provided below.

Threatened Flora

Survey method and effort

Targeted flora surveys were undertaken by qualified ecologists Mitchell Palmer (Manager Ecology and GIS – NSW), Dimity Bambrick (Senior Ecologist), Jake Schwebel (Project Botanist), Stephanie Cerato (Project Botanist), Nicholas Lloyd (Botanist), Kit King (Botanist) on 18 – 24 September 2022, 20 – 26 November 2022, 30 January – 3 February, and 14 – 17 February 2023, 11-15 September 2023 and 20-24 November 2023, over a total of 850 person hours.

Each ecologist undertook surveys searching via two phase systematic grids in areas of habitat >50 hectares with transects undertaken in between points, as well along a grid of traverses 10 metres apart across areas of suitable habitat for each target threatened flora species in zones <50ha. Survey was designed as far as practicable to maximise the likelihood of detection of targeted threatened flora species by grouping flora species considered likely to be consistently detected through survey according to optimal months of survey and specific associated habitat. Geospatial data was recorded using a handheld GPS, and illustrated in Figure 10**.**

Justification of survey method and effort

Survey guidelines followed included:

- Section 5 of the BAM to determine the potential for threatened species identified under the BAM as 'ecosystem credit species' and 'species credit species' to occur (DPIE 2020a).
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (DEC 2004).
- *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020e).

In addition to the above, a variation to the BAM guidance was applied to large areas of PCT 26 zones that are >100 hectares. The variation does not apply to other vegetation zones. This was discussed with BCS during the assessment phase of the project although noted that an agreed method was not concluded.

At the time surveys were undertaken and before design refinements, for all areas of habitat greater than >50 hectares, a 100 metre x 100 metre grid was applied in accordance with the BAM flora survey guidelines (DPIE 2020) that resulted in approximately 3,364 grid intersect points requiring survey, and approximately 423 (number of grids x 0.126 ha search area buffer or 40m diameter) representative hectares of survey required, inside the relevant zones within the subject land. Following the amendments to the development footprint, in accordance with the BAM flora survey guidelines, 1,778 grid points are required, covering a representative amount of 224 hectares (number of grids x 0.126 ha search area buffer or 40m diameter).

As an alternative, for areas >100 hectares in area (being PCT 26 Weeping Myall Sparse and DNG zones), a 300 metre x 300 metre area was instead applied, with transect surveys undertaken between each grid point. The intention of the survey effort employed was to achieve a level of survey that responds to the scale of the development footprint, reflects the relatively uniform, largely homogenous and repeated vegetation patterns, including the slight mosaic microrelief variation that occurs on occasion and was subjected to further detailed targeted survey, as well as the land use history, whilst remaining scientifically robust. This varied method is summarised below:

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- The method has been applied to two zones only, being PCT 26 DNG and PCT 26 Sparse (all other zones and microhabitats have been completed following the BAM flora survey guidelines' grid intersect survey density for walked transects, and are not subject to the variation).
- The grid intersect density was changed from searching at 100 m x 100 m grid intersects to searching at 300 m x 300 m grid intersects. Search effort still used the 40 m diameter area systematic search as per the BAM flora survey guidelines.
- Four ecologists conducted transects between the grid points. These were conducted by both walking and slow driving, the latter only where vegetation was more open and species, or similar species, clearly visible when in flower, and if observed, warranted more detailed investigation by foot.
  - Note, due to data capture methods at the time of survey, it is difficult to separate driving and walking transects in the geospatial tracks layer. Therefore, as a conservative measure, it is assumed that 50% of total transects were walked, which is substantially less than in reality, and this has been applied to calculations listed in Table 23 below.
- If target species were identified, or more common species observed such as *Bulbine bulbosa* for example which was noted as occurring commonly with threatened Swainsona species, during the lower density grid intersects, then survey effort was increased accordingly across the relevant vegetation zones.

Two threatened flora species have been recorded, *Swainsona sericea* and *Swainsona murrayana*. Additional clusters of these two species were recorded adjacent to areas where they were found in 2022. In summary, these species were found to co-occur in small patches and as isolated individuals in PCT 26 DNG, east of Kidman Way. Large numbers of the species were recorded, estimated to be up to 2000 individuals within approximately 30 hectares of optimal habitat. However, numerous design revisions have occurred to avoid and minimise impacts to larger patches to ensure a viable local population can be maintained. It is the intention that retained areas containing this species will be subject to a future stewardship site. Impacts will occur to small isolated individuals and patches, totalling approximately 5.5 hectares. Although the Weeping Myall communities, both woodland and DNG, are largely homogeneous through the broader region and subject land (i.e. similar species composition), small areas of microrelief do occur on occasion that form small mosaic alterations with the introduction of some additional species, more consistent with other vegetation types, and the overall structure. The two main examples of this are an increase in Lignum *Duma florulenta* and Nitre Goosefoot *Chenopodium nitrariaceum* in wetter areas still dominated by Weeping Myall, or that have evidence of previous woody Weeping Myall vegetation. These small variations and microhabitats were found to occur on the more gilgaied grey soils within the PCT 26 Intact and Sparse zones, but also slight changes occur on the red loam soils where an increase in forb richness occurs in PCT 26 DNG. The latter does contain some similarities to PCT 44 Forb-rich Speargrass – Windmill Grass – White Top grassland of the Riverina Bioregion; however, as previously stated, the vegetation has been mapped as derived version of PCT 26, due to evidence of woody debris, scattered recruitment of Myall and nearby roadside vegetation.

Typically, the two threatened Swainsona species have been found in areas of derived grassland with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust, and in the absence of *Walwhalleya proluta*, Plains Grass *Austrostipa aristiglumis* and *Enteropogon acicularis* as the dominant species. Swainsona habitat has also been observed to have a lower cover of grazing-tolerant robust chenopods and less dense grass sward, and where grazing activities were limited to cattle, and in the absence of heavier sheep grazing. The populations of the two threatened Swainsona species were included as a key constraint during the design process and direct impact to these species have largely been avoided to date.

Additional surveys were completed in November 2023 targeting suitable microhabitats. These included slightly lower lying areas suitable for all targeted flora species and particularly areas subject to more frequent periodic flooding or water retention, or seasonally moist to water-logged soils or contained areas of drying

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mud. For example, microhabitats for species such as *Austrostipa wakoolica*, Claypan Daisy, Austral Pilwort and *Convolvulus tedmoorei*.

Table 23 below provides a summary of the targeted flora survey effort completed across predominantly September 2022/2023 and November 2022/2023, and provides a comparison to the standard methods outlined in the guidelines.

Table 23 Overview of vegetation zones and survey completed in September 2022/2023 and November 2022/2023

	Total area required - subject land (ha)	Total area required - development footprint (ha)	Total area of grids completed (ha)	Total area of transect surveys (ha)	Total area surveyed (ha)	% BAM guideline method surveyed	% total development footprint surveyed
Required BAM 100x100	423	224	-	-	-	-	12.50
Completed September (22/23)	-	-	65.13	166.64	231.77	105	12.93
Completed November (22/23)	-	-	53.04	174.30	227.34	102.87	12.69

This accounts for all surveys with vegetation zones that have >50ha, and does not include PCT 13 and PCT 15, where small areas of impact were surveyed separately. The survey effort in each season accounts for approximately 12-13% of the total area of the habitat and microhabitats, not including the estimated amount of slow driving transects. This survey effort is on par with the required amount of total coverage that would have been achieved if the 100 metre x 100 metre grids, as prescribed by the guidelines, were implemented. The survey effort has been achieved by a combination of both grid searches and transects (in line with BCS' suggestion during consultation).

Following the most recent survey in November 2023, additional refinement of the development footprint (i.e. area of direct impact) has been undertaken to further avoid impacts to high biodiversity value areas within the subject land.

Timing of survey

Survey was conducted in relation to requirements in the TBDC survey guides, with exception of a variation to the methods that were applied for all PCT 26 zones.

Survey personnel and relevant experience

Targeted flora surveys were undertaken by the Biosis ecologists listed in Table 24.

Table 24 Targeted flora survey personnel and relevant experience

Staff member	Role	Relevant experience
Mitchell Palmer	Manager – Ecology and GIS (NSW)	Over 14 years' experience and key expertise in the identification of native flora, vegetation communities and avifauna species throughout

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Staff member	Role	Relevant experience
	BAM Accredited Assessor Principal Ecologist	NSW, including conducting flora and fauna surveys within the Riverina region.
Stephanie Cerato	Botanist	Four years' experience conducting threatened flora surveys within NSW.
Jake Schwebel	Botanist	Four years' experience conducting threatened flora surveys within NSW.
Nicholas Lloyd	Botanist	Four years' experience conducting threatened flora surveys within NSW and the Riverina region.
Kit King	Botanist	Three years' experience conducting threatened flora surveys within NSW.
Dimity Bambrick	Senior Ecologist	Six years' experience conducting threatened flora surveys within NSW, particularly in the Riverina
Dylan Mason	Botanist	One year experience conducting threatened flora surveys within NSW, particularly in the Riverina
Jess Chapman	Botanist	Two years' experience conducting threatened flora surveys within NSW, particularly in the Riverina

Results

Table 25 provides a summary of the results of the targeted flora surveys completed.

Table 25 Summary of targeted flora survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Austrostipa wakoolica	A spear-grass	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • November 2022 • November 2023	Surveyed suitable microhabitats in vegetation zones that are more frequently or periodically flooded or has seasonally moist to water-logged soils. Not detected in surveys.	N/A
Pilularia novae-hollandiae	Austral Pillwort	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • November 2022 • November 2023	Surveyed suitable microhabitats in vegetation zones that are more frequently or periodically flooded or has seasonally moist to water-logged soils	N/A

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
			and contains drying mud. Not detected in surveys.	
Maireana cheelii	Chariot Wheels	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023	Surveyed suitable microhabitats in vegetation zones that support heavier grey clay soils and higher chenopod abundance. Not detected in surveys.	N/A
Brachyscome muelleroides	Claypan Daisy	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023	Surveyed suitable microhabitats in vegetation zones that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance. Not recorded during surveys to date.	N/A
Brachyscome papillosa	Mossgiel Daisy	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023	Surveyed suitable microhabitats in vegetation zones that support heavier grey clay soils and higher chenopod abundance. Not detected in surveys.	N/A
Convolvulus tedmoorei	Bindweed	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • September 2023	Optimal habitat limited. Surveyed suitable microhabitats in vegetation zones that are more frequently or periodically flooded or has seasonally moist grey soils. Not recorded during surveys.	N/A

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Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Leptorhynchos orientalis	Lanky Buttons	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023	Surveyed suitable microhabitats in vegetation zones that derived grassland with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust. Not recorded during surveys to date.	N/A
Swainsona sericea	Silky Swainsona-pea	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023	Surveyed suitable microhabitats in vegetation zones that had derived grassland with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust. Recorded during surveys in areas where species such as *Walwhalleya proluta*, Plains Grass *Austrostipa aristiglumis* and *Enteropogon acicularis* were much less dominant.	Detected during surveys • 5.5 ha within PCT 26 DNG
Swainsona murrayana	Slender Darling Pea	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • September 2023	Surveyed suitable microhabitats in vegetation zones that had derived grassland with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust. Recorded during surveys in areas where species such as *Walwhalleya proluta*, Plains Grass *Austrostipa aristiglumis* and *Enteropogon acicularis* were much less dominant.	Detected during surveys • 5.5 ha within PCT 26 DNG
Lepidium monoplocoides	Winged Peppercress	• Within areas of potential habitat, a combination of	Surveyed suitable microhabitats in	N/A

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Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
		parallel transects in areas <50 ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023	vegetation zones that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance. Not recorded during surveys.	
Eucalyptus leucoxylon subsp. Pruinosa	Yellow Gum	• Within areas of potential habitat, a combination of parallel transects in areas <50 ha • September 2022 • February 2023.	Surveyed suitable microhabitats in PCT 13 and PCT 15. Not recorded during surveys.	N/A

Limitations

As previously mentioned in Section 3.1.5 and stated above, ecological surveys provide a sampling of flora and fauna at a given time and season. Factors influencing detectability of species during survey include species dormancy, seasonal conditions, ephemeral status of waterbodies, and migration and breeding behaviours of some fauna. In many cases, these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

Due to the size of the subject land, application of the threatened flora guidelines (*Surveying Threatened Plants and Their Habitats* (DPIE 2020b)*)* with their current intent was not practicable. Consultation with BCS has been undertaken, including an application to modify the survey method from that prescribed in the guidelines to reduce the level of survey effort required to a more practicable requirement, whilst remaining representative and scientifically robust. Confounding the issues of the enormity of survey effort required was the above average rainfall and significant flooding events that rendered large portions of the subject land inaccessible for most of the spring 2022 seasonal window, which covered the majority of species requiring survey. Areas still accessible contained standing water. This limitation has been remedied by further survey in November 2023.

Fauna habitat assessments

Fauna habitat assessment was undertaken to determine the presence of microhabitats and other critical habitat components (habitat constraints) suitable for all fauna species outlined in Table 21 and Appendix 2. Habitat assessments focussed on the presence of the following features within the subject land:

- Habitat trees including large and/or hollow-bearing trees, stick nests, availability of flowering shrubs and canopy/understorey feed tree species.
- Soil type.
- Condition and type of native vegetation and the presence of exotic species.

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- Presence and condition of pools and waterways.
- Quantity of ground litter and woody debris.
- Searches for indirect evidence of fauna (i.e. feathers, tracks and scats).
- General degradation of the site as a result of past and current disturbances such as vegetation clearing and industrial land management practices.
- Topography and landscape morphology.

Several habitat features with potential to support threatened species credit species were identified during these habitat assessments. These features have been summarised in Table 26.

Table 26 Habitat features with potential to support threatened species credit species

Habitat feature	Presence within the development footprint
Hollow-bearing trees	Habitat trees supporting hollows of a variety of size classes from small (<50 mm diameter) through to large (150 – 400 mm diameter) were present across the subject land. These trees have the potential to provide breeding resources for a range of native fauna species including threatened cockatoos (Major Mitchell Cockatoo), and owls (Barking Owl and Masked Owl). These have been prioritised for forestalling and therefore largely avoided.
Feed tree species	Trees, shrubs and mistletoe providing food resources for a range of bird species including Superb Parrot, Grey-crowned Babbler and more common species such as Red-rumped Parrots and Blue Bonnets.
Open grassland	Areas of open grassland provide foraging resources for large raptors species such as Little Eagle, Spotted Harrier and Square-tailed Kite, as well as owls. The subject land contains areas of mapped Important Area for Plains Wanderer, however these have been avoided.
Major and minor watercourses and waterbodies (i.e. dams)	Wetlands, ephemeral waterways and periodically inundated low lying areas and surrounding riparian vegetation support threatened amphibians such as Southern Bell Frog. In addition, large old trees, more likely to support tree hollows, such as Black Box are more common in riparian corridors and may support hollow-dwelling birds and mammals and act as an impart conduit for movement through the heavily modified landscape.
Woody debris and leaf litter	Woody debris and leaf litter was prevalent in the remnant vegetation patches across the subject land providing potential foraging habitat for birds, raptors and owl species.

Field capture of detailed fauna habitat information allowed for confirmation of presence/absence of habitat features and microhabitats for a range of candidate threatened species across surveyed portions of the development footprint. Fauna habitat assessments were captured using ArcGIS polygons attributed with specific habitat criteria that allowed for planning of further targeted survey for select species, or the exclusion of the potential for occurrence of various candidate species from the subject land.

Nocturnal birds (Barking Owl, Masked Owl and Plains Wanderer)

Survey method and effort

Habitat assessments, including the detailed mapping of hollow-bearing trees and opportunistic surveys were undertaken, however no targeted nocturnal surveys for owls were completed. With surveys for Dinawan Wind Farm and the project being undertaken concurrently, and given the size of the subject land, a high degree and unpracticable amount of survey effort would be required to confirm absence in accordance with the BAM fauna survey guidelines. With this in mind, a key focus was to map potential owl habitat and hollow bearing trees, and site infrastructure away from these areas as far as practicable. Approximately 40 person

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hours was collated during these surveys. No opportunistic records of owls were observed, nor were calls picked up during acoustic monitoring in March and April 2023 as part of Plains Wanderer surveys.

For Plains Wanderer, avoiding areas of NSW DCCEEW Mapped Important Areas habitat, and minimising impacts to buffers surrounding mapped important areas was a key focus. To supplement this, a combination of spotlighting, driving transects, and audio acoustic detection techniques was undertaken. Although considered unlikely to occur in this region, this survey also was undertaken for Bush Stone-curlew. Spotlight and driving transects were conducted March and April 2023 across eight nights, with audio detectors placed out between the 29 March to the 15 April, across 18 nights. Two Anabat swifts with acoustic microphones, and eight audiomoths were utilised during this period. Approximately 96 person hours was collated during these surveys.

Justification of survey method and effort

As stated above, nocturnal owl surveys were not undertaken in accordance with the survey guidance. The key focus of survey was on implementation of avoidance and minimisation of impacts to suitable owl habitat during project design, and prior to changes implemented in March 2024 (the BAM-C and TBDC were updated with new guidance and data regarding forest owls following submission of the BDAR).

Avoidance of important mapped areas for Plains Wanderer, in conjunction with detailed survey of other potential areas of habitat, was undertaken.

Survey personnel and relevant experience

Surveys were undertaken by the Biosis ecologists outlined in Table 27.

Table 27 Targeted nocturnal bird survey personnel and relevant experience

Staff member	Role	Relevant experience
Mitch Palmer	Manager – Ecology and GIS (NSW) BAM Accredited Assessor Principal Ecologist	Over 13 years' experience and key expertise in the identification of native flora, vegetation communities and avifauna species throughout NSW, including conducting flora and fauna surveys within the Riverina region.
Caragh Heenan	Senior Zoologist	Six years' experience conducting threatened fauna surveys within NSW.
Bret Stewart	Senior Zoologist (Technical Lead)	15 years' experience conducting threatened fauna surveys within NSW.
Joel Nicholson	Zoologist	4 years' experience conducting threatened fauna surveys within NSW.
Aleksei Atkin	Principal Ecologist	13 years' experience conducting threatened fauna surveys within NSW.
Kit King	Botanist (hollow bearing tree assessment)	Two years' experience conducting threatened flora surveys within NSW. (Hollow bearing tree assessment)

Results

As a result of detailed hollow bearing tree mapping within suitable habitat for threatened owls, 39 hollow bearing trees were recorded, with seven hollows determined to be suitable size and height for owls. Of these

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seven, one occurs on the edge of the development footprint and is assumed to be impacted. However, like many of the hollow bearing trees noted within the small, fragmented patches of the subject land, many of the hollows are occupied by more common resident fauna species such as Galahs, Sulphur-crested Cockatoos, Blue Bonnets and Red-rumped parrots. Of particular note to the suitable owl sized hollows, these were occupied by Galahs at the time of survey, and therefore are not considered to be in use for any threatened owls.

Spotlighting, driving transects and acoustic detection did not record any evidence of Plains Wanderer or Bush Stone-Curlew. A focus on avoiding mapped important habitat and identified potential areas of Plains Wanderer habitat was a key focus of the assessment for Plains Wanderer, as well as woodland patches containing coarse woody debris for Bush Stone-Curlew.

Table 28 Summary of diurnal bird survey method and results

Species Name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Tyto novaehollandiae	Masked Owl	Habitat assessment and hollow bearing tree assessment	No evidence of Owl use within suitable habitat	0 ha
Ninox connivens	Barking Owl	Habitat assessment and hollow bearing tree assessment	No evidence of Owl use within suitable habitat	0 ha
Pedionomus torquatus	Plains Wanderer	Avoidance of Important mapped areas Driving transects Audio acoustic detection	Important mapped areas identified and avoided Not recorded	0 ha of Important Mapped Areas
Burhinus grallarius	Bush Stone-curlew	Driving transects Audio acoustic detection	Not recorded	0 ha

Diurnal birds

Survey method and effort

Opportunistic surveys as well as large stick nest and hollow bearing tree surveys were conducted in September 2022, February 2023, March 2023 and September 2023. Surveys consisted of transects, observing hollows for use and other evidence of breeding. Additionally, detailed bird utilisation surveys in the subject land, and broader area (surveyed as part of Dinawan Wind Farm), were undertaken across multiple seasons (commencing in August 2022). Bird utilisation survey (BUS) points occurred within and adjacent to the subject land for Dinawan Wind Farm. Approximately 50 person hours was collated during these surveys.

Justification of survey method and effort

NSW DCCEEW is developing survey guidance for many threatened bird species (DPE 2023d). Methods employed as part of this assessment included:

- Survey for the presence of eucalypts containing hollows that are at least 9 m above the ground, and with hollow diameter of 10 cm or larger.
- Survey for the presence of breeding on site as follows; (a) begging birds of any age or sex; or (b) lone adult males identified during the breeding season (April to August); or (c) an occupied nest.
- Survey for the presence of nest trees supporting large stick nests.

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- Survey for the presence of living or dead eucalypt trees containing hollows greater than 5 cm diameter and greater than 4 m above the ground (or with a DBH of greater than 30 cm).

Currently, the TBDC stipulates a staged approach for the detection of breeding. This includes the identification of signs of breeding (presence of the species during breeding season) and potential nest trees (suitable hollow-bearing trees).

Three 20 minute, two hectare diurnal surveys repeated across multiple seasons and days were conducted as well as 26 bird utilisation points as part of the Dinawan Wind Farm, of which seven are within or adjacent to the subject land in similar habitats, totalling 575 replicates across all seasons.

The survey methods and effort completed by Biosis are considered to fulfil this requirement.

Survey personnel and relevant experience

Diurnal bird surveys were undertaken by the Biosis ecologists outlined in Table 29.

Table 29 Targeted diurnal bird survey personnel and relevant experience

Staff member	Role	Relevant experience
Mitch Palmer	Manager – Ecology and GIS (NSW) BAM Accredited Assessor Principal Ecologist	Over 13 years' experience and key expertise in the identification of native flora, vegetation communities and avifauna species throughout NSW, including conducting flora and fauna surveys within the Riverina region.
Caragh Heenan	Senior Zoologist	Six years' experience conducting threatened fauna surveys within NSW
Stephanie Cerato	Botanist (support fauna field surveys)	Four years' experience conducting threatened flora and fauna surveys within NSW (Superb parrot surveys 2022)
Bret Stewart	Senior Zoologist (Technical Lead)	15 years' experience conducting threatened fauna surveys within NSW.
Aleksei Atkin	Principal Ecologist	13 years' experience conducting threatened fauna surveys within NSW.

Results

Table 30 provides a summary of the results of the diurnal bird surveys completed. Again it should be noted that many of the hollow bearing trees recorded within the small, fragmented patches of the subject land, were found to be occupied by more common resident fauna species such as Galahs, Sulphur-crested Cockatoos, Blue Bonnets and Red-rumped parrots. This occupancy was concluded as preventing breeding opportunities for Superb Parrot within the subject land. One large active nest was recorded, currently in use by a pair of Wedge-tailed Eagles, with this tree being avoided during the design process. Small to medium nests were detected regularly, with most in use by common species such as Ravens, but also Brown Falcons and Nankeen Kestrels. No other large nests suitable for Little Eagle or Square-tailed Kites were detected.

Superb Parrots were recorded regularly during BUS surveys associated with the adjacent wind farm studies, particularly foraging within PCT 26 intact vegetation, more frequently along roadside corridors of McLennons Bore Road, with one observation along Liddles Lane, adjacent to the subject land. Paired individuals and groups including juveniles were recorded, particularly in autumn and summer seasons. This result is not unexpected given the nomadic nature of Superb Parrots in moving to northern and central areas of NSW over winter. Generally though, in all other seasons, Superb Parrots tend to remain within or near their

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breeding territories throughout the year, especially if suitable habitat and food sources are available but may undertake local movements or dispersals, particularly young birds seeking new territories or breeding opportunities. In the Riverina, Superb Parrots usually breed in forests dominated by large mature River Red Gums, typically close to watercourses (DCCEEW). Only the very occasional individual of River Red Gum occurs in the subject land, however, are not near major water courses, are isolated, and will not be impacted. Breeding can also occasionally occur in Blakely's Red Gum (*Eucalyptus blakelyi*) or Grey Box (*Eucalyptus microcarpa*), however these two species do not occur in the subject land.

Numerous ecosystem credit species were also recorded in the subject land. These included White-fronted Chat, Grey-crowned Babblers and Spotted Harrier, whilst Painted Honeyeaters, Southern Whiteface and Black Falcon were recorded in the broader locality as part of broader avifauna assessments associated with the adjacent windfarm.

Table 30 Summary of diurnal bird survey method and results

Species Name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Polytelis swainsonii	Superb Parrot	Hollow bearing tree surveys in September 2022 and September 2023. General diurnal bird surveys Bird utilisation surveys Opportunistic surveys	This species was observed foraging through the subject land. No evidence of breeding was observed.	0 ha
Hieraaetus morphnoides	Little Eagle	Targeted nest surveys in September 2022 and September 2023 Bird utilisation surveys	This species was not observed during multiple surveys. No suitable nests were observed.	0 ha
Lophoictinia isura	Square-tailed Kite	Targeted nest surveys in September 2022 and September 2023 Bird utilisation surveys	This species was not observed during multiple surveys. No suitable nests were observed.	0 ha
Ardeotis australis	Australian Bustard	Surveys throughout the subject land in September 2022, March and April 2023	This species was not observed during multiple surveys	0 ha
Lophochroa leadbeateri	Major Mitchell's Cockatoo	Hollow bearing tree surveys in September 2022 and September 2023. General diurnal bird surveys	This species was not observed foraging through the subject land. No evidence of breeding was observed.	0 ha

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Species Name	Common name	Survey method	Survey results	Species Polygon (ha) or count
		Bird utilisation surveys Opportunistic surveys		
Haliaeetus leucogaster	White-bellied Sea-Eagle	Targeted nest surveys in September 2022 and September 2023 Bird utilisation surveys	This species was not observed during multiple surveys. No suitable nests. Were observed	0 ha

Amphibians – Southern Bell Frog

Survey method and effort

Habitat assessments were undertaken to determine the likely presence of Southern Bell Fog in November 2022, and this species was observed opportunistically and repeatedly during the broader habitat surveys, as well as again in February and April 2023 during targeted surveys for other nocturnal species. This is following above average rainfall and flooding conditions that likely washed individuals from a stronghold area in the Coleambally irrigation areas to the North, via flooding events in the Delta Creek and Coleambally irrigation channel. Approximately 16 person hours was collated during these surveys. Additional targeted survey was completed in 15 - 19 January 2024.

Justification of survey method and effort

Targeted surveys were planned to occur in accordance with the ""NSW survey guidelines for Threatened frogs" however since this species was observed during habitat assessment surveys, this was deemed sufficient in order to ascertain habitat within the subject land. For the most part, the subject land provides habitat on a temporary basis, and during times of flooding events, with permanent habitat, albeit suboptimal due to limited vegetation cover and water quality, limited to the irrigation channel..

Survey personnel and relevant experience

Amphibian surveys were undertaken by the Biosis ecologists outlined in Table 31.

Table 31 Amphibian survey personnel and relevant experience

Staff member	Role	Relevant experience
Mitch Palmer	Manager – Ecology and GIS (NSW) BAM Accredited Assessor Principal Ecologist	Over 13 years' experience and key expertise in the identification of native flora, vegetation communities and avifauna species throughout NSW, including conducting flora and fauna surveys within the Riverina region.
Aleksei Atkin	Principal Ecologist	Over 13 years' experience conducting threatened fauna surveys within NSW.
Bret Stewart	Senior Zoologist (Technical Lead)	15 years' experience conducting threatened fauna surveys within NSW.

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Staff member	Role	Relevant experience
Tara Lillicot	Zoologist	Two years' experience conducting threatened fauna surveys within NSW.

Results

Table 32 provides a summary of the results of the frog surveys completed. Numerous Southern Bell Frog Litoria raniformis were detected within the subject land. It was noted that where more permanent water was found and *Gambusia holbrooki* were present, the Southern Bell Frog was not recorded or observed to be present. Where more permanent water was found, such as irrigation channels and farm dams, and *Gambusia holbrooki* was not present, mature individuals, immature individuals and tadpoles were observed.

Table 32 Summary of frog survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Litoria raniformis	Southern Bell Frog	Opportunistic observations Multiple (>100) individuals observed and linked to point locations shown on Figure 10.	This species was observed throughout the Coleambally irrigation channel and fringing areas of PCT 26 DNG within the subject land as well as some farm dams and areas of PCT 17 in November 2022, March 2023, and January 2024.	200m buffer of records, habitat and associated PCTs in accordance with relevant guidelines. • PCT 15 Moderate – 0.16 ha • PCT 17 Mod_Good – 0.22 ha • PCT 26 DNG – 106.17 ha • PCT 26 Intact – 0.29 ha • PCT 26 Sparse – 13.67 ha • PCT 46 Moderate – 1.64 ha

Microchiropteran bats

Survey method and effort

Calls were recorded from dusk until dawn using four Titley Scientific Anabat Express (Full Spectrum upgrade) and one Titley Scientific Anabat Swift ultrasonic recorders, fitted with omnidirectional microphones. Default settings for trigger, sensitivity, sampling rate and minimum / maximum frequency were used. Each time a bat flies past the detector, its call is recorded as a digital file (defined here as a 'pass') that is saved directly onto a memory card in the detector unit. Files were recorded in full spectrum format (.wav). Default settings for trigger, sensitivity, sampling rate and minimum / maximum frequency were used. Units were set on trigger mode to record at night. Units were located in flyways within target habitat areas to allow space in front and around the microphone to minimise echoes from hard surfaces, call attenuation from surrounding vegetation, and ensure adequate flight space around the microphone.

Justification of survey method and effort

Survey was undertaken with reference to the following guidelines:

- *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (NSW Office of Environment and Heritage, 2018).
- *Survey guidelines for Australia's threatened bats* (Department of the Environment, Water, Heritage and the Arts, 2010).

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Timing of survey

Surveys were undertaken in conjunction with the broader bird and bat utilisation surveys for Dinawan Wind Farm. Up to 12 ultrasonic detectors have been placed throughout similar habitats through all seasons across an 18 month period, consisting of six seasons of data (2x winter, 1x spring, 1x summer and 1x autumn) totalling 240 nights of survey as part of the assessment for Dinawan Wind Farm. One detector is within the subject land, with another 3 kilometres north of the subject land.

Survey personnel and relevant experience

Microbat surveys were undertaken by the Biosis ecologists outlined in Table 33.

Table 33 Targeted microbat survey personnel and relevant experience

Staff member	Role	Relevant experience
Caragh Heenan	Senior Zoologist	Six years' experience conducting threatened fauna surveys within NSW
Felicity Williams	Senior Zoologist – Bat Ecology	Over 12 years' experience in bat call data analysis.

Results

Data were viewed using Anabat Insight (version 2.0.7, licensed), by Titley Scientific.

Species identification was first refined by using known species geographic distributions (Churchill 2008, Australasian Bat Society 2022) to generate a list of species with potential to occur within the subject land. Species identification was guided by the probability of occurrence within the subject land based on distribution, database records obtained from NSW BioNet and known habitat values at each detector point and across the subject land more broadly.

Files not containing bat calls (noise files) were filtered out using a standard "allbats" filter in Anabat Insight and not included in further analysis. A custom decision tree was used to sort the remaining files into likely species and species groups. Calls were identified by visually comparing the spectrogram and call characteristics (e.g. characteristic frequency and call shape) with reference calls and descriptions from available reference materials (Reinhold et al. 2001, Pennay, Law, & Reinhold 2004). A call (pass) was defined as a sequence of five or more consecutive pulses of similar frequency and shape. Identification was not attempted for sequences with less than five defined consecutive pulses (unless for readily identifiable species such as the White-striped Freetail-bat *Austronomus australis)*. Similarly, sequences containing multiple bats or pulses with irregular frequency and / or shape (non-search-phase calls) were not identified to species level.

The focus of call analysis was to generate a list of species present, with a focus on threatened species, rather than analyse species activity. Once a species was positively identified, it was recorded as present. Species identification was, therefore, not attempted for all files recorded. Where a threatened species was not identified through the decision tree, additional checks were used to improve confidence that a false negative was not recorded including target frequency filters and manual review of 'noise' files

Species groups were used for *Nyctophilus spp* as the species in the genus are difficult to separate from each other, this includes the threatened Corbens Long-eared Bat *Nyctophilus corbeni*. Southern Myotis is another species potentially problematic to differentiate for calls as it overlaps with other, non-threatened species. However, given that this species has very specific habitat requirements including water with pools / stretches >3m for foraging with suitable roosting habitat within 200 metres (eg hollow-bearing trees), there is a low

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probability that this species would be present within the subject land, where such habitats do not occur. The subject land is south of predicted range and no preferred habitat for this species will be impacted.

Table 35 provides a summary of the results of the microbat surveys completed.

Table 34 Bat call confidence ratings

Identification	Description
C – Almost certain	Call characteristics diagnostic, matching those described in reference material, including species reference calls.
PR – Probable	Call most likely to represent a particular species, but there exists a low probability of confusion with species of similar call type or frequency, or call lacks sufficient detail (e.g. call quality) to be definite.
SG – Species Group	Call characteristics (e.g. frequency, shape) overlap with other species or call lacks sufficient detail (e.g. call quality) making it too difficult to distinguish between species.
X – Not Detected	Of the data analysed, no calls were attributable to this species.

Table 35 Summary of microbat survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Austronomus australis	White-striped Free-tailed Bat	Acoustic detection	C	N/A
Chalinolobus gouldii	Gould's Wattled Bat	Acoustic detection	C	N/A
Chalinolobus morio	Chocolate Wattled Bat	Acoustic detection	PR	N/A
Chalinolobus picatus	Little Pied Bat	Acoustic detection	PR	Ecosystem credit species only
Myotis macropus	Southern Myotis	Acoustic detection	SG	Species credit habitat not present. Likely Nyctophilus group
Nyctophilus corbeni	Corben's Long-eared Bat	Acoustic detection	SG	N/A
Nyctophilus geoffroyi	Lesser Long-eared Bat	Acoustic detection	SG	N/A
Nyctophilus gouldi	Gould's Long-eared Bat	Acoustic detection	SG	N/A
Ozimops petersi	Inland Free-tailed Bat	Acoustic detection	C	N/A
Ozimops planiceps	South-eastern Free-tailed Bat	Acoustic detection	C	N/A
Ozimops ridei	Ride's Free-tailed Bat	Acoustic detection	C	N/A
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Acoustic detection	PR	Ecosystem credit species only
Scotorepens balstoni	Inland Broad-nosed Bat	Acoustic detection	PR	N/A
Scotorepens greyii	Little Broad-nosed Bat	Acoustic detection	PR	N/A
Vespadelus baverstocki	Inland Forest Bat	Acoustic detection	PR	Ecosystem credit species only

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Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Vespadelus darlingtoni	Large Forest Bat	Acoustic detection	SG	N/A
Vespadelus regulus	Southern Forest Bat	Acoustic detection	SG	N/A
Vespadelus vulturnus	Little Forest Bat	Acoustic detection	SG	N/A

Limitations

Ultrasonic sampling is associated with a number of limitations. Detectability of bats relates to the intensity of their calls, their flight characteristics and the structure of the surrounding vegetation, all of which influence the distance over which a bat can be detected. Differences in the probability of detection may result in a reduced likelihood of recording and, therefore, positively identifying some species as present within a site.

Manual call analysis is also associated with limitations, including the sometimes arbitrary selection of useable calls and subjectivity of the observer.

Where threatened species calls overlap with non-threatened species, call analysis has taken a conservative approach in assuming the call could represent the threatened species.

4.3.2 Incidental flora and fauna surveys

The following threatened species were recorded during incidental surveys undertaken as part of the current assessment;

- Grey-crowned Babbler *Pomatostomus temporalis* (Vulnerable- BC Act) – Multiple observations within the subject land and roadside vegetation.
- White-fronted Chat *Epthianura albifrons* (Vulnerable – BC Act) – Multiple observations within the subject land.
- Spotted Harrier *Circus assimilis* (Vulnerable- BC Act) – One individual observed adjacent to the subject land.
- Black Falcon *Falco subniger* (Vulnerable – BC Act) – One individual observed adjacent to the subject land as part of wind farm assessments.
- Southern Bell Frog *Litoria raniformis* (Endangered – BC Act, Vulnerable– EPBC Act) – Multiple observations within the subject land.
- Painted Honeyeater *Grantiella picta* (Vulnerable – BC Act, Vulnerable- EPBC Act) – One pair observed adjacent to the subject land as part of wind farm assessments.
- Southern Whiteface *Aphelocephala leucopsis* (Vulnerable – EPBC Act) – Observations within the subject land as part of wind farm assessments.
- Superb Parrot *Polytelis swainsonii* ((Vulnerable – BC Act, Vulnerable- EPBC Act) – Observations within the subject land and roadside vegetation.

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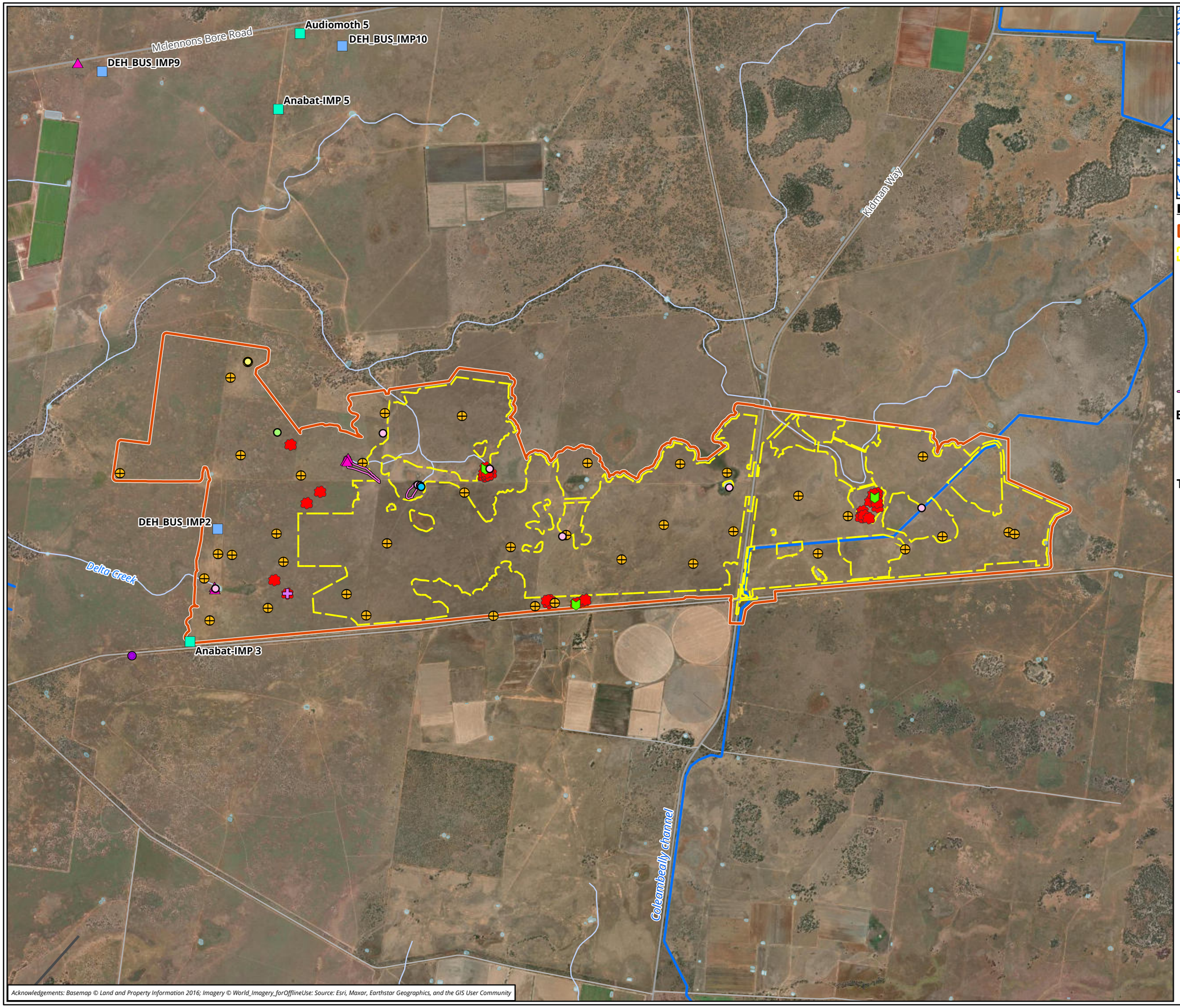
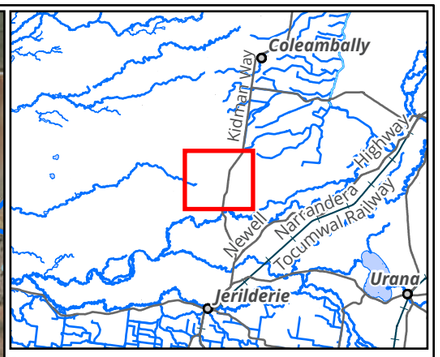




Legend

- Subject land
- Development footprint
- Hollow-bearing tree
- Acoustic detectors
- Diurnal birds survey
- Large nest
- Call playback - Frog
- Line survey - Frog

BBUS

- Bird utilisation site
- Bat utilisation site - audiomoths

Threatened fauna sightings

- Grey-crowned Babbler eastern subspecies
- Southern Bell Frog
- Spotted Harrier
- Superb Parrot
- White-fronted Chat

Figure 10.1 Targeted fauna survey

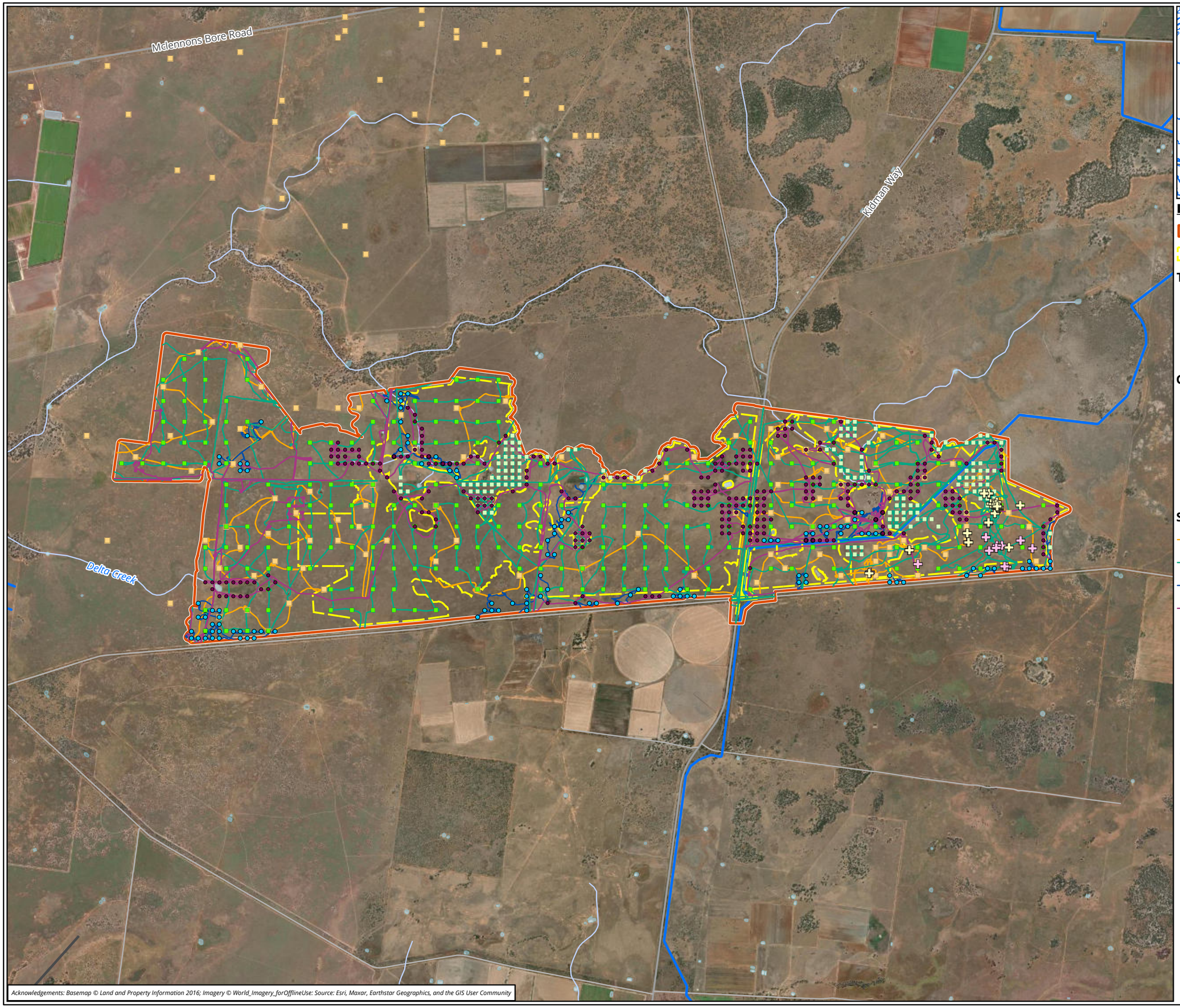
0 1 2

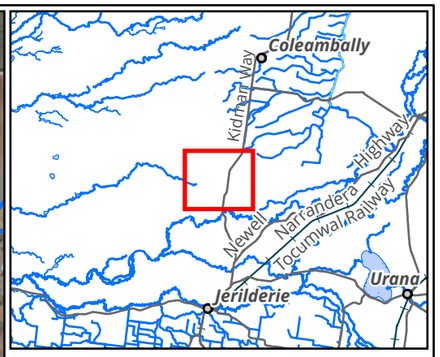
Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 14 August 2024,
Prepared by: LH, Prepared for: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F10.1_TrgSurveyFauna





Legend

- Subject land
- Development footprint

Threatened flora records

- Silky Swainsona-pea - *Swainsona sericea*
- Slender Darling Pea - *Swainsona murrayana*

Grid points

- September 2022
- November 2022
- September 2023 (300m x 300m)
- September 2023 (100m x 100m)
- November 2023

Survey tracks

- September 2022
- September 2023
- November 2022
- November 2023

Figure 10.2 Targeted flora survey

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 03 September 2024,
Prepared by: LH, Prepared for: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F10.2_TrgSurveyFlora

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

4.3.3 Expert reports

Sections 5.2 and 5.3 of the BAM outline that an expert report may be obtained instead of undertaking a species survey for a project, where the expert report is prepared by a person who, in the opinion of the Environment Agency Head, possesses specialised knowledge based on training, study or experience to provide an expert opinion in relation to the biodiversity values to which an expert report relates (DPIE 2020a).

No expert reports were utilised for the current assessment.

4.3.4 Threatened species summary and polygons

Table 36 provides details of threatened species impacted by the project and outlines the attributes that comprise the threatened species polygons. The presence of threatened species impacted by the project is illustrated in Figure 11.

Table 36 Threatened species polygons within the development footprint

Threatened species	Impact (ha / No. indiv.)	Unit of measure	Biodiversity risk weighting	Polygon attributes
Flora				
Swainsona sericea	Observed	Area	2	Total areas of microhabitat and individuals impacted by the development footprint following avoidance measures. Total areas of impact is 5.5 ha
Swainsona murrayana	Observed	Area	2	Total areas of microhabitat and individuals impacted by the development footprint following avoidance measures. Total areas of impact is 5.5 ha
Fauna				
Litoria raniformis	Observed	Area	2	The species polygon aligns with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs within which the species is associated or found within, of 200 metres radius from the top of bank. Total area impacted within PCTs and buffer is 122.16 ha

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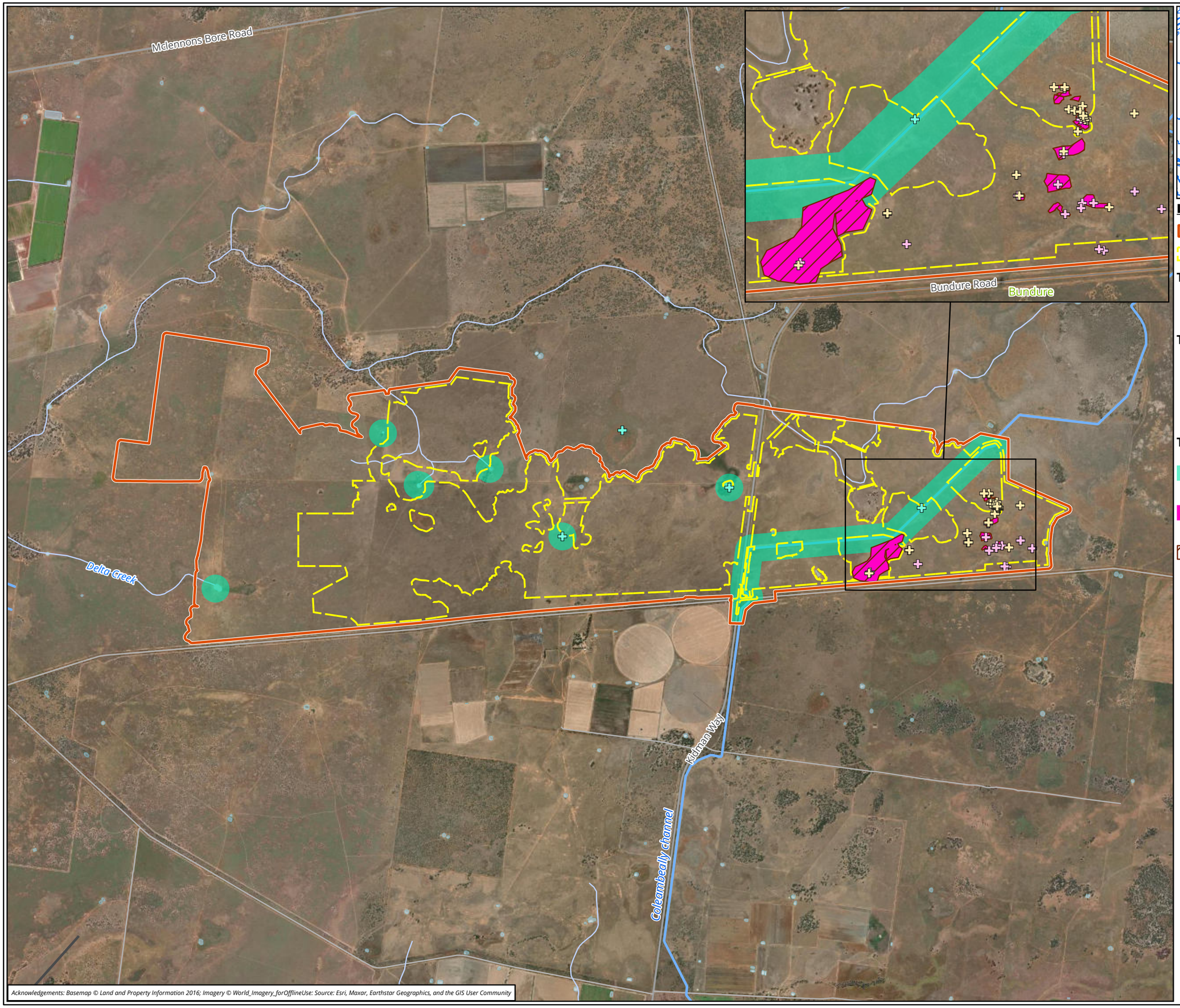

Legend

- Subject land
- Development footprint

Threatened fauna sightings

- Southern Bell Frog - *Litoria raniformis*

Threatened flora records

- Silky Swainsona-pea - *Swainsona sericea*
- Slender Darling Pea - *Swainsona murrayana*

Threatened species polygon

- Southern Bell Frog - *Litoria raniformis*
- Silky Swainsona-pea - *Swainsona sericea*
- Slender Darling Pea - *Swainsona murrayana*

Figure 11 Threatened species polygons

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: , Date: 14 August 2024,
Prepared by: LH, Prepared for: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F11_SpecPolys

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

STAGE 2 — IMPACT ASSESSMENT (BIODIVERSITY VALUES)

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5 Avoid and minimise impacts

This section demonstrates the efforts made to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the project in accordance with BAM, including an analysis of alternative:

- Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology.
- Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route.
- Locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location.
- Sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site.

A description of the efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through design refinements is also provided through other site constraints that Spark Renewables have considered in determining the location and design of the project are also identified.

5.1 Site Selection

During initial phases of the project feasibility, multiple properties and regions within the broader Riverina and South West REZ were considered. The South West REZ as a whole was chosen for multiple reasons including renewable energy resource potential, existing (and planned) electricity network (i.e. Project EnergyConnect), low human population densities and existing land use patterns. Many of the proposed renewable energy developments in the South West REZ are sited in areas that support native vegetation cover, particularly in the central to eastern portions of the REZ. The prevalence of native vegetation in these areas is due to land use practices and patterns of agricultural development. Lower rainfall areas and non-arable areas away from irrigation infrastructure still support large tracts of native vegetation where broadacre grazing takes place. Development of intensive dryland and/or irrigated agriculture has been limited by appropriate soil types and proximity to irrigation infrastructure. Government policy and community pressure has meant future renewable energy development in the South West REZ is now focussed on the undeveloped grazing land that supports native vegetation rather than on the areas of high value agricultural land. This has made complete avoidance of biodiversity impacts at a landscape and site selection level challenging within the South West REZ. The site selection process has therefore focused on avoiding higher quality woodland and forested areas and on utilising land previously disturbed by low intensity agriculture. Whilst avoidance of native vegetation is challenging in the South West REZ, a key focus was the avoidance and minimisation of impacts woody vegetation and maintaining connectivity, also noting the site selected is very flat and largely homogenous therefore presents a good opportunity to maintain native groundcover under the solar arrays. Avoid and minimise processes are further focussed at a project level driven by avoiding the highest biodiversity values present within the study area.

The final location of the project was chosen based on (EMM 2022):

- The subject land is within the South-West REZ, an area nominated for significant investment in renewable energy generation, storage and transmission projects.

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- The subject land is adjacent to Project EnergyConnect and the proposed Dinawan Substation and minimises the impacts and cost of transmission infrastructure required to export the electricity generated by the project directly into the grid via Project EnergyConnect.
- The subject land is relatively flat and has a very good solar resource that complements the available wind resource proposed to be utilised as part of the Dinawan Wind Farm.
- The land surrounding the subject land is sparsely populated with only four non-associated residences within 5 kilometres.
- The existing agricultural land use (native pasture grazing) within and surrounding the subject land is compatible with large-scale solar energy generation and storage.
- The subject land connects directly to Kidman Way, an approved B-Double route, with access to the Sturt and Newell Highways.

5.2 Constraints and opportunities preliminary assessment

Biosis was commissioned by Spark Renewables in late 2021 to undertake a preliminary biodiversity opportunities and constraints assessment at multiple contiguous properties totalling 54,000 hectares, as part of an overall due diligence for both potential solar and wind farm developments. Initially, the constraints and opportunities assessment was undertaken with desktop data only, followed by rapid field investigation to verify findings. The scope of this assessment was to identify high level constraints and describe biodiversity values within the subject land and neighbouring properties and allowed for recommendations to be provided in terms of avoidance, mitigation and/or further detailed assessment of biodiversity, guiding concept, preliminary and final designs. The constraints identified across the 54,000 hectare investigation area are shown in Table 37 and Figure 12. *Note, some constraints have been revised back from those indicated below and in Figure 12 following multiple field surveys, such as No-go to high constraint, and mostly around absence of Intact TEC or mapped wetlands*.

Table 37 Framework and hierarchy of constraints applied in project planning

Constraint category	Definition	Constraint value
No Go areas (Constraint score – 4)	These are areas that should be avoided and if not, may seriously affect regulatory approval of the project (i.e. regulators may require significant redesign to reduce impacts).	• 200 m No-Go zone setback required around National Parks estate (Oolambeyan National Park). • 100 m buffer of mapped Plains Wanderer Important Habitat Areas. • High condition TECs and wetlands.

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Constraint category	Definition	Constraint value
High Constraint (Constraint score – 3)	These are areas that should be avoided if possible and will require justification in a BDAR if they cannot be avoided. Includes areas that are likely to generate high biodiversity credit per hectare requirements that will require offsetting.	• 300 m within treed watercourses (most likely location of raptor and parrot breeding sites). • 100 – 300 m buffer of mapped Plains Wanderer Important Habitat Areas. • Any EPBC and BC Act listed TECs in moderate condition. • Additional >300 m – 500 m buffer from treed watercourses to reduce impacts to raptor breeding sites. • All other PCTs within 300m of a watercourse. • Potential EPBC Act listed grassland TECs that require ground-truthing to confirm presence and constraint level (Figure 12)
Moderate Constraint (Constraint score – 2)	Suitable for development. These areas do not necessarily need to be avoided but will generate a moderate biodiversity credit per hectare that require offsetting.	• All native vegetation not subject to the above constraints. • Non-native vegetation or areas likely to meet the definition of Category 1 land however where prescribed impacts may be possible.
Low Constraint (Constraint score – 1)	Best suited for development. These areas are unlikely to generate biodiversity credits (exotic/cultivated/irrigated areas) or may have low biodiversity credit requirements per hectare.	• Non-native vegetation or areas likely to meet the definition of Category 1 land and where prescribed impacts are considered negligible.

5.3 Alternative footprints

The development footprint (i.e. the area within which direct impacts will occur) has been refined through consideration of the findings of a preliminary ecological study and identification of constraints and opportunities mapped through the environmental impact assessment process (including this BDAR). The intent of this process was to avoid impacts to the highest ecological values identified as much as possible, whilst taking into account the high proportion of native vegetation within the subject land. Since the public exhibition of the Dinawan Solar Farm EIS (EMM 2023), the development footprint has been reduced by approximately 28% to 1,792 hectares (summarised in Table 38 below). This includes the removal of large portions of the development footprint west of Kidman Way, as well as smaller areas adjacent to Kidman Way and Liddles Lane, that contain BC Act and EPBC Act TECs. Although impacts to native vegetation, habitat and TECs will occur, complete avoidance of impacts wasn't possible due to the large amount of native vegetation within the subject land and broader investigation area, with instead a focus on avoidance of the highest value areas (Figure 14).

Measures to avoid and minimise impacts on highest value areas of native vegetation were considered during the planning stage of the project and designs were 'workshopped' through an iterative mapping process between Spark Renewables, EMM and the Biosis BAM Assessors and project ecologists. Other disciplines such as flooding and archaeology were also considered during multiple revisions of the development footprint to

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ensure highest biodiversity values, as well archaeological values and areas likely to be inundated during significant flood events were accounted for.

Overall, this process of refinement has resulted in impacts to areas of highest biodiversity value being avoided and/or minimised, including;

- Avoidance of impacts throughout the broader study area, and an overall reduction in loss of higher quality habitats from multiple design revisions.
- Avoidance of impacts to the vast majority of PCT 26 (Intact) with the highest VI score, and representing an EPBC Act listed TEC. Relocation of infrastructure away from areas of intact Weeping Myall with the highest biodiversity value resulted in impacts to PCT 26 (Sparse) increasing as a result of reducing impacts to the higher quality PCT 26 (Intact) zone, however this PCT 26 Sparse zone is more impacted by existing land uses and generally supports comparatively lower biodiversity values.
- Avoidance of impacts to the majority of areas of PCT 45 and PCT 46, both in high condition, considered more natural grasslands on grey cracking clay and loam soils, and more suitable to support potential Plains Wanderer habitat.
- Avoidance of direct impacts to important mapped areas for the Plains Wanderer.
- Avoidance of impacts to the vast majority of woodland and riparian PCT 13 and PCT 15 where higher fauna activity was observed, with impacts only to small isolated patches of low condition woody vegetation.
- Avoidance of approximately 97.4% of hollow bearing trees, with 38 out of 39 hollow bearing trees retained within larger patches of PCT 13 and PCT 15, including those with active hollows and large nests.
- Avoidance and minimisation of impacts to large patches of *Swainsona murrayana* and *Swainsona sericea.*
- Avoidance and minimisation of impacts to wetland vegetation communities and drainage lines with only lower order watercourses and Coleambally irrigation channel within the development footprint.

Table 38 Summary of key project refinements

Veg Zone	Study area (ha)	Development footprint V2 (ha)	Development footprint V4 (ha)	Development footprint V7 (ha)	EIS exhibited footprint (ha)	RTS amended footprint (ha)	Total change from V2 (ha)
Non Native	28.8	4.8	8.0	15.2	10.6	7.69	+2.89
13_Moderate	8.3	3.1	0	0.2	0.2	0.12	-2.98
15_Mod_Good	1.4	1.0	01.0	0.2	0.2	0.16	-0.83
15_Moderate	1.04	0.9	0.9	0.9	0.8	0	-0.9
16_Good	15.1	0	0	0	0	0	-
17_Mod_Good	49.9	22.1	28.4	2.9	3.0	1.06	-21.04
17_Moderate	60.9	17.7	17.7	6.2	6.2	0.08	-17.62
26_DNG	1207.4	921.3	907.3	904.7	884.3	860.04	-61.26
26_Intact	777.4	67.3	17.5	20.2	20.2	0.42	-66.88
26_Sparse	1756.9	1433.5	1588.1	1561.5	1550.8	919.19	-514.31

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Veg Zone	Study area (ha)	Development footprint V2 (ha)	Development footprint V4 (ha)	Development footprint V7 (ha)	EIS exhibited footprint (ha)	RTS amended footprint (ha)	Total change from V2 (ha)
45_Mod_Good	339.9	6.4	2.5	6.3	5.2	0.05	-6.35
46_Moderate	207.9	28.4	11.5	6.6	6.2	1.68	-26.72

5.3.1 Retention of hollow bearing trees

Many patches of woody vegetation dominated by Black Box within the subject land contain a significant number of hollows, many of which are classified within the small size category, however, do contain medium to large hollows on occasion. Recording of hollow bearing tree data was focused on the medium or greater size classes that many of the threatened fauna in the region would occupy. The project may result in the loss of one hollow-bearing tree, out of the 39 recorded within the subject land that contain small, medium and large, or a combination of all three. This represents a 97.4% retention of woody vegetation with medium or greater sized hollows. These hollows provide denning, sheltering and breeding for a raft of hollow dependent native fauna, however observations during multiple seasonal surveys noted use of the hollows by more common fauna such as Galahs. A summary of the hollow bearing trees is found in Table 39.

Table 39 Summary of hollow bearing trees

Tree number	Species	Diameter at breast height (Dbh) class	Small	Medium	Large	Proposed impact
10908	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10909	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10910	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	No	Yes	No	Retained
10911	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	No	Yes	No	Retained
10912	*Eucalyptus largiflorens* – Black Box	Very Large Tree > 100cm	No	Yes	Yes	Removed or impacted
10913	*Eucalyptus largiflorens* – Black Box	Very Large Tree > 100cm	No	Yes	Yes	Retained
10914	*Eucalyptus largiflorens* – Black Box	Very Large Tree > 100cm	No	Yes	No	Retained
10915	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10916	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	Yes	Retained
10917	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10918	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	No	Yes	No	Retained

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Tree number	Species	Diameter at breast height (Dbh) class	Small	Medium	Large	Proposed impact
10919	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10920	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10921	*Eucalyptus largiflorens* – Black Box	Very Large Tree > 100cm	No	Yes	No	Retained
10922	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10923	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10924	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10925	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	No	Yes	No	Retained
10926	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	No	Yes	Retained
10927	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	No	Yes	No	Retained
10928	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	No	Yes	Retained
10929	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10930	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10931	*Eucalyptus largiflorens* – Black Box	Very Large Tree > 100cm	No	Yes	No	Retained
10932	*Eucalyptus camaldulensis* – River Red Gum	Large Tree 50-100cm	No	Yes	No	Retained
10933	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	Yes	Yes	No	Retained
10934	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	Yes	Yes	No	Retained
10935	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	Yes	Yes	No	Retained
10936	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	Yes	Yes	No	Retained
10937	*Eucalyptus camaldulensis* – River Red Gum	Large Tree 50-100cm	No	Yes	Yes	Retained
10938	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	No	Yes	No	Retained
10939	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	Yes	Yes	No	Retained

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Tree number	Species	Diameter at breast height (Dbh) class	Small	Medium	Large	Proposed impact
10940	*Eucalyptus camaldulensis* – River Red Gum	Large Tree 50-100cm	No	Yes	Yes	Retained
10941	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	Yes	Yes	No	Retained
13836	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	Yes	Yes	No	Retained
13837	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	Yes	Yes	No	Retained
13838	*Eucalyptus largiflorens* – Black Box	Large Tree 50-100cm	Yes	Yes	No	Retained
13840	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	Yes	Yes	No	Retained
13841	*Eucalyptus largiflorens* – Black Box	Medium Tree 20-50cm	Yes	Yes	No	Retained

5.4 Avoidance of EPBC Act listed species and communities

Avoidance and minimisation of impacts to biodiversity values and in particular, EPBC Act listed species and communities, have been undertaken throughout the development and design of the project from initial desktop-based constraints information, followed by design workshops and updates based on a number of rounds of collection of ground-validated data. As mentioned above, this includes a priority focus on avoidance and reducing impacts for intact Weeping Myall communities, Natural Grassland communities, Plains Wanderer habitat, known *Swainsona murrayana* records, as well as more optimal habitats for *Litoria raniformis* and Superb parrot. Where indirect or residual impacts still occur, stringent mitigation measures will be implemented (refer Section 7 and Section 10.1).

Section 10.1 provides detailed information on assessment and impacts to EPBC Act listed species and communities following all efforts to minimise impacts to biodiversity values.

5.5 Summary

As previously indicated, the principal means to reduce impacts on biodiversity values within a development site is to avoid and/or minimise the removal of native vegetation and fauna habitat. Additional recommendations include measures to mitigate residual impacts after all measures to avoid and minimise impacts have been considered in Table 40.

Figure 13 shows the final development footprint, while Figure 14 shows the extent of refinements undertaken to avoid or minimise impacts on biodiversity values. The final development footprint (including construction and operation) as well as demonstrating indirect and prescribed impact zones where applicable is shown in Figure 15 and Figure 16.

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Table 40 Summary of avoidance and minimisation of impact

Avoidance and minimisation components	Action	Outcome	Timing	Responsibility
Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology.	Investigate modes or technologies that would avoid or minimise impacts on biodiversity values. Solar tracking systems. Not require site leveling or heavy disturbance to groundcover. Adaptive and groundcover management plans detail ongoing monitoring requirements and adaptive management	Reduction in impacts beneath, but more so between, solar arrays to incentivise and to retain a level of biodiversity value as per partial loss calculations in Section 6.4 Avoidance of site leveling. Temporary impacts of compaction as opposed to full clearing and levelling of groundcover that will regenerate within adaptive and groundcover management plans	Project design Construction Operational monitoring	Spark Renewables Contractors
Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route.	Utilising existing access as far as possible. Good access to existing local and regional roads.	Minimise clearing impacts Avoidance of higher biodiversity values.	Project design	Spark Renewables
Alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	Site selection Location next to proposed Dinawan Substation and ProjectEnergyConnect.	Minimise clearing impacts Avoidance of higher biodiversity values.	Project design	Spark Renewables
Alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site.	Constraints and opportunities assessment Utilising project design to avoid areas of highest biodiversity value.	Avoidance of higher biodiversity values. Avoidance of key habitat for Plains Wanderer Minimising impacts to hollow bearing trees	Project design	Spark Renewables
Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design.	Constraints and opportunities assessment Utilising project design to avoid areas of highest biodiversity value. Adaptive and groundcover management plans detail ongoing monitoring requirements and adaptive management	Avoidance of higher biodiversity values, including EPBC listed TECs Avoidance of key habitat for Plains Wanderer Minimising impacts to hollow bearing trees Minmising impacts to known threatened species and their optimal microhabitats Allowing for movement corridors and fly paths, minimising connectivity constraints.	Project design Construction Operational monitoring	Spark Renewables Contractors

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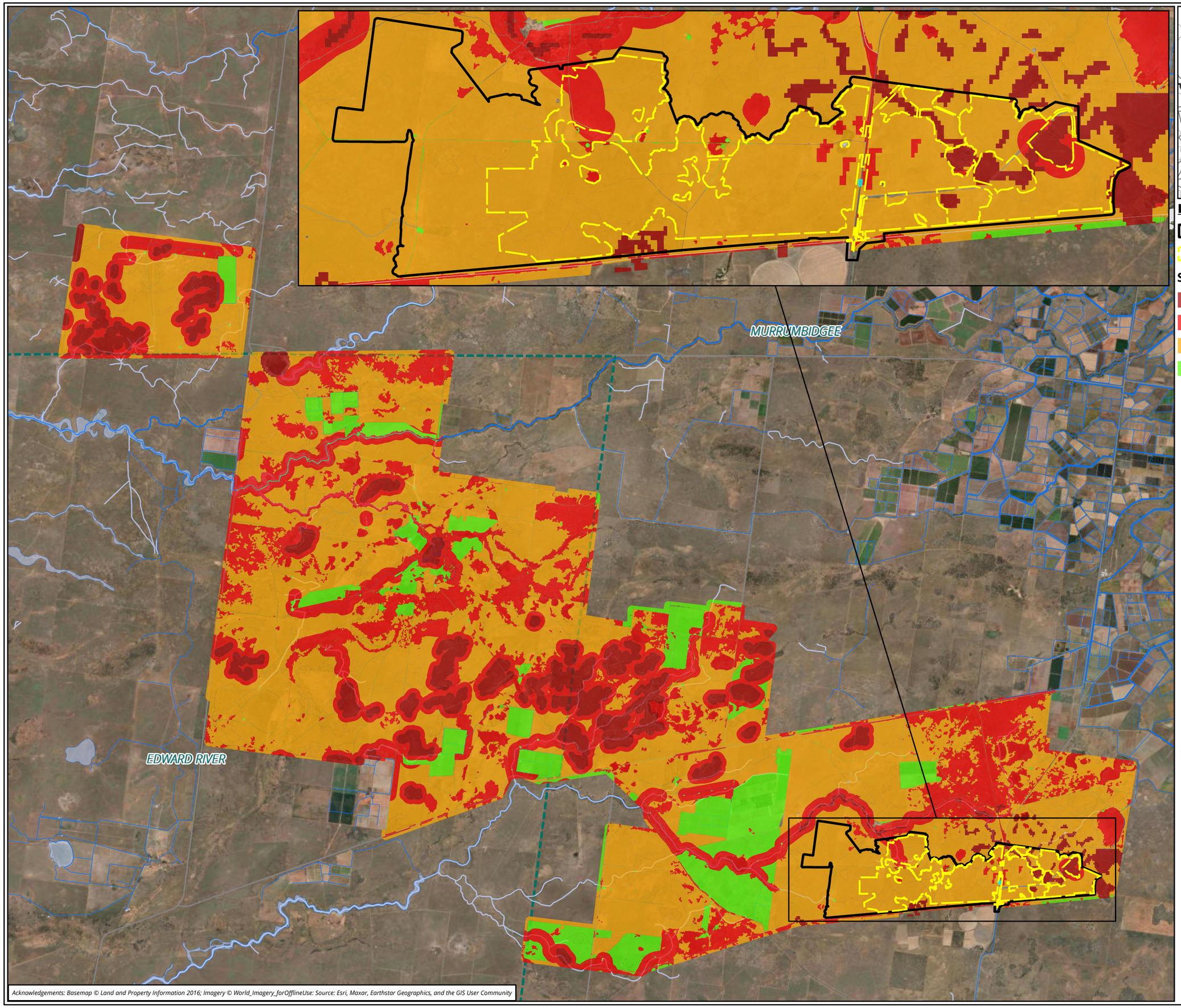
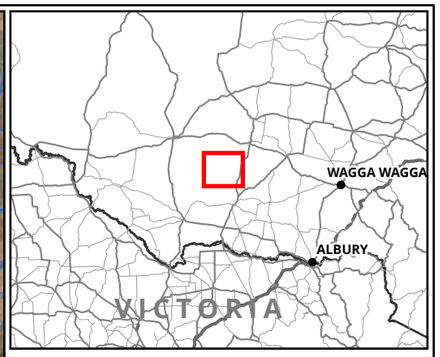
Avoidance and minimisation components	Action	Outcome	Timing	Responsibility
Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal.	Conduct surveys to identify site constraints and opportunities to avoid and minimise. Adaptive and groundcover management plans detail ongoing monitoring requirements and adaptive management	Avoidance and minimising impacts to large *Swainsona murrayana* and *Swainsona sericea* patches Avoidance and minimising impacts to large optimal areas of *Litoria raniformis* habitat patches	Project design Construction Operational monitoring	Spark Renewables Contractors





Legend

- Subject land
- Development footprint

Solar constraints

- No-go
- High constraint
- Moderate constraint
- Low constraint

Figure 12 Preliminary constraints to inform design

0 1 2 3 4 5

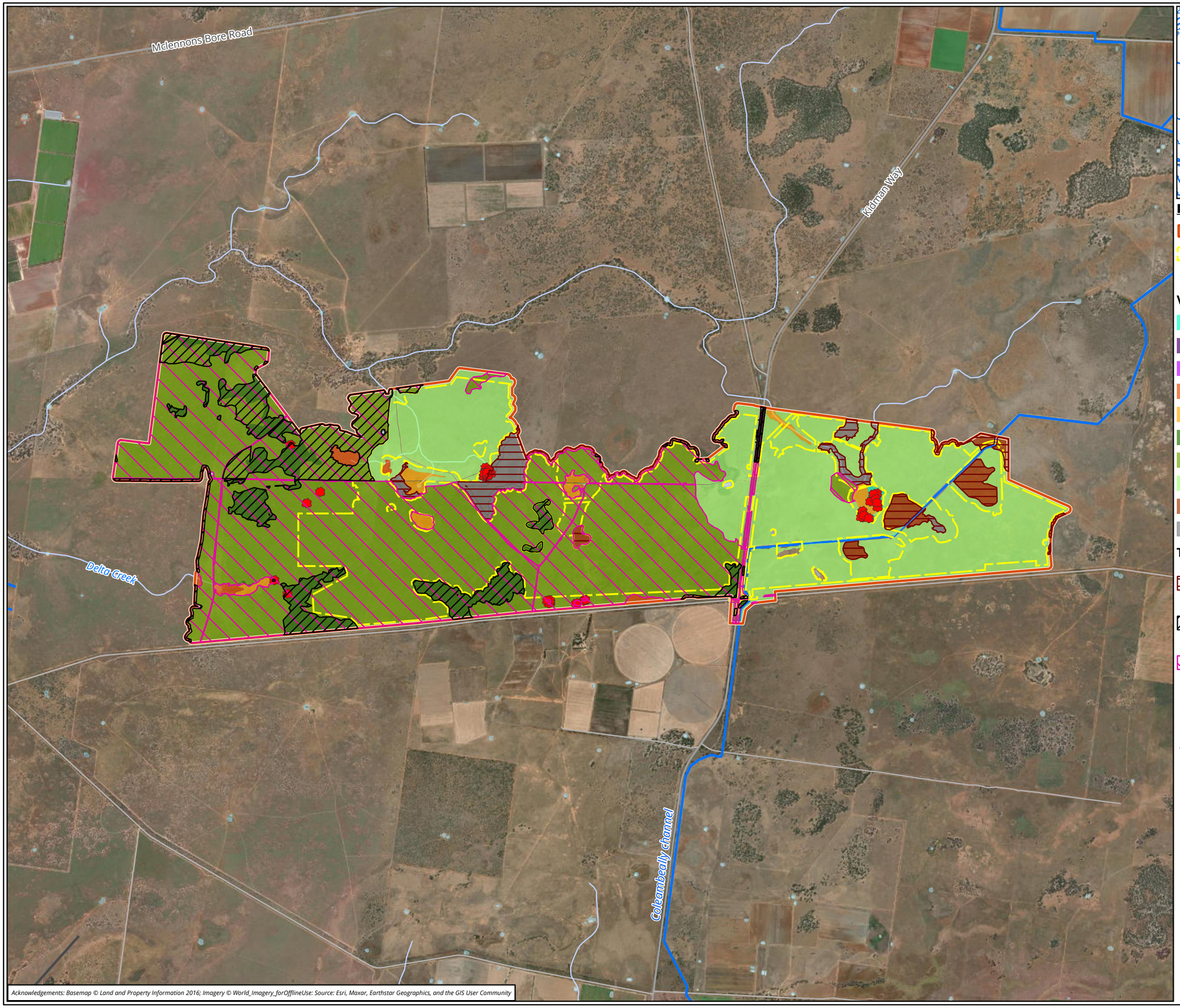
Kilometers
Scale: 1:160,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

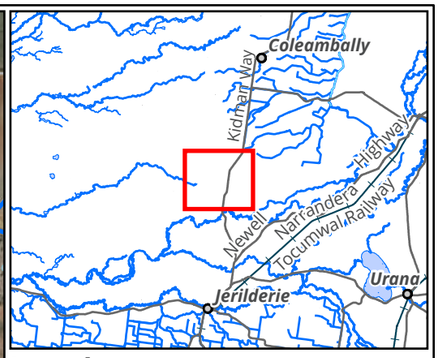
N

biosis

Matter: 37263, Date: 13 August 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-14.aprx
Layout: 37263_F12_Constraints

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community





Legend

- Subject land
- Development footprint
- Hollow-bearing tree

Vegetation zone

- VZ1 - 13_Moderate
- VZ2 - 15_Moderate
- VZ3 - 15_Moderate_Good
- VZ4 - 17_Moderate
- VZ5 - 17_Moderate_Good
- VZ6 - 26_Intact
- VZ7 - 26_Sparse_Canopy
- VZ8 - 26_DNG
- VZ10 - 46_Moderate
- <all other values>

Threatened ecological communities

- Natural Grasslands (EEC, EPBC Act)
- Weeping Myall Woodland (EEC, EPBC Act)
- Weeping Myall Woodland (EEC, BC Act)

Figure 13 Final development footprint

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 03 September 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
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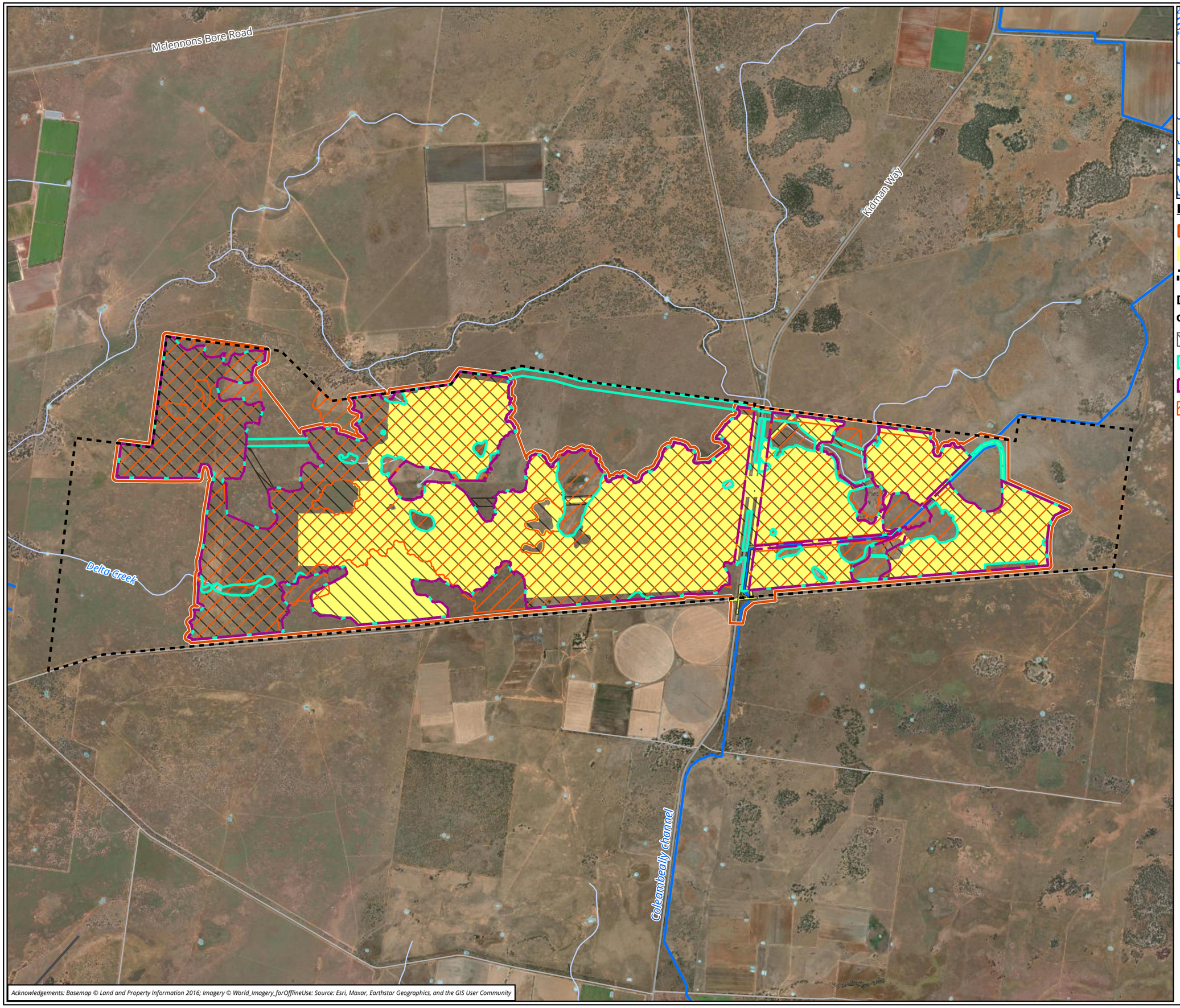

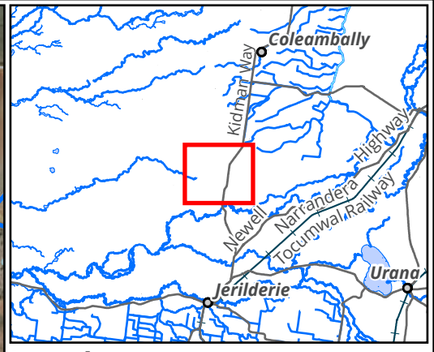

Legend

- Subject land
- Development footprint
- Study area

Development footprint alternate options

- Version 15
- Version 7
- Version 4
- Version 2

Figure 14 Alternate options

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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GIS: LH, Checked by: MP, Last edited by: lharley
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6 Impacts that are unable to be avoided

Assessment of direct and indirect impacts unable to be avoided has been undertaken in accordance with the BAM (DPIE 2020a). The following direct and indirect impacts are unable to be avoided in progressing the project.

6.1 Direct impacts

Direct impacts include vegetation clearing calculated from within the development footprint including solar arrays, electrical cabling, access roads, public road upgrades, APZs, and other infrastructure such as substations, BESS, and construction compounds.

Total direct impacts to native vegetation in moderate to good condition are up to 1,782.82 hectares (99% of which is PCT 26, and majority is in DNG (48%) or Sparse condition (51%) [i.e supporting comparatively lower value biodiversity]) of which 919.62 hectares conforms with the NSW BC Act listed Weeping Myall TEC. Although impacts to Weeping Myall TEC is a high number, this community is by far the most dominant PCT in the broader locality and region (refer Figure 8). The project's direct impact to this TEC under the BC Act are unlikely to be significant or detrimental to the persistence of the TEC locally or regionally with highest value intact areas avoided as far as practicable (for areas consistent with the EPBC Act listing, see Section 10.1). An estimated total of 44,064 hectares of Weeping Myall Woodland that is known or has a high to moderate confidence level, is mapped within 50 kilometres of the subject land, with a further 232,990 hectares that may be commensurate with the sparse or derived Weeping Myall zones (represented in the SVTM mapping as grassland PCTs in some instances), however at a lower confidence level. In total, the amount of Weeping Myall woodland or derived forms is estimated at 277,054 hectares within 50 kilometres of the subject land. Observations within the broader locality and ground-truthed within the Dinawan Solar Farm and Dinawan Wind Farm study areas via field surveys has determined the mapping for this PCT is largely accurate, however does contain some inaccuracies with vegetation boundaries and some patches with White Cypress Pine communities (PCT28) recorded, but mapped in the SVTM as PCT 26. As such, impacts associated with the development footprint are approximately 2.1% of the estimated area of Weeping Myall woodland where confidence is considered high within 50 kilometres of the subject land, and 0.3% of all potential Weeping Myall forms and condition zones within 50 kilometres of the subject land. It is noted that this does not consider cumulative impacts of other projects in the broader region. A summary of the estimated impacts is as follows;

- Intact Weeping Myall zone and TEC impacts of approximately 0.05% (0.42/44,064 ha) within 50 km of the subject land (higher confidence).
- Intact and sparse Weeping Myall zones and TEC impacts of approximately 2.1% (919.62/44,064 ha) within 50km of the subject land (higher confidence).
- Intact and sparse Weeping Myall zones and TEC of approximately 0.3% (919.62/277,054 ha) within 50km of the subject land (lower confidence).

To mitigate impacts to native vegetation as a result of temporary impacts, site rehabilitation and ecological restoration works will be completed in areas such as temporary construction laydown areas and trenching for underground cabling. A Biodiversity Management Plan (BMP), including adaptive and groundcover management sub plans, will also look at opportunities for revegetation and restoration plans to buffer areas of important habitat, such as the adjacent retained areas and to provide for biodiversity corridors through the subject land and ensure improve and maintain principles are delivered to these areas.

A breakdown of direct impacts arising from the project include:

- Impacts to up to 0.12 ha of PCT 13 Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- Impacts to up to 0.16 ha of PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- Impacts to up to 1.14 ha of PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- Impacts to up to 1,779.65 ha of PCT 26 Weeping Myall open woodland and DNG of the Riverina Bioregion and NSW South Western Slopes Bioregion, comprising the following:
  - 860.04 ha to PCT 26 DNG (48.33%).
  - 919.19 ha to PCT 26 sparse (51.65%).
  - 0.42 ha to PCT 26 intact (0.02%).
- Impacts to up to 0.05 ha of PCT 45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion.
- Impacts to up to 1.68 ha of PCT 46 Curly Windmill Grass – speargrass – wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion.
- Impacts to up to:
  - 919.62 ha of Weeping Myall TEC listed under the BC Act (i.e. areas mapped as PCT 26 Sparse and Intact) and 0.48 ha of Weeping Myall woodland listed under the EPBC Act.
  - 1.73 ha of grasslands considered to align with the Natural Grasslands of the Murray Valley TEC listed under the EPBC Act (ie areas mapped as PCT 45 and PCT 46).
- Impacts to 5.5 ha containing individuals of *Swainsona murrayana* and *Swainsona sericea*.
- Impacts to 122.16 ha of habitat considered dispersal habitat for *Litoria raniformis*.

For all intents and purposes, these impacts are considered to be representative of the worst case. They consider 100%, and permanent, loss of vegetation and will occur from the outset of the development; however, the majority of direct impacts are expected to be during the construction stage only.

Native ground cover disturbance under the solar arrays is expected to be temporary in nature and native ground cover will be able to regenerate and persist throughout operations. This is discussed further in Section 6.4. Mitigation measures outlined in Section 7 will help to minimise the potential impacts to biodiversity values that remain present within the subject land.

A summary of PCTs/zones directly impacted is provided in Table 41.

Table 41 Summary of direct impacts to vegetation

Zone	PCT	TEC	Area within subject land (ha)	Area impacted (ha)	VI Score
Zone 1	13_Moderate	-	8.14	0.12	70.8
Zone 2	15_Mod_Good	-	1.43	0.16	70.0
Zone 3	15_Moderate	-	1.04	-	58.2
Zone 4	17_Mod_Good	-	42.79	1.06	77.3
Zone 5	17_Moderate	-	21.30	0.08	41.0
Zone 6	26_DNG*	-	1,110.59	860.04	25.1
Zone 7	26_Intact	Yes – Weeping Myall (BC Act, EPBC Act [partial])	248.51	0.42	48.4
Zone 8	26_Sparse*	Yes – Weeping Myall (BC Act, EPBC Act [partial])	1,775.03	919.19	32.5
Zone 9	45_Mod_Good	Yes – Natural Grasslands of the Murray Valley (EPBC Act)	86.55	0.05	91.1
Zone 10	46_Moderate	Yes – Natural Grasslands of the Murray Valley (EPBC Act)	67.55	1.68	88.6

*** PCT 26 DNG and Sparse vegetation zones are considered subject to partial loss of biodiversity values beneath the solar array project component. Further assessment and information is provided in Section 6.4 below.**

Table 42 Summary of direct impacts species credit habitat or individuals

Species	Sensitivity	Area (ha) or count
Swainsona murrayana	2	5.5 ha
Swainsona sericea	2	5.5 ha
Southern Bell Frog	2	122.16 ha

6.1.1 Loss of hollow bearing trees

As outlined in Section 5.3.1 above, many patches of woody vegetation dominated by Black Box within the subject land contain a significant number of hollows. The project will result in the loss or impacts to one hollow-bearing tree, out of the 39 recorded within the subject land that contain small, medium and large hollows, or a combination of all three. This represents a 97.4% retention of woody vegetation with medium or greater sized hollows. A summary of the hollow bearing trees to be removed is provided in Table 43.

Table 43 Summary of hollow bearing trees

Tree number	Species	Diameter at breast height (Dbh) class	Small	Medium	Large	Impact
10912	*Eucalyptus largiflorens* – Black Box	Very Large Tree > 100cm	No	Yes	Yes	Removed or impacted

6.2 Indirect impacts

This section details potential indirect impacts associated with the construction and operation of the project following the implementation of proposed avoidance and minimisation measures. Indirect impacts are considered to potentially occur in areas outside the development footprint, but within the subject land (Figure 15). In accordance with the BAM, a proponent can retire credits to offset indirect impacts that cannot be avoided or adequately minimised. All indirect impacts can be adequately mitigated within a BMP via active management and improve and maintain principles.

Potential indirect impacts arising from the project are outlined and addressed in Table 44.

Table 44 Assessment of indirect impacts

Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood, consequences and justification
Inadvertent impacts on adjacent habitat or vegetation	All PCT/zones All ecosystem credit species Weeping Myall TEC (BC Act and EPBC Act listings) Natural grasslands TEC (EPBC Act listing) *Swainsona murrayana* *Swainsona sericea* Plains Wanderer important mapped areas and associated buffers. Southern Bell Frog	705 ha of adjacent vegetation subject to monitoring, and adaptive management. 11.1 ha of important mapped area for Plains Wanderer in subject land.	One-off	Long-term	Construction, operation and rehabilitation	Low. Impacts to adjacent vegetation during construction and operational phase can be prevented or minimised through appropriate exclusion fencing, implementation of a Biodiversity management plan (BMP) and Construction Environmental Management Plan (CEMP) or similar, detailing best practice environmental protection measures, strict water quality practices and stormwater controls, and by ensuring any lighting is directed towards the developed area, rather than towards adjacent retained habitat. Connectivity remains throughout areas of retained vegetation minimising impacts to threatened species, including important mapped areas for the Plains Wanderer. Retained areas within Stage 1, east of Kidman Way, are subject to investigation, feasibility and inclusion as a stewardship site.
Reduced viability of adjacent habitat due to edge effects	All PCT/zones All ecosystem credit species Weeping Myall TEC (BC Act and EPBC Act listings) Natural grasslands TEC (EPBC Act listing) *Swainsona murrayana* *Swainsona sericea* Plains Wanderer important mapped areas and associated buffers. Southern Bell Frog	705 ha of adjacent vegetation subject to monitoring, and adaptive management. 11.1 ha of important mapped area for Plains Wanderer in subject land.	Unknown	Short-term	Construction and operation	Low. Adjacent habitats are currently subject to disturbance via clearing and existing agricultural land use. Improve and maintain principles will apply within the BMP to ensure retained areas of adjacent habitat do not decline or are subjected to adverse impacts.

Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood, consequences and justification
Reduced viability of adjacent habitat due to noise, dust or light spill	All PCT/zones All ecosystem credit species Weeping Myall TEC (BC Act and EPBC Act listings) Natural grasslands TEC (EPBC Act listing) Plains Wanderer important mapped areas and associated buffers.	705 ha of adjacent vegetation subject to monitoring, and adaptive management. 11.1 ha of important mapped area for Plains Wanderer in subject land.	Temporary	Short-term	Construction and operation	Low. It is predicted that the adjacent habitat may be impacted in a small way by noise, dust, compaction and light spill, during construction and operation. However, this will be managed via best practices outlined in a BMP and CEMP or similar. Improve and maintain principles will apply within the BMP to ensure retained areas of adjacent habitat do not decline or are subjected to adverse impacts. The importance of calling behaviour in Plains-wanderers is poorly understood. Females call to attract males typically during spring or during conditions which favour breeding, such as following significant rainfall. The calls of Plains-wanderers are somewhat unique in that their extremely low frequency range results in a wavelength of 100 times the width of the bird's head. This would make it impossible for the bird to detect the source of the call, except that Plains-wanderers have a large aural canal which extends through the centre of their head. The location of a call can therefore be determined by the arrival of sound at a different time at each eardrum. A byproduct of this unique anatomy is that Plains-wanderers have a narrow range of hearing and are especially tolerant of loud noise. University researchers have found that Plains-wanderers in captivity remain calm so long as they are visually isolated from passers-by. Birds have been observed to remain calm and continue to feed in a noisy university animal house despite clanging of pans, vocalisations of sheep and bats, and constant vehicle traffic (Trust for nature, 2017).
Transport of weeds and pathogens from within the development footprint to adjacent vegetation	All PCT/zones All ecosystem credit species Weeping Myall TEC (BC Act and EPBC Act listings) Natural grasslands TEC (EPBC Act listing) *Swainsona murrayana*	705 ha of adjacent vegetation subject to monitoring, and adaptive management. 11.1 ha of important mapped area	Unknown	Possibly long-term	Construction and operation	Low. Weeds occurring within the development footprint are consistent with those occurring within adjacent vegetation to be retained. Increased transport of pathogens and weeds is unlikely to occur but will be managed by biosecurity measures outlined in the CEMP or similar.

Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood, consequences and justification
	Swainsona sericea Plains Wanderer important mapped areas Southern Bell Frog	for Plains Wanderer in subject land.				
Increased risk of starvation, exposure and loss of shade or shelter	Plains Wanderer important mapped areas and associated buffers. Southern Bell Frog All ecosystem credit species	705 ha of adjacent vegetation subject to monitoring, and adaptive management. 11.1 ha of important mapped area for Plains Wanderer in subject land. Loss of one hollow bearing tree.	Unknown	Possibly long-term	Construction and operation	Low. Improve and maintain principles will apply within the BMP to ensure retained areas of adjacent habitat do not decline or are subjected to adverse impacts. While the removal of sheltering vegetation within the development footprint is a small proportion of the commensurate habitat available within the subject land and broader study area, the removal of potential roost/sheltering sites is a more adverse impact, but not one that is likely to result in mortality of individuals, however, may result in an increase of competition for remaining habitat features. Connectivity remains throughout areas of retained vegetation minimising impacts to threatened species, including important mapped areas for the Plains Wanderer. Retained areas within Stage 1, east of Kidman Way, are subject to investigation, feasibility and inclusion as a stewardship site.
Loss of breeding habitats	Hollow dependent fauna Southern Bell Frog Ecosystem credit species	705 ha of adjacent vegetation subject to monitoring, and adaptive management. One hollow bearing tree. Dispersal habitat for Southern Bell frog	One-off	Long-term	Construction	Low. One hollow-bearing tree will be removed by the project. Indirect impacts associated with the loss of breeding habitats are not considered likely to be substantial or significant to any locally occurring threatened, or non-threatened, species based on numbers of retained patches and hollow bearing trees. Connectivity remains throughout areas of retained vegetation minimising impacts to threatened species. Dispersal habitat for Southern Bell Frog will be impacted however mitigated and includes adaptive management procedures. Habitat considered more optimal for breeding (Coleambally channel and PCT 13, 15 and PCT 17) are largely avoided and remains available for use.

Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood, consequences and justification
Trampling of threatened flora species	*Swainsona murrayana* *Swainsona sericea*	Retained areas of adjacent vegetation containing known threatened flora species, subject to monitoring and adaptive management	One-off	Long-term	Construction	Low. Known threatened species recorded within the subject land have been avoided as far as practicable. Species that occur within retained vegetation will be protected and improve and maintain principles will apply within the BMP to ensure retained areas of adjacent habitat and individuals do not decline or are subjected to adverse impacts. Exclusion fencing to be installed to limit grazing and accidental and/or unauthorised access.
Inhibition of nitrogen fixation and increased soil salinity	N/A	N/A	N/A	N/A	N/A	Negligible. Not expected to result from the development. May be associated with ongoing treatment of nearby agricultural land unrelated to the project. Any future excavations or soil disturbance resulting from the future development of the subject land would be largely restricted to areas having undergone significant previous disturbance through cattle grazing and vehicular traffic. As such it is not considered likely that the future development of the subject land would result in substantial changes to the level of nitrogen fixation or soil salinity in the locality.
Fertiliser drift	N/A	N/A	N/A	N/A	N/A	Negligible. The subject land has a long history of grazing over its total extent. Grazing is still active in all areas. Exotic species dominance and presence is common. No fertiliser is proposed to be used.
Rubbish dumping	N/A	N/A	N/A	N/A	N/A	Negligible. Standard environmental controls for the project will ensure potential impacts are minimised. Works will follow an approved CEMP or similar and specific waste and water management requirements.
Wood collection	N/A	N/A	N/A	N/A	N/A	Negligible. Not expected to result from the development. Future development proposed within the subject land is unlikely to increase access to any retained vegetation, beyond current access capacity. Based on the future use of the subject land, future landholders are not expected to be likely to undertake wood collection beyond existing rural approvals within the retained vegetation to a level that it will have a detrimental effect.

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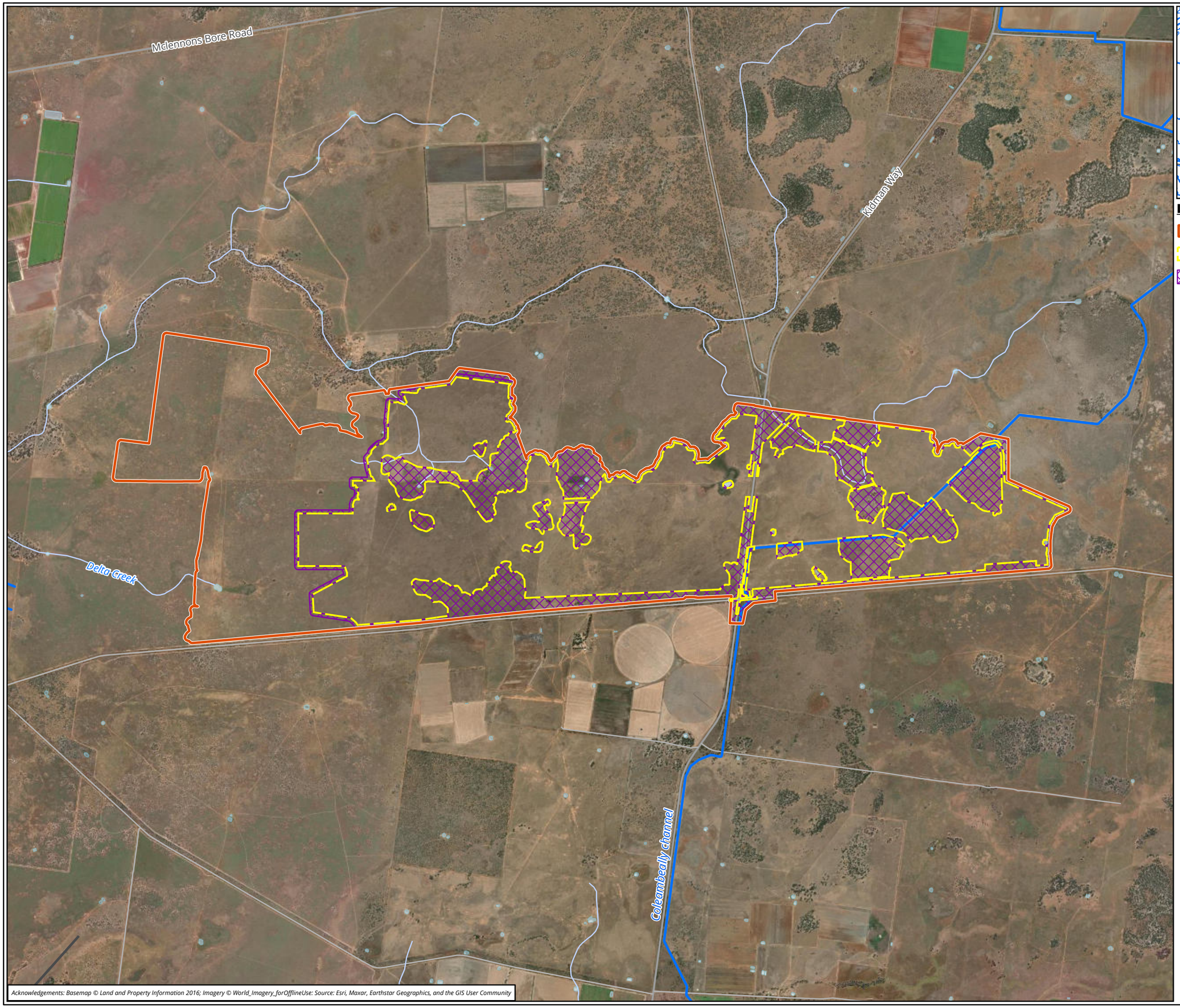
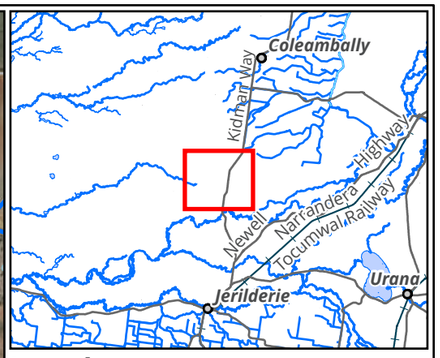
Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood, consequences and justification
						Unauthorised access and collection of wood is expected to be negligible.
Removal and disturbance of rocks, including bush rock	N/A	N/A	N/A	N/A	N/A	Negligible. The subject land does not support bush rock.
Increase in predators and pest animal populations	Plains Wanderer important mapped areas and associated buffers. Southern Bell Frog All ecosystem credit species assumed present	705 ha of adjacent vegetation subject to monitoring, and adaptive management. 11.1 ha of important mapped area for Plains Wanderer in subject land.	One-off	Long-term	Operation	Moderate. Foxes are noted and have been observed regularly during this assessment, however this is a common occurrence in this rural area. The project is not expected to increase numbers with required mitigation, however movement through the subject land may be considered to be exacerbated with construction and improved access roads through the subject land. The BMP will detail pest management regimes in order to control foxes within the subject land during construction and operations.
Changed fire regimes	N/A	N/A	N/A	N/A	N/A	Low. Appropriate asset protection zones and fire mitigation systems will be implemented for the project and the implementation of bushfire management and mitigation measures for the project will help to manage risk of fire within the subject land.
Disturbance to specialist breeding and foraging habitat, e.g. important mapped areas	Plains Wanderer important mapped areas and associated buffers. All ecosystem credit species assumed present	11.1 ha of important mapped area for Plains Wanderer in subject land. 28.1 ha of habitat within 100m buffer of	Unknown	Possibly long-term	Construction and operation	Moderate. Mapped Important Areas for Plains Wanderer occurs within the subject land, and impacts have been avoided. Improve and maintain principles will apply within the BMP to ensure retained important mapped areas and adjacent habitat do not decline or are subjected to adverse impacts. See Section 8.2 and Appendix 5 for further assessment of these impacts in the associated SAII assessment.

Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood, consequences and justification
		important mapped areas.				
Fragmentation of movement corridors	All PCT/zones All ecosystem credit species assumed present Weeping Myall TEC Natural grasslands EPBC TEC *Swainsona murrayana* *Swainsona sericea* Plains Wanderer important mapped areas and associated buffers. Southern Bell Frog	705 ha of adjacent vegetation subject to monitoring, and adaptive management. 11.1 ha of important mapped area for Plains Wanderer in subject land. Loss of one hollow bearing tree.	One-off	Long-term	Construction and operation	Low. The subject land has been subjected to previous historical disturbances and is heavily modified in terms of mature woody vegetation. Patches of movement have been maintained within the development footprint for more mobile fauna. Improve and maintain principles will apply within the BMP to ensure retained adjacent habitat does not decline or is subjected to adverse impacts. Connectivity remains throughout areas of retained vegetation minimising impacts to threatened species. Perimeter fencing may disturb the movement of larger ground dwelling fauna such as Kangaroos and Emus, however, will be designed to incorporate fauna friendly components as far as practicable.





Legend

- Subject land
- Development footprint
- Indirect impacts

Figure 15 Estimated zones of indirect impact

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 08 May 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F15-19.aprx
Layout: 37263_F15_IndirectImpact

6.3 Prescribed impacts

Identification and assessment of prescribed biodiversity impacts are outlined and addressed in Table 45, and the section below, and shown on Figure 16.

Table 45 Identification of prescribed impacts

Prescribed impact	Description of relevant habitat features associated with prescribed impacts	Threatened species likely to utilise habitat features associated with prescribed impact	Importance of habitat feature to impacted species
Karst, caves, crevices, cliffs, rocks and other geological features of significance	The subject land does not contain any karst, caves, crevices, cliffs, rocks and other geological features of significance. This prescribed impact is not discussed further.	N/A	N/A
Occurrences of human-made structures and non-native vegetation	The subject land does not contain any large areas of exotic vegetation or human-made structures such as buildings. The Coleambally irrigation channel occurs in the eastern portion of the development footprint.	Southern Bell Frog	Exotic vegetation - Negligible. Non-native vegetation is not in sufficient quantities, nor contains a particular resource to be considered important to the recorded threatened fauna species. Human-made structures – Low. The Coleambally irrigation channel will be maintained during construction and operation, with minimal impacts anticipated. The preferred approach to cable crossings within Coleambally irrigation channel is underground via trenching. Existing bridges and crossing will be used for vehicle access. Work will be scheduled during times when the Coleambally irrigation channel is typically dry. It is not anticipated that farm dams will be removed, however mitigation measures are provided as part of the biodiversity management and adaptive management plan.
Corridors or other areas of connectivity linking habitat for threatened entities	The subject land is largely cleared and fragmented in regard to woody vegetation and does not form part of a recognised wildlife corridor, however, does contain some important linkages to surrounding habitats.	All ecosystem credit species assumed present Weeping Myall TEC Natural grasslands TEC *Swainsona murrayana* *Swainsona sericea* Plains Wanderer important mapped areas Southern Bell Frog	Low. Habitat connectivity is critical for maintaining healthy populations, as it promotes biological diversity through the exchange of genes. While the project will diminish local connectivity, this is unlikely to prevent genetic exchange of the threatened entities known to be inhabiting the subject land and broader study area by substantially limiting movement

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Prescribed impact	Description of relevant habitat features associated with prescribed impacts	Threatened species likely to utilise habitat features associated with prescribed impact	Importance of habitat feature to impacted species
			through the landscape, pollination or seed dispersal. This is achieved through retained areas of vegetation and habitats with the subject land, and areas outside of the subject land that will be unimpacted. Connectivity remains throughout areas of retained vegetation minimising impacts to threatened species. Groundcover management plans to determine monitoring, mitigation and adaptive management (Section 7).
Protected animals that may use the proposed wind farm development site as a flyway or migration route	This prescribed impact is not relevant to the project.	N/A	N/A
Water bodies or any hydrological processes that sustain threatened entities	The development footprint is between two waterways, Yanco Creek to the south and Cooinbil Creek to the north. To the west of the project is Coleambally Creek and Delta Creek. Coleambally Creek is a minor waterway that is part of the Coleambally irrigation channel. Several ephemeral watercourses associated with Delta Creek are located within the subject land, including five first order watercourses and one second order watercourse.	Southern Bell Frog	Low. No significant alterations to hydrology are anticipated and drainage lines, dams and ephemeral wetlands have largely been avoided. Impacts to adjacent dispersal habitat for the Southern Bell Frog will occur, however impacts to breeding areas or areas of refuge are substantially reduced and mitigated. Overall, the project is expected to minimally impact existing surface water quality and flow patterns through the implementation of numerous mitigation and management measures, most of which will be captured in a CEMP, Operational Environmental Management Plans (OEMP) or similar.
Where the proposed development may result in vehicle strike on threatened	The project will result in increased vehicle traffic during construction and to a far less extent, operations. This increased vehicle traffic has the		Low. Non-threatened, ground dwelling fauna known to inhabit the general area, particularly macropods such as Emu, Eastern Grey

Prescribed impact	Description of relevant habitat features associated with prescribed impacts	Threatened species likely to utilise habitat features associated with prescribed impact	Importance of habitat feature to impacted species
fauna or on animals that are part of a threatened ecological community	potential to impact upon native fauna species that are active during the day, and generally with a higher potential for impact in areas where refuge/forage habitat exists immediately adjacent to areas where vehicle movements will occur. As such, construction traffic moving through the proposed access/electrical cabling corridors is seen as the highest risk.		Kangaroo and Red Kangaroo are notoriously prone to vehicle strike. Vehicle strike of macropods is likely to be an impact already in place, which may be exacerbated during construction. Low flying ground foraging birds such as Red-rump parrots, Blue bonnets and Superb parrots are also prone to increased collision due to increase in traffic during construction. Repeated collision with Superb Parrots may result in impacts to local populations. Access and vehicle movements within 200m of dispersal habitat for the Southern Bell Frog may be susceptible to vehicle impacts on rare occasions. Low or reduced speed limits during construction are proposed, as well as species identification and situational awareness training for construction and operational employees.

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6.3.1 Human-made structures and non-native vegetation

Nature

The subject land does not contain any large areas of exotic vegetation or human-made structures such as buildings. The Coleambally irrigation channel occurs in the eastern portion of the development footprint and is a modified section of Coleambally Creek, and is part of the Coleambally irrigations area to the north of the subject land, travelling through to the west with the delivery of irrigation and environmental water. Existing public roads will be used to access the development footprint (including Kidman Way and Bundure Road), with existing farm tracks utilised as far as practicable for internal access.

Extent

The extent of this impact is considered to be negligible. Non-native vegetation is not in sufficient quantities, nor contains a particular resource to be considered important to the recorded threatened flora and fauna species. The Coleambally irrigation channel will be maintained during construction and operation, with minimal impacts anticipated. Existing bridges and crossings will be used for vehicle access.

Duration

This impact would be one-off and permanent.

Consequences for entities detailed in Table 45

The proposed removal of non-native vegetation constitutes a small reduction in general habitat for local flora and fauna populations, however, this is unlikely to be of consequence to the long-term persistence of any species.

The project will not impact on the function, existing habitat and water availability of the Coleambally irrigation channel, and impacts are considered minor. Dams and irrigation channels are utilised by fauna species, such as waterbirds and Southern Bell Frog, as permanent water resources throughout the year, with some dams created in areas that likely originally supported natural ephemeral billabongs. It is not anticipated that existing farm dams require removal. Should any dams require removal, they will be subject to mitigation measures, including draining several days prior to removal, and should have an appropriately qualified individual present to relocate fauna.

6.3.2 Habitat connectivity

Nature

Loss of native vegetation and habitat has potential to affect landscape connectivity permanently or temporarily during construction and operation.

Extent

The extent of this impact is considered to be minor. Areas of more abundant and mature woody vegetation, as well as lower lying ephemeral grasslands and drainage lines, have been prioritised for avoidance, with retained areas subject to improvement within criteria set out in a BMP.

However the project may cause disruption to large ground dwelling fauna such as Kangaroos and Emus due to perimeter fencing.

Duration

This impact would be one-off and permanent and subject to stringent mitigation measures.

Consequences for entities detailed in Table 45

Habitat connectivity is critical for maintaining healthy populations, as it promotes biological diversity through the exchange of genes. However, the subject land is largely cleared and fragmented in regard to woody vegetation and does not form part of a recognised wildlife corridor, however, does contain some important linkages to surrounding habitats. Mature woody vegetation within the broader locality is generally consigned to Black Box dominated riparian areas and patches of intact Weeping Myall woodland that have been prioritised for avoidance during detailed design.

Superb Parrots have been recorded using vegetation within the subject land, however, most frequently move along wooded corridors, seldom crossing extensive open areas (Webster 1988; Webster & Ahern 1992) such as that which occurs in the subject land. This behaviour is evident during substantial bird surveys undertaken in the subject land and broader locality. This is also the case for species such as the Grey-crowned babbler (and Painted Honeyeater – observed to the north of the subject land), observed generally moving along wooded patches and corridors of Intact Weeping Myall vegetation zones that have been largely avoided by the project, and where connectivity remains to the north and south of the subject land.

Species such as White-fronted Chat were recorded in the subject land, (and Southern Whiteface within the broader locality) in and around PCT 17, within Nitre goosefoot and Lignum shrubs. These areas have also been subject to clear avoidance measures and are retained and remain connected within the subject land and broader habitats.

A Spotted Harrier was observed foraging in the north east of the subject land. No impacts to breeding or nesting site will occur, but the project will result in a reduction or displacement of natural foraging habitat, such as open grasslands, for this species, and other more common raptors. However, managed vegetation surrounding and within solar arrays can actually create beneficial habitats for some raptors like the Spotted Harrier, as the areas between and around panels can provide shelter for prey species. Grazing and low-impact agriculture that will be implemented as part of groundcover management, or native plant restoration as part of the adaptive and groundcover management plan in these areas may enhance the foraging habitat. Raptor species may also use solar arrays and other infrastructure as perching sites to survey the area for prey. Although the area of occupancy is reduced, this could enhance raptor foraging in certain areas within the subject land.

Areas of important mapped habitat for the Plains Wanderer will not be isolated. Gates and perimeter fencing follow the southern and western portions of important mapped habitat buffer. The portion of the development footprint that progresses around the northern and eastern buffer area is for vehicle access only, and links up to, and follows, an existing farm track network that crosses the Coleambally irrigation channel via an existing bridge.

Heavily modified areas previously denuded of woody vegetation contain regeneration of juvenile and immature vegetation and provide some level of connectivity. Retained woody areas within the subject land, and more broadly still, create stepping stones for mobile fauna to actively move through the subject land, as well as promoting movement of genetic floristic material into adjacent areas of habitat such as riparian areas,

retained grassland areas and roadside vegetation. Perimeter fencing may disturb the movement of larger ground dwelling fauna such as Kangaroos and Emus and cause disbursement into the locality more broadly.

Retained vegetation and grasslands, including managed groundcover within solar arrays areas, will still enable effective seed dispersal mechanisms (wind, animals, etc.), ensuring that native flora species can spread their genetic material within the subject land and over a wider area. This includes areas of retained microhabitats (e.g., different soil types, moisture levels), which can select for diverse adaptations in species. Maintaining a gene pool by encouraging different traits to thrive under varying conditions. While the project would diminish local scale connectivity, this is unlikely to prevent genetic exchange of the threatened entities known to be inhabiting the subject land and broader assessment area.

6.3.3 Water bodies, water quality and hydrological processes

Nature

The subject land is largely within a flat uniform landscape on poorly drained red clay soils with minor ephemeral drainage lines or slightly lower lying grey clay depressions which are seasonally and infrequently inundated. Current water quality and hydrological process (how water flows and is distributed across the subject land) contribute to the sustenance and resilience of the vegetation present, and in turn, the flora and fauna species that rely on said vegetation.

Extent

The extent of this impact is considered to be minor. No significant direct impacts are considered to occur to major water ways in the region, change hydrological flow, or contribute to the degradation of waterways within the subject land or broadly.

Duration

This impact would be one-off and permanent and subject to stringent mitigation measures.

Consequences for entities detailed in Table 45

No significant alterations to hydrology are anticipated and drainage lines and ephemeral wetlands have largely been avoided. Overall, the project is expected to minimally impact existing surface water quality and flow patterns through the implementation of numerous mitigation and management measures, most of which would be captured in the CEMP or similar.

6.3.4 Vehicle strikes

Nature

The project has the potential to result in increased vehicle strikes during construction from increased light and heavy vehicle movements.

Extent

Increased heavy vehicle movements will occur, predominantly during construction. However the existing public roads, such as Kidman Way, currently act as a major conduit of heavy vehicle traffic in the region.

Perimeter fencing of the development footprint may create a barrier that prevents, and in some instances, funnels mobile large ground dwelling fauna towards major and rural roads.

Duration

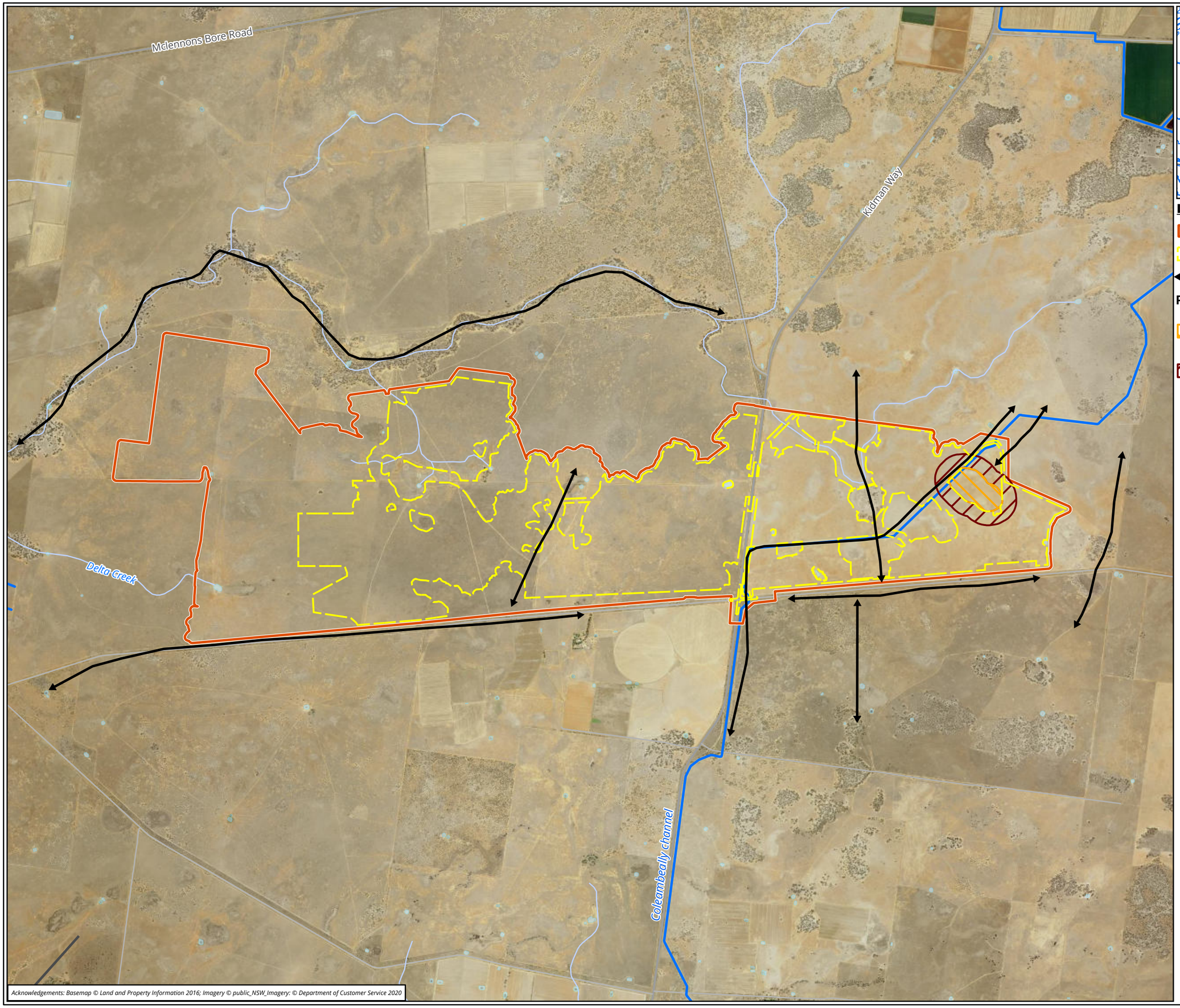
This impact would be ongoing but temporary, limited to predominantly construction stages. Perimeter fencing may cause occasional fauna to venture towards public roads on a rare yet permanent basis.

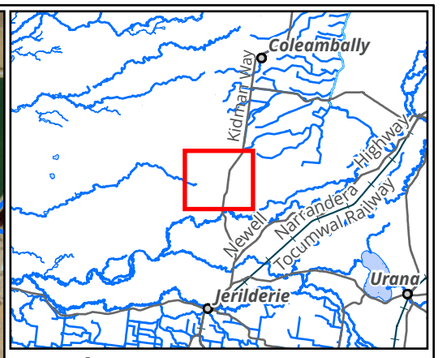
Consequences for entities detailed in Table 45

Non-threatened, ground dwelling fauna known to inhabit the general area, particularly macropods such as Emu, Eastern Grey Kangaroo and Red Kangaroo are notoriously prone to vehicle strike. Vehicle strike of macropods is likely to be an impact already in place due to the existing road network and traffic levels, which may be exacerbated during construction.

Low flying ground foraging birds such as Red-rump parrots, Blue Bonnets and Superb Parrots are also prone to increased collision due to increase in traffic during construction. Repeated vehicle impacts to threatened species such as Superb Parrots could cause an impact to local population, however the likelihood of repeated strikes is considered low.

It can be reasonably expected that the potential for vehicle strikes can be effectively managed through driver awareness training on the potential for fauna to occur, as well as on-site measures such as reduced speed limits and signage and education programs for staff. As such, the project is not expected to result in any substantial or significant impacts associated with vehicle strikes outside of what already exists due to the project's proximity to a major regional road corridor (Kidman Way).





Legend

- Subject land
- Development footprint
- Indicative flight paths

Prescribed impacts

- Plains-wanderer important habitat (100m buffer)
- Plains-wanderer important habitat (100-300m buffer)

Figure 16 Prescribed impacts

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 08 May 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F15-19.aprx
Layout: 37263_F16_PrescImpact

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © public_NSW_Imagery: © Department of Customer Service 2020

6.4 Impacts considered uncertain – Partial loss beneath solar arrays

6.4.1 Background to partial loss

The BAM allows for consideration of indirect impacts via attributing a partial loss score to biodiversity values in areas where impacts do not result in the complete loss of biodiversity, such as via direct clearing. In the context of the project, partial loss considerations relate to areas where direct impacts to native ground stratum vegetation will be avoided during the construction of the solar arrays, and which will continue to support native vegetation (and habitats) throughout the operational and decommissioning phases of the project. By default, the entire area beneath the solar panel arrays is considered a complete loss (i.e. full clearance) and impacts are assessed, and associated offset credits are calculated, accordingly. However this scenario is considered not to represent the reality whereby not all areas within the solar array will be directly (and permanently) impacted during construction, and the retention of substantial portions of the existing ground stratum vegetation is considered highly likely, and highly feasible. While not directly impacted, these retained areas, are considered likely to be subject to indirect impacts associated with the construction and operation of the arrays, and it is more suitable to consider these areas subject to partial loss of biodiversity values, rather than the complete loss, as is the standard assessment approach for the project.

The notion of partial loss acknowledges the potential for indirect impacts resulting from vectors such as shading and micro-climate alterations acting on the retained vegetation and habitats under solar panels, potentially altering the structure and species composition over time. There are examples of operational solar farms in NSW that have been able to retain (and potentially improve) the condition of ground stratum vegetation beneath solar arrays through a combination of active management and a reduction of existing negative pressures such as over-grazing and/or weed invasion. There is also a substantial body of international literature that exists relating to the interactions of solar farms and biodiversity values, which suggests that the continued persistence of native ground stratum vegetation beneath arrays is possible, despite the potentially negative pressures of over-shading and other alterations to micro-climates and microhabitats.

Solar arrays have been shown to affect their immediate surroundings and abiotic processes through factors such as the redistribution of precipitation, changes to reflection and absorption of solar and other radiation, changes to shading patterns, alteration of air-flow and protection from the wind, and alteration of soil moisture and temperature (Uldrijan et al 2021, Tanner et al 2021, Tanner et al 2020, Hernandez et al 2020, Graham et al 2021, Ahed et al 2018). The interactions between these factors and their level of influence will be site and species dependent, and the resultant effects on retained vegetation beneath solar arrays is likely to vary.

It may be assumed that overshading of ground stratum vegetation from solar arrays would impact negatively on the retained vegetation, and in some cases (and for some species) this may be true. However, the effects of shading from solar panels on unirrigated pasture (often experiencing water stress) in north-western United States of America have been found to positively influence biomass growth, with areas of full shade generating 126 % more harvested dry biomass than full sun areas (within the solar farm), and 90 % more dry biomass than control areas (Ahed et al 2018). Soil moisture appeared to be stored better beneath solar arrays, which was likely to be contributing to the increase in vegetation biomass production, and it was concluded that some water limited environments are likely to benefit from the reduction in evapotranspiration and consequently water demand as a result of the increased shading (Ahed et al 2018). It is acknowledged that these findings are not directly comparable to the subject land, however they illustrate that substantial grass growth remains possible in full and partially shaded areas within solar arrays.

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Another study in arid north-western China has demonstrated another positive influence of solar arrays, whereby average soil temperature beneath the arrays was found to be lower than that outside the arrays, and soil moisture content was also higher beneath the panels (Wu et al 2022). This increased soil moisture and reduced soil temperature have the potential to benefit the ongoing retention of vegetation in the ground stratum beneath solar arrays, and the study concluded that their results indicated that solar farms have the potential to benefit vegetation in arid environments, as they can mitigate heat and water stress and facilitate vegetation restoration (Wu et al 2022).

However, studies have also shown exotic species such as *Erodium cicutarium* and *Schismus arabicus* to benefit from altered microhabitats (specifically increased shading) beneath solar panels in arid desert environments in California (Tanner et al 2020). Similar exotic congeners to the two species included in this study are known to occur in and around the subject land, and it should be acknowledged that any positive influence on native vegetation from altered micro-climates, may have an equally positive influence on exotic species. Increased cover and abundance of exotic species could negatively impact upon the long-term persistence of retained native ground stratum vegetation without ongoing management.

These are just a few examples of how solar arrays may influence the structure and species composition of retained ground stratum vegetation, however they demonstrate the potential for ongoing persistence of biodiversity values within solar arrays. However, as with any dynamic ecological system, the influence of altered micro-climate and microhabitats is likely to affect the floristic composition and structure of retained vegetation in different ways. Whilst some native species may benefit from reduced temperatures and increased soil moisture, other species may be influenced in a less positive way. Non-biotic factors also need to be considered in terms of their influence on the future composition of retained vegetation, such as the height, size and spacing of the panels and the need for ongoing management (i.e. for bushfire protection) of vegetation, which may prevent taller species reaching maturity and setting seed, potentially altering the future floristic makeup of the vegetation.

It is this dynamic change in floristic composition and structure that is being considered in application of a partial loss calculation for future vegetation integrity of retained ground stratum vegetation within the solar array, and a conservative approach is required to not overestimate the potential future condition of the vegetation, when compared to benchmark values.

To ensure a conservative approach, the following factors have been considered:

- Partial loss may result from both direct and indirect impacts.
- All measures to avoid, minimise and mitigate impacts must be considered prior to consideration of partial loss.
- The method used for scoring of partial loss must be ecologically valid and representative, and must consider the resulting outcome and condition of vegetation over time.
- Where scoring of partial loss relies on ongoing management of native vegetation, this management must be secured through conditions of consent or approval.
- Credits arising from partial loss must be included in the conditions of consent or approval.
- Should partial loss be deemed non-compliant against associated monitoring and triggers, full credit liability would be applicable.
- Where there is uncertainty of the impacts which may arise, the precautionary principle should apply.

Table 46 below, outlines how the above listed factors have been considered in relation to the project.

Table 46 Partial loss considerations and application to the project

Consideration	Application to the project
Partial loss may result from both direct and indirect impacts.	• Where partial loss calculations have been considered these are based on impacts including: – Direct impacts associated with ongoing management required for bushfire and operational purposes which will remove, and/or reduce the height of, species from the tree, shrub and grass growth form groups. Noting that shorter species in the shrub and grass growth form groups are likely to be able to be retained and persist. – Indirect impacts to retained PCTs associated with longer-term changes to floristic structure and composition, and community function associated with changes to micro-climate and microhabitats beneath solar panel arrays
All measures to avoid, minimise and mitigate impacts must be considered prior to consideration of partial loss.	• Section 5 above demonstrates the efforts to which the project has gone to reduce direct and indirect impacts to biodiversity values. • Further options will be explored during the infrastructure and construction contractor procurement phases of the project to select technologies and methods that help to further reduce impacts of the project to biodiversity. • Ongoing measures to reduce impacts to biodiversity values during the construction, operational and decommissioning phases of the project will be set out in the project's BMP, within initial measures provided in Table 47 below.
The method used for scoring of partial loss must be ecologically valid and representative, and must consider the resulting outcome and condition of vegetation over time.	• The method used for calculating partial loss (i.e. future vegetation integrity scores within partial loss management zones) is presented below, and considers the current structure, composition, and function values of the retained vegetation as the basis for predicted future attribute values. Furthermore the presence of characteristic (or indicator) species for the original PCT are also considered in the assessment of future condition.
Where scoring of partial loss relies on ongoing management of native vegetation, this management must be secured through conditions of consent or approval.	• It is expected that ongoing management of vegetation will be secured through a Groundcover Management Plan (or similar) which will be included as a condition of consent for the project. The Plan will include an adaptive management framework, including specific targets and triggers to ensure mitigation intervention will occur if the predicted values for future vegetation condition are not being met.
Credits arising from partial loss must be included in the conditions of consent or approval.	• It is expected that the credits arising from partial loss will be included in the project's overall credit requirement, detailed in the conditions of consent.
Where there is uncertainty of the impacts which may arise, the precautionary principle should apply.	• The precautionary principle has been applied in development of predicted future attribute values, and in development of initial adaptive management triggers and mitigation measures.

Additional measures to avoid and minimise impacts to retained ground stratum vegetation

A groundcover management plan would be prepared and implemented prior to construction to avoid and minimise impacts to retained ground stratum vegetation. The plan will include an adaptive management framework, including specific targets and triggers to ensure mitigation intervention will occur if the predicted values for future vegetation condition are not being met. A framework for partial loss calculations is provided in Section 6.4.2 below and will form the basis for setting groundcover condition targets and evaluating performance against impact predictions.

Measures to ensure construction activities minimise impacts to groundcover will be determined through detailed design in consultation with the project's key contract delivery partners.

Table 47 below provides additional measures that will be further developed through detailed design and implemented by the project to avoid and minimise impacts to retained ground stratum vegetation beneath the solar arrays, and subject to partial loss considerations.

Table 47 Additional measures to avoid and minimise impacts to retained ground stratum vegetation

Avoid / minimise measures	Justification
Selecting construction methods that minimise ground disturbance such as the minimal site scraping implemented during construction of Bomen Solar Farm (see Section 6.4.2). Other methods include using rollers on grasslands and groundcover as a preferable method to prepare ground for construction instead of land excavation.	Critical to the minimisation of impacts to ground stratum vegetation and habitats. The project is committed to restricting scraping to no more than 40% of the solar array areas, and where practicable using a roller, in place of a scraper, to further minimise impacts to ground stratum vegetation. Further details will be provided in the Groundcover Management Plan. Work-flow planning will undergo detailed consideration to minimise the need for multiple periods of compaction and re-tracking over retained ground stratum vegetation, consideration of compartmentalisation of works areas and planned access for machinery into/out of each area, consider machines with greater reach distances to minimise the amount of compaction required, use soft-tracked and/or smaller machines over heavier machines where practicable, establish and maintain no-go zones in areas of retained vegetation.
Introduce rotational grazing with long rest periods for vegetation growth and repopulation	Rotational rest periods to allow seed set, from grazing and/or slashing, will likely be required to ensure the long-term maintenance of ground stratum vegetation within the operational solar farm, a detailed mosaic approach that considers species' growth and reproduction periods, and required operational management objectives (i.e ground stratum heights for bushfire prevention), will be developed in the Groundcover Management Plan.

Avoid / minimise measures	Justification
Select local native species to increase vegetation adaptation to the sites' soils and climates for planting and seed mixes. Plantings should be sourced from local genetic stock to enable sustainable reproduction of native vegetation.	Direct seeding as a rehabilitation measure for areas substantially disturbed during construction and decommissioning, as well as a mitigation measure where species and cover targets are below those nominated (see partial loss information below), as well as any revegetation works will ensure suitable species are selected and seeds are from local sources. Requirements and suitable species and seed collection requirements will be detailed in the Groundcover Management Plan, and sourcing seed will form part of early works to ensure sufficient lead time is provided before seeds/ tubestock plants are required.
After seedlings are planted onsite, they will require water (usually only for first few months) and weed control around them for first 3-6 months as far as practicable. Amount of watering and weed management lowers after this time period to enable area to continue its own development.	Water and weed control efforts are a critical component of successful rehabilitation and mitigation, especially in warmer seasons. Requirements will be detailed in the Groundcover Management Plan.
Select native seed mixes which boost pollinator habitat and foraging onsite and around perimeter of development.	Species selected will be those representative of existing PCTs on site, consideration of how peak flowering periods for pollinator attracting species can be included within mosaic management requirements will be a key components of this measure, and will be detailed in the Groundcover Management Plan.

6.4.2 Partial loss calculations

Areas subject to partial loss and complete loss

Initial steps in calculating how partial loss will be considered for the project require determination of the area to which partial loss will be applied. This area has been determined to include PCT 26 Weeping Myall woodland in the Sparse and DNG condition states only, within the solar arrays component of the project's development footprint (equating to approximately 95% of the development footprint).

As outlined above, this area is currently assumed to be subject to complete loss, however through application of impact minimisation measures outlined in Section 5 and Table 47 above (i.e. impact minimising infrastructure components, detailed construction workflow planning, avoided site scraping, establishment of no-go zones, etc), it can reasonably and confidently be expected that direct and complete impacts to this entire area can be prevented (or minimised).

The total area of the PCT 26 Weeping Myall woodland vegetation zones within the solar array project component is provided in Table 48 below.

Table 48 PCT 26 Weeping Myall woodland vegetation zones within the solar array component only

Vegetation zone	Area (ha)
PCT 26 Sparse	888.54

Vegetation zone	Area (ha)
PCT 26 DNG	797.62
Total	**1,686.15**

Ideally, detailed design of the project and infrastructure and contractor procurement would be sufficiently progressed to be able to accurately calculate the total areas subject to permanent direct impacts (i.e. complete loss), as well as those areas able to be retained. Retained areas would include those protected from impacts any more substantial than (for example) a small tracked vehicle, resulting in minimal, short term disturbance, or complete avoidance of impacts (i.e. partial loss). However, it is not possible to calculate these retained areas at this stage of the project. The BAM requirement for full calculation of offset liability prior to consent, and the project's need to maintain flexibility during detailed design and procurement, are at odds for allowing the detailed calculation of areas subject to the different impact treatment. Instead a suitably conservative proportion of the solar array area, nominated to be subject to direct impact (complete loss), versus retained or indirectly impacted (partial loss) is proposed. By using a proportion of the total impact area to calculate partial loss, detailed calculations and workflow planning can be undertaken during detailed design and post-procurement stages. The application of partial loss will incentivise retention of ground stratum vegetation during construction and operations.

The proportion of the solar array component within the project's development footprint was conservatively estimated based on Spark Renewables' experience constructing the Bomen Solar Farm which is described in detail below. The proportions nominated for complete loss and partial loss, are as follows:

- Complete loss: 40%
- Partial loss: 60%

Based on these proportions, the total areas subject to complete loss and partial loss are provided in Table 49 below.

Table 49 PCT 26 Weeping Myall woodland vegetation zones within the solar array component only

Vegetation zone	Total area (ha)	Complete loss (40 %) (ha)	Partial loss (60 %) (ha)
PCT 26 Sparse	888.54	355.42	533.12
PCT 26 DNG	797.62	319.05	478.57
Total	**1,686.16**	**674.47**	**1,011.69**

The project's consent conditions would ensure that areas no greater than those nominated above will be subject to complete loss, and the specific details of how this will be achieved will be developed within the project's Groundcover Management Plan (included as a sub-plan to the project's BMP) and following detailed design and contractor/infrastructure procurement. The Groundcover Management Plan, developed in consultation with BCS, will also include an adaptive management framework, including specific targets and triggers to ensure intervention would occur if the areas nominated as partial loss fall below specific key indicators during ongoing management. Further information on nominated monitoring and adaptive management triggers is provided below.

Bomen Solar Farm case study

Spark Renewables' Bomen Solar Farm was constructed in 2019 by Beon Energy Solutions. Spark Renewables' experience building the Bomen Solar Farm provides confidence that groundcover can be retained throughout the site preparation and installation of solar arrays. In their experience, on flat sites like Bomen and Dinawan Solar Farms, the removal of groundcover within solar array areas can be limited to installation of PV piles, inverter pads, access tracks and reticulation cable trenching. Photographs demonstrating the presence of groundcover throughout construction at Bomen Solar Farm are provided in Plate 1 below. The construction methodology applied at Bomen could also be implemented at Dinawan Solar Farm. Beon Energy Solutions have completed a site visit to Dinawan Solar Farm and confirmed that similar construction methods could be implemented and that vegetation removal could be limited to slashing throughout the solar arrays.

An estimate of the percentage of groundcover removed at Bomen Solar Farm is summarised in Table 50.

Table 50 Estimate of Groundcover Removal at Bomen Solar Farm

Bomen Solar Farm	Estimation
Sample area	52,825 m^2
Number of solar panel rows	52
Area impacted directly beneath panels	9,672 m^2
Inverter impact area	600 m^2
Access tracks	4,700 m^2
Total vegetation removal	14,972 m^2
Percentage vegetation removal	28 %

Despite this relevant case study resulting in less than 30% complete vegetation removal, it has conservatively been assumed that up to 40% of groundcover would be completely removed from the project, leaving up to 60% of the solar arrays subject to partial loss.

Plate 1 Evidence of groundcover retention at Bomen Solar Farm during construction

Future vegetation integrity scores for partial loss areas

The key incentive for proponents for the application of partial loss , which results in benefits for site scale biodiversity values, is the reduction in offset liability. The BAM calculates offset liability (in its simplest form) on the basis of loss in vegetation integrity (VI) scores resulting from the unavoidable impacts of a project (i.e. vegetation clearing). Where complete loss is assumed, VI scores calculated for each vegetation zone, via application of the BAM and collection of floristic plot data, are reduced to zero. For example, the PCT 26 Sparse and DNG vegetation zones within the development footprint has a calculated VI score of 32.5 and 25.1 respectively, which in the complete loss scenario would result in credits being calculated on the basis of a loss of -32.5 and -25.1 in VI score respectively.

However, in the partial loss scenario, future VI scores are not reduced to zero, as it can reasonably be expected that a number of native flora species will persist indefinitely, under the prescribed management regime. The reduction in VI score, which forms the basis for calculation of offset credits, will therefore be lower, which has the effect of reducing the offset liability calculated for the partial loss zone.

As outlined above the key consideration for the calculation of future VI scores, in a partial loss scenario, is that the method used for scoring of partial loss must be ecologically valid and representative, and must consider the resulting outcome and condition of vegetation over time.

For the project, application of partial loss is focussed on the PCT 26 Sparse and PCT 26 DNG vegetation zones, as these are the main areas subject to impacts from the solar arrays. Current VI scores calculated for these zones, as outlined in the BDAR (Biosis 2024) are as follows:

- PCT 26 Sparse – 32.5
- PCT 26 DNG – 25.1

Table 51 and Table 52 below presents the vegetation attribute values contributing to the calculated VI scores for each zone. The tables also present the range of vegetation attribute values, taken into consideration when determining expected future VI scores in the partial loss scenario, as well as the nominated future value for each vegetation attribute.

Table 51 Current and future vegetation attributes for the PCT 26 Sparse vegetation zone

PCT 26 - Sparse				
Composition (Species richness)	**Max**	**Min**	**Average (Current VI)**	**Predicted (Future VI)**
Tree (TG)	2	0	1	0
Shrub (SG)	4	1	2.6	2
Grass & grasslike (GG)	11	5	7.8	4
Forb (FG)	13	4	7.5	3
Fern (EG)	1	0	0.6	0
Other (OG)	1	0	0.8	0
Structure (% cover)	**Max**	**Min**	**Average (Current VI)**	**Predicted (Future VI)**
Tree (TG)	1.1	0.0	0.4	0.0
Shrub (SG)	1.9	0.1	0.7	0.2

PCT 26 - Sparse				
Grass & grasslike (GG)	90.7	6.6	47.8	20.0
Forb (FG)	4.7	0.4	1.6	0.3
Fern (EG)	0.1	0.0	0.1	0.0
Other (OG)	0.1	0.0	0.1	0.0
VI score	-	-	**32.5**	**9.7**

Table 52 Current and future vegetation attributes for the PCT 26 DNG vegetation zone

PCT 26 - DNG				
Composition (Species richness)	**Max**	**Min**	**Average (Current VI)**	**Predicted (Future VI)**
Tree (TG)	1	0	0.3	0
Shrub (SG)	9	1	4.8	2
Grass & grasslike (GG)	10	6	8.1	4
Forb (FG)	12	3	7.1	3
Fern (EG)	1	0	0.1	0
Other (OG)	1	0	0.6	0
Structure (% cover)	**Max**	**Min**	**Average (Current VI)**	**Predicted (Future VI)**
Tree (TG)	0.1	0.0	0.0	0.0
Shrub (SG)	12.6	0.1	2.3	0.2
Grass & grasslike (GG)	74.2	27.1	51.2	20.0
Forb (FG)	2.5	0.4	1.2	0.3
Fern (EG)	0.1	0.0	0.0	0.0
Other (OG)	0.1	0.0	0.1	0.0
VI score	-	-	**25.1**	**9.7**

It should be noted that plant community function values (collected as part of BAM floristic plots) also contribute to current and future vegetation integrity scores, however all future attribute values for plant community function have been assumed to be reduced to zero (i.e. tree stem size class, leaf litter, large woody debris) as a result of required operational management of the solar farm, and as such are not presented herein.

It can be seen from Table 51 and Table 52 above, that under the same prescribed management, it is expected that the future VI scores for both the PCT 26 Sparse and PCT 26 DNG vegetation zones will be 9.7. This results in a loss in VI scores of:

- PCT 26 Sparse: -22.8
- PCT 26 DNG: -15.4

The reduction in VI score of -22.8 (PCT 26 Sparse) and -15.4 (PCT 26 DNG) would form the basis of the offset credit requirement calculations for the partial loss zones.

Justification of future vegetation integrity scores for partial loss areas

The values presented above have been entered into the BAM Calculator for separate 'partial loss' and 'complete loss' management zones within each of the PCT 26 Sparse and PCT 26 DNG vegetation zones to calculate the updated credit obligation for these areas, which are presented below in Table 53.

Table 53 Credit calculations for complete loss and partial loss for solar array component impacts only

Vegetation zone	Impacts - Complete loss (40 %) (ha)	Impacts - Partial loss (60 %) (ha)	Total credits required
PCT 26 Sparse	355.42	533.12	11,859
PCT 26 DNG	319.05	478.57	7,693
Total	**674.46**	**1011.69**	**19,552**

Under the assumption of 40 % complete loss and 60 % partial loss within the solar array area, and based on the future VI scores presented above, the project's offset liability for impacts associated with the solar arrays would equate to 19,552 credits for PCT 26 Weeping Myall Woodland in DNG and Sparse condition. This equates to an overall reduction of 6,164 credits (or approximately 23 %), compared to assuming complete loss to PCT 26 Weeping Myall Woodland in DNG and Sparse condition zones across the project. If following completion of required partial loss monitoring and reporting as per the BMP, it was determined to have not succeeded in achieving set targets, then a full credit liability would be required to be retired for these two zones, totalling 25,716 credits, instead of the 19,552 partial liability.

Credit calculations for the above values are provided in BAM-C case number 00034896/BAAS17051/23/00042134 – Revision 17, with associated Credit Reports provided in Section 11.

Justification of future vegetation integrity scores for partial loss areas

Table 54 below presents the justifications for predicted future vegetation attributes that form the basis of partial loss calculations.

Table 54 Justifications for future vegetation attribute values in partial loss zones

Growth form group and attribute scores	Justification
Tree (TG) • **Future composition value: 0** • **Future structure value: 0**	• Maintenance requirements of the solar farm will result in the ongoing removal of all tall vegetation, and any species in the Tree growth form group will be removed.
Shrub (SG) • **Future composition value: 2** • **Future structure value: 0.2**	• Maintenance requirements of the solar farm will result in the ongoing removal of all tall vegetation, and taller species in the Shrub growth form group will be removed. • A total of 15 species in the Shrub growth form group have been recorded across the subject vegetation zones, with a maximum count of 4 (Sparse)

Growth form group and attribute scores	Justification
	and 9 (DNG) species, and a minimum of 1 (Sparse) and 1 (DNG) species recorded in a single BAM plot. • 14 of the 15 species are species of chenopod, all of which support a growth habitat that could survive under the solar panel arrays. • Many species are known to occur in treed (i.e. shady) and moist communities, and as such can be expected to persist under altered micro-climate conditions beneath solar arrays. • Many species support a low / prostrate growth habitat which will allow seed set even under the most stringent of bushfire management conditions (i.e. maintenance of ground cover at <100 mm). • Future maintenance of an average of 2 species across all monitoring plots, at a minimum of 0.1% cover each, is considered a conservative prediction for future persistence of species in the Shrub growth form group.
Grass and grasslike (GG) • **Future composition value: 4** • **Future structure value: 20.0**	• Maintenance requirements of the solar farm will result in the ongoing removal of all tall vegetation, and taller species in the Grass and grasslike growth form group will be removed. • A total of 23 species in the Grass and grasslike growth form group have been recorded across the subject vegetation zones, with a maximum of 11 (Sparse) and 10 (DNG) species, and a minimum of 5 (Sparse) and 6 (DNG) species recorded in a single BAM plot. • Current average composition values are 47.8 (Sparse) and 51.2 (DNG). • 13 species are C3 grasses known to benefit from lower temperatures and higher moisture levels, and thus can be expected to persist under altered micro-climate conditions beneath solar panel arrays. • Many species support a lower growth habitat which will allow seed set even under the most stringent of bushfire management conditions (i.e. maintenance of ground cover at ≤100 mm). • Future maintenance of an average of 4 species across all monitoring plots, and a minimum average total cover of 20 %, is considered a conservative prediction for future persistence of species in the Grass and grasslike growth form group.
Forb (FG) • **Future composition value: 3** • **Future structure value: 0.3**	• Maintenance requirements of the solar farm will result in the ongoing removal of all tall vegetation, it is unlikely that species in the Forb growth form group will be removed as a result. • A total of 31 species in the Forb growth form group have been recorded across the subject vegetation zones, with a maximum of 13 (Sparse) and 12 (DNG) species, and a minimum of 4 (Sparse) and 3 (DNG) species recorded in a single BAM plot. • Current average composition values are 7.5 (Sparse) and 7.1 (DNG), average structure values are 1.6 (Sparse) and 1.2 (DNG). • Many species support a lower growth habitat which will allow seed set even under the most stringent of bushfire management conditions (i.e. maintenance of ground cover at ≤100 mm). • The Forb growth form group comprises a diverse range of species potentially more sensitive to ecosystem changes, and more so than hardier species in the Shrub and Grass and Grasslike growth form groups. As such, predicting the future persistence in this growth form group has applied a more precautionary approach in terms of future composition and structure values.

Growth form group and attribute scores	Justification
	• Future maintenance of an average of 3 species across all monitoring plots, at a minimum of 0.1 % cover each, is considered a conservative prediction for future persistence of species in the Forb growth form group.
Fern (EG) • **Future composition value: 0** • **Future structure value: 0.0**	• Current average composition and structure values for species in the Fern growth form group are too low to predict any future persistence under a partial loss scenario.
Other (OG) • **Future composition value: 0** • **Future structure value: 0.0**	• Current average composition and structure values for species in the Other growth form group are too low to predict any future persistence under a partial loss scenario.

Persistence of existing biodiversity values

Another important factor in the consideration of a partial loss scenario for the project is the maintenance of existing biodiversity values, representative of PCT 26 Weeping Myall woodland (DNG and Sparse). If future maintenance and ongoing indirect impacts from the operational solar farm were to irreversibly change the structure, type and function of the ecosystem such that it could be no longer considered to represent PCT 26 Weeping Myall woodland, it could be argued that this would be considered a complete loss.

To enable the ongoing monitoring of this potential negative impact, and allow for mitigation intervention (if required), the persistence of a minimum number of characteristic (or representative) species has also been factored in to partial loss considerations. Species considered characteristic to PCT 26 Weeping Myall woodland, include those listed in the BioNet Vegetation Classification for the PCT, with those most relevant to partial loss considerations comprising the ground stratum species list, as well as species listed in the BioNet description of the PCT.

BAM plots collected within PCT 26 during development of this BDAR, found between 3 and 7 characteristic ground stratum species from the Shrub, Forb and Grass and grasslike growth form groups in the PCT 26 Sparse vegetation zone, and between 5 and 9 characteristic ground stratum species in PCT 26 DNG.

It is proposed that a minimum of 3 characteristic ground stratum species (from either those already recorded on site, or any newly recorded characteristic species) will be maintained (averaged across monitoring plots), to ensure substantial changes to the structure, type and function of the ecosystem do not occur.

Table 55 below provides an analysis of the PCT 26 characteristic ground stratum species recorded within the PCT 26 Sparse and PCT 26 DNG vegetation zones and their likelihood of persistence within an operational solar farm.

Table 55 PCT 26 characteristic ground stratum species and their likelihood of persistence within an operational solar farm

Species name	Likelihood to survive under panels	Justification	Risks
***Alternanthera denticulata* - Lesser Joyweed**	High likelihood	Occurs in wooded and moist communities	Lower - can set seed at low growth height (prostrate)

Species name	Likelihood to survive under panels	Justification	Risks
***Atriplex leptocarpa* - Slender-fruit Saltbush**	Moderate likelihood	Occurs in wooded and moist communities	Lower - can set seed at low growth height (prostrate)
***Atriplex semibaccata* - Creeping Saltbush**	Moderate likelihood	Occurs in wooded and moist communities	Lower - can set seed at low growth height (prostrate)
***Austrostipa aristiglumis* - Plains Grass**	Low likelihood	C3 grass, but taller species likely to be impacted by management	High - unlikely to be able to set seed, without detailed mosaic slashing/grazing management
***Austrostipa nodosa* - A Speargrass**	Moderate likelihood	C3 grass, but taller species likely to be impacted by management	Moderate – may not be able to set seed, without detailed mosaic slashing/grazing management
***Austrostipa scabra* - Speargrass**	High likelihood	C3 grass, shorter species, more likely to be able to set seed at lower heights	Moderate - will require mosaic management of grass height to prevent population decline
***Centipeda cunninghamii* - Common Sneezeweed**	High likelihood	Low growing, noted as able to grow in moist swampy soils, full sun, partial shade.	Lower - can set seed at low growth height (prostrate)
***Enchylaena tomentosa* - Ruby Saltbush**	High likelihood	Generally taller shrub, may grow more prostrate under management, grows in shadier/moister habitats	Moderate – may not be able to set seed, without detailed mosaic slashing/grazing management
***Maireana aphylla* - Cotton Bush**	Low likelihood	Generally taller shrub, may growth more prostrate under management (not really characteristic species)	High - unlikely to be able to set seed, without detailed mosaic slashing/grazing management
***Maireana decalvans* - Black Cotton Bush**	High likelihood	Generally taller shrub, may growth more prostrate under management	Moderate - likely to require mosaic management of height to prevent population decline
***Rhodanthe corymbiflora* - Small White Sunray**	High likelihood	Can occur in wooded and moist communities	Lower - can set seed at low growth height
***Rytidosperma caespitosum* - Ringed Wallaby Grass**	High likelihood	C3 grass, shorter species, more likely to be able to set seed at lower heights	Moderate - will require mosaic management of grass height to prevent population decline
***Rytidosperma setaceum* - Small-flowered Wallaby-grass**	Moderate likelihood	C3 grass, shorter species, more likely to be able to set seed at lower heights	Moderate - will require mosaic management of grass height to prevent population decline

Species name	Likelihood to survive under panels	Justification	Risks
***Sporobolus caroli* - Fairy Grass**	High likelihood	C3 grass, shorter species, more likely to be able to set seed at lower heights	Moderate - will require mosaic management of grass height to prevent population decline
***Vittadinia cuneata* - A Fuzzweed**	High likelihood	Can occur in wooded and moist communities	Lower - can set seed at low growth height

It can be seen from the table above that it is likely that the minimum requirement of 3 characteristic ground stratum species will be able to be maintained under a future partial loss scenario.

Monitoring and adaptive management

A robust monitoring and adaptive management plan will be critical to the success of the retention of the ground stratum vegetation within the solar arrays during the operational phase of project. Establishment of a Before After Control Impact (BCAI) study program will allow for tracking of performance targets over time and an associated Trigger Action Response Plan (TARP) will ensure suitable mitigation is implemented if, and when, required.

The detailed monitoring and adaptive management plan will be developed during preparation of the Groundcover Management Plan, however it will include (at a minimum) the following key components.

- Development of a detailed ongoing monitoring program that implements a Before-after-control-impact (BACI) study design and considers how adaptive management triggers can be accurately measured throughout the life of the program.
- Development of a Trigger, Action, Response Plan (TARP) that includes key performance indicators for vegetation attribute values and characteristic species presence that implement the SMART system (Specific, Measurable, Achievable, Realistic and Timebound).
- Development of mitigation measures based on trigger levels targeted toward the key performance indicators such as; direct seeding of areas where grass cover is continually lower than target levels, implementation of strategic grazing in late winter and spring to reduce competition from medics and clovers, implementation of active weed control intervention if exotic species cover exceeds target levels, re-consideration of mosaic management program of groundcover growth in insufficient areas of grassland are recorded setting seed.

A draft partial loss monitoring and adaptive management plan is provided below in Table 56, which has been developed with reference to the BAM and the NSW Biodiversity Conservation Trust's Ecological Management Module (BCT 2022). It includes measures that will be implemented to achieve the retention of biodiversity value within the solar arrays during construction, operation and decommissioning, and will be further developed as part of the preparation of the project's Groundcover Management Plan.

Table 56 Proposed partial loss monitoring and adaptive management plan

Monitoring metric	No. plots	Frequency and timing (post construction)	Performance targets*	Adaptive management triggers	Mitigation response
Vegetation Integrity (Impact) plots	PCT 26 Sparse – 7* PCT 26 DNG – 7	**Years 1-3**– Biannually, spring and late summer	**VI score** ≥ 9.7 **Shrub (SG)** ≥ 2 spp, ≥ 0.2 % cover **Grass (GG)** ≥ 4 spp, ≥ 20 % cover **Forb (FG)** ≥ 3 spp, ≥ 0.3 % cover **PCT 26 characteristic spp** ≥ 3 spp	Tier 1 - single event VI score, No. spp or % cover for growth form group, No. characteristic spp fall below performance targets	Intervention considered Initiate rapid assessment framework to determine if mitigation is required Comparison to control plots and ground cover transects Consider severity of trigger event Consider increased monitoring, grazing/slashing regime adjustment, native herbivore exclusions, increased pest control and/or monitoring, mosaic seed set regime adjustment, active intervention (i.e. direct seeding, weed control)
				Tier 2 – ongoing/multiple events Above metrics fall below performance targets	Active intervention required Initiate rapid assessment framework to determine required mitigation
Grass cover assessment method transects	Nested with Vegetation Integrity (Impact) plots	As per Vegetation Integrity (Impact) plots	**Native grass** ≥ 20 % cover **Exotic species (all species)** ≤ 50 % cover	Tier 1 - single event Native grass cover below performance target Exotic species cover above performance target	Intervention considered Initiate rapid assessment framework to determine if mitigation is required
				Tier 2 – ongoing/multiple events Above metrics fall below performance targets	Active intervention required Initiate rapid assessment framework to determine required mitigation

Monitoring metric	No. plots	Frequency and timing (post construction)	Performance targets*	Adaptive management triggers	Mitigation response
Seed set monitoring	TBC (bushfire considerations to be determined)	As per Vegetation Integrity (Impact) plots	**Evidence of seed set** from ≥ 50 % of individuals from dominant native ground stratum species within mosaic groundcover growth areas	Tier 1 - single event Seed set below performance target	Intervention considered Initiate rapid assessment framework to determine if mitigation is required
				Tier 2 – ongoing/multiple events Above metrics fall below performance targets	Active intervention required Initiate rapid assessment framework to determine required mitigation
Herbivore scat assessment	Nested with Vegetation Integrity (Impact) plots	As per Vegetation Integrity (Impact) plots	Data collected to quantify volume and type of scats to allow for assessment of grazing pressure and comparative purposes if adaptive management triggers are realised	n/a	n/a
Vegetation Integrity (Control) plots	PCT 26 Sparse – 3 PCT 26 DNG – 3	As per Vegetation Integrity (Impact) plots	Data collected to be used for comparison to impact plots	n/a	n/a
Photo monitoring	Co-located with Vegetation Integrity plots (Impact and Control)	As per Vegetation Integrity (Impact) plots	Two photos collected for each Vegetation Integrity plot (start and end of 50 m transect) to be used for temporal comparisons Temporal comparisons do not show evidence of decline in monitoring metrices (i.e. native/exotic vegetation cover, overall condition)	Comparison determines declining condition and/or metrics	Intervention considered Initiate rapid assessment framework to determine if mitigation is required

*** - Total of seven plots required based on Table 3 of BAM**

6.5 Cumulative Impacts

An assessment of proposed and current renewable and other projects within similar PCTs, habitats and sited in the South West REZ has been carried out to provide a summary of potential cumulative impacts to biodiversity (Table 57). Eighteen large scale renewable energy related projects in the South West REZ, all impacting upon similar PCTs, habitats and threatened species have been considered.

It is important to recognise that the South West REZ is currently a highly competitive landscape for renewable energy development and project outcomes will largely be determined by the NSW Government allocation of access rights to the limited transmission infrastructure present. For example, the NSW Government registration of interest for the South West REZ received 49 registrations, representing 34 gigawatts of electricity (more than 13 times the intended 2.5 gigawatts capacity) from potential generation and storage projects. Access to the South West REZ transmission lines will be managed by the NSW Government in accordance with the NSW Electricity Infrastructure Investment Act 2020 (EII Act). A competitive tender process for transmission "access rights" will be administered by AEMO Services (ASL). The mix of technologies and size of projects that will be built in the South West REZ will, to a large extent, be determined by the outcomes of this competitive auction process. This process would limit the scale of development within the South West REZ and means that the cumulative impacts required to build the South West REZ to its maximum capacity would be less than that predicted for the full extent of all projects currently proposed.

Impacts resulting from the project are largely consistent with impacts that are considered to occur at other nearby proposals, more so with those occurring within 50 kilometres or less.

The summary of biodiversity impacts from publicly available information was reviewed to gain an understanding of the main biodiversity impacts and how these may contribute to cumulative impacts when considering the development of the project.

Table 57 Cumulative impact summary

Project, description and location	Distance	Overview	Potential biodiversity impacts
Dinawan Wind Farm (RTS stage)	0 km	Includes construction and operation of up to 200 turbines; 1.2 GW wind farm on approximately 7,256 ha.	Estimated impacts to 1,145 ha of native vegetation, including nine PCTs and three TECs. Weeping Myall, White Cypress Pine and Natural Grasslands impacts are anticipated.
Project EnergyConnect (Approved – under construction)	Substation adjacent to the northern boudnary. Transmission 1km south east	Includes construction and operation of 330 kV and 500 kV transmission line and Dinawan Substation.	38 PCTs directly impacted 1,615.20 ha of native vegetation 232.16 ha of TECs, including 101 ha of Weeping Myall Loss of habitat of 74 ecosystem species 20 candidate species impacted
Argoon Wind Farm (EIS Stage)	1km south	Includes construction and operation of up to 106 turbines, 900MW and battery storage.	Estimated impacts are unknown, but mapped preliminary vegetation of 10,888 ha of native vegetation including

Project, description and location	Distance	Overview	Potential biodiversity impacts
			impacts to Weeping Myall Woodland and Natural grasslands
Yanco Delta Wind Farm (Approved)	1km south	Includes construciton and operation of up to 1.5 GW wind farm, including approximately 225 WTGs across 24,000 ha.	10 PCTs directly impacted 174 ha of native vegetation 129 ha of EPBC listed natural grassland TEC impacted 31 ha of Weeping Myall TEC impacted Loss of habitat of 14 threatened species Impacts to 0.03 ha of Plains Wanderer habitat
Coleambally BESS (Approved)	30 km north	Includes construction and operation of 100 MW capacity BESS across 4 ha	Impacts to 2.75 ha of PCT 16 Black Box woodland 2.86 ha of PCT 26 Weeping Myall woodland Impacts to 0.45 ha of Superb Parrot breeding habitat
Coleambally Solar Farm (Approved)	30 km north	Includes 150 MW solar farm constructed on 570 ha formerly used to support irrigation cropping	Impacts to 0.74 ha of native vegetation including 0.66 ha PCT 16 Black Box woodland and 0.08 ha of PCT 26 Weeping Myall woodland
Bullawah Wind Farm (EIS stage)	38 km north west	Includes construction and operation of 1 GW wind farm, including approximately 170 WTGs across 33,000 ha.	Estimated impacts to 1012.6 ha of native vegetation including impacts to Weeping Myall Woodland and Natural grasslands
Darlington Point Solar Farm (Approved)	45 km north	Includes 275 MW solar farm (constructed) and 200 MW BESS (under construction) on 1,042 ha formerly used for grazing.	Impacts to PCT 45 Plains Grassland and impacts to PCT 16 Black Box woodland
Woodland BESS (Approved)	45 km north	Includes construction and operation of 200 MW BESS across 16 ha.	Potential impacts to 5 TECs and 17 threatened species
Yarrabee Solar Farm (Approved)	45 km south	Includes construction and operation of 900 MW solar farm and BESS on approximately 2,600 ha	Impacts to 3 PCTs, including one TEC. Impacts to two threatened species
Pottinger Wind and Solar Farm (RTS stage)	50 km west	Includes construction and operation of 750 GW wind farm, 300 solar farm and 500 MW BESS., including approximately 108 WTGs across approximately 15,160 ha.	Impacts to 470 ha of native vegetation for the wind farm and 630 ha for the solar farm, including potential impacts to Weeping Myall Woodland and Natural Grasslands TECs
Currawarra Solar Farm (Approved)	60 km south	Includes construction and operation of 195 MW solar farm and BESS on approximately 472 ha.	Impacts to three PCTs, including one TEC totalling 3.8 ha of native vegetation

Project, description and location	Distance	Overview	Potential biodiversity impacts
Tarleigh Park Solar Farm (Approved)	75 km south	Includes construction and operation of 90 MW solar farm and BESS on approximarely 250 ha.	Impacts to three PCTs, including one TEC totalling 3.37 ha of native vegetation
Tchelery Wind Farm (EIS stage)	>100km west	Includes construction and operation of 800 MW wind farm, including approximately 120 WTGs	Potential impacts to 16 PCTs, 4 TECs including Weeping Myall Woodland. Potential impacts to seven flora species and five fauna species known to occur.
Baldon Wind Farm (EIS stage)	>100 km west	Includes construction and operation of 1 GW wind farm, including approximately 162 WTGs across approximately 42,000 ha.	Potential impacts to 17 PCTs including Natural grassland TECs Potential impacts to 3 threatened species, including the Plains Wanderer
The Plains Wind Farm (RTS stage)	>100km north west	Includes construction and operation of 1.8 GW wind farm, including approximately 226 WTGs across approximately 58,000 ha.	Potential impacts to 558 ha of native vegetation 15 PCTs and two TECs, including Weeping Myall Woodland. Potential impacts to Plains Wanderer habitat
Wilan Wind Farm (EIS stage)	>100 km west	Includes construction and operation of 800 MW wind farm, including approximately 138 WTGs	Potential impacts to 607 ha of native vegetation, including 12 PCTs. Potential impacts to two threatened flora species
Keri Keri Wind Farm (RTS stage)	>100 km west	Includes construction and operation of 1 GW wind farm, including approximately 176 WTGs and 200 MW BESS.	Potential impacts to 2625 ha of native vegetation including 9 PCTs and one TEC, and one threatened flora species
Junction Rivers Wind Farm (RTS stage)	>100 km west	Includes construction and operation of 750 MW wind farm, including approximately 96 WTGs	Impacts to 68.16 ha of native vegetation including seven PCTS and two TECs.

7 Mitigation and management of impacts

Identification of measures to mitigate or manage impacts (Table 58) has been undertaken in accordance with the BAM (DPIE 2020a), including considerations such as:

- Techniques, timing, frequency and responsibility.
- Identification of measures for which there is risk of failure.
- Evaluation of the risk and consequence of any residual impacts.
- Documentation of any adaptive management strategy proposed.

Identification of measures for mitigating impacts related to:

- Displacement of resident fauna.
- Indirect impacts on native vegetation and habitat.
- Mitigating prescribed biodiversity impacts.
- Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain.

There is a significant opportunity to further minimise biodiversity impacts through the application of adaptive management and monitoring measures to promote the retention of native groundcover within the development footprint of the project. The project is well-positioned to take a forward thinking approach to developing biodiversity avoidance and mitigation measures which exceed typical statutory requirements for state significant large-scale solar development. This is due to the unique siting of the project within a region with extensive remnant native groundcover. The proposal to implement groundcover retention within the subject land aims to embed NSW's nature positive approach to improve outcomes for residual impacts to ecological communities and species including Weeping Myall woodland, Plains Wanderer and Slender Darling Pea. The proposed measures would encourage the project to better follow the impact mitigation hierarchy of ensuring impact avoidance and mitigation are fulfilled before offsetting is pursued.

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Table 58 Measures to mitigate and manage impacts

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
	Direct and indirect impacts			
B1	Removal of native vegetation and TECs	• An Environmental Management Strategy (EMS) contained within a CEMP will be prepared and implemented, including industry standard measures for the management of soil, surface water and pollutants, weeds, pests and pathogens, as well as site-specific measures and relevant sub-management plans. Relevant sub-plans specific to the management of biodiversity are a Biodiversity Management Plan, with subsequent sub- plans such as Pest Animal Management Plan, Weed Management Plan and Groundcover Management Plan. • Wherever possible the project will look to avoid impacts to native vegetation and TECs through minimisation of clearing footprint during detailed design and preferentially locating infrastructure/plant/materials etc in areas of existing disturbance. • Prescriptions for mitigation of potential impacts of construction activities on retained native vegetation and habitat will be addressed in a site-specific CEMP and BMP sub-plan. The plan will include all measures outlined below: – Minimise vegetation clearance and disturbance, including impacts to standing dead trees and riparian zones. – Where possible, limit clearing to trimming rather than the removal of whole plants. – Physically delineate vegetation to be cleared and/or protected on site and install appropriate signage prior to works commencing. – No-Go Zones should be erected during the construction phase at the extent of clearing works in patches of vegetation to ensure clearing limit is not exceeded and no vehicle or plant equipment movement occurs outside the clearing limit. These areas should be checked as part of the pre-clearing survey. – Protect trees in accordance with the requirements of Australian Standard 4970-2009 for the Protection of Trees on Development Sites. – Do not damage tree roots unless absolutely necessary, and engage a qualified arborist where roots >50mm are impacted within the Tree Protection Zone. – Retain dead tree trunks, bush rock or logs in-situ unless they are in the development footprint and moving is unavoidable. Reposition material elsewhere on the site or approved adjacent sites. Dead wood and Coarse Woody Debris (CWD) should be lifted and placed into adjacent vegetation, not pushed. – Undertake pre-clearance inspections by a licenced ecologist of vegetation to ensure all no-go areas are appropriately fenced.	Prior to construction – during construction	Proponent / Principal contractor

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		– If any threatened species (flora or fauna) is discovered during the works, stop work immediately at the site of species identification and notify the onsite Manager. Work will only recommence once the impact on the species has been assessed and appropriate control measures provided. – If any damage occurs to vegetation outside of the impact area (as shown in the CEMP), notify the onsite Manager and Environmental Representative so that appropriate remediation strategies can be developed. • A biosecurity management plan will be prepared as part of the project's CEMP and will detail measures to prevent the spread of weeds and pathogens, and other biosecurity items into or out of the impact area upon implementation. • Secure biodiversity offsets in accordance with the NSW BOS.		
B2	Removal of fauna and flora habitat Removal of threatened fauna habitat	• Wherever possible the project will look to avoid removal of hollow-bearing trees and trees supporting nests during detailed design. • The CEMP will include a plan for pre-clearance surveys. Pre-clearance surveys will include: – Fauna general: ▪ Survey of all areas to be cleared prior to construction to identify and mark all fauna habitat to be impacted including hollow-bearing trees (HBTs) ▪ All HBTs to be removed will follow a two-stage removal process, including knocking of the tree to be removed 24 hours prior to removal. ▪ All fauna habitat to be removed will be surveyed by a suitably qualified ecologist, prior, during and after removal. ▪ Active nests will be avoided by clearing. ▪ If native fauna is likely to be present, a licenced ecologist should inspect the removal and undertake fauna relocation to pre-determined areas nearby. – Flora general: ▪ All vegetation to be removed is to be clearly marked for removal. ▪ No-Go fencing is to be erected along the clearing extent where partial clearing of a patch is to occur. No-Go fencing is to be retained until the completion of the construction phase. • If native fauna is encountered on site, stop work and allow the fauna to move away un-harassed. Engage a licenced ecologist if assistance is required to move fauna.	Prior to construction – during construction	Proponent / Principal contractor

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		Hollow dependent fauna • Pre-clearance surveys are to be undertaken to determine if these areas of habitat are being used by the species 24-48 hours before vegetation removal. • Removal of the one hollow bearing tree to occur outside breeding season for Superb Parrot and other common fauna, September to November, as far as practicable, and potentially prior to the main vegetation clearing program. It would be ensured that this would not result in the removal of potential nest trees more than one breeding season prior to the main vegetation clearing program. • Two-staged tree removal under ecologist supervision is required for the removal of all trees within potential Superb Parrot high use areas.		
		Threatened raptor species (incl. non-threatened at risk species) • All potential raptor nests within 200 metres of the finalised development footprint are to be mapped and monitored at least one month prior to vegetation removal. • Pre-clearance surveys are to be undertaken within one week of scheduled vegetation removal to determine whether nests are in use by raptors. • Clearing of raptor nests with juveniles present will not be undertaken. • Removal of potential nest trees could occur as early works, outside breeding season, and prior to the main vegetation clearing program. It would be ensured that this would not result in the removal of potential nest trees more than one breeding season prior to the main vegetation clearing program. • Clearing of vegetation within 200 m of raptor nests with juveniles present will be avoided wherever possible. • Two-staged tree removal under ecologist supervision is required for the removal of all raptor nests.		
		Southern Bell Frog • Construction within waterbodies and irrigation channels if required will be preferentially undertaken when dry as far as practicable. • A suitable location for the relocation of Southern Bell Frog outside the subject land should be determined prior to clearing taking place, ensuring any areas proposed for relocation do not contain *Gambusia* species.		

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		• If dam dewatering is required, engaging a qualified and licensed ecologist to be present during dewatering of farm dams is required, to undertake fauna relocation (e.g. turtles, frogs, etc.) into an appropriate nearby habitat. • Once dewatering is complete, dams are to be left for a minimum of 48 hours to allow species such as frogs and yabbies to naturally relocate. Where possible, dewatered dams should be left dry for a minimum of 1 week. • Maintain and create Southern Bell Frog habitat to facilitate connectivity with the subject land and Coleambally irrigation channel.		
		Plains Wanderer • Pre-clearance surveys will be undertaken when prior to vegetation impacts in PCT 26 DNG and PCT 46 is proposed. • BMP to include priorities and strategies to reduce predators such as foxes and weed ingress. • During final design, maximise connectivity opportunities where impacts to optimal habitat and Important Mapped Areas are predicted.	Prior to construction – during construction	Proponent / Principal contractor
		Other threatened species (MNES) • Pre-clearance surveys will be undertaken when vegetation removal is proposed during the breeding season of threatened species (for example between July – October for Southern Whiteface). • Survey results will trigger the implementation of mitigation measures to minimise impacts to breeding individuals, to be further detailed in the BMP.		
B3	Construction adjacent to identified threatened flora populations	**Swainsona Species** • Ensure No-Go Zones are established early and maintained throughout the life of the construction an operation phase of the project. • In the event a stewardship of retained areas is not successful, regular monitoring of the health of the retained population will be undertaken throughout the life of the project as guided by the BMP and, if identified, negative pressures acting on the population will be subject to management.	Prior to construction – during construction	Proponent / Principal contractor
B4	Indirect impacts on retained native vegetation, habitat and native species	• Project fencing will be designed so as not to create barriers to fauna movement, nor to funnel fauna species into dead ends. Egress points will be provided for fauna that do enter the project site (both construction and operational). • Perimeter fencing will contain fauna friendly components at select points.	Prior to construction – during construction	Proponent / Principal contractor

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		• Ensure all works areas and access routes are clearly delineated and sign-posted from the outset of the project construction phase to avoid unauthorised/accidental access to retained areas. • Develop and implement specific erosion and sediment controls described in a CEMP, such as: – Minimising the area and duration of soil disturbance. – Progressively rehabilitate disturbed areas. – Temporary or permanent earth banks and silt fences. Trench blocks (i.e. trench/sack breakers) and compaction of backfilled soils to be used to prevent subsurface erosion. – Specific Erosion and Sediment Control Plans for waterway crossings. • All material stockpiles, vehicle parking and machinery storage, and other ancillary works are to be located within areas considered within the current assessment and not be located within retained vegetation outside the development footprint. • A waste management plan will be developed to ensure rubbish and construction waste are properly managed, and do not attract pest species. • Cleared vegetation, which may be mulched or stored for re-use on site, should be: – Stockpiled separately from topsoil in a manner which facilitates respreading or salvaging, avoids damage to adjacent live vegetation and does not impede wildlife. – Where possible, mulch produced from native vegetation should be reused for landscaping and site rehabilitation and spread <10cm deep to aid in retention of native seed bank. • Commit to undertaking ongoing pest animal control in conjunction with a local/regional pest control program (or providing a monetary contribution towards), and relevant landowners, to ensure a strategic approach can be achieved.		
B5	Reduced viability of adjacent habitat due to edge effects	• The CEMP will include an Groundcover Management Plan, including landscaping and rehabilitation components that will ensure areas of temporary disturbance are rehabilitated via best practice ecological restoration techniques. • Re-use felled vegetation (logs and tree-hollows) and other habitat features to increase the habitat values of any retained and adjacent vegetation. • Any revegetation / rehabilitation or vegetation screening works within and/or contiguous with areas of native vegetation are to use locally sourced (local provenance) seed stock only. All species installed are to be locally indigenous and suitable and characteristic of the surrounding PCTs.	Prior to construction – during construction	Proponent / Principal contractor

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
B6	Reduced viability of adjacent habitat due to noise, dust or light spill	• The CEMP will include a plan to ensure: – Minimisation of the amount of time that noise, light and vibration impacts are occurring. – Ensure the smallest machinery that can complete the required works are used to reduce potential noise and vibration impacts. – Regularly train workers and contractors to use equipment in ways to minimise noise. – Site managers periodically check the site and nearby residences for noise problems so that solutions can be quickly applied. – All plant and equipment will be turned off when not in use. – Known breeding habitat such as tree hollows and nests adjacent to works areas will be considered in noise management strategies. • The CEMP will include dust suppression to be undertaken as required using water sprays, water carts or other media on: – Unpaved work areas subject to traffic or wind. – Sand, spoil and aggregate stockpiles. – During the loading and unloading of dust generating materials. • Lighting will be designed in general accordance with Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting and the good lighting design Principals documented in Dark Sky Planning Guideline. • Lighting will be designed so as not to shine onto adjacent retained vegetation and habitats where possible.	Prior to construction – during construction	Proponent / Principal contractor
B7	Transport of weeds and pathogens to/from the site to/from adjacent vegetation	• A Biosecurity Management Plan will be prepared as part of the project's CEMP and will detail measures to prevent the spread of weeds and pathogens, and other biosecurity items into or out of the impact area upon implementation. • The plan will include prescriptions for regular monitoring and control of weeds.	Prior to construction – during construction	Proponent / Principal contractor
B8	Adaptive management strategies proposed to monitor and respond to impacts on biodiversity values that are uncertain	• All plans will be progressively reviewed and updated throughout operations. • All adaptive management strategy plans, including the BMP, will form part of an overarching Environmental Management Strategy (EMS).	Prior to construction – during construction-operation	Proponent / Principal contractor

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		• Preparation of a BMP will ensure mitigation strategies are properly implemented during construction and operation of the project. – The BMP will be prepared by a qualified ecologist or consulting company in consultation with regulators including BCS, part of NSW DCCEEW. – The BMP will be implemented for all stages of the project (pre-construction, construction, operation and decommissioning). – Mitigation strategies included in the plan will include (but are not limited to): ▪ Permit system for the clearing of native vegetation. ▪ Installation of no-go zones and delineation of vegetation to be removed/retained. ▪ Pre-clearance procedures for vegetation to be removed. • Unexpected finds procedure that includes strategies to minimise, mitigate and potentially offset unexpected impacts to threatened species not recorded during the preparation of the BDAR. ▪ Details of protection procedures for direct impacts on threatened flora. ▪ Requirements for revegetation or screening works including suitable species and requirements around local provenance and seed sources, and the re-use of felled vegetation and salvaged habitat features. ▪ Fencing requirements for No-Go Zones. ▪ Management requirements for stockpiles, vehicle parking, machinery storage, other ancillary works. ▪ Pest management requirements. ▪ An adaptive management strategy and timing of regular review/updates. ▪ Further detail as provided in Section 7.1 below.	Prior to construction – construction – operation.	Proponent / Principal contractor
B9		**Partial Loss** • A Groundcover Management Plan will be prepared to measure any partial loss and targets mentioned in Section 6.4 and Table 56, and ensure suitable mitigation and adaptive management strategies are implemented to achieve set targets. The plan will: – Demonstrate locations of baseline BAM plots and control BAM plots used for ongoing monitoring. – Demonstrate procedures to ensure that no more than 40% of the solar array areas within mapped PCT 26 (sparse and DNG condition) would be subject to complete loss of groundcover during construction;	Prior to construction – construction – operation.	Proponent / Principal contractor

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		– Targeted weed management measures to control and prevent the spread of noxious weeds. • Biannual (spring and summer) monitoring program to assess the condition of PCT26 within the solar array areas on an annual basis for the first 3 years following commencement of operations; – Performance targets for PCT26 vegetation integrity within the solar array areas linked to the partial loss calculations described in Section 6.4.2; – Trigger, action, response plan which identifies steps to be taken in response to a deterioration in vegetation integrity of PCT26 within the solar array areas including reference to adaptive management including adjustment of weed treatment, slashing regimes and direct seeding if required. – Monitoring outcomes will be subject to an independent audit following the 3rd year of monitoring. • If following completion of required partial loss monitoring and reporting as per the BMP, it was determined to have not succeeded in achieving set targets, then a full credit liability would be required to be retired for relevant zones, totalling 25,716 credits (10,786 PCT 26 DNG and 14,930 PCT 26 sparse) , instead of the 19,552 partial liability.		
B10		• Preparation of a Groundwater and Soil and Water Management Plan (or similar) that will: – Describe measures that will be employed to minimise soil erosion and the discharge of sediment and other pollutants from the site during construction and operation of the project. – Describe how water will be managed to achieve compliance with consent. – Establish responsibilities and reporting requirements. – Establish surface water quantity and quality monitoring requirements. – Establish trigger action response plans to enable progressive improvement.	Prior to construction – construction – operation.	Proponent / Principal contractor
	Prescribed impacts			
B11	Habitat connectivity	• The BMP will identify opportunities for nature positive measures to promote habitat clusters and connectivity within the development footprint. These measures are subject to detailed design. The following measures provide examples of measures that will be considered beyond typical mitigation of impacts. These include but not limited to – Wildlife Corridors: Flora and Riparian Pathways ▪ Maintain riparian zones within the subject land (e.g. Black Box dominated areas) by revegetating in gullies and increasing groundcover across site. This		

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		will reduce flood speed, height and damage from heavy rainfall to soils and local infrastructure. ▪ Conserve and revegetate Weeping Myall woodland to improve habitat connectivity degraded from previous land management ▪ Growing native vines, relevant to the local PCTs and region, up fences can provide extra source of nectar for birds and insects. – Wildlife Friendly Fences – Native groundcover, grasses and vegetation ▪ Consider using rollers on grasslands and groundcover as a preferable method to prepare ground for construction instead of land excavation. ▪ Manage rotational grazing with long rest periods for vegetation growth and repopulation, complying with partial loss targets and fire management requirements. – Flora/Fauna Abundance and Diversity ▪ Create wildlife havens and habitat clusters by facilitating native groundcover underneath solar arrays, and planting groups of shrubs at distances of up to 80m apart for woodland birds and small-medium mammals. Provide foraging and nesting habitat for bird species (e.g., Superb Parrot and Grey-crowned Babblers) and resources for Major Mitchells Cockatoo. ▪ Support active management to complying with partial loss targets within native and derived native grasslands between solar arrays and infrastructure providing foraging resources for raptor species and local parrot species. – Construction and Maintenance Criteria ▪ Prevent introduction, movement and spread of invasive species on/off site by washing down vehicles before entering designated development areas and ensure this waste does not flow into nearby watercourses ▪ Provide tool-box talks to all site personnel to communicate mitigation measures.		
B12	Vehicle strikes	• Speed limit for construction vehicles along Kidman Way and Bundure Road, should be reduced to minimise increased risk of vehicle strike on fauna. • Speed limits within the subject land should be enforced for the life of the project.	During construction - operation	Proponent / Principal contractor

	Measures to mitigate and manage impacts	Action	Timing	Responsibility
		• Fauna species (particularly threatened species) susceptible to vehicle strike will be included in project inductions to increase knowledge of the wildlife occurring within the subject land. • A vehicle strike protocol, including details of local WIRES contacts will be created and made available to all staff. • Suitable speed limit reductions will be determined during preparation of the BMP.		
B13	Construction in waterways & removal of dams	• Construction within waterbodies will be preferentially undertaken when dry. • During the micro siting process, where possible, construction in wet areas including dams, drainage lines and creek lines should be avoided. • Where avoidance or undertaking works when waterbodies are dry is not possible, all areas containing water, e.g. dams, must be surveyed as part of the pre-clearance and clearing survey outlined in the CEMP including: – Engaging a qualified and licensed ecologist to be present during dewatering of farm dams, to undertake fauna relocation (e.g. turtles, frogs, etc.) into an appropriate nearby habitat. – Once dewatering is complete, dams are to be left for a minimum of 48 hours to allow species such as frogs and yabbies to naturally relocate. Where possible, dewatered dams should be left dry for a minimum of 1 week.	Prior to construction – during construction.	Proponent / Principal contractor
B14	Fragmentation of movement corridors	• Investigate the establishment of Biodiversity Stewardship Sites in the immediate locality of the project to ensure local habitats outside the project are improved and conserved in perpetuity. • Ensure ongoing protection of roadside corridors as far as practicable and prevent indirect impacts through implementation of the BMP. • The following opportunities will be fully explored as a part of the detailed design: – Opportunities to further minimise the development footprint and clearing within important movement corridors for fauna. – Opportunities for post-works restoration of habitat connectivity within important movement corridors for fauna. – Areas subject to temporary disturbance will be rehabilitated using a native species planting schedule as much as practical considering any operational and safety constraints. – The total area exposed and cleared at any one time will be minimised and planned to allow for fauna movement during construction and periods of temporary disturbance	Prior to construction – construction.	Proponent / Principal contractor

7.1 Biodiversity Management Plan

A BMP will be implemented demonstrating adaptive management strategies to ensure key milestones are achieved. The BMP will be reviewed and approved by BCS prior to construction, and include the following project commitments:

- Protecting vegetation and fauna habitat outside the development footprint and managing the remaining remnant vegetation and fauna habitat within or surrounding the subject land toward a benchmark state using improve and maintain principles, minimising indirect impacts, especially to known threatened flora species and potential fauna species such as Plains Wanderer, Southern Bell Frog and Superb Parrot.
- Demarcation of retained areas of vegetation and particularly important mapped areas of Plains Wanderer.
- Ongoing vegetation monitoring of retained vegetation areas including collection of BAM plots prior to construction (if no baseline data is applicable) and at year 1, year 2 and year 3 post construction.
- Training and education awareness for all construction staff and operational staff on key threatened species, both flora and fauna, relevant to the region and project.
- Contain relevant sub plans for overall weed and biosecurity management, groundcover (partial loss) management, pest animal management and rehabilitation management.
- The objectives of the groundcover and partial loss component is to stabilise the soil surface, minmising weed infestation and loss of soil capability, whilst aiming to retain as much perennial grass and forb cover as possible, in accordance with approved targets and monitoring requirements, which will provide long term resilience and improved ecosystem functionality within and adjacent to the development footprint.
- Fauna monitoring and management protocols including identification and reporting of fauna mortalities to the relevant BCS office.
- Collection of detailed baseline weed data and ensuring no increase of key emerging weeds or invasive pests.
- Commit to ongoing consultation with Local Land Services (LLS) on fox control and baiting programs.
- Marking and identification of retained tree hollows and measures to minimise impacts to these features.
- Two stage pre-clearing protocols, including pre-clearing inspections, establishment of exclusion zones and on-ground identification of specific habitat features to be retained and/ or relocated.
    - For example, occupation surveys for no go threatened flora areas, application of exclusion measures / deterrents prior to vegetation clearing / earthworks, works undertaken in presence of spotter / catcher.
- Monitoring of soil and water controls to prevent indirect impacts associated with water pollution to the Coleambally irrigation channel potentially supporting a more sustained population of Southern Bell Frog.
- Clear performance targets and monitoring criteria.
- Corrective actions.
- Timing and responsibilities.

- Annual reporting requirements and consultation program with the relevant regulator.

A recommended outline of the BMP is provided below with further details demonstrated within the mitigation measures listed in Table 58.

- Introduction
  - Background
  - Management scope and objectives
- Planning requirements
- Construction and operational activities
- Habitat management
  - Flora and fauna values
  - Soils
  - Weeds and pests (i.e. key emerging weeds and priority weeds)
  - Baseline data
- Environmental mitigation measure
- Site specifics
  - Inductions
  - Erosion /sediment control
  - Retained vegetation and rehabilitation works
  - Plains wanderer awareness and management requirements.
- Adaptive management
  - Performance criteria, triggers, and responses
  - Partial loss criteria, triggers and monitoring requirements.
- Compliance management
- Review and Improvement

7.2 Adaptive management strategy

Many impacts are difficult to predict or assess prior to commencement of a project and therefore the CEMP, OEMP or similar will contain an adaptive management component, particularly the groundcover management plan.

Adaptive management strategies will be receptive to any new and relevant data that may arise through ongoing assessment and monitoring and are key to the successful implementation of crucial objectives yet also allow flexibility to changing dynamics and ongoing feedback and results. This includes measures to monitor predicted and uncertain impacts which will trigger adaptive management actions and allow for effective and quick responses. Management plans reviewed and approved by BCS will contain key adaptive management components.

7.3 Mitigation cost estimates for significant impacts

Costs of mitigation as a result of significant impacts from the project will be included in the BMP once final designs are known and post approval.

8 Impact summary

8.1 TECs and threatened species

This section outlines the impact summary for the project which has identified and assessed impacts on TECs and threatened species that are at risk of a SAII including:

- Addressing all criteria for each TEC listed as at risk of an SAII present on the subject land.
- Addressing all criteria for each threatened species at risk of an SAII present on the subject land.
- Documenting assumptions made and/or limitations to information.
- Documenting all sources of data, information, references used or consulted.
- Clearly justifying why any criteria could not be addressed.
- Identification of impacts requiring offset.
- Identification of impacts not requiring offset.
- Identification of areas not requiring offset

Figure 17 shows the location of threatened species at risk of an SAII within the subject land. Figure 18 shows the location of impacts requiring offset, impacts not requiring offset and areas not requiring assessment.

8.2 Serious and irreversible impacts

In accordance with Clause 6.7 of the BC Regulation 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:

- Principle 1: It 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.
- Principle 2: It 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.
- 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.
- 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.

Four species are considered to meet the above principles, however only one (Plains Wanderer) is still considered to have indirect and prescribed impacts attributed:

- Plains Wanderer Pedionomus torquatus. – Assessment undertaken.
- Austral Pillwort Pilularia novae-hollandiae – Summary provided however no detailed assessment is required as the species will not be impacted.
- Claypan Daisy Brachyscome muelleroides- – Summary provided however no detailed assessment is required as the species will not be impacted.

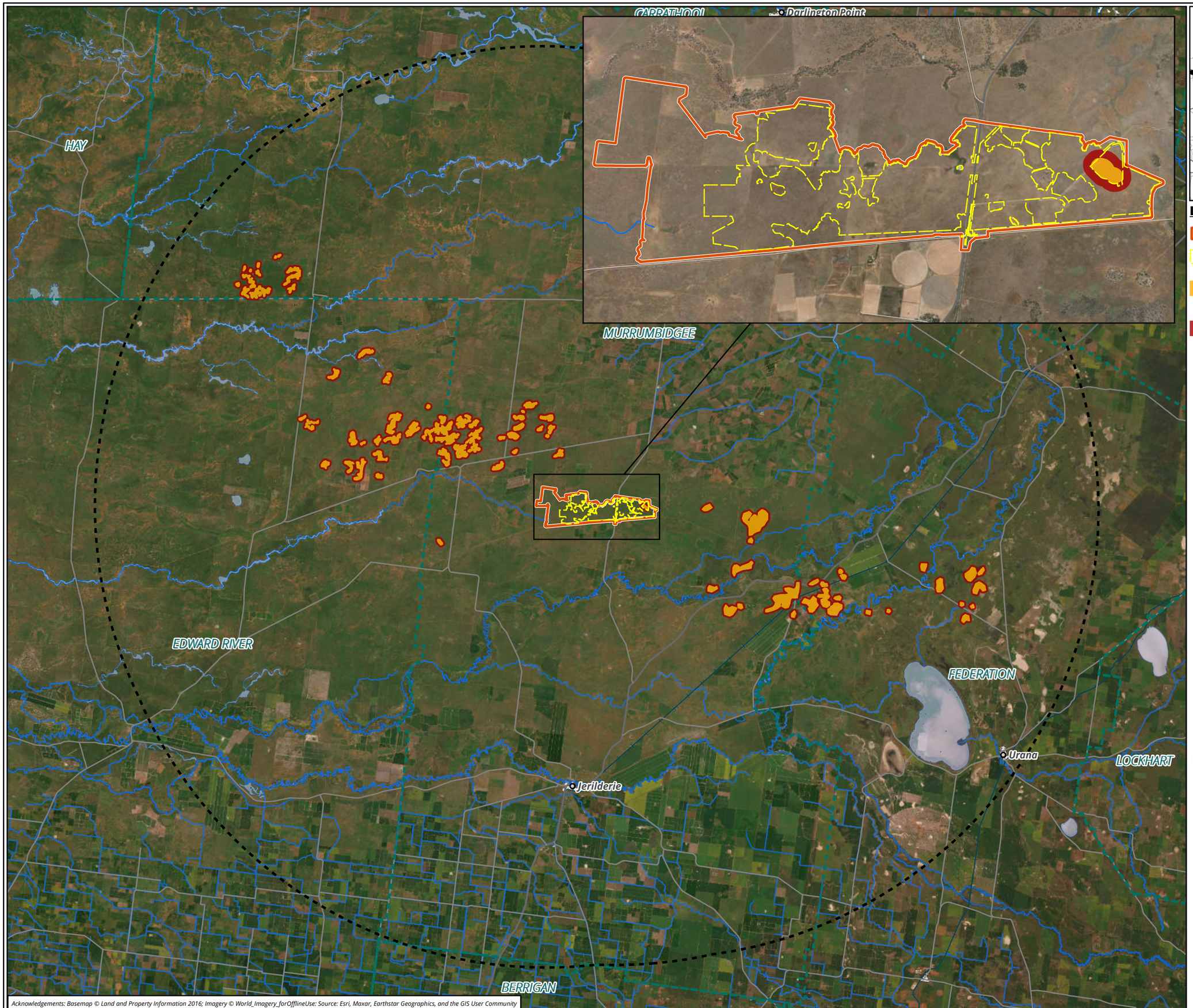
- Bindweed Convolvulus tedmoorei- – Summary provided however no detailed assessment is required as the species will not be impacted.

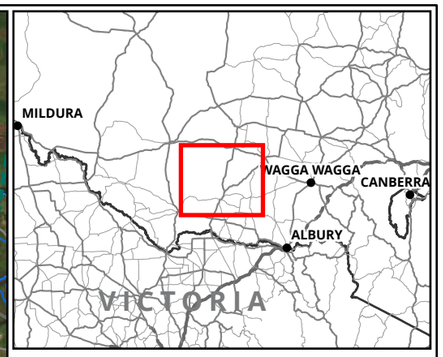
Detailed SAII assessment is provided in Appendix 5. A summary of the results of the SAII is provided below in Table 59.

Table 59 SAII summary

SAII entity	Summary of assessment
Austral Pillwort ***Pilularia novae-hollandiae***	Surveys for *Pilularia novae-hollandiae* were interrupted by flooding events in November 2022 and therefore the species was unable to be adequately surveyed prior to EIS exhibition and was thus assumed to be present within areas of suitable habitat. However, additional surveys were undertaken in suitable microhabitats for this species in November 2023. No individuals were detected. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential habitat including within seasonally damp situations such as shallow depression and on heavy grey cracking clays to lighter clay loam soils, in grassland and grassy woodland. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. This species prefers seasonally moist grey gilgaied soils on the floodplains within PCTS such as PCT 13, PCT 15, PCT 17, PCT 45 and PCT 46, which occur within the subject land, as well as areas of PCT 26, where it occurs with slight variations in microrelief on more gilgaied grey clay soils. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.
Claypan Daisy ***Brachyscome muelleroides***	*Brachyscome muelleroides* has been surveyed for throughout the development footprint in September 2022/2023 and September/November 2023. Surveys were undertaken in microhabitats that are more frequently or periodically flooded or have seasonally moist to water-logged soils, particularly in association with seasonal aquatic plants such as *Marsilea* species. No individuals were detected. In terms of avoidance, detailed constraints assessment modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential habitat including within seasonally damp situations such as shallow depression sand around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland and grassy woodland. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. This species prefers seasonally moist grey gilgaied soils on the floodplains within PCTs such as PCT 45 and PCT 46, which occur within the subject land. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.
Bindweed ***Convolvulus tedmoorei***	*Convolvulus tedmoorei* has been surveyed for throughout the development footprint in September 2022 and September 2023 and has not been recorded. Optimal habitat is limited within the subject land. Surveyed was undertaken in suitable microhabitats in vegetation zones that are more frequently or periodically flooded or has seasonally moist grey soils. In terms of avoidance, detailed constraints assessments modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas of grey clay soils as far as practicable. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and

SAII entity	Summary of assessment
	5.3. This species prefers grey clay soils on the floodplains of the Darling and Murrumbidgee Rivers within PCTs such as PCT 17, PCT 26, PCT 45 and PCT 46, which all within the subject land. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.
Plains Wanderer ***Pedionomus torquatus***	Throughout the development of the project layout, design decisions have been implemented to avoid impacts to Plains Wanderer habitat from a very early stage. This includes the avoidance of areas of Important Mapped Habitat, and restricting development to only 0.94 ha of potential habitat that falls within the 100 m buffer of an important mapped area (Figure 17). This section of the development footprint is separated from the mapped important habitat area by Coleambally Irrigation Channel (Figure 11). Areas of important mapped habitat for the Plains Wanderer will not be isolated. Gates and perimeter fencing follow the southern and western portions of important mapped habitat buffer. The portion of the development footprint that progresses around the northern and eastern buffer area is for vehicle access only, and links up to, and follows an existing farm track network that crosses the Coleambally irrigation channel and existing bridge. Due to the dynamic nature of the grasslands critical to this species, areas within the subject land may be suitable for this species in the future, however, the most optimal areas have been avoided within the development footprint as far as practicable. Areas of habitat are also fragmented by the existing irrigation channel. Supplementary surveys undertaken did not detect this species. Furthermore indirect impacts associated with disruption or abiotic process, the loss of functionally important species, and/or exacerbation of fragmentation and isolation are considered unlikely to be substantial as a result of the project. As a result of avoidance measure implemented, and mitigation measures, specific impacts requiring offsets for the species are no longer proposed.





Legend

- Subject land
- Development footprint
- Plains-wanderer important habitat (plus 100m buffer)
- Plains-wanderer important habitat (plus 300m buffer)

Figure 17 Serious and irreversible impacts

0 5 10 15

Kilometers
Scale: 1:400,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 08 May 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F15-19.aprx
Layout: 37263_F17_SAII

8.3 Identification of impacts requiring offset

8.3.1 Impacts to native vegetation (ecosystem credits)

As outlined in Section 9.2.1 of the BAM, the assessor must determine an offset for all impacts of proposals on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥15, where the PCT is representative of an EEC or a CEEC.
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community.
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

On this basis, all vegetation zones require offsetting as vegetation integrity score is greater than 20.

The offset requirement for the project was calculated using the BAM Calculator. Table 60 provides a summary of the ecosystem credit offsets required for impacts from the project within the development footprint.

Table 60 Total offsets required (ecosystem credits)

Vegetation zone	Area (ha)	Impact	VI score	Future VI score	Offset required	TEC	HBTs	Credit requirement
13_Moderate	0.12	Direct	70.8	0.0	Yes	No	Yes	4
15_Mod_Good	0.16	Direct	70	0.0	Yes	No	Yes	5
17_Mod_Good	1.06	Direct	77.3	0.0	Yes	No	No	36
17_Moderate	0.08	Direct	41	0.0	Yes	No	No	1
26_DNG	381.44	Direct – Split complete loss	25.1	0.0	Yes	No	No	4,784
26_DNG	478.6	Indirect – Split partial loss	25.1	9.7	Yes	No	No	3,692
26 DNG*	*860.04*	*Complete loss/full impact*	*25.1*	*0.0*	*Yes*	*No*	*No*	*10,786*
26_Intact	0.42	Direct	48.4	0.0	Yes	Yes – WM	No	10
26_Sparse	386.09	Direct – Complete loss	32.5	9.7	Yes	Yes – WM	No	6,271
26_Sparse	533.10	Indirect – Partial loss	32.5	0.0	Yes	Yes – WM	No	6,086
26 DNG*	*919.19*	*Complete loss/full impact*	*32.5*	*0.0*	*Yes*	*Yes – WM*	*No*	*14,930*

Vegetation zone	Area (ha)	Impact	VI score	Future VI score	Offset required	TEC	HBTs	Credit requirement
45_Mod_Good	0.05	Direct	91.1	0.0	Yes	No	No	3
46_Moderate	1.68	Direct	91.0	0.0	Yes	No	No	93

Note, rows marked with * above for PCT 26 DNG (10,786 credits) and PCT 26 sparse (14,930 credits) reflect a full credit liability required in the event that partial loss management, mitigation and monitoring, following implementation of the groundcover management plan, was not successful.

8.3.2 Impacts to threatened species and their habitat

As outlined in Section 9.2.2 of the BAM an offset is also required for the impacts of projects on the habitat of threatened species assessed for ecosystem credits and associated with a PCT in a vegetation zone with a vegetation integrity score of ≥17.

The offset requirement for the project was calculated using the BAM Calculator. Table 61 provides a summary of the species credit offsets required for impacts from the project within the development footprint.

Table 61 Offsets required (species credits)

Species	Impact	Vegetation zone	Area (ha)	Biodiversity risk weighting	Credit requirement
Swainsona murrayana	Direct	PCT 26 DNG	5.5	2	76
Swainsona sericea	Direct	PCT 26 DNG	5.5	2	76
Southern Bell Frog	Direct/ Prescribed	200m buffer of habitat, records and associated PCTs in accordance with relevant guidelines. • PCT 15 Moderate – 0.16 ha • PCT 17 Mod_Good – 0.22 ha • PCT 26 DNG – 106.18 ha • PCT 26 Intact – 0.29 ha • PCT 26 Sparse – 13.66 ha • PCT 46 Moderate – 1.64 ha	122.16	2	1,647

Species polygons for the above three species credit species impacted by the project are illustrated in Figure 11.

8.3.3 Staging of offsets

The development footprint has been broken up into three areas to facilitate the staged retirement of the project's biodiversity credit liability. Spark Renewables will confirm the offset staging plan with DPHI prior to the commencement of construction. This is discussed further in Section 9.4, however tables are shown in Table 62 through to Table 64.

Table 62 Enabling works credit breakdown

Vegetation zone	Impact (ha)	Credit requirement
Ecosystem credits		
13_Moderate	-	-
15_Mod_Good	-	-
17_Mod_Good	-	-
17_Moderate	-	-
26_DNG	17.56	220
26_Intact	-	-
26_Sparse	3.13	51
45_Mod_Good	-	-
46_Moderate	-	-
Species credits		
Swainsona murrayana	-	-
Swainsona sericea	-	-
Southern Bell Frog	0.38	5

*** Includes credits for both complete loss and partial loss areas**

Table 63 Stage 1 credit breakdown

Vegetation zone	Impact (ha)	Credit requirement
Ecosystem credits		
13_Moderate	0.12	4
15_Mod_Good	-	-
17_Mod_Good	0.78	26
17_Moderate	-	-
26_DNG	622.54	7,807
26_Intact	0.29	7
26_Sparse	101.99	1,656
46_Moderate	1.65	91
Species credits		
Swainsona murrayana	5.5	76
Swainsona sericea	5.5	76
Southern Bell Frog	103.38	1,350

*** Includes credits for both complete loss and partial loss areas**

Table 64 Stage 2 credit breakdown

Vegetation zone	Impact (ha)	Credit requirement
Ecosystem credits		

Vegetation zone	Impact (ha)	Credit requirement
13_Moderate	-	-
15_Mod_Good	0.16	5
17_Mod_Good	0.28	9
17_Moderate	0.08	1
26_DNG*	219.93	2,758
26_Intact	0.14	3
26_Sparse*	814.07	13,215
45_Mod_Good	0.05	3
46_Moderate	0.03	2
Species credits		
Swainsona murrayana	-	-
Swainsona sericea	-	-
Southern Bell Frog	19.96	430

*** Includes credits for both complete loss and partial loss areas**

8.4 Identification of impacts not requiring offset

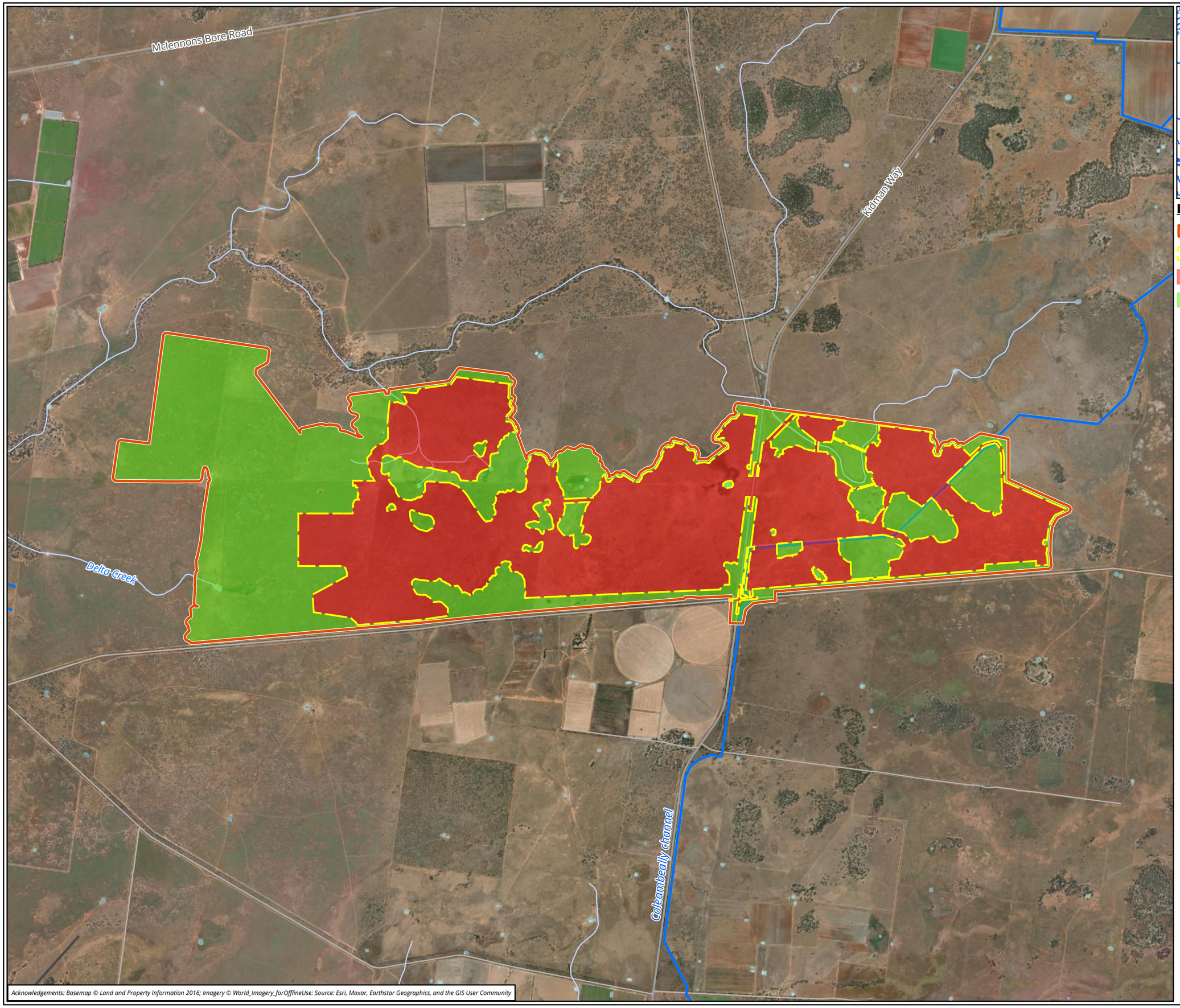
As outlined in Section 9.2.1 of the BAM, offsets are not required for impacts to vegetation zones that have a vegetation integrity score of <17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community, or <15, where the PCT is representative of an EEC or a CEEC.

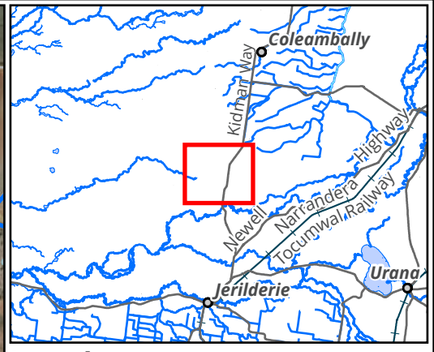
Indirect impacts do not require offsetting and are subject to detailed mitigation and management to improve and maintain vegetation within criteria set in the BMP, including groundcover management and adaptive management plans.

8.5 Identification of areas not requiring assessment

Following assessment the following areas do not require assessment in accordance with BAM:

- Areas of Category 1 Exempt land with exemptions to prescribed impacts.





Legend

- Subject land
- Development footprint
- Impacts requiring offsets
- Impacts not requiring offset

Figure 18 Impacts requiring or not requiring offsets

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 08 May 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F15-19.aprx
Layout: 37263_F18_Offsets

9 Biodiversity Offset Strategy

9.1 Overview

In order to secure the biodiversity offset liability expected to be required for the project's residual unavoidable impacts, Spark Renewables has commenced investigations into the establishment of local Biodiversity Stewardship Sites.

To date, five properties have been subject to desktop and on-ground assessment to determine their suitability for establishment of Biodiversity Stewardship Sites, and to generate offset credits suitable for the project's requirements, these properties are as follows:

- Four Corners – Approx. 4200 ha area to the north-west of the subject land.
- Goolgumbla – Approx. 2100 ha area to the north of the subject land.
- Red Swamp – Approx. 1100 ha area to the north of the subject land.
- Stuart – Approx. 3400 ha area to the south of the subject land.
- Turkey Plains – Approx. 950 ha area to the north of the subject land.

9.2 Offsetting obligations and options

As outlined above in Table 60 and Table 61 and summarised in Table 65 below, the project is expected to require offsets for residual unavoidable impacts to six PCTs and six species credit species. Table 65 also provides a summary of the projects expected offset liability (assuming 100 % loss of biodiversity values beneath solar arrays).

Table 65 Summary of project offset requirement (total)

Biodiversity value	Offset trading group (OTG)	Area impacted (Ha)	Credits required
PCT 13	Inland Floodplain Woodlands ≥50% to 70% cleared	0.12	4
PCT 15		0.16	5
PCT 17	Inland Floodplain Shrublands ≥50% to <70% cleared	1.14	37
PCT 26	Weeping Myall Woodland TEC	919.61	14,940
PCT 26 (DNG)	Riverine Plain Woodlands ≥90%	860.04	10,786
PCT 45	Riverine Plain Grasslands ≥50% to <70% cleared	0.05	3
PCT 46	Riverine Plain Grasslands <50% cleared	1.68	93
Swainsona murrayana	N/A	5.5	76
Swainsona sericea	N/A	5.5	76
Southern Bell Frog	N/A	122.16	1,647

To secure the above offset liability Spark Renewables has three broad options, which include:

- Payment to the Biodiversity Conservation Fund (the Fund) managed by the Biodiversity Conservation Trust (BCT).
- Purchase of credits from the open market.
- Establishment of a Biodiversity Stewardship Site(s) to generate credits for offsetting the project specifically.

Each of these options has some potential benefits and drawbacks, which are briefly outlined below.

Option 1: Payment to the Biodiversity Offset Fund managed by the BCT

Satisfying an offset obligation by paying to the Biodiversity Offset Fund (the Fund) has the major benefit of being an expedited and unambiguous way for a proponent to meet their obligations. However, it does include increased costs associated with the 'Risk premium', and an administrative cost per credit added on top of the costs to source/generate the credits, calculated by the BCT. As such, Payment to the Fund is considered likely to be the most expensive option available to a proponent, however it requires the least amount time and effort in offset security, which can both be substantial (e.g., compared to establishing a Stewardship Site).

Option 2: Purchase credits from the open market

Biodiversity credits exist in an open market-based system whereby an owner of a Biodiversity Stewardship Site, who has generated a range of biodiversity credits, lists their credits in an online database for proponents with a credit obligation to interrogate and enter into price negotiations with relevant credit holders. As an open market, the price of credits is set by supply and demand factors as well as requirements for credits generated at a Biodiversity Stewardship Site to be sold for at least the minimum portion each credit contributes to the management costs of that site (Part A cost, further detailed below). Initial credit sales must all go to funding the management actions required to be undertaken at the Biodiversity Stewardship Site (the costing of which is termed the 'Total Fund Deposit' [TFD]), however once the TFD has been fully satisfied, any future credit sales are generally direct profit to the credit owner.

Potential benefits from procuring credits from the open market include a potential increase in offsetting options when applying the 'Like-for-Like' rules included in the BAM, and then further again with the 'Like for Like Variation Rules', as well as the ability to negotiate with sellers on price, potentially with multiple credit holders. Drawbacks include an ongoing general paucity of credits available on the market (which is particularly relevant to projects with large credit obligations), sellers setting a high price and being unwilling to negotiate, timeframes associated with negotiations, timeframes associated with procurement of a range of credit types (where required), timeframes to process sales, and additional credit 'transfer' and 'retirement' fees.

Option 3: Establish a Biodiversity Stewardship Site

Establishment of a Biodiversity Stewardship Site (or multiple sites) with the intention of generating credits to satisfy the project's offset obligation is considered likely to be the most suitable option available to Spark Renewables for the project. This is due to the expected quantum of offsets that will be required for the project, and the associated cost of securing those offsets through either the open credit market or via payment to the Fund. The suitability of this option is however dependent on securing land that is both suitable for the establishment of a Biodiversity Stewardship Site and supports PCTs/habitats considered Like-for-Like with those impacted by the project. Further information is provided below.

9.3 Local offset feasibility

Assessments undertaken to date of offset suitability over the five above listed properties (the subject properties) are detailed below.

Background research

Desktop review of background information was undertaken to provide ecological context to the subject properties and items to consider during further assessment, including:

- BioNet Atlas of NSW Wildlife for BC Act listed threatened entities.
- Protected Matters Search Tool for EPBC Act matters of national environmental significance.
- Vegetation mapping including:
  - Riverina State Vegetation Type Mapping (SVTM) (DPIE 2016).
  - Biosis PCT mapping undertaken across the broader project area to date.
- Establishment of a Stewardship Site case for the project in the BAM Calculator and assessment of predicted threatened species.
- Research into factors influencing the boundaries of the potential Biodiversity Stewardship Sites such as areas to be excluded via review of Land and Property Information easements spatial layers, MinView searches, current cadastral databases, land zoning, and research into any existing offset obligations.

Field investigation

Field investigations of the subject properties were completed by two experienced Biosis ecologists, over five days (24-26 July and 01-02 August 2023), and included:

- Rapid ground-validation of mapped vegetation to preliminary PCTs and broad scale mapping of ecological condition states.
- Determination of high-level expected management issues/actions required to be undertaken to generate the biodiversity credits if a Biodiversity Stewardship Site is established. Including assessment of any management issues considered substantial enough to preclude areas from being entered in a Biodiversity Stewardship Site.
- Collection of floristic plot data (BAM plots) used for calculation of credit generation potential.
- Assessment of areas of potential habitat for threatened species that could generate 'species credits', and/or confirmation of existing species records.

Credit calculations and suitability assessment

Following completion of the field investigations, analysis of the data collected was undertaken to:

- Map and calculate the areas of vegetation zones.
- Calculate the estimated number of biodiversity credits generated by the subject properties through entry of vegetation zone areas and relevant BAM plot data into the online BAM Credit Calculator.
  - BAM plot data collected across the subject properties was supplemented with data collected during the preparation of this BDAR. Where no plot data was available for certain PCTs present

on the subject properties, appropriate credit generation ratios were applied based on similarities in ecological condition and BDAR / Biodiversity Offset Strategy field data.

- Complete a suitability assessment, based on Offset Trading Group (OTG), to determine which areas of the subject properties would be best suited to generate credits that could be used to offset the impacts of the projects.

Results

Background research

Desktop review of background information found a range of suitable PCTs as being mapped across the subject properties and existing records of target species credit species, which have the potential to generate offset credits for the project. These items were ground validated with further detail provide below.

Desktop assessment into factors influencing the areas of each of the subject properties which can be entered into a Biodiversity Stewardship Site, such as the presence of utilities and assets and associated easements, mining leases, Crown Lands and other considerations such as existing conservation obligations, also found a range of items present across the subject properties. Such items generally require exclusion from a Biodiversity Stewardship Site, and as such coinciding areas of mapped vegetation and habitats cannot generate offset credits.

Table 66 provides the details of the factors influencing the potential boundaries of future Biodiversity Stewardship Sites at each of the subject properties, and provides an estimated percentage reduction in total area available for biodiversity credit generation (compared to the full extent of mapped vegetation and habitats on each site).

Table 66 Results of desktop research into factors influencing the Biodiversity Stewardship Site areas and boundaries

Biodiversity Stewardship site	Approx. area	Utilities from Dial Before You Dig searches	Mining leases	Crown lands	Other considerations	Percentage reduction in credit generation
Four corners	4203 ha	• Essential Energy easement present within the site along southern boundary adjacent to North Boundary Road.	• None present.	• A number of Crown Lands roads easements occur in a grid pattern through the site.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.
Goolgumbla	2131 ha	• Essential Energy underground earth/wires, poles and (assumed) overhead powerlines along Pooginook Road along site's western boundary, crossing through north-western lots away from the roadway. • Telstra cabling along Pooginook Road, unlikely to occur within or influence the site.	• None present.	• A Crown Lands road easement occurs through the centre of the site running in an east/west direction.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.
Red Swamp	1119 ha	• Transgrid communication cable in/adjacent to Kidman way, unlikely to occur within or influence the site. • Essential Energy underground earth/wires, poles and (assumed) overhead powerlines along Cadell Road along site's western boundary and Kidman Way along the site's south-eastern boundary. • Telstra cabling along Mclennons Bore Road, unlikely to occur within or influence the site. • Telstra cabling along Kidman Way appears to occur within the site.	• None present.	• Crown Lands road easements occur along the northern, western and southern boundaries of the site and encroach slightly into the site.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.

Biodiversity Stewardship site	Approx. area	Utilities from Dial Before You Dig searches	Mining leases	Crown lands	Other considerations	Percentage reduction in credit generation
Stuart	3365 ha	• Essential Energy underground earth/wires, poles and (assumed) overhead powerlines occur through the central portion of the site from Mabins Well Road in the southern portion of the site, and Carrathool Road along the site's western boundary. • Telstra cabling / infrastructure along Mabins Well Road and Carrathool Road may occur within the site. • Telstra cabling / infrastructure occurs within the central portion of site in Lots 22 and 28 DP756311, and Crown Land road easements.	• None present.	• A number of Crown Lands roads easements occur within the northern and southern portions of the site.	• A number of areas of Category 2 – Sensitive Regulated Land occur within the property assumed to represent historic and/or current conservation agreements or set-asides etc. these areas have been excluded from the potential BSA areas.	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers. • 633 ha (168) excluded for assumed conservation areas.
Turkey Plains	967 ha	• Essential Energy poles and (assumed) overhead powerlines occur through the north-western potion of the site	• None present.	• Crown Lands roads easements occur in the north and south of the site running in an east/west direction.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.

Field investigation, Credit calculations and suitability assessment

Field investigations confirmed the presence of nine different PCTs across the five subject properties, details of which are provided in Table 67 below. Ecological condition was found to range from good to low and derived native grasslands.

Table 67 PCTs confirmed present within the subject properties

PCT	Offset Trading Group (OTG)	Four Corners	G'gumbla	Red Swamp	Stuart	Turkey Plains
10 River Red Gum – Black Box woodland wetland	Inland Riverine Forests <50% cleared				X	
13 Black Box – Lignum woodland wetland	Inland Floodplain Woodlands ≥50% to 70% cleared	X	X	X		X
15 Black Box open woodland wetland with chenopod understorey	Inland Floodplain Woodlands ≥50% to <70% cleared			X		
16 Black Box grassy open woodland wetland	Inland Floodplain Woodlands ≥50% to <70% cleared		X	X		X
17 Lignum shrubland wetland	Inland Floodplain Shrublands ≥50% to <70% cleared	X	X	X	X	
26 Weeping Myall open woodland	Weeping Myall Woodland TEC and Riverine Plain Woodlands ≥90%	X	X	X	X	X
28 White Cypress Pine open woodland	Sandhill Pine Woodland TEC		X		X	
44 Forb-rich Speargrass – Windmill Grass – White Top grassland	Riverine Plain Grasslands ≥70% to <90% cleared					X
164 Cotton Bush open shrubland	Riverine Chenopod Shrublands <50% cleared				X	

Threatened species habitat was assessed and habitat was recorded for species expected to require offsets as a result of the project, with Silky Swainson-pea record on the Turkey Plains property. Further assessment and targeted surveys would be required to determine the presence of the target threatened species across the subject properties.

Management actions that would be required to be undertaken following the establishment of a Biodiversity Stewardship Site across the subject properties were found to include fairly standard requirements such as; weed control, fence removal for fauna passage, fence installation/maintenance for stock exclusion, access track closures and maintenance, removal of dumped farm refuse and scrap building material, etc. None were found to be of significant concern in terms of preventing a BSA from being established over (portions of) the sites.

The offset credits that could potentially be generated at each property were assessed using BAM plot data collected across the subject properties, supplemented with relevant data collected from the BDAR. Table 68 provides the areas of each PCT and OTG recorded across the subject properties along with an estimate of the potential credits that could be generated (considering the exclusions detailed in Table 66). It should be noted that offset credit generation potential is considered an estimate only and further detailed assessment and collection of additional plot data is required to confirm the numbers presented herein. However the data in Table 68 provides a good indication of the amount of offsets each property would be able to provide, which match those expected to be required by the project.

Table 68 Summary of OTGs and PCTs mapped and potential credit generation across the subject properties (including consideration of solar and wind credit requirements)

Type	Stage / Property	Inland Riverine Forests <50% (PCT 10)	Inland Floodplain Woodlands ≥50% to 70% (PCT 13, 15, 16)	Inland Floodplain Shrublands <50% (PCT 24, 160)	Inland Floodplain Shrublands ≥50% to <70% (PCT 17)	Riverine Plain Woodlands ≥90% (PCT 26 DNG)	Weeping Myall Woodland TEC (PCT 26 non-DNG)	Sandhill Pine Woodland TEC (PCT 28)	Natural Grasslands CEEC (PCT 44, 45, 46)	Riverine Chenopod Shrublands <50% (PCT 164)	Stage / Property total
BSA	Four Corners	0	86	0	43	15022	138	0	0	0	15289
BSA	Goolgumbla	0	2507	0	264	4304	1805	307	0	0	9188
BSA	Red Swamp	0	1077	0	66	1160	3149	0	146	0	5598
BSA	Stuart	119	0	0	373	6825	1766	564	0	259	9907
BSA	Turkey Plains	0	244	0	0	1520	1498	0	29	0	3289
BSA	**Totals**	**119**	**3914**	**0**	**747**	**28830**	**8356**	**871**	**174**	**259**	**43272**
Solar	Early works	0	0	0	0	220	51	0	0	0	271
Solar	Stage 1	0	4	0	26	7,807	1,663	0	91	0	9,591
Solar	Stage 2	0	5	0	10	2,758	13,215	0	5	0	15,993
Solar	**Total**	**0**	**9**	**0**	**37**	**10,785**	**14,929**	**0**	**96**	**0**	**25,855**
Wind	1 (East)	0	117	3	54	1669	6835	11	819	0	9508
Wind	2 (West)	4	546	137	23	2204	5671	1175*[2]	5253*[2]	0	15013
Wind	**Total**	**4**	**663**	**140**	**77**	**3873**	**12506**	**1186**	**6072**	**0**	**24521**
Total +/-		**115**	**3242**	**-140**	**633**	**14172**	**-19079**	**-315**	**-5994**	**259**	-

9.4 Offset staging plan

As outlined in Section 1.5, the development footprint has been broken up into three areas to facilitate the staged retirement of the project's biodiversity credit liability. Prior to works commencing in each area, the biodiversity offset associated with that area will be secured.

Indicative offset areas are defined in Table 69 and Table 2 and are considered possible to be discrete packages of work for which staging of offset obligations is feasible, with resultant offset credit liabilities for each of these stages provided Table 70 and illustrated on Figure 19.

Table 69 Offset staging plan

Offset staging area	Location	Total Area (ha)
Early/Enabling works area	Small areas predominantly located off Kidman Way to initiate site access intersection works and facilitate construction of accommodation, office and maintenance facilities	22
Stage 1	Primarily east of Kidman Way (including public road upgrades)	734
Stage 2	West of Kidman Way	1,035

Table 70 Total offset staging credits breakdown

PCT	Early/Enabling works area	Stage 1	Stage 2
13_Moderate	-	4	-
15_Mod_Good	-	-	5
17_Mod_Good	-	26	9
17_Moderate	-	-	1
26_DNG	220	7,807	2,758
26_Intact	-	7	3
26_Sparse	51	1,656	13,215
45_Mod_Good	-	-	3
46_Moderate	-	91	2
Swainsona murrayana	-	76	-
Swainsona sericea	-	76	-
Southern Bell Frog	5	1,350	293

Spark Renewables will confirm the offset staging plan with DPHI prior to the commencement of construction.

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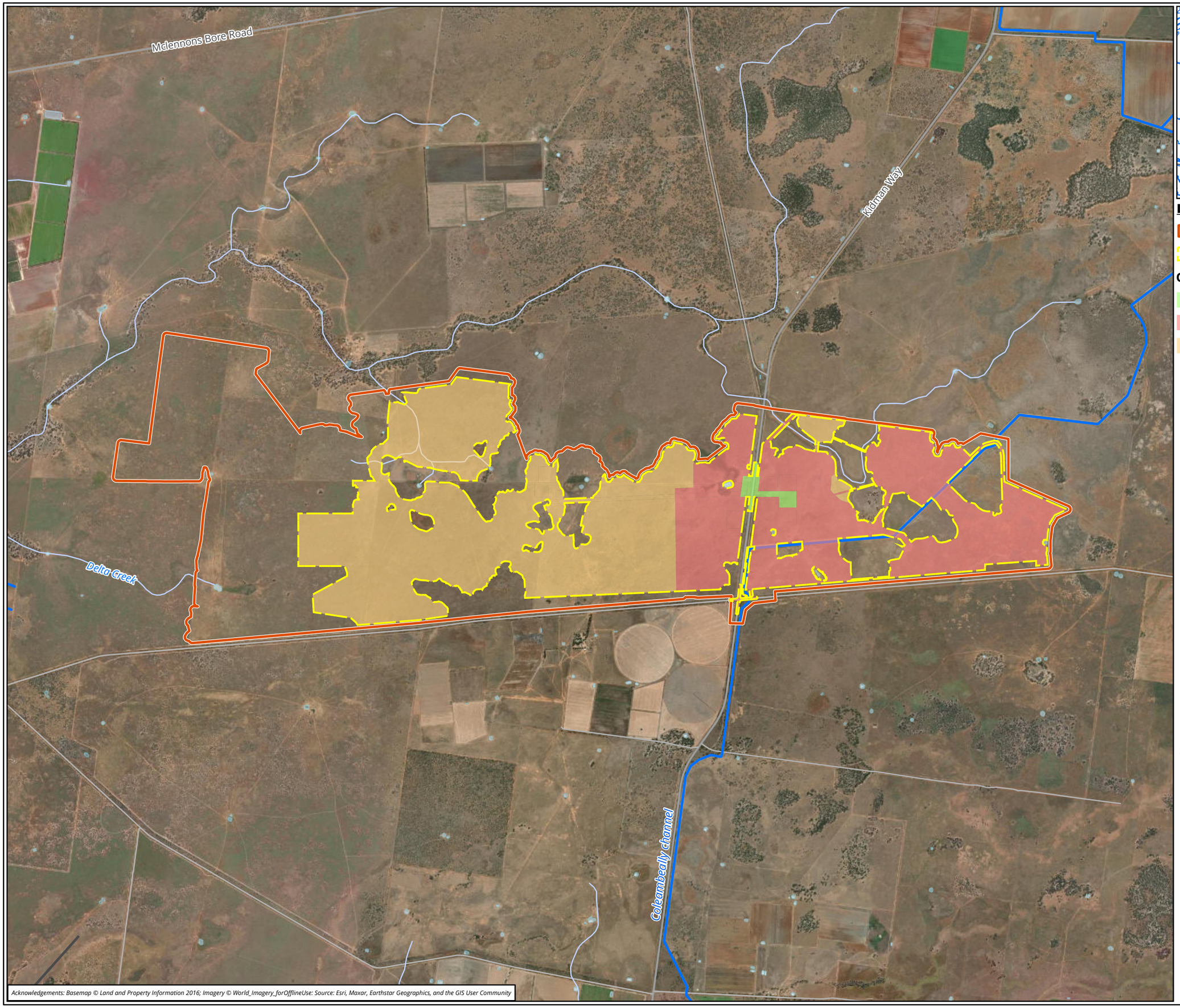

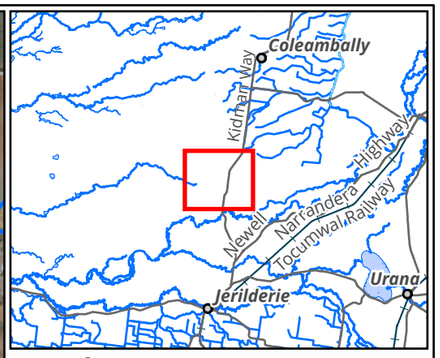

Legend

- Subject land
- Development footprint

Offset stage

- Early works area
- Stage 1
- Stage 2

Figure 19 Project and offset staging

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 28 August 2024,
GIS: LH, Checked by: MP, Last edited by: lharley
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F15-19.aprx
Layout: 37263_F19_Stages

10 Assessment against biodiversity legislation

10.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act. Under the EPBC Act, activities that have potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment and Water for assessment.

An EPBC Act referral was lodged on the 4 April 2023 and deemed a Controlled Action (EPBC 2023/09516) on the 12 July 2023 based on listed threatened species and communities as the relevant controlling provisions. Supplementary SEARs detailing the Commonwealth Department of Climate Change, Energy, the Environment and Water's assessment requirements were provided on 22 August 2023.

An assessment of the impacts of the project on MNES, against heads of consideration outlined in Commonwealth of Australia (2013) was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required. MNES relevant to the project are summarised in Table 71. In accordance with the supplementary SEARs, Table 72 contains a summary of impacts to relevant entities and Appendix 2 and Appendix 6 contains a summary of all species predicted, as well as those that are known or have a moderate or greater likelihood of occurrence and where Significant Impact Criteria (SIC) assessments have been undertaken. Following avoidance of biodiversity values as demonstrated in Section 5, measures and offsets would be implemented to address residual and significant impacts under the EPBC Act and bilateral agreement. Table 73 and Table 74 summarise the impacts and residual offset respectively.

Table 71 Summary of the assessment of the project against the EPBC Act

Matter of NES	Project specifics	Potential for significant impact
Threatened species	Six EPBC listed threatened species are considered to have a known, potential or uncertain impact as a result of the project. These include • *Austrostipa wakoolica* • Painted Honeyeater • Southern Bell Frog • Plains Wanderer • Superb Parrot • *Swainsona murrayana* All other potential threatened species are considered to have a low likelihood of occurrence due to limited or absent suitable micro habitats in the subject land.	Of all entities assessed, the following are considered to have a significant impact resulting from the project: • *Swainsona murrayana* • Plains Wanderer
Threatened ecological communities	Direct and indirect impacts are considered to occur to two listed TECs • Weeping Myall Woodland	Of all entities assessed, the following are considered to have a significant impact resulting from the project: • Weeping Myall Woodland

Matter of NES	Project specifics	Potential for significant impact
	• Natural Grasslands of the Murray Valley Plains No other EPBC listed TECs occur within the subject land	
Migratory species	Background searches identified the following migratory species as having potential to occur in the subject land: • *Actitis hypoleucos* • *Apus pacificus* • *Calidris acuminata* • *Calidris ferruginea* • *Calidris melanotos* • *Charadrius veredus* • *Gallinago hardwickii* • *Gelochelidon nilotica* • *Haliaeetus leucogaster* • *Hirundapus caudacutus* • *Hydroprogne caspia* • *Limosa limosa* • *Merops ornatus* • *Motacilla flava* • *Numenius madagascariensis* • *Legadis falcinellus* • *Tringa nebularia*	There is no, or limited, suitable habitat within the subject land for migratory shorebird species, particularly those that are largely associated with tidal mudflats or coastal beaches and estuaries. Migratory species that may occur in inland areas such as Latham's Snipe and Glossy Ibis, may occasionally utilise any natural drainage systems, depressional wetlands or farm dams in the subject land during suitable conditions. Impacts to these areas are likely to be minimal, if any, with the project design largely avoiding any impacts to wetland habitats. The nature and scale of the project is unlikely to result in impacts to aerial species such as White-throated Needletail and Fork-tailed Swift, which are almost exclusively aerial and are unlikely to be affected by ground level disturbance.
National Heritage Places	The subject land contains no World Heritage Properties or National Heritage Places.	There are no national or world heritage places within or near the subject land. The project is unlikely to result in any direct or indirect impacts to national or world heritage.
Wetlands of international importance (Ramsar sites)	There are no Ramsar wetland areas within or near the subject land. The subject land is 200-300 kilometres upstream from the nearest Ramsar site at Hattah-Kulkyne Lakes (Ramsar site 16), 400-500 kilometres upstream from the Riverland (Ramsar site 29) and Banrock Station wetland complex (Ramsar site 63), and 500-600 kilometres upstream from the Coorong, and lakes Alexandrina and Albert wetland (Ramsar site 25).	Given the large geographical separation between Ramsar Wetlands and the subject land, no direct or indirect impacts to the wetlands are likely to occur as a result of the project. Potential impacts from the project are expected to be localised and not result in any direct or indirect impacts to the hydrological regime or ecological character of the identified wetlands. Therefore, direct and/or indirect impacts on this listed item are considered unlikely.

Table 72 Summary of relevant EPBC Act threatened species and ecological communities

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
Development footprint					
Weeping Myall woodlands	Likely to be significant impacts	Recorded within development footprint.	Yes	Most dominant vegetation community with the broader locality and development footprint, in three various condition zones. Only Intact Myall, and small areas of sparse vegetation zones within the development footprint are considered to meet the criteria of the MNES listing. A large amount of intact Weeping Myall has been prioritised for avoidance, even more so during this amendment and design optimisation, with approximately 0.48 ha of Weeping Myall TEC that is known or likely to meet the criteria under the EPBC Act within the amended development footprint, a 99.6% reduction from 137 ha in the EIS BDAR submission. However, as this community as a whole is subject to the largest impact from the project, it is still considered there would be a reduced area of occupancy for other areas within the sparse zone to meet the criteria in future, even with existing land management practices, and in conjunction with cumulative impacts within the region, there is potential for significant impacts on the TEC.	Potential for significant impact on criteria 1 of SIC - Reduce the extent of an ecological community taking into account direct, cumulative and indirect impacts
Natural Grasslands of the Murray Valley Plains	Likely to be significant impacts	Recorded within development footprint.	Yes	Impacts to known areas of this community have been avoided where possible and restricted to small isolated patches or fringing areas of larger more connected patches. A worse case total of 1.73 ha, a 84.9% reduction from 11.5 ha in the EIS BDAR submission, may be impacted within the amended development footprint. This TEC has been prioritised for avoidance during design refinement. Potential areas of vegetation that will have patches commensurate with this TEC within 50 km of the subject land is approximately 103,912 ha. It is estimated in the Riverina that approximately 61,000 ha remain in the region. The removal of 1.73 ha equates to approximately <0.1%. Given the amount of avoidance of the TEC, and despite some potential for cumulative impacts, it is unlikely that significant impacts would occur to this TEC as a result of the project.	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
Plains-Wanderer	Likely to be significant impacts	Known to occur. Important mapped habitat within subject land	Yes	The Plains Wanderer is known to occur throughout the broader locality historically, with the Riverina considered a strong hold for the species. Although important mapped areas from an SAII and BC Act perspective have been avoided, other areas of the subject land may provide habitat for Plains Wanderer at certain times pending fluctuating long term environmental conditions. Due to the dynamic nature of the grassland habitats and condition states therein, a key focus during project design was the avoidance of likely suitable habitat at a landscape scale. Specifically, due to the cryptic nature of this species and critically endangered listing, avoidance of suitable habitat and mapped important areas were incorporated early into project designs. This included avoiding and minimising impacts to areas of lower tussocky grasslands such as PCT 46, as well as areas of important mapped habitat and associated buffers. Approximately 0.94 ha of suitable habitat quality that falls within a 100m buffer of the important mapped area will be impacted. This section of the development footprint is separated from the mapped important habitat area by Coleambally Irrigation Channel (Figure 11). Additionally, suboptimal patches and fringing areas at time of survey of PCT 26 DNG and PCT 46 that may provide habitat in future due to the dynamic nature of grassland communities in the Riverina, particularly south of the Coleambally Irrigation Channel, will also be impacted. However, the total impacts equate to approximately 0.01% of the total available habitat within 10km of the subject land (596 ha) and 0.001% of the total available habitat within 50km of the subject land (4,453ha). Site surveys were undertaken in November 2022 (impacted by flooding) as well as March 2023 and April 2023. Surveys were conducted via nocturnal transects as well as acoustic detection. No evidence of this species within suitable habitat within the subject land were recorded.	Significant impact possible due to criteria 2 of SIC - reduce the area of occupancy of the species
Brachyscome muelleroides	Some risk of significant impact	Surveyed. Unlikely to be present	Unlikely	Targeted surveys for *Brachyscome muelleroides* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023, and this species has not been recorded. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
				high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible (including within seasonally damp situations such as shallow depression sand around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland and grassy woodland). This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. This species prefers seasonally moist grey gilgaied soils on the floodplains with PCTs such as PCT 45 and PCT 46, which occur within the subject land. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures	
Lepidium monoplocoides	Some risk of significant impact	Surveyed. Unlikely to be present	Unlikely	Targeted surveys for *Lepidium monoplocoides* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023 and this species has not been recorded. No records have been detected. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures	Significant impact unlikely
Sclerolaena napiformis	Minimal risk of significant impact	Surveyed. Unlikely to be present	Unlikely	Targeted surveys for *Sclerolaena napiformis* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023 and this species has not been recorded. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible (including within seasonally damp situations such as shallow depression sand around the margins of claypans, on heavy grey cracking	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
				clays to lighter clay loam soils, in grassland and grassy woodland). This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. This species prefers grassland PCTs such as PCT 46, and derived areas of PCT 26 which occur within the subject land. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	
Austrostipa wakoolica	Some risk of significant impact	Assumed present	Unlikely	*Austrostipa wakoolica* has been surveyed adequately to date in November 2022 and November 2023 and has not been recorded. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This included known habitats such as lignum swamp in brown loam with box, creek banks in grey silty clay, mallee and lignum sandy loam flat, open cypress pine forest on low range in sandy soil and a low rock rise fenced-off from stock for about 18 months (DECCW, 2014). Areas surveyed were microhabitats that are subject to more frequent periodic flooding to maintain wetter conditions. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	Significant impact unlikely
Maireana cheelii	Some risk of significant impact	Surveyed. Unlikely to be present	Yes	Targeted surveys for *Maireana cheelii* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023 and the species has not been recorded. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
				impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	
Swainsona murrayana	Some risk of significant impact	Recorded within development footprint.	Yes	This species has been identified during surveys in September 2022 and September 2023. All records and suitable habitat were found to be east of the Kidman Way and south of the Coleambally irrigation channel within the subject land. Large numbers of the species were recorded, estimated to up to 2000 individuals and 30 ha of optimal habitat, however numerous design revisions have occurred to avoid and minimise impacts to larger patches to ensure a viable local population can be maintained. Impacts will occur to small, isolated individuals and patches, totalling approximately 5.5 ha. This represents approximately 18% of the local population recorded within the subject land. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	Potential for significant impact
Swainsona plagiotropis	Minimal risk of significant impact	Surveyed. Unlikely to be present	Unlikely	Targeted surveys for *Swainsona plagiotropis* have been carried out throughout the development footprint in September 2022 and September 2023 and this species has not been recorded. It was found to be flowering during surveys in September 2023 at a known reference population near Jerilderie. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
Eastern Major Mitchell's Cockatoo	Minimal risk of significant impact	Surveyed. Unlikely to be present for breeding	Yes	Not recorded during detailed surveys. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. No known breeding site will be impacted. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	Significant impact unlikely
Hooded Robin	Minimal risk of significant impact	Surveyed. Unlikely to be present	Negligible	Not recorded during detailed surveys. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	Significant impact unlikely
Australasian Bittern	Minimal risk of significant impact	Transient only	Negligible	There is no optimal habitat for the Australasian Bittern within the subject land, however this species is known to fly to and from breeding grounds in and around Leeton and Griffith in NSW, through to Victoria. It is very unlikely that this species would occur within the subject land with a lack of suitable habitat, other than rare transient use or during increased seasonal flooding events, and only on a temporary basis. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	Significant impact unlikely
Superb Parrot	Some risk of significant impact	Recorded within development footprint.	Yes	Recorded foraging onsite. No evidence of breeding was observed within the subject land, and potential hollows were found to be preferentially in use by common species such as Blue Bonnets and Galahs. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
				high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	
Southern Whiteface	Some risk of significant impact	Recorded within development footprint.	Yes	Recorded foraging in the broader locality. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	Significant impact unlikely
Painted Honeyeater	Some risk of significant impact	Recorded adjacent to development footprint	Yes	Recorded foraging adjacent to the subject land in high condition Weeping Myall vegetation that has been avoided, and not subject to this project. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Direct impacts to 0.42 ha of intact Weeping Myall areas containing mature woody vegetation are predicted; however, 248.09 ha will be retained within the subject land, and an additional 44,000 ha within 50 km of the subject land will also be retained. The project will not impact substantially on the ability for this species to move through the broader landscape. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
				BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.	
Diamond Firetail	Some risk of significant impact	Surveyed. Unlikely to be present	Negligible	Not recorded during detailed surveys, however recorded as part of the surveys for Dinawan Wind Farm, further to north-west. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures	Significant impact unlikely
Blue-winged Parrot	Minimal risk of significant impact	Surveyed. Unlikely to be present	Negligible	Not recorded during detailed surveys. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This has resulted in multiple revisions of the development footprint as demonstrated in Section 5.2 and 5.3. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures	Significant impact unlikely
Southern Bell Frog	Some risk of significant impact	Recorded within development footprint.	Yes	This species was observed opportunistically and repeatedly during habitat surveys, as well as again in February, April 2023 and January 2024. Records occurred following above average rainfall and flooding conditions that likely washed individuals from a stronghold area in the Coleambally irrigation areas to the north, via flooding events in Delta Creek and Coleambally irrigation channel. For the majority of the time, the only areas that provide more permanent, yet still suboptimal habitat, are within the irrigation channel and grasslands adjacent to it. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to	Significant impact unlikely

MNES	DCCEEW consideration	Updated likelihood of occurrence based on assessment	Potential impacts	Rationale	SIC self-assessment undertaken / result (Appendix 6)
				ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Direct impacts will be limited to small areas around Coleambally irrigation channel, and impacts to dispersal habitat only. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures as well as generation of additional credits for indirect impacts to residual transient habitats as prescribed by the BAM.	
Koala	Minimal risk of significant impact	Surveyed. Unlikely to be present	Negligible	Not recorded during detailed surveys. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Preferred feed trees and major connectivity and movement corridors have been avoided. No preferred feed tree species, River Red Gums, will be impacted. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures	Significant impact unlikely

Table 73 Summary table of impacts for MNES

Name of **MNES**	Nature & consequence of impact (direct & indirect)	Duration of impact (e.g. construction, operation, life of project)	Quantum of impact	Consequence of impact (local, state & national scales)	Impact requires offsetting? (significant or not)
Development footprint					
Weeping Myall Woodlands	Direct Indirect	Life of project	Direct impacts to 0.48 ha. Indirect impacts to 78.99 within the subject land.	Local	Yes – A total of 10 credits related to EPBC woodland, and 12,357 weeping myall TEC credits would be retired as a result of the project, excluding credits required for the DNG zone.
Natural Grasslands of the Murray Valley Plains	Direct Indirect	Life of project	Direct impacts to 1.73 ha. Indirect impacts to 152.37 within the subject land.	Local	Yes – A total of 96 credits associated with natural grasslands, including PCT 46 or PCT 45 would be retired as a result of the project.
Plains-Wanderer	Direct Indirect	Life of project	Direct impacts to 1.73 ha natural grassland. Indirect impacts to 152 ha in subject land	Local	No - No specific offsets will be required, however a total of 96 credits associated with natural grasslands, including PCT 46 or PCT 45 would be retired as a result of the project. Potential stewardships being investigated contain suitable habitat for this species as well as NSW important mapped areas.
Brachyscome muelleroides	N/A	N/A	Not known to occur within the subject land. Reduced area of occupancy within suitable microhabitats.	N/A	No - No specific offsets will be required.

Name of **MNES**	Nature & consequence of impact (direct & indirect)	Duration of impact (e.g. construction, operation, life of project)	Quantum of impact	Consequence of impact (local, state & national scales)	Impact requires offsetting? (significant or not)
Lepidium monoplocoides	N/A	N/A	Not known to occur within the subject land. Reduced area of occupancy within suitable microhabitats.	N/A	No - No specific offsets will be required.
Sclerolaena napiformis	N/A	N/A	Not known to occur within the subject land. Reduced area of occupancy within suitable microhabitats.	N/A	No - No specific offsets will be required.
Austrostipa wakoolica	N/A	N/A	Not known to occur within the subject land. Reduced area of occupancy within suitable microhabitats.	N/A	No - No specific offsets will be required.
Maireana cheelii	N/A	N/A	Not known to occur within the subject land. Reduced area of occupancy within suitable microhabitats.	N/A	No - No specific offsets will be required.

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Name of **MNES**	Nature & consequence of impact (direct & indirect)	Duration of impact (e.g. construction, operation, life of project)	Quantum of impact	Consequence of impact (local, state & national scales)	Impact requires offsetting? (significant or not)
Swainsona murrayana	Direct Indirect	Life of project	Direct impacts to isolated individuals across an area of 5.5 ha. Indirect and mitigated impacts to 25 ha of optimal habitat containing approximately 2000 plants	Local	Yes - A total of 76 credits would be retired as a result of the project. Potential stewardships being investigated contain suitable habitat and have recorded individuals for this species.
Swainsona plagiotropis	N/A	N/A	Not known to occur within the subject land. Reduced area of occupancy within suitable microhabitats.	N/A	No - No specific offsets will be required.
Eastern Major Mitchell's Cockatoo	Direct Indirect	Life of project	Direct impacts to foraging habitat of 0.71 ha and loss of one hollow bearing tree. Indirect impacts to foraging habitat of 89.30 ha.	Local	No - No specific offsets will be required, however potential foraging habitat would be secured by the projects overall retiring of credits and project offset liability.
Hooded Robin	Direct Indirect	Life of project	Direct impacts to foraging habitat of 0.71 ha.	Local	No - No specific offsets will be required, however potential foraging habitat would be secured by the projects overall retiring of credits and project offset liability.

Name of **MNES**	Nature & consequence of impact (direct & indirect)	Duration of impact (e.g. construction, operation, life of project)	Quantum of impact	Consequence of impact (local, state & national scales)	Impact requires offsetting? (significant or not)
			Indirect impacts to foraging habitat of 89.30 ha.		
Australasian Bittern	Indirect	Life of project	Indirect impacts to potential transient and nomadic movements.	Local	No - No specific offsets will be required,
Superb Parrot	Direct Indirect	Life of project	Direct impacts to foraging habitat of 0.71 ha. Indirect impacts to foraging habitat of 89.30 ha.	Local	No - No specific offsets will be required, however potential foraging habitat would be secured by the projects overall retiring of credits and project offset liability.
Southern Whiteface	Direct Indirect	Life of project	Direct impacts to foraging habitat of 1.86 ha. Indirect impacts to foraging habitat of 132 ha.	Local	No - No specific offsets will be required, however potential foraging habitat would be secured by the projects overall retiring of credits and project offset liability.
Painted Honeyeater	Direct Indirect	Life of project	Direct impacts to foraging habitat of 0.71 ha. Indirect impacts to foraging habitat of 89.30 ha.	Local	No - No specific offsets will be required, however potential foraging habitat would be secured by the projects overall retiring of credits and project offset liability.

Name of **MNES**	Nature & consequence of impact (direct & indirect)	Duration of impact (e.g. construction, operation, life of project)	Quantum of impact	Consequence of impact (local, state & national scales)	Impact requires offsetting? (significant or not)
Diamond Firetail	Direct Indirect	Life of project	Direct impacts to foraging habitat of 1.86 ha. Indirect impacts to foraging habitat of 132 ha.	Local	No - No specific offsets will be required, however potential foraging habitat would be secured by the projects overall retiring of credits and project offset liability.
Blue-winged Parrot	Direct Indirect	Life of project	Direct impacts to foraging habitat of 0.71 ha. Indirect impacts to foraging habitat of 89.30 ha.	Local	No - No specific offsets will be required, however potential foraging habitat would be secured by the projects overall retiring of credits and project offset liability.
Southern Bell Frog	Direct Indirect	Life of project	Direct impacts to habitat of 8.41 ha. Indirect impacts to dispersal habitat of 122.16 ha.	Local	Yes - A total of 1,647 credits associated would be retired as a result of the project. Potential stewardships being investigated contain suitable habitat and have recorded individuals for this species.
Koala	N/A	N/A	Not known to occur within the subject land.	N/A	N/A

Table 74 Summary table of offsets for MNES

Name **of MNES**	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS/BDAR)
Development footprint					

Name **of MNES**	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS/BDAR)
Weeping Myall Woodlands	PCT 26 Intact	0.48	Yes – Like for like credits	Bilateral agreement 10 intact myall credits 12,357 sparse myall woodland credits	BDAR
Natural Grasslands of the Murray Valley Plains	PCT 45 PCT 46	1.73	Yes – Like for like credits	Bilateral agreement 96 credits	BDAR
Plains-Wanderer	PCT 26 DNG PCT 45 and PCT 46	277 1.73	Yes – via ecosystem credits	Bilateral agreement 8,476 credits for PCT 26 DNG 96 credits for PCT 45 and PCT 46	BDAR
Brachyscome muelleroides	N/A	N/A	No	N/A	N/A
Lepidium monoplocoides	N/A	N/A	No	N/A	N/A
Sclerolaena napiformis	N/A	N/A	No	N/A	N/A
Austrostipa wakoolica	N/A	N/A	No	N/A	N/A
Maireana cheelii	N/A	N/A	No	N/A	N/A
Swainsona murrayana	PCT 26 DNG	5.5	Yes – Like for like credits	Bilateral agreement 76 credits	BDAR
Swainsona plagiotropis	N/A	N/A	No	N/A	N/A

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Name **of MNES**	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS/BDAR)
Eastern Major Mitchell's Cockatoo	PCT 13 PCT 15 PCT 26 Intact	0.71	Yes – via ecosystem credits	Bilateral agreement 19 credits	BDAR
Hooded Robin	PCT 13 PCT 15 PCT 26 Intact	0.71	Yes – via ecosystem credits	Bilateral agreement 19 credits	BDAR
Australasian Bittern	N/A	N/A	No	N/A	N/A
Superb Parrot	PCT 26 Intact	0.42	Yes – via ecosystem credits	Bilateral agreement 10 credits	BDAR
Southern Whiteface	PCT 13 PCT 15 PCT 17 PCT 26 Intact	1.86	Yes – via ecosystem credits	Bilateral agreement 56 credits	BDAR
Painted Honeyeater	PCT 26 Intact	0.71	Yes – via ecosystem credits	Bilateral agreement 10 credits	BDAR
Diamond Firetail	PCT 13 PCT 15 PCT 17 PCT 26 Intact	1.86	Yes – via ecosystem credits	Bilateral agreement 56 credits	BDAR
Blue-winged Parrot	PCT 13 PCT 15 PCT 26 Intact	0.71	Yes – via ecosystem credits	Bilateral agreement 19 credits	BDAR
Southern Bell Frog	PCT15 PCT17 PCT 26 (dispersal only) PCT 46	122.16	Yes – Like for like credits	Bilateral agreement 1,647 credits	BDAR
Koala	N/A	N/A	No	N/A	N/A

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10.2 Environmental Planning and Assessment Act 1979/Environmental Planning and Assessment Regulation 2021

The Project is SSD and development consent is being sought under Section 4 of the NSW EP&A Act. An EIS is a requirement of the development assessment process.

A Scoping Report was prepared and submitted to DPE in November 2022. SEARs were issued for the project on 12 December 2022. The SEARs form the basis of the assessment criteria for the project. Supplementary SEARs were issued on 20 August 2022 in relation to the determination of the project as a Controlled Action under the Commonwealth EPBC Act (EPBC 2023/09516).

This BDAR was submitted to the Minister for Planning and Public Spaces as part of the EIS and State Significant Development Application (SSDA), under Part 4 of the *Environmental Planning and Assessment Act* (EP&A Act) on the November 2023. A Response to Submission letter (RTS) and associated agency responses were issued on the 19 December and 21 December respectively. Due to the number of submissions received, the project will be determined by the Independent Planning Commission (IPC).

10.3 State Environmental Planning Policies

10.3.1 State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 3: Koala habitat protection 2020

Chapter 3 of State Environmental Planning Policy (Biodiversity and Conservation) 2021, applies to identified LGAs in areas not zoned as RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry, and within these rural land zonings, the former State Environmental Planning Policy (Koala Habitat Protection) 2020 (Koala SEPP 2020) continues to apply. The development footprint occurs on rural zoning so the Koala SEPP 2020 would be relevant to the project; however, this chapter only applies to development applications where Council is the consent authority, which is not the case for the project.

The aims of Chapter 3 Koala Habitat Protection 2020 and Chapter 4 Koala Habitat Protection 2021 are to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

These aims and considerations have been addressed in accordance with the BAM and the BC Act, as well as the Commonwealth EPBC Act, in preparation of this BDAR. Habitat and opportunistic surveys have been undertaken for Koala to ascertain their presence within the subject land with measures to avoid and minimise impacts to the species have been employed.

10.4 Local Land Services Act 2013 and Local Land Services Amendment Act 2016

The LLS Act defines 'category 1-exempt ’and' as areas of the State to which Part 5A of the LLS Act applies, which are designated as category 1-exempt land on ‘he 'native vegetation regulatory map', prepared and published under the LLS Act. An assessment of non-native vegetation or areas exempt from further assessment was undertaken in accordance with BC Act s6.8(3), which states that any assessment relating to biodiversity is to exclude the clearing of native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the Local Land Services Amendment Act 2016 (LLS Act). This

excludes any impacts prescribed by the regulations under section 6.3. Additionally, in accordance with section 1.5 of the BAM, biodiversity values that do not need to be assessed include: (d) biodiversity values associated with the assessment of the impacts of any clearing of native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the LLS Act), other than the additional biodiversity impacts in accordance with clause 6.1 of the BC regulation.

10.5 Biodiversity Conservation Act 2016

The NSW BC Act requires that the BAM be applied to all proposals that trigger the BOS, and that a BDAR is required to be submitted to the approval authority. This project is SSD and, therefore, the BOS applies in accordance with Section 7.9 of the BC Act. A BDAR is required, prepared in accordance with the BAM (DPIE 2020a).

10.6 Biosecurity Act 2015

The Biosecurity Act provides for the identification, classification and control of priority weeds with the purpose of determining if a biosecurity risk is likely to occur. A biosecurity risk is defined as the risk of a biosecurity impact occurring, which for weeds includes the introduction, presence, spread or increase of a pest into or within NSW or any part of the State. A pest plant has the potential to; harm or reduce biodiversity or out-compete other organisms for resources, including food, water, nutrients, habitat and sunlight.

The General Biosecurity Duty as outlined in the Biosecurity Act states:

All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. 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, so far as is reasonably practicable.

Two priority weeds for the Murray LLS Region have been recorded in the subject land and are listed in Table 75, along with their associated Duty. Weed management practices and mitigation will be detailed within the BMP.

Table 75 Priority weeds within the subject land

Scientific name	Common name	Relevant biosecurity duty
Lycium ferocissimum	African Boxthorn	General Biosecurity Duty.
Xanthium spinosum	Bathurst Burr	General Biosecurity Duty

10.7 Water Management Act 2000

The WM Act provides for the sustainable and integrated management of the state's water. The WM Act is supported by a series of interpretation guidelines which provide design considerations and overarching management measures for works on waterfront land. These considerations and management measures should be considered when planning and undertaking the proposed works. To which the following guidelines are relevant:

- Guidelines for watercourse crossings on waterfront land (NSW Office of Water 2012a).
- Guidelines for outlet structures on waterfront land (NSW Office of Water 2012b).

- Guidelines for laying pipes and cables in watercourses on waterfront land (NSW Office of Water 2012c).
- Guidelines for instream works on waterfront land (NSW Office of Water 2012d).

Under the WM Act an approval is required to undertake controlled activities on waterfront land, unless that activity is otherwise exempt under Section 91E of the WM Act, Section 4.41 of the EP&A Act, land is defined within the Act as the bed of any river, lake or estuary and any land within 40 metres of the river banks, lake shore or estuary mean high water mark. Several ephemeral watercourses associated with Delta Creek are located within the subject land, including five first order watercourses and one second order watercourse.

The proposed development is SSD, it is therefore exempt from the requirement to obtain a Controlled Activity Approval for activities on or under waterfront land. Therefore, works proposed within the mapped riparian corridor will be assessed as part of the EIS. The proposed works are consistent with the riparian corridor matrix (first and second order waterways) of the NSW Natural Resources Access Regular (NRAR) (2022b).

10.8 Fisheries Management Act 1994

The FM Act provides for the protection and conservation of aquatic species and their habitat throughout NSW. Impacts to threatened species, populations and communities, and critical habitats listed under the FM Act must be assessed through an Assessment of Significance process.

No predicted habitat for threatened aquatic species is mapped on the DPI spatial data portal within the subject land. No records of threatened aquatic species have been recorded within 10 kilometres of the subject land on the BioNet Atlas of NSW, however two species were predicted by the Protected Matters Search Tool (PMST).

As there is no mapped key fish habitat within the subject land or records within 10 kilometres, the project is unlikely to result in impacts to fish passage.

Several ephemeral watercourses associated with Delta Creek are located within the subject land, including five first order watercourses and one second order watercourse. No instream woody debris is proposed to be removed and therefore a permit under Part 7 of the FM Act is not required. NSW DPI is required to assess all projects that involve structures that span the full width of a waterway (including pipe crossings) or modifies the velocity or quantity of water. Mitigation measures will be implemented to ensure impacts within the subject land do not result in indirect impacts to waterways in the broader locality. As the waterways do not support aquatic ecological communities, fish passage is unlikely to be impacted by the project.

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11 Biodiversity credit report

Offsetting through the transfer and retirement of biodiversity credits, or paying into the BCT Offset Fund, is required for the current assessment for impacts to one vegetation zone at the subject land. A biodiversity credit report is provided on the following pages.

Due to the complexity required to accurately calculate offset credits associated with partial loss and complete loss relative to a sub-component of the development footprint (solar array only) and to accurately calculate offset staging, multiple BAM-C cases have been created. Table 76 is provided to assist in review of the BAM-C cases and provides guidance on what each calculator represents, and how each case fits into overall project offset calculations. Associated Final Credit Reports are provided in the following pages.

Table 76 BAM-C case legacy notes

BOAMS Case number	BAM-C Revision No.	BAM-C proposal name	Comments
00034896/BAAS17051/23/00042134	Revision 13	Dev Corridor DEH_SF - RTS Dev Corridor (all impacts)	• Total project impacts • Accurate for all PCTs and threatened species, except PCT 26 DNG and PCT 26 Sparse due to partial loss calculations not being included to maintain correct species credit numbers. • PCT 26 DNG and PCT 26 Sparse impacts/credits superseded by total sum of credits outlined in BAM-C Revision 17 and BAM-C Revision 20
00034896/BAAS17051/24/00050987	Revision 0	Dev Corridor DEH_SF - Enabling works	• Enabling work impacts only - for staging breakdown • Accurate for all PCTs and threatened species
00034896/BAAS17051/24/00050988	Revision 0	Dev Corridor DEH_SF - STAGE 1	• Stage 1 impacts only - for staging breakdown • Accurate for all PCTs and threatened species, except PCT 26 DNG and PCT 26 Sparse due to partial loss calculations not being included to maintain correct species credit numbers. • PCT 26 DNG and PCT 26 Sparse superseded by BAM-C Revision 1
00034896/BAAS17051/24/00050988	Revision 1	Dev Corridor DEH_SF - STAGE 1 – Includes partial loss	• Stage 1 impacts only - for staging breakdown • Accurate for all PCTs including PCT 26 partial loss • Inaccurate for species credits. Revision 0 is accurate for Stage 1 species credits.
00034896/BAAS17051/24/00050989	Revision 0	Dev Corridor DEH_SF - STAGE 2	• Stage 2 impacts only - for staging breakdown • Accurate for all PCTs and threatened species, except PCT 26 DNG and PCT 26 Sparse due to partial loss calculations not being included to maintain correct species credit numbers.

BOAMS Case number	BAM-C Revision No.	BAM-C proposal name	Comments
			• PCT 26 DNG and PCT 26 Sparse superseded by BAM-C Revision 1
00034896/BAAS17051/24/00050989	Revision 1	Dev Corridor DEH_SF - STAGE 2 – Includes partial loss	• Stage 2 impacts only - for staging breakdown • Accurate for all PCTs including PCT 26 partial loss • Inaccurate for species credits. Revision 0 is accurate for Stage 2 species credits.
00034896/BAAS17051/23/00042134	Revision 17	Calculations for 40% complete loss and 60% partial loss - solar arrays only	• Solar array project component only • PCT 26 DNG and PCT 26 Sparse only • Summary calculation for 40% complete loss, 60% partial loss • No delineation between credits associated with complete loss or partial loss • No staging considered • Supersedes project total credits required for PCT 26 DNG and PCT 26 Sparse (outlined in BAM-C Revision 13) when summed with credits outlined in BAM-C Revision20
00034896/BAAS17051/23/00042134	Revision 18	Calculations for 60% partial loss - solar arrays only	• Solar array project component only • PCT 26 DNG and PCT 26 Sparse only • Calculation for 60% partial loss only • Required to delineate between credits associated with complete loss or partial loss • No staging considered • Reference / calculation purposes only
00034896/BAAS17051/23/00042134	Revision 19	Calculations for 40% complete loss - solar arrays only	• Solar array project component only • PCT 26 DNG and PCT 26 Sparse only • Calculation for 40% complete loss only • Required to delineate between credits associated with complete loss or partial loss • No staging considered • Reference / calculation purposes only
00034896/BAAS17051/23/00042134	Revision 20	Calculations for complete loss non-solar array only	• Non-solar array project components only • PCT 26 DNG and PCT 26 Sparse only • Required to calculate credits required for complete loss from non-solar array project components • No staging considered • Supersedes project total credits required for PCT 26 DNG and PCT 26 Sparse (outlined in BAM-C Revision13) when summed with credits outlined in BAM-C Revision17
00034896/BAAS17051/23/00042134	Revision 21	PCT 26 DNG and Sparse Only - Stage	• Stage 1 impacts only – All project components

BOAMS Case number	BAM-C Revision No.	BAM-C proposal name	Comments
		1 All impacts - including 40pct complete loss 60pct Partial loss for solar arrays	• Accurate total Stage 1 credits for PCT 26 DNG and PCT 26 Sparse • No delineation between complete loss or partial loss • Supersedes PCT 26 DNG and PCT 26 Sparse credits outlined in BAM-C Revision 15
00034896/BAAS17051/23/00042134	Revision 22	PCT 26 DNG and Sparse Only - Stage 2 All impacts - including 40pct complete loss 60pct Partial loss for solar arrays	• Stage 2 impacts only – All project components • Accurate total Stage 2 credits for PCT 26 DNG and PCT 26 Sparse • No delineation between complete loss or partial loss • Supersedes PCT 26 DNG and PCT 26 Sparse credits outlined in BAM-C Revision 16

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00034896/BAAS17051/23/00042134	Dev Corridor DEH_SF - RTS Dev Corridor	14/03/2024
Assessor Name	Report Created	BAM Data version *
Mitchell Palmer	11/09/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS17051	Finalised	11/09/2024
Assessment Revision	Assessment Type	
13	Major Projects	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
1	13_Moderate	Not a TEC	70.8	70.8	0.12	PCT Cleared - 57%	High Sensitivity to Gain			1.75		4
											Subtotal	**4**
Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
2	15_Mod_Good	Not a TEC	70	70.0	0.16	PCT Cleared - 50%	High Sensitivity to Gain			1.75		5
											Subtotal	**5**
Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion												
9	46_Moderate	Natural Grasslands of the Murray Valley Plains	88.6	88.6	1.7	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		93
											Subtotal	**93**

Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
3	17_Mod_Good	Not a TEC	77.3	77.3	1.1	PCT Cleared - 63%	High Sensitivity to Gain			1.75		36
4	17_Moderate	Not a TEC	41	41.0	0.08	PCT Cleared - 63%	High Sensitivity to Gain			1.75		1
											Subtotal	**37**
Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion												
8	45_Mod_Good	Natural Grasslands of the Murray Valley Plains	91.1	91.1	0.05	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		3
											Subtotal	**3**

Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion												
5	26_DNG	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	25.1	25.1	860	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		10786
6	26_Intact01	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	48.4	48.4	0.42	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		10

7	26_Sparse01	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	32.5	32.5	919.2	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	14930
										Subtotal	**25726**
										Total	**25868**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Litoria raniformis / Southern Bell Frog (Fauna)									
15_Mod_Good	70.0	70.0	0.16	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	6

17_Mod_Good	77.3	77.3	0.22	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	8
26_DNG	25.1	25.1	106.2	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	1331
46_Moderate	88.6	88.6	1.6	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	73
26_Intact01	48.4	48.4	0.29	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	7
26_Sparse01	32.5	32.5	13.7	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	222
								Subtotal	**1647**

Swainsona murrayana / Slender Darling Pea (Flora)									
26_DNG	27.5	27.5	5.5	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Vulnerable	False	76
								Subtotal	**76**
Swainsona sericea / Silky Swainson-pea (Flora)									
26_DNG	27.5	27.5	5.5	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Not Listed	False	76
								Subtotal	**76**

BAM Credit Summary Report

Proposal Details

Assessment Id
00034896/BAAS17051/24/00050987

Proposal Name
Dinewan Solar Farm - Enabling

BAM data last updated *
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Mitchell Palmer

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Assessment Revision
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Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion												
1	26_DNG	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	25.1	25.1	17.6	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		220
2	26_Sparse01	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	32.5	32.5	3.1	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		51
											Subtotal	**271**
											Total	**271**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Litoria raniformis / Southern Bell Frog (Fauna)									
26_DNG	25.1	25.1	0.38	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	5
								Subtotal	**5**

BAM Credit Summary Report

Proposal Details

Assessment Id
00034896/BAAS17051/24/00050988

Proposal Name
Dinawan Solar Farm - Stage 1

BAM data last updated *
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Mitchell Palmer

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Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
1	13_Moderate	Not a TEC	70.8	70.8	0.12	PCT Cleared - 57%	High Sensitivity to Gain			1.75		4
											Subtotal	**4**
Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion												
6	46_Moderate	Natural Grasslands of the Murray Valley Plains	88.6	88.6	1.6	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		91
											Subtotal	**91**
Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
2	17_Mod_Good	Not a TEC	77.3	77.3	0.78	PCT Cleared - 63%	High Sensitivity to Gain			1.75		26
											Subtotal	**26**

Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion												
3	26_DNG	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	25.1	25.1	622.5	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		7807
4	26_Intact01	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	48.4	48.4	0.29	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		7

5	26_Sparse	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	32.5	32.5	102	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		1656
											Subtotal	**9470**
											Total	**9591**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Litoria raniformis / Southern Bell Frog (Fauna)									
26_DNG	25.1	25.1	97	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	1216

26_Sparse	32.5	32.5	3.3	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	54
46_Moderate	88.6	88.6	1.6	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	73
26_Intact01	48.4	48.4	0.29	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	7
								Subtotal	**1350**
Swainsona murrayana / Slender Darling Pea (Flora)									
26_DNG	25.1	25.1	5.5	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Vulnerable	False	69
								Subtotal	**69**
Swainsona sericea / Silky Swainson-pea (Flora)									
26_DNG	25.1	25.1	5.5	Biodiversity Conservation Act listing status	Ability to colonise improved habitat	Vulnerable	Not Listed	False	69
								Subtotal	**69**

BAM Credit Summary Report

Proposal Details

Assessment Id
00034896/BAAS17051/24/00050989

Proposal Name
Dinawan Solar Farm - stage 2

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Assessor Name
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11/09/2024

Assessment Revision
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Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
1	15_Mod_Good	Not a TEC	70	70.0	0.17	PCT Cleared - 50%	High Sensitivity to Gain			1.75		5
											Subtotal	**5**
Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion												
8	46_Moderate	Natural Grasslands of the Murray Valley Plains	88.6	88.6	0.03	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		2
											Subtotal	**2**
Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)												
2	17_Mod_Good	Not a TEC	77.3	77.3	0.28	PCT Cleared - 63%	High Sensitivity to Gain			1.75		9
3	17_Moderate	Not a TEC	41	41.0	0.08	PCT Cleared - 63%	High Sensitivity to Gain			1.75		1
											Subtotal	**10**

Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion												
7	45_Mod_Good	Natural Grasslands of the Murray Valley Plains	91.1	91.1	0.05	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		3
											Subtotal	**3**
Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion												
4	26_DNG	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	25.1	25.1	219.9	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		2758

5	26_Intact	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	48.4	48.4	0.14	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		3
6	26_Sparse	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	32.5	32.5	814.1	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		13215
											Subtotal	**15976**
											Total	**15996**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Litoria raniformis / Southern Bell Frog (Fauna)									
15_Mod_Good	70.0	70.0	0.17	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	6
17_Mod_Good	77.3	77.3	0.22	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	8
26_DNG	25.1	25.1	8.8	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	111
26_Sparse	32.5	32.5	10.3	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Vulnerable	False	168
								Subtotal	**293**

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00034896/BAAS17051/23/00042134

Proposal Name
Dev Corridor DEH_SF - RTS Dev Corridor

BAM data last updated *
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Proponent Names

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BAM Case Status
Finalised

Assessment Revision
13

Assessment Type
Major Projects

Date Finalised
11/09/2024

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
13-Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Not a TEC	0.1	4	0	4
15-Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Not a TEC	0.2	5	0	5
17-Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Not a TEC	1.1	0	37	37
26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	1779.7	0	25726	25726
45-Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	Natural Grasslands of the Murray Valley Plains	0.1	0	3	3
46-Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	Natural Grasslands of the Murray Valley Plains	1.7	0	93	93

13-Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Inland Floodplain Woodlands This includes PCT's: 13, 15, 16, 83, 438, 454, 630	Inland Floodplain Woodlands >=50% and <70%	13_Moderate	Yes	4	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

15-Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Inland Floodplain Woodlands This includes PCT's: 13, 15, 16, 83, 438, 454, 630	Inland Floodplain Woodlands >=50% and <70%	15_Mod_Good	Yes	5	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

15-Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

17-Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Inland Floodplain Shrublands This includes PCT's: 17, 115, 161, 241, 247, 375	Inland Floodplain Shrublands >=50% and <70%	17_Mod_Good	No	36	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Inland Floodplain Shrublands This includes PCT's: 17, 115, 161, 241, 247, 375	Inland Floodplain Shrublands >=50% and <70%	17_Moderate	No	1	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
26-Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions This includes PCT's: 26, 27, 37, 43, 49, 55, 145, 159, 1766	-	26_DNG	No	10786	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions This includes PCT's: 26, 27, 37, 43, 49, 55, 145, 159, 1766	-	26_Intact01	No	10	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions This includes PCT's: 26, 27, 37, 43, 49, 55, 145, 159, 1766	-	26_Sparse01	No	14930	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

45-Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Natural Grasslands of the Murray Valley Plains This includes PCT's: 44, 45, 46	-	45_Mod_Good	No	3	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
46-Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Natural Grasslands of the Murray Valley Plains This includes PCT's: 44, 45, 46	-	46_Moderate	No	93	Murrumbidgee, Darling Depression, Lachlan, Lachlan Plains, Lower Slopes, Murray Fans, Robinvale Plains and South Olary Plain. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

46-Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Litoria raniformis / Southern Bell Frog	**15_Mod_Good, 17_Mod_Good, 26_DNG, 46_Moderate, 26_Intact01, 26_Sparse01**	122.2	1647.00
Swainsona murrayana / Slender Darling Pea	**26_DNG**	5.5	76.00
Swainsona sericea / Silky Swainson-pea	**26_DNG**	5.5	76.00

Credit Retirement Options

Like-for-like credit retirement options

Litoria raniformis / Southern Bell Frog	Spp	IBRA subregion
	Litoria raniformis / Southern Bell Frog	Any in NSW
Swainsona murrayana / Slender Darling Pea	Spp	IBRA subregion
	Swainsona murrayana / Slender Darling Pea	Any in NSW

Swainsona sericea / Silky Swainson-pea	Spp	IBRA subregion
	Swainsona sericea / Silky Swainson-pea	Any in NSW

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APPENDICES

Appendix 1 Survey methods

Appendix 1.1 Nomenclature

The flora taxonomy (classification) used in this report follows the most recent Flora of NSW (Harden 1992, Harden 1993, Harden 2000, Harden 2002). All doubtful species names were verified with the online Australian Plant Name Index (Australian National Botanic Gardens 2007). Flora species, including threatened species and introduced flora species, are referred to by both their common and then scientific names when first mentioned. Subsequent references to flora species cite the common names only, unless there is no common name, for which scientific name will be used. Common names, where available, have been included in threatened species tables and the complete flora list in Appendix 3.

Names of vertebrates follow the Census of Australian Vertebrates (CAVs) maintained by the DCCEEW (DSEWPaC 2009). In the body of this report vertebrates are referred to by both their common and scientific names when first mentioned. Subsequent references to these species cite the common name only.

Appendix 1.2 Permits and licences

The flora and fauna assessment was conducted under the terms of Biosis' Scientific Licence issued by DPIE (SL100758, expiry date 30 June 2025). The BAM Assessment and quality review of the BDAR was carried out by Accredited Assessor/s Mitchell Palmer (BAAS17051).

Appendix 1.3 Limitations

As discussed throughout this BDAR in Section 3.1.5 and Section 4, field surveys were undertaken in accordance with the BAM (DPIE 2020a) with exception to the proposed variation. Ecological surveys provide a sampling of flora and fauna at a given time and season. Factors influencing detectability of species during survey include species dormancy, seasonal conditions, ephemeral status of waterbodies, and migration and breeding behaviours of some fauna. Above average rainfall events in 2022, and substantial flooding of low lying areas throughout the subject land hindered field surveys in October and November 2022. In many cases, these factors do not present a significant limitation to assessing the overall biodiversity values of a site. Second season surveys in spring 2023 were completed to reduce this limitation.

Surveys undertaken, combined with habitat assessments and desktop analysis are considered sufficient to reach the conclusions herein regarding this and all other species' likelihood of occurrence within the subject land.

Database searches, and associated conclusions on the likelihood of species to occur within the assessment area, are reliant upon external data sources and information managed by third parties.

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Appendix 2 BAM Candidate species and EPBC Act species assessment

Table A 1: Threatened flora species assessment

Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Amphibromus fluitans **River Swamp Wallaby-grass**	VU	VU	No	Inhabits both natural and man-made water-bodies, including swamps, lagoons, billabongs and dams, most of which are permanent, and not ephemeral waterbodies	Low	No	Excluded – Geographical limitations	Low	The closest record of River Swamp-Wallaby Grass occurs over 80 kilometres away and is over 20 years old. Suitable habitat is broadly associated with PCT 17.
Austrostipa wakoolica **A spear-grass**	EN	EN	Yes	Densely tufted perennial grass restricted to the Murray River tributaries of central-western and south-western NSW. Grows on floodplains, on the edges of lignum swamp, creek banks and lignum sandy-loam flats in a variety of communities including Western Slopes Dry Sclerophyll Forests, Floodplain Transition Woodlands, Riverine Plain Woodlands and Western Peneplain Woodlands. Grows in a variety of soils including silty clays and sandy loams.	Medium	Yes	Included – Survey undertaken	Low	The subject land is within Spear Grass predicted distribution only. The closest record occurs over 40km from the subject land. Suitable habitat is broadly represented by Lignum swamp on floodplains within PCT 17 and 26. Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils. This species was not detected during targeted surveys.
Brachyscome muelleroides **Claypan Daisy**	VU	VU	Yes	Annual herb distributed throughout the Wagga Wagga, Narranderra, Tocumwal and	Medium	Yes	Included – Survey undertaken	Low	Claypan Daisy occurs over 40km from the subject land. Suitable habitat is broadly represented by grasslands

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				Walbundrie areas. Found growing in damp areas, depressions, claypan margins, and lagoon margins in Riverine Plain Grasslands and Inland Floodplain Swamps. Grows in muds derived from heavy clay.					comprising PCT 46 and 45. Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance. This species was not detected during targeted surveys.
Brachyscome papillosa **Mossgiel Daisy**	VU	VU	Yes	Multistemmed perennial herb endemic to NSW, primarily distributed throughout the Riverina bioregion with one site occurring in the South Western Slopes. Grows on Saltbush plains in a variety of communities including Aeolian Chenopod Shrublands, Inland Floodplain Shrublands, Riverine Plain Grasslands and Inland Saline Lakes. Grows in clay soils.	Medium	Yes	Included – Survey undertaken	Low	Mossgiel Daisy occurs over 25km from the subject land, with the most recent record from over 20 years ago. Suitable habitat is broadly represented by shrubland and grassland comprising PCTs 13, 15, 17 and 46. Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance. This species was not detected during targeted surveys.
Caladenia arenaria **Sand-hill Spider Orchid**	EN	EN	No	Small orchid, found in the Riverina between Urana and Narranderra. Grows in woodland and on sandhills associated with White Cypress Pine *Callitris glaucophylla* in Floodplain Transition Woodlands and Riverine	Low	No	Excluded – No suitable microhabitat	Low	Sand-hill Spider Orchid occurs over 30km from the subject land. Suitable habitat is broadly represented by shrubland and pine communities, however this species is not known to be associated with any PCTs that occur within the subject land.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				Sandhill Woodlands. Grows in sand soils.					
Convolvulus tedmoorei **Bindweed**		EN	Yes	Perennial herb restricted to four areas, two on the Murrumbidgee and Darling Rivers, one on the road to Wilcannia east of Broken Hill and one from Menindee Road near Scarsdale. Found on floodplains in a variety of communities including Riverine Chenopod Shrublands, Inland Floodplain Shrublands, Semi-arid Floodplain Grasslands and Inland Saline Lakes. Grows in grey clay soils.	Low	Yes	Included – Survey undertaken	Low	Bindweed occurs over 20km from the subject land, with the most recent record from over 50 years ago. Suitable habitat is broadly represented by shrubland and grassland comprising PCTs 17, 26, 46 and 45. Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils
Cullen parvum **Small Scurf-pea**		EN	No	Small shrub recorded from two locations, once in 1884 in Wagga Wagga and the other in 1967 in Jinderra near Albury. Found in grassland or understorey in areas that experience between –50 - 700mm of rainfall per year such as Inland Riverine Forests, Riverine Plain Grasslands, Floodplain Transition Woodlands and Western Slopes Grassy Woodlands.	Low	No	Excluded – No suitable microhabitat	Low	Small Scurf-pea occurs over 20km from the subject land, with the most recent record from over 50 years ago. Suitable habitat is broadly represented by shrubland and grassland however does not occur within PCT and microhabitats within the subject land.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
***Diuris* sp. (Oaklands, D.L. Jones 5380)** **Oaklands Diuris**		EN	No	Terrestrial orchid restricted to the Oaklands-Urana region of southern NSW. Grows amongst grasses and forbs in association with White Cypress Pine Callitris glaucophylla in Floodplain Transition Woodlands and Riverine Sandhill Woodlands. Grows in sandy loam soils.	Low	No	Excluded – No suitable microhabitat	Low	The habitat for Oaklands Diuris is not present within the subject land. The species is not associated with any PCT's present within the subject land.
Diuris tricolor **Pine Donkey Orchid**		VU	No	Terrestrial orchid with a sporadic distribution ranging from south of Narrandera stretching northwards through central western NSW towards the QLD border. Grows amongst grasses, sometimes in disturbed areas in a variety of communities including Pilliga Outwash Dry Sclerophyll Forests, Southern Tablelands Grassy Woodlands, North-west Alluvial Sand Woodlands and Floodplain Transition Woodlands. Grows on sand and red earth soils.	Low	No	Excluded – No suitable microhabitat	Low	Habitat for Diuris tricolor is not present within the subject land. The species is not associated with any PCT's present within the subject land.
Eucalyptus leucoxylon subsp. Pruinosa **Yellow Gum**		VU	Yes	Small to medium-sized tree restricted to several small areas between Barham and Euston. In New South Wales, it occurs at the bases of sandy	Low	Yes	Included – Survey undertaken	Low	No records of Yellow Gum occur within 25km of the subject land. This species has habitat broadly associated with PCT's 13 and 15, however was not detected during the

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				rises and on loamy clay flats on the floodplains of the Murray River and its tributaries in the Riverina Bioregion					field investigation or targeted surveys.
Lepidium aschersonii **Spiny Peppercress**	VU	VU	No	Erect perennial herb occurring in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). Found on ridges of gilgai clays dominated by Brigalow, Belah, Buloke and Grey Box. In the south has been recorded growing in Bull Mallee. Often the understorey is dominated by introduced plants. The species grows as a component of the ground flora, in grey loamy clays.	Low	No	Excluded – No suitable microhabitat	Low	No records of Spiny-Peppercress occur within 25 km of the subject land. Suitable habitat is represented by PCT 26.
Lepidium monoplocoides **Winged Peppercress**	EN	EN	Yes	Erect, annual herb with populations sparsely scattered throughout a widespread distribution spanning the semi-arid western plains. Historical records are numerous although recent records are confined to two collections from Broken Hill, in 1915 and 1950. Grows in areas receiving between 300 mm to 500 mm annual rainfall on periodically inundated and waterlogged	Medium	Yes	Included – Survey undertaken	Low	Winged Peppercress has been recorded over 25km from the subject land. Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils, particularly in association seasonal aquatic plants such as *Marsilea* species was present in high abundance. Suitable habitat is available within patches of PCTs 15, 16, 26, 46 and 45. Not recorded during surveys.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				habitats in a variety of communities including Inland Floodplain Shrublands, Floodplain Transition Woodlands, Inland Saline Lakes, Sand Plain Mallee Woodlands and Western Peneplain Woodlands. Grows on waterlogged grey-brown clays					
Leptorhynchos orientalis **Lanky Buttons**		EN	Yes	Erect, annual forb confined to several Hay Plain and southern Riverina locations including Willanthry east of Hillston, Zara-Wanganella via Hay, McKinley Road south-west of Hillst'n, 'Moru"dah" west of Buckinbong State Forest and Cowl Cowl Station near Hillston. Grows in woodlands and sometimes on the margins of swamps in a variety of communities including Inland Floodplain Shrublands, Inland Floodplain Swamps, Riverine Plain Grasslands, Floodplain Transition Woodlands and Riverine Plain Woodlands. Grows on red clay to clay loam soils.	High	Yes	Included – Survey undertaken	Medium	Lanky buttons has been recorded over 25km from the subject land. Suitable habitat is available within shrublands, grasslands and woodland communities represented by PCTs 26, 46 and 45. Microhabitats with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust . No individuals were observed during targeted surveys.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
Maireana cheelii **Chariot Wheels**	VU	VU	Yes	Small perennial forb restricted to the southern Riverina region of NSW between Deniliquin and Hay. Grows in shallow depressions, on eroded or scalded surfaces or on the edge of windswept claypans in association with Bladder Saltbush Atriplex vesicaria in a variety of communities including Riverine Chenopod Shrublands, Riverine Plain Grasslands, Gibber Transition Shrublands, North-west Floodplain Woodlands, and Inland Saline Lakes. Grows on heavy grey clays, brown to red-brown clay-loams, or hard cracking red clay soils.	Medium	Yes	Included – Survey undertaken	Low	Chariot Wheels has been recorded approximately 20km from the subject land. Suitable habitat is broadly available within woodland and grassland PCT's 26 and 46. Microhabitats that support heavier grey clay soils and higher chenopod abundance. No individuals were observed during targeted surveys.
Pilularia novae-hollandiae **Austral Pillwort**		EN	Yes	Semi-aquatic fern with the only extant populations located at Lake Cowal and Oolambeyan National Park. Historical distribution ranged from Sydney, Khancoban, The Riverina near Albury and Urana. Grows in seasonally dry depressions, drainage lines, margins of marshes, shallow swamps and waterways in a variety of communities including Inland Riverine	Medium	Yes	Included – Survey undertaken	Medium	Austral Pilwort has been recorded 18km from the subject land. Suitable habitat is available within shrubland, woodland and grassland PCT's 13, 15, 46 and 45. Microhabitats that are more frequently or periodically flooded or has seasonally moist to water-logged soils. No individuals were observed during the targeted surveys.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				Forests, Inland Floodplain Swamps, Southern Tableland Dry Sclerophyll Forests, Coastal Floodplain Wetlands, Coastal Swamp Forests, Coastal Freshwater Lagoons. Grows in mud amongst grasses and sedges.					
Sclerolaena napiformis **Turnip Copperburr**	EN	EN	Yes	Small subshrub known from a few populations in the southern Riverina between Jerilderie and Moama primarily in Travelling Stock Routes and Road Reserves and also in north-central Victoria. Found growing on level plains in remnant grassland habitats including those subject to grazing in Riverine Plain Grasslands and Riverine Plain Woodlands. Grows in clay loam soils.	Medium	Yes	Included – Survey undertaken Not recorded during surveys	Low	Turnip Copperburr has been recorded 19km from the subject land. This species is primarily found on the Hay Plain, which occurs anecdotally west of Oolambeyan National park on the flat scalded plains towards Balranald. Microhabitats that support heavier grey clay soils and higher chenopod abundance. No individuals were observed during targeted surveys.
Swainsona murrayana **Slender Darling Pea**	VU	VU	Yes	Small sparsely downy forb distributed between Jerilderie and Deniliquin areas of the southern Riverine Plain as far north as Willandra National Park, near Broken Hill and between Dubbo and Mudgee. Found growing on level plains, floodplains and depressions in a variety of communities	High	Yes	Included – Survey undertaken Recorded during surveys	High	Slender Darling Pea has been recorded within the subject land, with suitable habitat represented by shrubland, grassland and woodland PCTs 13, 15, 26, 46 and 45. Refinements to the development footprint have avoided significant populations of this species identified within the subject land.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				including Riverine Chenopod Shrublands, Semi-arid Floodplain Shrublands, Western Slopes Grasslands, Brigalow Clay Plain Woodlands, Riverine Plain Woodlands and Inland Saline Lakes. Grows in heavy clay based soils ranging from grey, red and brown cracking clays to red-brown earths and loams.					
Swainsona plagiotropis **Red Darling Pea**	VU	VU	Yes	Small prostrate forb sparsely distributed between Jerilderie and the Louth-Bourke area with a disjunct population occurring in the north-western plains from Buttabone Stud Park ~35 kilometres west of Warren. Found growing on roadsides, rail reserves, stock routes, grasslands and in table drains in Riverine Plain Grasslands, Riverine Chenopod Shrublands, Semi-arid Floodplain Grasslands and Riverine Plain Woodlands. Grows in heavy red-brown clay-loam soils.	Medium	Yes	Included – Survey undertaken Not recorded during surveys	Low	This species is primarily found on the Hay Plain, which occurs anecdotally west of Oolambeyan National park on the flat scalded plains towards Balranald, but also known to occur within the Jerilderie Nature Reserve. Microhabitats with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust. No individuals were observed during targeted surveys.
Swainsona sericea **Silky Swainson-pea**		VU	Yes	Small prostrate or erect perennial herb with a distribution spanning from the Northern Tablelands to the	High	Yes	Included – Survey undertaken	High	Silky Swainsona-pea has been recorded bordering the subject land in isolated patches. Suitable habitat is broadly available within woodland

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				Southern Tablelands and further inland on the slopes and plains with an additional outlying population in the far north-west of NSW. Found growing in a variety of communities including Natural Temperate Grasslands, Snow Gum Eucalyptus pauciflora Woodlands on the Monaro, Box-Gum Woodland, New England Dry Sclerophyll Forests, North-west Slopes Dry Sclerophyll Woodlands, North-west Plain Shrublands, Western Slopes Grasslands, Floodplain Transition Woodlands and Subalpine Woodlands.			Recorded during surveys		and grassland PCTs 26, 46 and 45. Refinements to the development footprint have avoided significant populations of this species identified within the subject land.
Solanum karsense **Menindee Nightshade**	VU	VU	Yes	Forb restricted to the far south-western plains, extending up the Darling River to the Menindee and Wilcannia districts. Grows in occasionally flooded depressions with heavy soil, including level river floodplains of grey clay with Black Box and Old Man Saltbush, and open treeless plains with solonized brown soils. Habitats are generally lake beds or floodplains of heavy grey clays with a highly	Low	Yes	Excluded – Geographical limitations	Low	Menindee Nightshade does not occur within 25km of the subject land. This species is primarily found west of Maude, and therefore has been excluded from the assessment.

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Species	Status		BAM predicted SCS	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC							
				self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils					

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Table A 2: Threatened fauna species assessment – BAM Candidate and EPBC only

Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
Birds											
Actitis hypoleucos **Common Sandpiper**			No	Migratory	PMST, BioNet	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999).	Low	No	Excluded - vagrant	Negligible	No records of Common Sandpiper occur within 50km of the subject land. Suitable habitat may include grassland and riparian woodland, however, the subject land is unlikely to provide habitat frequented by the species, with only few populations known west of the Great Dividing Range.
Anthochaera phrygia **Regent Honeyeater**	CR	CR	No		PMST, BioNet	Regent Honeyeaters are semi-nomadic, occurring in temperate eucalypt woodlands and open forests. Most records are from box-ironbark eucalypt forest associations and wet lowland coastal forests. Nectar and fruit from mistletoes are also eaten.	Low	No	Excluded – no microhabitat or important mapped areas	Negligible	No records of Regent honeyeater occur within 50km of the subject land. The subject land is not mapped as an important area for the species and does not

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						This species usually nest in tall mature eucalypts and sheoaks.					contain suitable habitat, as it is not associated with any PCTs that occur within the subject land.
Aphelocephala leucopsis **Southern Whiteface**	Vu		No	No	PMST	Dry open forests and woodland and inland scrubs of mallee, mulga and saltbush are the preferred habitat of Southern Whiteface, especially areas with fallen timber or dead trees and stumps.	Known	No	Included – Survey undertaken	Medium	Southern Whiteface has been recorded within and adjacent to the subject land Suitable habitat is available in woodland, scattered trees and open farmland associated with PCT's 13, 15, and 26. Preferred intact habitat has been avoided. Minor impacts to fringing vegetation.
Apus pacificus **Fork-tailed Swift**			No	Migratory	PMST, BioNet	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh.	Low	No	Excluded	Negligible	Fork tailed swift has been recorded approximately 23km from the subject land. Suitable habitat may include open farmland and riparian woodland, however, the subject land is unlikely to provide habitat frequented by the species as it more

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
						They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999).					commonly utilises coastal habitat and only few populations are known west of the Great Dividing Range.
Ardeotis australis **Australian Bustard**		EN	Yes		BioNet	This species appears to be confined to areas where the upper vegetation canopy cover is less than 10% or under 2m high (NPWS 1996). Mainly occurs in open woodland, low shrubland, farmland and roost in tree or on a high vantage point on the ground (Blakers et al. 1984, NPWS 1996). This species does not build nest, eggs are laid on open bare ground beside grass or tussock (NPWS 1996).	Medium	Yes	Included – Survey undertaken	Low	Australian Bustard has been recorded approximately 17km from the subject land with the most recent record from over 15 years ago. Suitable habitat for the species is available within the subject land, represented by open farmland and shrubland and grassland communities consistent with PCT's 15, 13, 26, 46 and 45.
Botaurus poiciloptilus **Australasian Bittern**	EN	EN	No		PMST, BioNet	The Australasian Bittern is distributed across south-eastern Australia. Often found in terrestrial and estuarine wetlands, generally where there is permanent water with tall, dense vegetation including Typha spp. and	Low	No	Included – Survey undertaken	Low	Australian Bittern has been recorded within the subject land. Suitable habitat is present, represented by Lignum woodland and wetland PCT 13.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						Eleocharis spp.. Typically this bird forages at night on frogs, fish and invertebrates, and remains inconspicuous during the day. The breeding season extends from October to January with nests being built amongst dense vegetation on a flattened platform of reeds.					Known to move through the site during migration.
Burhinus grallarius **Bush Stone-curlew**		EN	Yes		BioNet	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Occurs in lightly timbered open forest and woodland, or partly cleared farmland with remnants of woodland, with a ground cover of short sparse grass and few or no shrubs where fallen branches and leaf litter are present.	Low	Yes	Included – Survey undertaken	Low	Bush Stone-Curlew has been recorded approximately 19km from the subject land with the most recent record from over 10 years ago. Suitable habitat for the species is available within the subject land, represented by partially cleared farmland and thinned woodland communities consistent with PCT's 13, 15, and 26.
Calidris acuminata **Sharp-tailed Sandpiper**			No	Migratory	PMST, BioNet	In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This	Low	No	Excluded - vagrant	Negligible	Sharp-tailed Sandpiper has been recorded approximately 16km from the subject land. Suitable habitat within the subject land may

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
						includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal areas with much beachcast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs (Higgins & Davies 1996).					include wetland communities and flooded paddocks.
Calidris ferruginea **Curlew Sandpiper**	CR	EN	No	Migratory	PMST, BioNet	Inhabits sheltered intertidal mudflats. Also non-tidal swamps, lagoons and lakes near the coast. Infrequently recorded inland.	Low	No	Excluded - vagrant	Negligible	Curlew Sandpiper has not been recorded within 50km of the subject land. No suitable habitat is available within the

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
											subject land, such as intertidal flats, and the species is not associated with any PCTs within the subject land.
Calidris melanotos **Pectoral Sandpiper**			No	Migratory	PMST, BioNet	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (Higgins & Davies 1996).	Low	No	Excluded - vagrant	Negligible	Pectoral Sandpiper has not been recorded within 50km of the subject land. Habitat within the subject land is not suitable, given the distance from the coast.
Calyptorhynchus Latham **Glossy Black-Cockatoo**	VU	VU	No		PMST, BioNet	Inhabits forest with low nutrients, characteristically with key Allocasuarina species. Tends to prefer drier forest types. Often confined to remnant patches in	Low	No	Excluded – limited microhabitat	Low	Glossy Black-Cockatoo has been recorded approximately 40km from the subject land. Habitat within the

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						hills and gullies. Breed in hollows stumps or limbs, either living or dead.					subject land is unsuitable, as it does not contain forest communities with Allocasuarina species, and the species is not associated with any PCT's within the subject land.
Charadrius veredus **Oriental Plover**			No	Migratory	BioNet	Immediately after arriving in non-breeding grounds in northern Australia, Oriental Plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland (Bigg 1981; Bransbury 1985; Crawford 1972; Murlis et al. 1988; Serventy & Whittell 1976; Storr 1977, 1980, 1984b). Thereafter they usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps At the onset of the Wet Season, some may move into lightly wooded grasslands (Storr 1977). Some remain in estuarine and littoral	Low	No	Excluded - vagrant	Negligible	Oriental Plover has been recorded approximately 38km from the subject land, with the most recent record from over 15 years ago. Suitable habitat may include open farmland and grassland communities within the subject land.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
						environments, and a few are occasionally recorded around terrestrial wetlands or flooded paddocks (Boekel 1980; Close 1982; McCrie 1984). Vagrants in southern Australia have been recorded in saltmarsh (Park 1983; Patterson 1983; Pedler 1982).					
Falco hypoleucos **Grey Falcon**	VU	EN	No		PMST, BioNet	Found over open country and wooded lands of tropical and temperate Australia. Mainly found on sandy and stony plains of inland drainage systems with lightly timbered acacia scrub.	Low	No	Excluded - vagrant	Low	Grey Falcon has been recorded approximately 13km from the subject land with the most recent record from over 10 years ago. Suitable habitat for the species is available within the subject land, represented by open farmland and acacia woodland communities and within PCT's 13, 15, 16, 17, 26, 46 and 45.
Gallinago hardwickii **Latham's Snipe**			No	Migratory	PMST, BioNet	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level (Chapman 1969; Naarding 1981). They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands,	Medium	No	Excluded - vagrant	Low	Latham's Snipe has been recorded approximately 13km from the subject land. Suitable habitat is represented by wetland communities within the subject land.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
						around bogs and other water bodies) (Frith et. al. 1977; Naarding 1983; Weston 2006, pers. comm.). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (Frith et al. 1977; Naarding 1983).					
Gelochelidon nilotica **Gull-billed Tern**			No	Migratory	BioNet	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean	Low	No	Excluded - vagrant	Negligible	Gull-billed Tern has been recorded approximately 35km from the subject land. Suitable habitat may be present within wetland communities and in grasslands during periods of inundation.
Grantiella picta **Painted Honeyeater**	VU	VU	No		PMST, BioNet	Found mainly in dry open woodlands and forests, where it is strongly associated with mistletoe. Often found on plains with scattered eucalypts and remnant trees on farmlands.	Known	No	Included – Survey undertaken	High	Painted Honeyeater has previously been recorded within the subject land in 2019 and recorded within surveys for the adjacent wind farm. Suitable habitat is available in woodland, scattered trees and open farmland associated with PCT's 13, 15, and 26.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
Haliaeetus leucogaster **White-bellied Sea-Eagle**		VU	Yes		BioNet	A migratory species that is generally sedentary in Australia, although immature individuals and some adults are dispersive. Found in terrestrial and coastal wetlands; favouring deep freshwater swamps, lakes and reservoirs; shallow coastal lagoons and saltmarshes. It hunts over open terrestrial habitats. Feeds on birds, reptiles, fish, mammals, crustaceans and carrion. Roosts and makes nest in trees.	Low	Yes	Included – Survey undertaken	Low	White-bellied Sea-Eagle has been recorded approximately 16km from the subject land. Terrestrial and shallow aquatic foraging habitat are available within PCTs 13, 15, 17, 26 and 45. Aquatic foraging resources are likely favourable during wetter periods, where freshwater wetlands become inundated.
Hieraaetus morphnoides **Little Eagle**		VU	Yes		Bionet	The Little Eagle is most abundant in lightly timbered areas with open areas nearby providing an abundance of prey species. It has often been recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. The Little Eagle nests in tall living trees within farmland, woodland and forests.	Medium	Yes	Included – Survey undertaken	Medium	Little Eagle has previously been recorded within the subject land in 2020. Suitable habitat is available within open and sparsely vegetated and intact woodlands within PCTs 13, 15, 17, 26, 46 and 45. Not recorded during recent surveys in 2022 through to 2024.
Hirundapus caudacutus	VU		No	Migratory	PMST, Bionet	Almost exclusively an aerial species, occur over most types of habitat, they are probably	Medium	No	Included – Survey	Negligible	White-throated Needletail has not been recorded within

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
White-throated Needletail						recorded most often above wooded areas, including open forest.			undertaken		the subject land. Only comes to ground in adverse weather.
Hydroprogne caspia **Caspian Tern**			No	Migratory		Generally found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred, however known to frequent inland areas and wetlands during periods of inundation.	Low	No	Excluded - vagrant	Negligible	Caspian Tern has been recorded approximately 34 km from the subject land over 15 years ago. No suitable habitat occurs within the subject land, given the distance from the coast.
Lathamus discolor **Swift Parrot**	CR	EN	No		PMST, Bionet	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Mugga Ironbark E. sideroxylon, and White Box E. albens. Commonly used lerp infested trees include Grey Box E. microcarpa, Grey Box E. moluccana and Blackbutt E.	Low	No	Excluded – no important mapped habitat	Negligible	Swift Parrot has been recorded approximately 25km from the subject land. No suitable habitat occurs within the subject land, with a low floristic diversity of flowering trees and shrubs across the PCTs present. The subject land does not contain any important areas mapped for the species, and the species is not associated with any

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						pilularis. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.					PCT's within the subject land.
Leipoa ocellata **Malleefowl**	VU	EN	No	Migratory	PMST, Bionet	The malleefowl occurs in tall, dense mallee with a mean annual rainfall of 300 to 450mm (NPWS 1996). This species prefers areas with a light sandy to sandy loam soil, a dense but discontinuous canopy cover, dense and variable herb layer and open ground for easy of movement (NPWS 1996).	Low	No	Excluded – No habitat	Negligible	Malleefowl has been recorded approximately 19km from the subject land with the most recent record from over 20 years ago. The species is not associated with any PCT's present within the subject land and no suitable habitat it present, given there is no tall, densely vegetation Mallee vegetation.
Limosa limosa **Black-tailed Godwit**		VU	No	Migratory	Bionet	n Australia the Black-tailed Godwit has a primarily coastal habitat environment. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets. The use of habitat often depends on the	Low	No	Excluded - vagrant	Negligible	Black-tailed Godwit has been recorded approximately 46km from the subject land over 20 years ago. The subject land is unlikely to provide suitable habitat for this species given the distance from coastal areas, and that

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						stage of the tide. It is also found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. They also use lagoons in sewage farms and saltworks (Higgins & Davies 1996).					very few records occur inland.
Lophochroa leadbeateri **Major Mitchell's Cockatoo**	VU	VU	Yes		Bionet	Found mainly in semi-arid and arid regions, in dry woodlands, particularly mallee - casuarina assemblages. They breed in the hollows of large trees, often near watercourse.	High	Yes	Included – Survey undertaken	Low	Major Mitchells Cockatoo has been recorded approximately 13km from the subject land. Foraging and breeding habitat is represented by large hollows and woodland communities within PCT's 13, 15, 26 and 45. Not recorded during recent surveys in 2022 through to 2024.
Lophoictinia isura **Square-tailed Kite**		VU	Yes		Bionet	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia	Medium	Yes	Included – Survey undertaken	Medium	Square-tailed Kite has been recorded approximately 36km from the subject land over 10 years ago. Suitable habitat is

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
						maculata, E. elata, or E. smithii. Individuals appear to occupy large hunting ranges of more than 100 km2. They require large living trees for breeding, particularly near water with surrounding woodland /forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.					represented by large Eucalypts, open farmland, woodland, shrubland and grassland communities within PCT's 13, 15, 26 and 45.
Merops ornatus **Rainbow Bee-eater**			No	Migratory	Bionet	The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Higgins 1999). It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water (Badman 1979; Boekel 1976; Fry 1984; Roberts 1979; Storr 1984a, 1984b, 1985a). It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches (Higgins 1999).	Known	No	Included – Survey undertaken	High	Rainbow Bee-eater has previously been recorded within the subject land. Suitable habitat is represented by woodland and shrubland communities and areas of open farmland.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
Motacilla flava **Yellow Wagtail**			No	Migratory	PMST, Bionet	Prefers damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs	Low	No	Excluded - vagrant	Negligible	Yellow Wagtail has not been recorded within 50km of the subject land.
Ninox connivens **Barking Owl**		VU	Yes		Bionet	Generally found in open forests, woodlands, swamp woodlands, farmlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country. Territories are typically 2000 ha in NSW habitats. Hunts small arboreal mammals or birds and terrestrial mammals when tree hollows are absent.	Medium	Yes	Included – Survey undertaken	Low	Suitable habitat available in large hollows, open farmland, dense shrubland and woodland within PCTs 13 and 15
Numenius madagascariensis **Eastern Curlew**	CR		No	Migratory	PMST, Bionet	Occurs in sheltered coasts, especially estuaries, embayments, harbours, inlets and coastal lagoons with large intertidal mudflats or sandflats often with beds of seagrass.	Low	No	Excluded - vagrant	Negligible	Eastern Curlew has not been recorded within 50km of the subject land. No suitable habitat is available within the subject land, such as coastal estuaries, inlets or embayment's, and the species is not associated with any PCTs within the subject land.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
Pedionomus torquatus **Plains-wanderer**	CR	EN	Yes		PMST, Bionet	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. Habitat structure appears to be more important than plant species composition. Preferred habitat typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses. They have been recorded in some agricultural land including unimproved pasture, and cropping on long rotation.	High	Yes	Included – Survey undertaken. Mapped important habitat	Medium	Plains-wanderer has previously been recorded within the subject land. Not recorded in surveys undertaken. Important areas of Plains wanderer are mapped within the northern section of the subject land. Suitable habitat is present within grassland represented by PCT 46.
Pezoporus occidentalis **Night Parrot**	EN	EX	No	Migratory	PMST, Bionet	The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt. The Night Parrot builds its nest which consists of a few small sticks at the end of a 'tunnel' that is formed in a Spinifex tussock or a small bush. Up to four white eggs are laid in this nest. Some unconfirmed reports have claimed that the Night Parrot may nest or	Negligible	No	Excluded	Negligible	Night Parrot is extinct in NSW. No records occur within 50km of the subject land.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						roost in caves, and one unverified source claimed that it may also excavate burrows in sandy soils.					
Plegadis falcinellus **Glossy Ibis**			No	Migratory	Bionet	The Glossy Ibis' preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons	Low	No	Excluded - vagrant	Low	Glossy Ibis has been recorded approximately 6km from the subject land. Suitable habitat occurs within the subject land in wetland communities on floodplains.
Polytelis anthopeplus monarchoides **Regent Parrot (eastern subspecies)**			Yes		Bionet	The species nests within River Red Gum forests along the Murray, Wakool and lower Murrumbidgee Rivers, and possibly the Darling River downstream of Pooncarie. Typical nest trees are large, mature healthy trees with many spouts (though dead trees are used) and are usually located close to a watercourse. Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands. Mallee woodland within 20 kilometres of nesting sites is critical foraging habitat for breeding birds. They may utilise	Low	Yes	Excluded – Geographical limitations	Negligible	Regent Parrot (eastern subspecies) has not been recorded within 50km of the subject land. Woodland habitat is broadly available within PCTs 13 and 15 however the subject land does not contain Mallee woodland or near the Murray River.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
						cereal crops and will feed on spilt grain. Is claimed to be a pest in almond orchards. Birds move between the riverine nesting habitat and foraging sites along corridors of natural vegetation. Outside the breeding season birds may move away from the riverine plain, with birds observed in mallee over 60 kilometres from the river. However, there are very few records in NSW away from the Murray River during the non-breeding season and it has been speculated that most birds may join non-breeding flocks in Victoria.					
Polytelis swainsonii **Superb Parrot**	VU	VU	Yes		PMST, Bionet	Found mainly in open, tall riparian River Red Gum forest or woodland. Often found in farmland including grazing land with patches of remnant vegetation. Forages primarily in grassy box woodland, feeding in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants.	Known	Yes	Included – Survey undertaken	High	Superb Parrot has previously been recorded within the subject land and was recorded during the field investigation. Suitable habitat is present within grazing land, and native woodland and grassland vegetation within PCTs 13, 26 and 45.
Rostratula australis	EN	EN	No		Bionet	Usually found in shallow inland wetlands including farm dams,	Low	No	No	Low	Australian Painted Snipe has been

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
Australian Painted Snipe						lakes, rice crops, swamps and waterlogged grassland. They prefer freshwater wetlands, but have been recorded in brackish waters. Forages on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.					recorded approximately 25km from the subject land over 15 years ago. Suitable habitat is broadly available within farm dams, and freshwater Lignum wetlands and shrublands within PCTs 13 and 17.
Stagonopleua guttata ***Diamond Firetail***	VU	VU	No		Bionet PMST	Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover	Known	No	No – recorded opportunistically	Low	Diamond Firetail has been recorded within and adjacent to the subject land. Suitable habitat is available in woodland, scattered trees and open farmland associated with PCT's 13, 15, and 26. Preferred intact habitat has been avoided. Minor impacts to fringing vegetation.
Tringa nebularia **Common Greenshank**			No	Migratory	Bionet	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh,	Low	No	Excluded - vagrant	Negligible	Common Greenshank has been recorded approximately 5km from the subject land. Suitable habitat occurs within the subject land

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees. It was once recorded with Black-winged Stilts (Himantopus himantopus) in pasture, but are generally not found in dry grassland (Higgins & Davies 1996).					in wetland communities.
Tyto novaehollandiae **Masked Owl**		VU	Yes		Bionet	The Masked Owl is found in range of wooded habitats that provide tall or dense mature trees with hollows suitable for nesting and roosting. It is mostly seen in open	Medium	Yes	Included – Survey undertaken	Medium	Masked Owl has been recorded approximately 24km from the subject land over 20 years ago.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						forests and woodlands adjacent to cleared lands. Prey includes hollow-dependent arboreal marsupials and terrestrial mammals.					Suitable habitat is available within woodland in PCTs 13 and 26 and large hollows.
Mammals											
Phascolarctos cinereus **Koala**	VU	VU	Yes		PMST, Bionet	In NSW the Koala mainly occurs on the central and north coasts with some populations in the western region. Koalas feed almost exclusively on eucalypt foliage, and their preferences vary regionally. Primary feed trees include Eucalyptus camaldulensis within the Riverina. They are solitary with varying home ranges.	Low	Yes	Excluded – Limited habitat in subject land	Low	Koala has been recorded approximately 14km from the subject land. Suitable habitat is broadly available within woodland communities 13, 15, 17 and 26. The subject land contains sporadic occurrences and low condition patches of preferred Koala feed tree species *Eucalyptus camaldulensis* in suboptimal condition.
Nyctophilus corbeni **Corben's Long-eared Bat**	VU	VU	No		PMST, Bionet	Restricted to the Murray-Darling basin and western slopes. Found in a range of habitats including tall Eucalypt forests, mallee, open savanna and Black Box woodland, preferring habitats with a distinct canopy and cluttered, dense understorey. Roost in tree hollows	Medium	No	Included – Survey undertaken	Low	Corbens Long-eared Bat has not been recorded within 50km of the subject land. May be found in PCT 13 and 15.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						and fissures and under exfoliating bark.					
Pteropus poliocephalus **Grey-headed Flying Fox**	VU		No	Nomadic	PMST	Occur in various habitat from subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Low	No	Excluded – Geographical limitations and lack of habitat	Low	Grey-headed Flying Fox has not been recorded within 50km of the subject land. The subject does not contain suitable habitat for the species, which is not associated with any PCT's within the subject land.
Frogs											
Crinia sloanei **Sloane's Froglet**	EN	VU	No		PMST, Bionet	Sloane's Froglet is a cryptic species, usually found only after rain. This species has a widely scattered distribution throughout the floodplains of the Murray-Darling Basin in NSW and has been recorded mostly in the Darling Riverine Plains, NSW South Western Slopes, and the Riverina bioregions. It is typically associated with periodically inundated grassland, woodland and disturbed areas.	Low	No	Excluded - vagrant	Low	Sloane's Froglet has been recorded approximately 25km from the subject land over 20 years ago. While the subject land contains periodically inundated grasslands, the species is not associated with any PCT's within the subject land.
Litoria raniformis	VU	EN	Yes		PMST, Bionet	In NSW, the species is known to exist only in isolated populations in	Known	Yes	Included – Survey	High	Southern Bell Frog has previously been

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
Southern Bell Frog						the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral swamps or billabongs with an abundance of bulrushes and other emergent vegetation along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.			undertaken		recorded within the subject land and was observed during the field investigation. Suitable habitat is present within swamp and wetland within PCTs 13 and 17. This species was also identified within Coleambally irrigation channel.
Fish											
Galaxias rostratus **Flathead Galaxias**	CR		No		PMST, Bionet	Flathead Galaxias are found in still or slow moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation. Flathead Galaxias spawn in spring and lay slightly adhesive demersal eggs.	Low	No	Excluded – No habitat	Medium	No records of Flathead Galaxias occur within 50km of the subject land. There is mapped habitat for Flathead Galaxias within the subject land comprising Delta Creek outside of the subject land.

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EPBC	BC									
Maccullochella peelii **Murray Cod**	VU		No		PMST, Bionet	The Murray Cods natural distribution extends throughout the Murray-Darling basin ranging west of the divide from south east Queensland, through NSW into Victoria and South Australia. It is found in the waterways of the Murray–Darling Basin in a wide range of warm water habitats that range from clear, rocky streams to slow flowing turbid rivers, billabongs and large deep holes. Murray Cod is entirely a freshwater species and will not tolerate high salinity levels.	Low	No	Excluded – No habitat	Low	No records of Murray Cod occur within 50km of the subject land. No mapped habitat occurs within the subject land. Habitat is not likely suitable within the subject land, given the absence of rocky streams, rivers and deep holes.
Macquaria australasica **Macquarie Perch**	EN		No		PMST, Bionet	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven catchments. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	Low	No	Excluded – No habitat	Low	No records of Macquarie Perch occur within 50km of the subject land. No mapped habitat occurs within the subject land. Habitat is not likely suitable within the subject land, given the absence of rivers and lakes.
Maccullochella macquariensis **Trout Cod**	EN		No		PMST	The Trout Cod is endemic to the southern Murray-Darling river system, including the Murrumbidgee and Murray Rivers,	Low	No	Excluded – No habitat	Low	No records of Trout Cod occur within 50km of the subject land. No mapped habitat occurs

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Species	Status		BAM predicted SCS	Migratory	Other Sources	Habitat Description	Potential occurrence in subject land	BAM Candidate species	Survey required/ undertaken	Potential for impact	Conclusion and rationale
	EP BC	BC									
						and the Macquarie River in central NSW. Trout Cod are often found in faster flowing water with rocky and gravel bottoms, but can also be found in some slower flowing, lowland rivers. Large woody snags are very important for the species as they provide complex habitats for each stage of the species' life cycle.					within the subject land. Habitat is not likely suitable within the subject land, given the absence of rivers, or fast flowing water with gravel bottoms and large woody snags.

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Appendix 3 Flora

Appendix 3.1 BAM plot field data

Table A 3: BAM plot floristics

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Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Native species																		
	Roepera glauca																	
Aizoaceae	Zaleya galericulata	Hogweed																
Alismataceae	Alisma plantago-aquatica	Water Plantain	2	200														
Amaranthaceae	Amaranthus spp.	Amaranth																
Amaranthaceae	Alternanthera nana	Hairy Joyweed																
Amaranthaceae	Ptilotus semilanatus	Lambs tails																
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed									0.5	60			0.1	20	0.2	400
Amaranthaceae	Ptilotus erubescens	None																
Amaranthaceae	Ptilotus spp.	None																
Amaranthaceae	Ptilotus nobilis	Yellowtails																
Amaryllidaceae	Calostemma purpureum	Garland Lily																
Anthericaceae	Thysanotus baueri	Fringe-lily																
Anthericaceae	Tricoryne elatior	Yellow Autumn-lily																
Asphodelaceae	Bulbine bulbosa	Bulbine Lily			0.1	5												
Asphodelaceae	Bulbine semibarbata	Wild Onion																
Asteraceae	Craspedia spp.	Billy Buttons																
Asteraceae	Chrysocephalum semipapposum	Clustered Everlasting																
Asteraceae	Cotula australis	Common Cotula																
Asteraceae	Chrysocephalum apiculatum	Common Everlasting			1													
Asteraceae	Centipeda cunninghamii	Common Sneezeweed			0.1	100											0.3	200
Asteraceae	Senecio spp.	Groundsel, Fireweed																
Asteraceae	Brachyscome lineariloba	Hard-headed Daisy																
Asteraceae	Leucochrysum molle	Hoary Sunray			2													
Asteraceae	Calotis cuneata	Mountain Burr-Daisy																
Asteraceae	Calotis scabiosifolia var. scabiosifo	None																
Asteraceae	Euchiton spp.	None																
Asteraceae	Pycnosorus spp.	None																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Native species																		
	Roepera glauca																	
Aizoaceae	Zaleya galericulata	Hogweed																
Alismataceae	Alisma plantago-aquatica	Water Plantain																
Amaranthaceae	Amaranthus spp.	Amaranth																
Amaranthaceae	Alternanthera nana	Hairy Joyweed																
Amaranthaceae	Ptilotus semilanatus	Lambs tails	0.1	1					0.1	6	0.1	20	0.2	50				
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed			0.1	10	0.1	10							0.1	10		
Amaranthaceae	Ptilotus erubescens	None																
Amaranthaceae	Ptilotus spp.	None																
Amaranthaceae	Ptilotus nobilis	Yellowtails									0.2	60						
Amaryllidaceae	Calostemma purpureum	Garland Lily																
Anthericaceae	Thysanotus baueri	Fringe-lily																
Anthericaceae	Tricoryne elatior	Yellow Autumn-lily																
Asphodelaceae	Bulbine bulbosa	Bulbine Lily																
Asphodelaceae	Bulbine semibarbata	Wild Onion																
Asteraceae	Craspedia spp.	Billy Buttons																
Asteraceae	Chrysocephalum semipapposum	Clustered Everlasting																
Asteraceae	Cotula australis	Common Cotula																
Asteraceae	Chrysocephalum apiculatum	Common Everlasting											0.1	1	0.1	10		
Asteraceae	Centipeda cunninghamii	Common Sneezeweed																
Asteraceae	Senecio spp.	Groundsel, Fireweed																
Asteraceae	Brachyscome lineariloba	Hard-headed Daisy																
Asteraceae	Leucochrysum molle	Hoary Sunray																
Asteraceae	Calotis cuneata	Mountain Burr-Daisy																
Asteraceae	Calotis scabiosifolia var. scabiosifo	None																
Asteraceae	Euchiton spp.	None																
Asteraceae	Pycnosorus spp.	None																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Native species																			
	Roepera glauca																		
Aizoaceae	Zaleya galericulata	Hogweed																	
Alismataceae	Alisma plantago-aquatica	Water Plantain																	
Amaranthaceae	Amaranthus spp.	Amaranth																	
Amaranthaceae	Alternanthera nana	Hairy Joyweed																	
Amaranthaceae	Ptilotus semilanatus	Lambs tails	0.1	30											0.1	1	0.1	5	0.2
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed			0.2	50													
Amaranthaceae	Ptilotus erubescens	None																	
Amaranthaceae	Ptilotus spp.	None							0.1	1									
Amaranthaceae	Ptilotus nobilis	Yellowtails											0.1	1			0.1	2	
Amaryllidaceae	Calostemma purpureum	Garland Lily																	
Anthericaceae	Thysanotus baueri	Fringe-lily																	
Anthericaceae	Tricoryne elatior	Yellow Autumn-lily																	
Asphodelaceae	Bulbine bulbosa	Bulbine Lily																	
Asphodelaceae	Bulbine semibarbata	Wild Onion																	
Asteraceae	Craspedia spp.	Billy Buttons																	
Asteraceae	Chrysocephalum semipapposum	Clustered Everlasting																	
Asteraceae	Cotula australis	Common Cotula																	
Asteraceae	Chrysocephalum apiculatum	Common Everlasting	0.1	5									0.1	2					0.1
Asteraceae	Centipeda cunninghamii	Common Sneezeweed			0.1	1													
Asteraceae	Senecio spp.	Groundsel, Fireweed																	
Asteraceae	Brachyscome lineariloba	Hard-headed Daisy																	
Asteraceae	Leucochrysum molle	Hoary Sunray																	
Asteraceae	Calotis cuneata	Mountain Burr-Daisy							0.1	50									
Asteraceae	Calotis scabiosifolia var. scabiosifo	None																	
Asteraceae	Euchiton spp.	None																	
Asteraceae	Pycnosorus spp.	None																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Native species																				
	Roepera glauca																			
Aizoaceae	Zaleya galericulata	Hogweed																		
Alismataceae	Alisma plantago-aquatica	Water Plantain																		
Amaranthaceae	Amaranthus spp.	Amaranth																		
Amaranthaceae	Alternanthera nana	Hairy Joyweed																		
Amaranthaceae	Ptilotus semilanatus	Lambs tails	50	0.1	10	0.1	10	0.1	10	0.1	5						0.1	10		
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed																	0.1	10
Amaranthaceae	Ptilotus erubescens	None																		
Amaranthaceae	Ptilotus spp.	None																		
Amaranthaceae	Ptilotus nobilis	Yellowtails															0.1	10	0.1	2
Amaryllidaceae	Calostemma purpureum	Garland Lily																		
Anthericaceae	Thysanotus baueri	Fringe-lily																		
Anthericaceae	Tricoryne elatior	Yellow Autumn-lily																		
Asphodelaceae	Bulbine bulbosa	Bulbine Lily																		
Asphodelaceae	Bulbine semibarbata	Wild Onion																		
Asteraceae	Craspedia spp.	Billy Buttons																		
Asteraceae	Chrysocephalum semipapposum	Clustered Everlasting																	0.1	1
Asteraceae	Cotula australis	Common Cotula													0.1	1			0.1	1
Asteraceae	Chrysocephalum apiculatum	Common Everlasting	10			0.1	20	0.1	10						0.1	2			0.1	2
Asteraceae	Centipeda cunninghamii	Common Sneezeweed																		
Asteraceae	Senecio spp.	Groundsel, Fireweed																		
Asteraceae	Brachyscome lineariloba	Hard-headed Daisy																		
Asteraceae	Leucochrysum molle	Hoary Sunray		2	300			0.1	8								0.5	60		
Asteraceae	Calotis cuneata	Mountain Burr-Daisy																		
Asteraceae	Calotis scabiosifolia var. scabiosifo	None																		
Asteraceae	Euchiton spp.	None																		
Asteraceae	Pycnosorus spp.	None																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Native species																		
	Roepera glauca																	
Aizoaceae	Zaleya galericulata	Hogweed																
Alismataceae	Alisma plantago-aquatica	Water Plantain																
Amaranthaceae	Amaranthus spp.	Amaranth																
Amaranthaceae	Alternanthera nana	Hairy Joyweed																
Amaranthaceae	Ptilotus semilanatus	Lambs tails	0.1	20														
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed					0.1	10			0.1	10					0.1	2
Amaranthaceae	Ptilotus erubescens	None																
Amaranthaceae	Ptilotus spp.	None																
Amaranthaceae	Ptilotus nobilis	Yellowtails																
Amaryllidaceae	Calostemma purpureum	Garland Lily																
Anthericaceae	Thysanotus baueri	Fringe-lily																
Anthericaceae	Tricoryne elatior	Yellow Autumn-lily																
Asphodelaceae	Bulbine bulbosa	Bulbine Lily																
Asphodelaceae	Bulbine semibarbata	Wild Onion																
Asteraceae	Craspedia spp.	Billy Buttons																
Asteraceae	Chrysocephalum semipapposum	Clustered Everlasting																
Asteraceae	Cotula australis	Common Cotula																
Asteraceae	Chrysocephalum apiculatum	Common Everlasting	3	200														
Asteraceae	Centipeda cunninghamii	Common Sneezeweed									0.1	20	0.1	1				
Asteraceae	Senecio spp.	Groundsel, Fireweed																
Asteraceae	Brachyscome lineariloba	Hard-headed Daisy	0.3	60														
Asteraceae	Leucochrysum molle	Hoary Sunray																
Asteraceae	Calotis cuneata	Mountain Burr-Daisy																
Asteraceae	Calotis scabiosifolia var. scabiosifo	None																
Asteraceae	Euchiton spp.	None																
Asteraceae	Pycnosorus spp.	None																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_55		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Native species																				
	Roepera glauca																			
Aizoaceae	Zaleya galericulata	Hogweed																		
Alismataceae	Alisma plantago-aquatica	Water Plantain																		
Amaranthaceae	Amaranthus spp.	Amaranth																		
Amaranthaceae	Alternanthera nana	Hairy Joyweed																		
Amaranthaceae	Ptilotus semilanatus	Lambs tails																	0.1	2
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed	0.1	20													0.1	10		
Amaranthaceae	Ptilotus erubescens	None																		
Amaranthaceae	Ptilotus spp.	None																		
Amaranthaceae	Ptilotus nobilis	Yellowtails																		
Amaryllidaceae	Calostemma purpureum	Garland Lily																		
Anthericaceae	Thysanotus baueri	Fringe-lily																		
Anthericaceae	Tricoryne elatior	Yellow Autumn-lily																		
Asphodelaceae	Bulbine bulbosa	Bulbine Lily																		
Asphodelaceae	Bulbine semibarbata	Wild Onion																		
Asteraceae	Craspedia spp.	Billy Buttons																		
Asteraceae	Chrysocephalum semipapposum	Clustered Everlasting																		
Asteraceae	Cotula australis	Common Cotula																		
Asteraceae	Chrysocephalum apiculatum	Common Everlasting																		
Asteraceae	Centipeda cunninghamii	Common Sneezeweed	0.1	30			0.1	20												
Asteraceae	Senecio spp.	Groundsel, Fireweed																		
Asteraceae	Brachyscome lineariloba	Hard-headed Daisy																		
Asteraceae	Leucochrysum molle	Hoary Sunray																		
Asteraceae	Calotis cuneata	Mountain Burr-Daisy																		
Asteraceae	Calotis scabiosifolia var. scabiosifo	None															0.1	2		
Asteraceae	Euchiton spp.	None																		
Asteraceae	Pycnosorus spp.	None																		

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Asteraceae	Sigesbeckia australiensis	None																
Asteraceae	Vittadinia cuneata	None			0.1	5												
Asteraceae	Vittadinia cuneata var. cuneata	None																
Asteraceae	Vittadinia hispidula	None																
Asteraceae	Calocephalus sonderi	Pale Beauty-heads																
Asteraceae	Calotis cuneifolia	Purple Burr-Daisy																
Asteraceae	Calotis scabiosifolia	Rough Burr-daisy			0.7	100												
Asteraceae	Leptorhynchos squamatus	Scaly Buttons																
Asteraceae	Rhodanthe corymbiflora	Small White Sunray			0.1	10											0.1	1
Asteraceae	Sonchus spp.	Sowthistle																
Asteraceae	Senecio glossanthus	Streaked Poverty Bush																
Asteraceae	Brachyscome ciliaris	Variable Daisy																
Asteraceae	Vittadinia gracilis	Woolly New Holland Daisy																
Asteraceae	Leiocarpa panaetioides	Wooly Buttons																
Asteraceae	Eclipta platyglossa	Yellow Twin-heads									0.1	1			0.1	5		
Asteraceae	Centipeda minima subsp. minima	spreading sneezeweed																
Boraginaceae	Heliotropium spp.	None																
Brassicaceae	Lepidium spp.	None																
Brassicaceae	Lepidium pseudohyssopifolium	Peppercress																
Campanulaceae	Wahlenbergia fluminalis	River Bluebell													0.1	1		
Campanulaceae	Wahlenbergia stricta	Tall Bluebell																
Caryophyllaceae	Stellaria angustifolia	Swamp Starwort																
Casuarinaceae	Allocasuarina luehmannii	Bulloak																
Chenopodiaceae	Einadia hastata	Berry Saltbush																
Chenopodiaceae	Maireana decalvans	Black Cotton Bush																
Chenopodiaceae	Sclerolaena muricata	Black Rolypoly	0.1	10			1	70	0.1	3	0.1	3			0.1	5		
Chenopodiaceae	Sclerolaena muricata var. muricat	Black Rolypoly																
Chenopodiaceae	Sclerolaena muricata var. semiglal	Black Rolypoly																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Asteraceae	Sigesbeckia australiensis	None																
Asteraceae	Vittadinia cuneata	None	0.2	20	0.1	5	0.1	10	0.1	10	0.1	20	0.3	20	0.1	10		
Asteraceae	Vittadinia cuneata var. cuneata	None																
Asteraceae	Vittadinia hispidula	None																
Asteraceae	Calocephalus sonderi	Pale Beauty-heads																
Asteraceae	Calotis cuneifolia	Purple Burr-Daisy																
Asteraceae	Calotis scabiosifolia	Rough Burr-daisy																
Asteraceae	Leptorhynchos squamatus	Scaly Buttons																
Asteraceae	Rhodanthe corymbiflora	Small White Sunray			0.1	1			0.1	20	0.1	20	0.1	5				
Asteraceae	Sonchus spp.	Sowthistle																
Asteraceae	Senecio glossanthus	Streaked Poverty Bush																
Asteraceae	Brachyscome ciliaris	Variable Daisy																
Asteraceae	Vittadinia gracilis	Woolly New Holland Daisy																
Asteraceae	Leiocarpa panaetioides	Wooly Buttons																
Asteraceae	Eclipta platyglossa	Yellow Twin-heads																
Asteraceae	Centipeda minima subsp. minima	spreading sneezeweed																
Boraginaceae	Heliotropium spp.	None																
Brassicaceae	Lepidium spp.	None																
Brassicaceae	Lepidium pseudohyssopifolium	Peppercress																
Campanulaceae	Wahlenbergia fluminalis	River Bluebell																
Campanulaceae	Wahlenbergia stricta	Tall Bluebell																
Caryophyllaceae	Stellaria angustifolia	Swamp Starwort																
Casuarinaceae	Allocasuarina luehmannii	Bulloak																
Chenopodiaceae	Einadia hastata	Berry Saltbush																
Chenopodiaceae	Maireana decalvans	Black Cotton Bush																
Chenopodiaceae	Sclerolaena muricata	Black Rolypoly	0.1	1	0.3	30	1	50			0.1	10			0.1	20	15	90
Chenopodiaceae	Sclerolaena muricata var. muricat	Black Rolypoly																
Chenopodiaceae	Sclerolaena muricata var. semiglal	Black Rolypoly																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Asteraceae	Sigesbeckia australiensis	None																	
Asteraceae	Vittadinia cuneata	None	0.2	20			0.2	60	0.1	10			0.1	5	0.2	50	0.1	10	0.3
Asteraceae	Vittadinia cuneata var. cuneata	None																	
Asteraceae	Vittadinia hispidula	None																	
Asteraceae	Calocephalus sonderi	Pale Beauty-heads																	
Asteraceae	Calotis cuneifolia	Purple Burr-Daisy											0.2	200					
Asteraceae	Calotis scabiosifolia	Rough Burr-daisy																	
Asteraceae	Leptorhynchos squamatus	Scaly Buttons																	
Asteraceae	Rhodanthe corymbiflora	Small White Sunray	0.1	20			0.1	1									0.1	5	0.1
Asteraceae	Sonchus spp.	Sowthistle																	
Asteraceae	Senecio glossanthus	Streaked Poverty Bush																	
Asteraceae	Brachyscome ciliaris	Variable Daisy																	
Asteraceae	Vittadinia gracilis	Woolly New Holland Daisy																	
Asteraceae	Leiocarpa panaetioides	Wooly Buttons																	
Asteraceae	Eclipta platyglossa	Yellow Twin-heads																	
Asteraceae	Centipeda minima subsp. minima	spreading sneezeweed																	
Boraginaceae	Heliotropium spp.	None																	
Brassicaceae	Lepidium spp.	None																	
Brassicaceae	Lepidium pseudohyssopifolium	Peppercress																	
Campanulaceae	Wahlenbergia fluminalis	River Bluebell																	
Campanulaceae	Wahlenbergia stricta	Tall Bluebell																	
Caryophyllaceae	Stellaria angustifolia	Swamp Starwort																	
Casuarinaceae	Allocasuarina luehmannii	Bulloak																	
Chenopodiaceae	Einadia hastata	Berry Saltbush																	
Chenopodiaceae	Maireana decalvans	Black Cotton Bush							0.1	20									
Chenopodiaceae	Sclerolaena muricata	Black Rolypoly	0.1	10			0.2	50	0.1	10			0.2	50	0.1	20	0.5	10	
Chenopodiaceae	Sclerolaena muricata var. muricat	Black Rolypoly									0.3	10							
Chenopodiaceae	Sclerolaena muricata var. semiglal	Black Rolypoly																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Asteraceae	Sigesbeckia australiensis	None																		
Asteraceae	Vittadinia cuneata	None	40			0.4	100	0.2	30	0.3	10			0.1	6	0.1	20	0.1	20	
Asteraceae	Vittadinia cuneata var. cuneata	None																		
Asteraceae	Vittadinia hispidula	None																		
Asteraceae	Calocephalus sonderi	Pale Beauty-heads																		
Asteraceae	Calotis cuneifolia	Purple Burr-Daisy																	0.1	1
Asteraceae	Calotis scabiosifolia	Rough Burr-daisy													0.1	1				
Asteraceae	Leptorhynchos squamatus	Scaly Buttons																		
Asteraceae	Rhodanthe corymbiflora	Small White Sunray	1					0.1	1	0.1	10					0.1	2			
Asteraceae	Sonchus spp.	Sowthistle																		
Asteraceae	Senecio glossanthus	Streaked Poverty Bush																		
Asteraceae	Brachyscome ciliaris	Variable Daisy																		
Asteraceae	Vittadinia gracilis	Woolly New Holland Daisy		0.1	10															
Asteraceae	Leiocarpa panaetioides	Wooly Buttons																		
Asteraceae	Eclipta platyglossa	Yellow Twin-heads																		
Asteraceae	Centipeda minima subsp. minima	spreading sneezeweed																		
Boraginaceae	Heliotropium spp.	None																		
Brassicaceae	Lepidium spp.	None																		
Brassicaceae	Lepidium pseudohyssopifolium	Peppercress																		
Campanulaceae	Wahlenbergia fluminalis	River Bluebell																		
Campanulaceae	Wahlenbergia stricta	Tall Bluebell																		
Caryophyllaceae	Stellaria angustifolia	Swamp Starwort																		
Casuarinaceae	Allocasuarina luehmannii	Bulloak																		
Chenopodiaceae	Einadia hastata	Berry Saltbush											0.1	5						
Chenopodiaceae	Maireana decalvans	Black Cotton Bush									0.1	10			0.1	1				
Chenopodiaceae	Sclerolaena muricata	Black Rolypoly		0.1	3	0.1	1			5		0.3	70	0.1	10	0.2	20	1	30	
Chenopodiaceae	Sclerolaena muricata var. muricat	Black Rolypoly																		
Chenopodiaceae	Sclerolaena muricata var. semiglal	Black Rolypoly																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Asteraceae	Sigesbeckia australiensis	None																
Asteraceae	Vittadinia cuneata	None	0.1	20													0.1	2
Asteraceae	Vittadinia cuneata var. cuneata	None																
Asteraceae	Vittadinia hispidula	None																
Asteraceae	Calocephalus sonderi	Pale Beauty-heads																
Asteraceae	Calotis cuneifolia	Purple Burr-Daisy																
Asteraceae	Calotis scabiosifolia	Rough Burr-daisy					0.1	1			0.1	6						
Asteraceae	Leptorhynchos squamatus	Scaly Buttons																
Asteraceae	Rhodanthe corymbiflora	Small White Sunray	0.1	6									0.1	1				
Asteraceae	Sonchus spp.	Sowthistle																
Asteraceae	Senecio glossanthus	Streaked Poverty Bush																
Asteraceae	Brachyscome ciliaris	Variable Daisy																
Asteraceae	Vittadinia gracilis	Woolly New Holland Daisy																
Asteraceae	Leiocarpa panaetioides	Wooly Buttons																
Asteraceae	Eclipta platyglossa	Yellow Twin-heads			0.1	1			2	50								
Asteraceae	Centipeda minima subsp. minima	spreading sneezeweed																
Boraginaceae	Heliotropium spp.	None																
Brassicaceae	Lepidium spp.	None																
Brassicaceae	Lepidium pseudohyssopifolium	Peppercress																
Campanulaceae	Wahlenbergia fluminalis	River Bluebell																
Campanulaceae	Wahlenbergia stricta	Tall Bluebell																
Caryophyllaceae	Stellaria angustifolia	Swamp Starwort																
Casuarinaceae	Allocasuarina luehmannii	Bulloak																
Chenopodiaceae	Einadia hastata	Berry Saltbush																
Chenopodiaceae	Maireana decalvans	Black Cotton Bush																
Chenopodiaceae	Sclerolaena muricata	Black Rolypoly	0.1	5	0.5	20	0.2	50	0.1	10			2		70	1000	0.1	2
Chenopodiaceae	Sclerolaena muricata var. muricat	Black Rolypoly																
Chenopodiaceae	Sclerolaena muricata var. semiglal	Black Rolypoly									1							

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_555		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Asteraceae	Sigesbeckia australiensis	None																		
Asteraceae	Vittadinia cuneata	None																		
Asteraceae	Vittadinia cuneata var. cuneata	None																		
Asteraceae	Vittadinia hispidula	None																		
Asteraceae	Calocephalus sonderi	Pale Beauty-heads																	0.1	1
Asteraceae	Calotis cuneifolia	Purple Burr-Daisy																		
Asteraceae	Calotis scabiosifolia	Rough Burr-daisy																		
Asteraceae	Leptorhynchos squamatus	Scaly Buttons																		
Asteraceae	Rhodanthe corymbiflora	Small White Sunray					0.1	5												
Asteraceae	Sonchus spp.	Sowthistle																		
Asteraceae	Senecio glossanthus	Streaked Poverty Bush															0.1	1		
Asteraceae	Brachyscome ciliaris	Variable Daisy																		
Asteraceae	Vittadinia gracilis	Woolly New Holland Daisy																		
Asteraceae	Leiocarpa panaetioides	Wooly Buttons																		
Asteraceae	Eclipta platyglossa	Yellow Twin-heads			0.1	2											0.1	2		
Asteraceae	Centipeda minima subsp. minima	spreading sneezeweed																		
Boraginaceae	Heliotropium spp.	None																		
Brassicaceae	Lepidium spp.	None																		
Brassicaceae	Lepidium pseudohyssopifolium	Peppercress																		
Campanulaceae	Wahlenbergia fluminalis	River Bluebell																		
Campanulaceae	Wahlenbergia stricta	Tall Bluebell																		
Caryophyllaceae	Stellaria angustifolia	Swamp Starwort																		
Casuarinaceae	Allocasuarina luehmannii	Bulloak																		
Chenopodiaceae	Einadia hastata	Berry Saltbush																		
Chenopodiaceae	Maireana decalvans	Black Cotton Bush					0.1	10												
Chenopodiaceae	Sclerolaena muricata	Black Rolypoly	0.1	20	0.3	10	1		2	200	35	800	7	20	3	300	5	50	0.2	
Chenopodiaceae	Sclerolaena muricata var. muricat	Black Rolypoly																		
Chenopodiaceae	Sclerolaena muricata var. semiglal	Black Rolypoly																		

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Salsola tragus	Buckbush,Soft Rolpoly, Saltwort																
Chenopodiaceae	Salsola tragus subsp. tragus	Buckbush,Soft Rolpoly, Saltwort																
Chenopodiaceae	Dissocarpus paradoxus	Cannonball Burr																
Chenopodiaceae	Einadia nutans	Climbing Saltbush																
Chenopodiaceae	Sclerolaena spp.	Copperburr, Poverty-bush																
Chenopodiaceae	Maireana aphylla	Cotton Bush																
Chenopodiaceae	Maireana spp.	Cotton Bush, Bluebush, Fissure-weed																
Chenopodiaceae	Atriplex semibaccata	Creeping Saltbush									0.3	1			0.2	10		
Chenopodiaceae	Dysphania cristata	Crested Crumbweed																
Chenopodiaceae	Chenopodium desertorum	Desert Goosefoot																
Chenopodiaceae	Atriplex lindleyi	Eastern Flat-top Saltbush																
Chenopodiaceae	Einadia trigonos	Fishweed																
Chenopodiaceae	Maireana ciliata	Fissure Weed																
Chenopodiaceae	Sclerolaena birchii	Galvinized Burr																
Chenopodiaceae	Sclerolaena tricuspis	Giant Redburr																
Chenopodiaceae	Sclerolaena bicornis	Goathead Burr																
Chenopodiaceae	Sclerolaena diacantha	Grey Copperburr																
Chenopodiaceae	Maireana pentagona	Hairy Bluebush, Slender Fissure-weed			0.1	5												
Chenopodiaceae	Chenopodium nitrariaceum	Nitre Goosefoot																
Chenopodiaceae	Dissocarpus biflorus var. biflorus	None																
Chenopodiaceae	Maireana brevifolia	None																
Chenopodiaceae	Maireana excavata	None																
Chenopodiaceae	Maireana humillima	None															0.1	1
Chenopodiaceae	Maireana trichoptera	None																
Chenopodiaceae	Salsola australis	None																
Chenopodiaceae	Atriplex nummularia	Old Man Saltbush													0.3	1		
Chenopodiaceae	Enchylaena tomentosa	Ruby Saltbush																
Chenopodiaceae	Sclerolaena brachyptera	Short-winged Copperburr																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Salsola tragus	Buckbush,Soft Rolpoly, Salt															0.1	10
Chenopodiaceae	Salsola tragus subsp. tragus	Buckbush,Soft Rolpoly, Salt																
Chenopodiaceae	Dissocarpus paradoxus	Cannonball Burr																
Chenopodiaceae	Einadia nutans	Climbing Saltbush																
Chenopodiaceae	Sclerolaena spp.	Copperburr, Poverty-bush																
Chenopodiaceae	Maireana aphylla	Cotton Bush											0.2	2				
Chenopodiaceae	Maireana spp.	Cotton Bush, Bluebush, Fiss																
Chenopodiaceae	Atriplex semibaccata	Creeping Saltbush	0.1	2	0.2	40							0.4	20			0.5	20
Chenopodiaceae	Dysphania cristata	Crested Crumbweed															0.1	10
Chenopodiaceae	Chenopodium desertorum	Desert Goosefoot															0.1	5
Chenopodiaceae	Atriplex lindleyi	Eastern Flat-top Saltbush																
Chenopodiaceae	Einadia trigonos	Fishweed																
Chenopodiaceae	Maireana ciliata	Fissure Weed																
Chenopodiaceae	Sclerolaena birchii	Galvinized Burr																
Chenopodiaceae	Sclerolaena tricuspis	Giant Redburr																
Chenopodiaceae	Sclerolaena bicornis	Goathead Burr			0.1	2												
Chenopodiaceae	Sclerolaena diacantha	Grey Copperburr			0.1	5	0.1	5			0.1	20	0.4	5	0.1	1		
Chenopodiaceae	Maireana pentagona	Hairy Bluebush, Slender Fis					0.1	20	0.1	1	0.5	200					0.3	20
Chenopodiaceae	Chenopodium nitrariaceum	Nitre Goosefoot																
Chenopodiaceae	Dissocarpus biflorus var. biflorus	None																
Chenopodiaceae	Maireana brevifolia	None																
Chenopodiaceae	Maireana excavata	None															0.3	20
Chenopodiaceae	Maireana humillima	None	1	50			0.1	10	0.1	30			0.3	20				
Chenopodiaceae	Maireana trichoptera	None																
Chenopodiaceae	Salsola australis	None																
Chenopodiaceae	Atriplex nummularia	Old Man Saltbush																
Chenopodiaceae	Enchylaena tomentosa	Ruby Saltbush			0.1	10											0.1	5
Chenopodiaceae	Sclerolaena brachyptera	Short-winged Copperburr																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Chenopodiaceae	Salsola tragus	Buckbush,Soft Rolpoly, Salt																	
Chenopodiaceae	Salsola tragus subsp. tragus	Buckbush,Soft Rolpoly, Salt																	
Chenopodiaceae	Dissocarpus paradoxus	Cannonball Burr																	
Chenopodiaceae	Einadia nutans	Climbing Saltbush																	
Chenopodiaceae	Sclerolaena spp.	Copperburr, Poverty-bush							0.1	1									
Chenopodiaceae	Maireana aphylla	Cotton Bush																	
Chenopodiaceae	Maireana spp.	Cotton Bush, Bluebush, Fiss																	
Chenopodiaceae	Atriplex semibaccata	Creeping Saltbush	0.1	30	0.1	5			0.1	50									
Chenopodiaceae	Dysphania cristata	Crested Crumbweed																	
Chenopodiaceae	Chenopodium desertorum	Desert Goosefoot																	
Chenopodiaceae	Atriplex lindleyi	Eastern Flat-top Saltbush																	
Chenopodiaceae	Einadia trigonos	Fishweed																	
Chenopodiaceae	Maireana ciliata	Fissure Weed											0.1	2					
Chenopodiaceae	Sclerolaena birchii	Galvinized Burr																	
Chenopodiaceae	Sclerolaena tricuspis	Giant Redburr																	
Chenopodiaceae	Sclerolaena bicornis	Goathead Burr							0.1	1									
Chenopodiaceae	Sclerolaena diacantha	Grey Copperburr			0.2	20			0.1	1			0.1	2					0.2
Chenopodiaceae	Maireana pentagona	Hairy Bluebush, Slender Fis	0.5	200					0.1	5			0.2	80	0.5	50	0.1	50	
Chenopodiaceae	Chenopodium nitrariaceum	Nitre Goosefoot																	
Chenopodiaceae	Dissocarpus biflorus var. biflorus	None																	
Chenopodiaceae	Maireana brevifolia	None																	
Chenopodiaceae	Maireana excavata	None											0.1	2					
Chenopodiaceae	Maireana humillima	None	0.2	30			0.1	10							0.1	4	1	100	0.1
Chenopodiaceae	Maireana trichoptera	None																	
Chenopodiaceae	Salsola australis	None							0.1	3									
Chenopodiaceae	Atriplex nummularia	Old Man Saltbush																	
Chenopodiaceae	Enchylaena tomentosa	Ruby Saltbush											0.1	1					
Chenopodiaceae	Sclerolaena brachyptera	Short-winged Copperburr							0.5	100									

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Chenopodiaceae	Salsola tragus	Buckbush,Soft Rolpoly, Salt								0.1	1			0.1	3					
Chenopodiaceae	Salsola tragus subsp. tragus	Buckbush,Soft Rolpoly, Salt																		
Chenopodiaceae	Dissocarpus paradoxus	Cannonball Burr																		
Chenopodiaceae	Einadia nutans	Climbing Saltbush																		
Chenopodiaceae	Sclerolaena spp.	Copperburr, Poverty-bush																		
Chenopodiaceae	Maireana aphylla	Cotton Bush													0.1	1			0.1	2
Chenopodiaceae	Maireana spp.	Cotton Bush, Bluebush, Fiss																		
Chenopodiaceae	Atriplex semibaccata	Creeping Saltbush		0.1	2	0.1	3	0.1	6			0.1	10	2	50	0.2	50			
Chenopodiaceae	Dysphania cristata	Crested Crumbweed																		
Chenopodiaceae	Chenopodium desertorum	Desert Goosefoot																		
Chenopodiaceae	Atriplex lindleyi	Eastern Flat-top Saltbush																		
Chenopodiaceae	Einadia trigonos	Fishweed										0.2	30							
Chenopodiaceae	Maireana ciliata	Fissure Weed																		
Chenopodiaceae	Sclerolaena birchii	Galvinized Burr																	0.1	1
Chenopodiaceae	Sclerolaena tricuspis	Giant Redburr																		
Chenopodiaceae	Sclerolaena bicornis	Goathead Burr				0.1	1	0.1	1	7				0.1	2	0.1	1			
Chenopodiaceae	Sclerolaena diacantha	Grey Copperburr	20			0.1	1					0.1	8	0.5	50					
Chenopodiaceae	Maireana pentagona	Hairy Bluebush, Slender Fis														0.1	10	0.1	2	
Chenopodiaceae	Chenopodium nitrariaceum	Nitre Goosefoot																		
Chenopodiaceae	Dissocarpus biflorus var. biflorus	None														0.1	1			
Chenopodiaceae	Maireana brevifolia	None																		
Chenopodiaceae	Maireana excavata	None				0.2	80	0.1	20	0.1	10			0.1	2					
Chenopodiaceae	Maireana humillima	None	20	0.3	200	0.2	80	0.1	40			0.1	10			0.1	20			
Chenopodiaceae	Maireana trichoptera	None																		
Chenopodiaceae	Salsola australis	None																		
Chenopodiaceae	Atriplex nummularia	Old Man Saltbush										0.1	10							
Chenopodiaceae	Enchylaena tomentosa	Ruby Saltbush		0.1	1			0.1	5	0.1	10			0.1	5	0.1	5	0.1	10	
Chenopodiaceae	Sclerolaena brachyptera	Short-winged Copperburr																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Salsola tragus	Buckbush,Soft Rolpoly, Salt																
Chenopodiaceae	Salsola tragus subsp. tragus	Buckbush,Soft Rolpoly, Salt																
Chenopodiaceae	Dissocarpus paradoxus	Cannonball Burr																
Chenopodiaceae	Einadia nutans	Climbing Saltbush													0.1	10		
Chenopodiaceae	Sclerolaena spp.	Copperburr, Poverty-bush																
Chenopodiaceae	Maireana aphylla	Cotton Bush																
Chenopodiaceae	Maireana spp.	Cotton Bush, Bluebush, Fiss																
Chenopodiaceae	Atriplex semibaccata	Creeping Saltbush	0.1	5			0.1	10	0.1	4					0.1	1		
Chenopodiaceae	Dysphania cristata	Crested Crumbweed													3	200		
Chenopodiaceae	Chenopodium desertorum	Desert Goosefoot																
Chenopodiaceae	Atriplex lindleyi	Eastern Flat-top Saltbush																
Chenopodiaceae	Einadia trigonos	Fishweed																
Chenopodiaceae	Maireana ciliata	Fissure Weed																
Chenopodiaceae	Sclerolaena birchii	Galvinized Burr																
Chenopodiaceae	Sclerolaena tricuspis	Giant Redburr																
Chenopodiaceae	Sclerolaena bicornis	Goathead Burr																
Chenopodiaceae	Sclerolaena diacantha	Grey Copperburr																
Chenopodiaceae	Maireana pentagona	Hairy Bluebush, Slender Fis																
Chenopodiaceae	Chenopodium nitrariaceum	Nitre Goosefoot							0.1	1								
Chenopodiaceae	Dissocarpus biflorus var. biflorus	None																
Chenopodiaceae	Maireana brevifolia	None																
Chenopodiaceae	Maireana excavata	None	0.1	10											0.1	10		
Chenopodiaceae	Maireana humillima	None	0.1	20			0.1	1										
Chenopodiaceae	Maireana trichoptera	None																
Chenopodiaceae	Salsola australis	None																
Chenopodiaceae	Atriplex nummularia	Old Man Saltbush													0.1	10		
Chenopodiaceae	Enchylaena tomentosa	Ruby Saltbush			0.1	10	0.1	10	0.1	2					0.1	3		
Chenopodiaceae	Sclerolaena brachyptera	Short-winged Copperburr																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_55		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Salsola tragus	Buckbush,Soft Rolpoly, Salt																		
Chenopodiaceae	Salsola tragus subsp. tragus	Buckbush,Soft Rolpoly, Salt															0.1	1		
Chenopodiaceae	Dissocarpus paradoxus	Cannonball Burr																		
Chenopodiaceae	Einadia nutans	Climbing Saltbush							0.2	20	0.1	10	0.3	5						
Chenopodiaceae	Sclerolaena spp.	Copperburr, Poverty-bush																		
Chenopodiaceae	Maireana aphylla	Cotton Bush																		
Chenopodiaceae	Maireana spp.	Cotton Bush, Bluebush, Fiss																		
Chenopodiaceae	Atriplex semibaccata	Creeping Saltbush	0.1	3	0.1	2			1	70	0.5	50	0.3	6	0.5	100				
Chenopodiaceae	Dysphania cristata	Crested Crumbweed									0.3	40								
Chenopodiaceae	Chenopodium desertorum	Desert Goosefoot																		
Chenopodiaceae	Atriplex lindleyi	Eastern Flat-top Saltbush																		
Chenopodiaceae	Einadia trigonos	Fishweed																		
Chenopodiaceae	Maireana ciliata	Fissure Weed																		
Chenopodiaceae	Sclerolaena birchii	Galvinized Burr																		
Chenopodiaceae	Sclerolaena tricuspis	Giant Redburr																		
Chenopodiaceae	Sclerolaena bicornis	Goathead Burr									0.5	30	0.3	1	0.1	1				
Chenopodiaceae	Sclerolaena diacantha	Grey Copperburr							1	40			0.1	2	0.1	5				
Chenopodiaceae	Maireana pentagona	Hairy Bluebush, Slender Fis																	0.1	5
Chenopodiaceae	Chenopodium nitrariaceum	Nitre Goosefoot							0.1	10										
Chenopodiaceae	Dissocarpus biflorus var. biflorus	None																		
Chenopodiaceae	Maireana brevifolia	None																		
Chenopodiaceae	Maireana excavata	None					0.1	10			0.1	2							0.5	50
Chenopodiaceae	Maireana humillima	None													0.1	2				
Chenopodiaceae	Maireana trichoptera	None																		
Chenopodiaceae	Salsola australis	None																		
Chenopodiaceae	Atriplex nummularia	Old Man Saltbush																		
Chenopodiaceae	Enchylaena tomentosa	Ruby Saltbush									0.1	1	0.1	4	0.1	3	0.1	1		
Chenopodiaceae	Sclerolaena brachyptera	Short-winged Copperburr					0.1	5												

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Sclerolaena eriacantha	Silky Copperburr																
Chenopodiaceae	Atriplex leptocarpa	Slender-fruit Saltbush																
Chenopodiaceae	Dysphania pumilio	Small Crumbweed																
Chenopodiaceae	Sclerolaena stelligera	Star Copperburr																
Chenopodiaceae	Sclerolaena divaricata	Tangled Copperburr															0.1	10
Chenopodiaceae	Rhagodia spinescens	Thorny Saltbush																
Chenopodiaceae	Maireana enchylaenoides	Wingless Fissure-weed																
Clusiaceae	Hypericum spp.	None																
Convolvulaceae	Convolvulus angustissimus	None											0.1	2				
Convolvulaceae	Convolvulus spp.	None																
Crassulaceae	Crassula colorata	Dense Stonecrop			1													
Crassulaceae	Crassula spp.	Stonecrop																
Cupressaceae	Callitris glaucophylla	White Cypress Pine																
Cyperaceae	Isolepis spp.	Club-rush																
Cyperaceae	Cyperus difformis	Dirty Dora																
Cyperaceae	Carex inversa	Knob Sedge															0.2	30
Cyperaceae	Isolepis cernua	Nodding Club-rush															0.3	80
Cyperaceae	Carpha nivicola	None																
Cyperaceae	Eleocharis acuta	None	50	5000			60	5000	40	1000	65	3000	60	5000	30	3000	10	900
Cyperaceae	Eleocharis pallens	Pale Spike Sedge	5	400			5	400	5	200	1	100	5	500	5	300		
Cyperaceae	Cyperus gracilis	Slender Flat-sedge																
Euphorbiaceae	Euphorbia drummondii	Caustic Weed													0.1	1		
Fabaceae (Faboideae	Swainsona procumbens	Broughton Pea			0.1	2												
Fabaceae (Mimosoid	Acacia oswaldii	Miljee																
Fabaceae (Mimosoid	Acacia pendula	Weeping Myall, Boree													0.1	1	0.2	1
Geraniaceae	Erodium crinitum	Blue Crowfoot																
Geraniaceae	Erodium spp.	Crowfoot																
Goodeniaceae	Goodenia fascicularis	Mallee Goodenia											0.1	2				

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Sclerolaena eriacantha	Silky Copperburr																
Chenopodiaceae	Atriplex leptocarpa	Slender-fruit Saltbush											1	30				
Chenopodiaceae	Dysphania pumilio	Small Crumbweed																
Chenopodiaceae	Sclerolaena stelligera	Star Copperburr																
Chenopodiaceae	Sclerolaena divaricata	Tangled Copperburr											1	10				
Chenopodiaceae	Rhagodia spinescens	Thorny Saltbush											0.1	10				
Chenopodiaceae	Maireana enchylaenoides	Wingless Fissure-weed																
Clusiaceae	Hypericum spp.	None																
Convolvulaceae	Convolvulus angustissimus	None	0.1	3					0.1	1	0.1	5					0.1	10
Convolvulaceae	Convolvulus spp.	None																
Crassulaceae	Crassula colorata	Dense Stonecrop																
Crassulaceae	Crassula spp.	Stonecrop																
Cupressaceae	Callitris glaucophylla	White Cypress Pine																
Cyperaceae	Isolepis spp.	Club-rush																
Cyperaceae	Cyperus difformis	Dirty Dora																
Cyperaceae	Carex inversa	Knob Sedge													0.1	20		
Cyperaceae	Isolepis cernua	Nodding Club-rush																
Cyperaceae	Carpha nivicola	None																
Cyperaceae	Eleocharis acuta	None			5	1000	0.1	50							1	20		
Cyperaceae	Eleocharis pallens	Pale Spike Sedge			0.2	40												
Cyperaceae	Cyperus gracilis	Slender Flat-sedge																
Euphorbiaceae	Euphorbia drummondii	Caustic Weed															0.1	20
Fabaceae (Faboideae	Swainsona procumbens	Broughton Pea			0.1	10									0.1	1		
Fabaceae (Mimosoid	Acacia oswaldii	Miljee															0.1	1
Fabaceae (Mimosoid	Acacia pendula	Weeping Myall, Boree	0.5	1					0.1	1			5	1	10	10	5	10
Geraniaceae	Erodium crinitum	Blue Crowfoot	0.1	20					0.1	5	0.1	5						
Geraniaceae	Erodium spp.	Crowfoot																
Goodeniaceae	Goodenia fascicularis	Mallee Goodenia																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Chenopodiaceae	Sclerolaena eriacantha	Silky Copperburr																	
Chenopodiaceae	Atriplex leptocarpa	Slender-fruit Saltbush																	
Chenopodiaceae	Dysphania pumilio	Small Crumbweed																	
Chenopodiaceae	Sclerolaena stelligera	Star Copperburr																	
Chenopodiaceae	Sclerolaena divaricata	Tangled Copperburr			0.2	20									0.1	1	0.1	2	
Chenopodiaceae	Rhagodia spinescens	Thorny Saltbush																	
Chenopodiaceae	Maireana enchylaenoides	Wingless Fissure-weed																	
Clusiaceae	Hypericum spp.	None																	
Convolvulaceae	Convolvulus angustissimus	None			0.1	2							0.1	3	0.1	10			0.1
Convolvulaceae	Convolvulus spp.	None																	
Crassulaceae	Crassula colorata	Dense Stonecrop																	
Crassulaceae	Crassula spp.	Stonecrop																	
Cupressaceae	Callitris glaucophylla	White Cypress Pine																	
Cyperaceae	Isolepis spp.	Club-rush																	
Cyperaceae	Cyperus difformis	Dirty Dora																	
Cyperaceae	Carex inversa	Knob Sedge																	0.1
Cyperaceae	Isolepis cernua	Nodding Club-rush			0.1	10													
Cyperaceae	Carpha nivicola	None																	
Cyperaceae	Eleocharis acuta	None			20	3000													
Cyperaceae	Eleocharis pallens	Pale Spike Sedge			5	1000					20								
Cyperaceae	Cyperus gracilis	Slender Flat-sedge																	
Euphorbiaceae	Euphorbia drummondii	Caustic Weed											0.1	6					
Fabaceae (Faboideae	Swainsona procumbens	Broughton Pea																	
Fabaceae (Mimosoid	Acacia oswaldii	Miljee			0.1	1													0.2
Fabaceae (Mimosoid	Acacia pendula	Weeping Myall, Boree	15	4	1	2	0.5	1	0.1	1					1		0.5	2	0.1
Geraniaceae	Erodium crinitum	Blue Crowfoot	0.1	1			0.1	10	0.1	10			0.2	50					0.1
Geraniaceae	Erodium spp.	Crowfoot																	
Goodeniaceae	Goodenia fascicularis	Mallee Goodenia											0.1	2	0.1	5			

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Chenopodiaceae	Sclerolaena eriacantha	Silky Copperburr																		
Chenopodiaceae	Atriplex leptocarpa	Slender-fruit Saltbush							2	0.1	20	0.2	50	0.2						
Chenopodiaceae	Dysphania pumilio	Small Crumbweed																		
Chenopodiaceae	Sclerolaena stelligera	Star Copperburr																		
Chenopodiaceae	Sclerolaena divaricata	Tangled Copperburr																		
Chenopodiaceae	Rhagodia spinescens	Thorny Saltbush																		
Chenopodiaceae	Maireana enchylaenoides	Wingless Fissure-weed																		
Clusiaceae	Hypericum spp.	None																		
Convolvulaceae	Convolvulus angustissimus	None	1	0.1	8	0.1	20								5	0.1	2	0.1	8	0.1
Convolvulaceae	Convolvulus spp.	None									20	0.1								
Crassulaceae	Crassula colorata	Dense Stonecrop																		
Crassulaceae	Crassula spp.	Stonecrop																		
Cupressaceae	Callitris glaucophylla	White Cypress Pine																		
Cyperaceae	Isolepis spp.	Club-rush																		
Cyperaceae	Cyperus difformis	Dirty Dora																		
Cyperaceae	Carex inversa	Knob Sedge	10																	
Cyperaceae	Isolepis cernua	Nodding Club-rush																		
Cyperaceae	Carpha nivicola	None																		
Cyperaceae	Eleocharis acuta	None																		
Cyperaceae	Eleocharis pallens	Pale Spike Sedge																		
Cyperaceae	Cyperus gracilis	Slender Flat-sedge																		
Euphorbiaceae	Euphorbia drummondii	Caustic Weed													20	0.1			5	0.1
Fabaceae (Faboideae	Swainsona procumbens	Broughton Pea															1	0.1		
Fabaceae (Mimosoid	Acacia oswaldii	Miljee	3																	
Fabaceae (Mimosoid	Acacia pendula	Weeping Myall, Boree	3				1	0.1			2	0.1								
Geraniaceae	Erodium crinitum	Blue Crowfoot	10				2	0.1									1	0.1		
Geraniaceae	Erodium spp.	Crowfoot																		
Goodeniaceae	Goodenia fascicularis	Mallee Goodenia															10	0.1	2	0.1

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Sclerolaena eriacantha	Silky Copperburr																
Chenopodiaceae	Atriplex leptocarpa	Slender-fruit Saltbush	0.1	5													0.1	2
Chenopodiaceae	Dysphania pumilio	Small Crumbweed																
Chenopodiaceae	Sclerolaena stelligera	Star Copperburr																
Chenopodiaceae	Sclerolaena divaricata	Tangled Copperburr	0.1	10					0.2	20							0.1	3
Chenopodiaceae	Rhagodia spinescens	Thorny Saltbush																
Chenopodiaceae	Maireana enchylaenoides	Wingless Fissure-weed																
Clusiaceae	Hypericum spp.	None	0.1	5														
Convolvulaceae	Convolvulus angustissimus	None					0.1	10	0.1	2								
Convolvulaceae	Convolvulus spp.	None																
Crassulaceae	Crassula colorata	Dense Stonecrop																
Crassulaceae	Crassula spp.	Stonecrop																
Cupressaceae	Callitris glaucophylla	White Cypress Pine																
Cyperaceae	Isolepis spp.	Club-rush																
Cyperaceae	Cyperus difformis	Dirty Dora																
Cyperaceae	Carex inversa	Knob Sedge							0.2	40								
Cyperaceae	Isolepis cernua	Nodding Club-rush	0.1	2													0.1	2
Cyperaceae	Carpha nivicola	None	0.1	6														
Cyperaceae	Eleocharis acuta	None			5	500	0.6	600	4	200							2	400
Cyperaceae	Eleocharis pallens	Pale Spike Sedge			0.3	30	0.1	20	2	200	10		5					
Cyperaceae	Cyperus gracilis	Slender Flat-sedge																
Euphorbiaceae	Euphorbia drummondii	Caustic Weed									0.1	5						
Fabaceae (Faboideae	Swainsona procumbens	Broughton Pea					0.1	10										
Fabaceae (Mimosoid	Acacia oswaldii	Miljee																
Fabaceae (Mimosoid	Acacia pendula	Weeping Myall, Boree			0.1	6	0.1	1									3	3
Geraniaceae	Erodium crinitum	Blue Crowfoot	0.1	10											0.1	1		
Geraniaceae	Erodium spp.	Crowfoot																
Goodeniaceae	Goodenia fascicularis	Mallee Goodenia																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_555		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Sclerolaena eriacantha	Silky Copperburr					0.1	20												
Chenopodiaceae	Atriplex leptocarpa	Slender-fruit Saltbush					0.1	10												
Chenopodiaceae	Dysphania pumilio	Small Crumbweed																		
Chenopodiaceae	Sclerolaena stelligera	Star Copperburr																		
Chenopodiaceae	Sclerolaena divaricata	Tangled Copperburr																		
Chenopodiaceae	Rhagodia spinescens	Thorny Saltbush											0.1	1						
Chenopodiaceae	Maireana enchylaenoides	Wingless Fissure-weed																		
Clusiaceae	Hypericum spp.	None																		
Convolvulaceae	Convolvulus angustissimus	None																		
Convolvulaceae	Convolvulus spp.	None																	0.1	5
Crassulaceae	Crassula colorata	Dense Stonecrop																		
Crassulaceae	Crassula spp.	Stonecrop																		
Cupressaceae	Callitris glaucophylla	White Cypress Pine																		
Cyperaceae	Isolepis spp.	Club-rush																		
Cyperaceae	Cyperus difformis	Dirty Dora																		
Cyperaceae	Carex inversa	Knob Sedge																		
Cyperaceae	Isolepis cernua	Nodding Club-rush	0.2	100																
Cyperaceae	Carpha nivicola	None																		
Cyperaceae	Eleocharis acuta	None	25	900	20	2000														
Cyperaceae	Eleocharis pallens	Pale Spike Sedge	5	300	0.5	200	0.4	50									1	500		
Cyperaceae	Cyperus gracilis	Slender Flat-sedge																		
Euphorbiaceae	Euphorbia drummondii	Caustic Weed			0.1	10											0.1	5		
Fabaceae (Faboideae	Swainsona procumbens	Broughton Pea	0.1	5																
Fabaceae (Mimosoid	Acacia oswaldii	Miljee							0.2	3										
Fabaceae (Mimosoid	Acacia pendula	Weeping Myall, Boree	1	1			0.1	2											0.5	4
Geraniaceae	Erodium crinitum	Blue Crowfoot							0.2	40										
Geraniaceae	Erodium spp.	Crowfoot																		
Goodeniaceae	Goodenia fascicularis	Mallee Goodenia																		

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Goodeniaceae	Goodenia gracilis	None																
Goodeniaceae	Goodenia pusilliflora	None									0.1	5	0.1	1	0.1	20	0.1	20
Goodeniaceae	Goodenia spp.	None																
Goodeniaceae	Goodenia glauca	Pale Goodenia																
Hydrocharitaceae	Ottelia ovalifolia subsp. ovalifolia	Swamp Lily																
Juncaceae	Juncus subsecundus	Finger Rush	0.2	100			0.1	20	0.1	10			2	400	0.1	5		
Juncaceae	Juncus filicaulis	None	0.1	50			0.1	10	0.1	5								
Juncaceae	Juncus flavidus	None											0.1	10				
Juncaceae	Juncus spp.	None													0.2	20		
Juncaceae	Juncus usitatus	None																
Juncaginaceae	Triglochin spp.	None	10	300							0.1	5						
Juncaginaceae	Triglochin striata	Streaked Arrowgrass																
Lamiaceae	Teucrium racemosum	Grey Germander																
Lythraceae	Lythrum hyssopifolia	Hyssop Loosestrife																
Malvaceae	Sida corrugata	Corrugated Sida															0.2	50
Malvaceae	Sida trichopoda	High Sida																
Malvaceae	Malva spp.	Mallow																
Malvaceae	Sida spp.	None																
Marsileaceae	Marsilea drummondii	Common Nardoo	10	500			10	400	10	500	3	400	5	500	1	200	0.1	50
Marsileaceae	Marsilea costulifera	None	0.1	100							0.5	20	0.5	200	0.3	50		
Myrtaceae	Eucalyptus largiflorens	Black Box																
Myrtaceae	Eucalyptus camaldulensis	River Red Gum																
Nyctaginaceae	Boerhavia dominii	Tarvine																
Oxalidaceae	Oxalis perennans	None															0.1	20
Phrymaceae	Mimulus gracilis	Slender Monkey-flower																
Plantaginaceae	Plantago gaudichaudii	Narrow Plantain																
Poaceae	Rytidosperma duttonianum	Brown-back Wallaby Grass			0.2	30	8	300	0.1	5	0.1	1	0.1	20	0.1	1	1	20
Poaceae	Aristida behriana	Bunch Wiregrass																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Goodeniaceae	Goodenia gracilis	None																
Goodeniaceae	Goodenia pusilliflora	None					0.1	6			0.1	10	0.1	10	0.1	30	0.1	5
Goodeniaceae	Goodenia spp.	None																
Goodeniaceae	Goodenia glauca	Pale Goodenia																
Hydrocharitaceae	Ottelia ovalifolia subsp. ovalifolia	Swamp Lily																
Juncaceae	Juncus subsecundus	Finger Rush			0.1	5												
Juncaceae	Juncus filicaulis	None			0.2	30												
Juncaceae	Juncus flavidus	None																
Juncaceae	Juncus spp.	None																
Juncaceae	Juncus usitatus	None																
Juncaginaceae	Triglochin spp.	None																
Juncaginaceae	Triglochin striata	Streaked Arrowgrass			0.1	5												
Lamiaceae	Teucrium racemosum	Grey Germander																
Lythraceae	Lythrum hyssopifolia	Hyssop Loosestrife																
Malvaceae	Sida corrugata	Corrugated Sida	0.1	20	0.1	1	0.1	10	0.2	100	0.4	200			0.3	60	0.1	20
Malvaceae	Sida trichopoda	High Sida																
Malvaceae	Malva spp.	Mallow																
Malvaceae	Sida spp.	None																
Marsileaceae	Marsilea drummondii	Common Nardoo			0.3	80									0.3	200		
Marsileaceae	Marsilea costulifera	None																
Myrtaceae	Eucalyptus largiflorens	Black Box																
Myrtaceae	Eucalyptus camaldulensis	River Red Gum																
Nyctaginaceae	Boerhavia dominii	Tarvine															0.5	50
Oxalidaceae	Oxalis perennans	None	1	100	0.1	1	0.2	100	0.1	20	0.1	20	0.1	10			0.1	5
Phrymaceae	Mimulus gracilis	Slender Monkey-flower																
Plantaginaceae	Plantago gaudichaudii	Narrow Plantain																
Poaceae	Rytidosperma duttonianum	Brown-back Wallaby Grass					0.5	50					2	100				
Poaceae	Aristida behriana	Bunch Wiregrass																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Goodeniaceae	Goodenia gracilis	None																	
Goodeniaceae	Goodenia pusilliflora	None			1	500													
Goodeniaceae	Goodenia spp.	None							0.1	2									
Goodeniaceae	Goodenia glauca	Pale Goodenia																	
Hydrocharitaceae	Ottelia ovalifolia subsp. ovalifolia	Swamp Lily																	
Juncaceae	Juncus subsecundus	Finger Rush	0.1	1	4	1000	0.1	1											0.1
Juncaceae	Juncus filicaulis	None																	
Juncaceae	Juncus flavidus	None																	
Juncaceae	Juncus spp.	None							0.1	3	0.1	20							
Juncaceae	Juncus usitatus	None																	
Juncaginaceae	Triglochin spp.	None																	
Juncaginaceae	Triglochin striata	Streaked Arrowgrass																	
Lamiaceae	Teucrium racemosum	Grey Germander											0.1	2					
Lythraceae	Lythrum hyssopifolia	Hyssop Loosestrife																	
Malvaceae	Sida corrugata	Corrugated Sida	0.2	40			0.1	40	0.1	50			0.1	5	0.1	10	0.1	5	0.1
Malvaceae	Sida trichopoda	High Sida																	
Malvaceae	Malva spp.	Mallow																	
Malvaceae	Sida spp.	None																	
Marsileaceae	Marsilea drummondii	Common Nardoo			0.1	50	0.3	200			0.2	200							
Marsileaceae	Marsilea costulifera	None																	
Myrtaceae	Eucalyptus largiflorens	Black Box																	
Myrtaceae	Eucalyptus camaldulensis	River Red Gum																	
Nyctaginaceae	Boerhavia dominii	Tarvine					0.1	5											
Oxalidaceae	Oxalis perennans	None	0.2	100			0.1	10					0.1	5	0.1	30	4	200	0.3
Phrymaceae	Mimulus gracilis	Slender Monkey-flower																	
Plantaginaceae	Plantago gaudichaudii	Narrow Plantain																	
Poaceae	Rytidosperma duttonianum	Brown-back Wallaby Grass	3	800	15	2000	0.5	200			2				0.3	50	2	50	
Poaceae	Aristida behriana	Bunch Wiregrass																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Goodeniaceae	Goodenia gracilis	None																		
Goodeniaceae	Goodenia pusilliflora	None		0.1	2	0.1	4	0.1	20								0.1	20		
Goodeniaceae	Goodenia spp.	None																		
Goodeniaceae	Goodenia glauca	Pale Goodenia																		
Hydrocharitaceae	Ottelia ovalifolia subsp. ovalifolia	Swamp Lily																		
Juncaceae	Juncus subsecundus	Finger Rush	10																0.1	2
Juncaceae	Juncus filicaulis	None																		
Juncaceae	Juncus flavidus	None																		
Juncaceae	Juncus spp.	None									0.2	10								
Juncaceae	Juncus usitatus	None																		
Juncaginaceae	Triglochin spp.	None																		
Juncaginaceae	Triglochin striata	Streaked Arrowgrass																		
Lamiaceae	Teucrium racemosum	Grey Germander																	0.1	2
Lythraceae	Lythrum hyssopifolia	Hyssop Loosestrife																		
Malvaceae	Sida corrugata	Corrugated Sida	5	0.1	80	0.1	50	0.1	20	0.1	40	0.1	5	0.1	10	0.1	20	0.1	20	
Malvaceae	Sida trichopoda	High Sida																		
Malvaceae	Malva spp.	Mallow																		
Malvaceae	Sida spp.	None																		
Marsileaceae	Marsilea drummondii	Common Nardoo																	0.1	4
Marsileaceae	Marsilea costulifera	None																		
Myrtaceae	Eucalyptus largiflorens	Black Box											25	6						
Myrtaceae	Eucalyptus camaldulensis	River Red Gum																		
Nyctaginaceae	Boerhavia dominii	Tarvine									0.1	3	0.1	5						
Oxalidaceae	Oxalis perennans	None	300	0.1	20	0.2	50	0.1	1				0.1	10	0.1	5	0.1	1	0.1	10
Phrymaceae	Mimulus gracilis	Slender Monkey-flower																		
Plantaginaceae	Plantago gaudichaudii	Narrow Plantain																		
Poaceae	Rytidosperma duttonianum	Brown-back Wallaby Grass									0.1	10	0.2	10			0.2	30		
Poaceae	Aristida behriana	Bunch Wiregrass																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Goodeniaceae	Goodenia gracilis	None																
Goodeniaceae	Goodenia pusilliflora	None	0.1	5			0.1	10									0.1	5
Goodeniaceae	Goodenia spp.	None																
Goodeniaceae	Goodenia glauca	Pale Goodenia																
Hydrocharitaceae	Ottelia ovalifolia subsp. ovalifolia	Swamp Lily																
Juncaceae	Juncus subsecundus	Finger Rush	0.1	5	0.1	10											0.3	50
Juncaceae	Juncus filicaulis	None																
Juncaceae	Juncus flavidus	None			0.1	1												
Juncaceae	Juncus spp.	None							1	60			0.2	30				
Juncaceae	Juncus usitatus	None																
Juncaginaceae	Triglochin spp.	None																
Juncaginaceae	Triglochin striata	Streaked Arrowgrass																
Lamiaceae	Teucrium racemosum	Grey Germander																
Lythraceae	Lythrum hyssopifolia	Hyssop Loosestrife																
Malvaceae	Sida corrugata	Corrugated Sida	2	200	0.1	10	0.1	1							0.1	10	0.1	20
Malvaceae	Sida trichopoda	High Sida																
Malvaceae	Malva spp.	Mallow																
Malvaceae	Sida spp.	None																
Marsileaceae	Marsilea drummondii	Common Nardoo			3	300	0.3	100	0.1	40	0.1	200					1	100
Marsileaceae	Marsilea costulifera	None			0.3	40												
Myrtaceae	Eucalyptus largiflorens	Black Box													10	2		
Myrtaceae	Eucalyptus camaldulensis	River Red Gum																
Nyctaginaceae	Boerhavia dominii	Tarvine																
Oxalidaceae	Oxalis perennans	None	2	200	0.1	6	0.1	10	0.1	60	0.1	20					0.1	10
Phrymaceae	Mimulus gracilis	Slender Monkey-flower																
Plantaginaceae	Plantago gaudichaudii	Narrow Plantain																
Poaceae	Rytidosperma duttonianum	Brown-back Wallaby Grass					2	300	5	1000			5				5	200
Poaceae	Aristida behriana	Bunch Wiregrass																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_55		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Goodeniaceae	Goodenia gracilis	None																		
Goodeniaceae	Goodenia pusilliflora	None	0.1	50																
Goodeniaceae	Goodenia spp.	None					0.1	10												
Goodeniaceae	Goodenia glauca	Pale Goodenia																		
Hydrocharitaceae	Ottelia ovalifolia subsp. ovalifolia	Swamp Lily																		
Juncaceae	Juncus subsecundus	Finger Rush	0.1	10	0.1	2											0.2	20		
Juncaceae	Juncus filicaulis	None																		
Juncaceae	Juncus flavidus	None																		
Juncaceae	Juncus spp.	None																	0.2	40
Juncaceae	Juncus usitatus	None																		
Juncaginaceae	Triglochin spp.	None																		
Juncaginaceae	Triglochin striata	Streaked Arrowgrass																		
Lamiaceae	Teucrium racemosum	Grey Germander																		
Lythraceae	Lythrum hyssopifolia	Hyssop Loosestrife							0.1	3										
Malvaceae	Sida corrugata	Corrugated Sida			0.1	2	0.1	20	0.1	2	0.1	2							0.1	20
Malvaceae	Sida trichopoda	High Sida																		
Malvaceae	Malva spp.	Mallow																		
Malvaceae	Sida spp.	None																		
Marsileaceae	Marsilea drummondii	Common Nardoo	1	700	3	300	0.6	200									1	40		
Marsileaceae	Marsilea costulifera	None			0.5	10														
Myrtaceae	Eucalyptus largiflorens	Black Box							35	10	4	2	3	3	15	8				
Myrtaceae	Eucalyptus camaldulensis	River Red Gum																		
Nyctaginaceae	Boerhavia dominii	Tarvine									0.2	20	0.1	1	0.2	50				
Oxalidaceae	Oxalis perennans	None	0.1	20	0.1	2	0.1	5	0.2	100	0.1	1	0.1	3	0.1	10	0.1	5		
Phrymaceae	Mimulus gracilis	Slender Monkey-flower	0.1	5																
Plantaginaceae	Plantago gaudichaudii	Narrow Plantain																		
Poaceae	Rytidosperma duttonianum	Brown-back Wallaby Grass	1	500	0.5	20	5						0.1	20	0.1	5	5	200	2	
Poaceae	Aristida behriana	Bunch Wiregrass																		

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Eragrostis australasica	Canegrass																
Poaceae	Cynodon dactylon	Common Couch																
Poaceae	Enteropogon acicularis	Curly Windmill Grass			10		2	80			3	300	0.2	200	0.3	60	0.1	10
Poaceae	Enteropogon ramosus	Curly Windmill Grass																
Poaceae	Eriochloa pseudoacrotricha	Early Spring Grass																
Poaceae	Sporobolus caroli	Fairy Grass																
Poaceae	Paspalidium constrictum	Knottybutt Grass																
Poaceae	Eragrostis setifolia	Neverfail																
Poaceae	Austrostipa nodosa	None			10													
Poaceae	Austrostipa spp.	None																
Poaceae	Eragrostis spp.	None																
Poaceae	Lachnagrostis filiformis	None																
Poaceae	Rytidosperma spp.	None																
Poaceae	Walwhalleya proluta	None			30		2	100			5	500	0.4	300	1	40	4	40
Poaceae	Eragrostis leptostachya	Paddock Lovegrass																
Poaceae	Panicum spp.	Panicum																
Poaceae	Austrostipa aristiglumis	Plains Grass			1		1											
Poaceae	Eragrostis lacunaria	Purple Lovegrass																
Poaceae	Bothriochloa macra	Red Grass																
Poaceae	Rytidosperma caespitosum	Ringed Wallaby Grass																
Poaceae	Austrostipa scabra subsp. falcata	Rough Speargrass																
Poaceae	Austrostipa scabra subsp. scabra	Rough Speargrass																
Poaceae	Rytidosperma carphoides	Short Wallaby Grass																
Poaceae	Tragus australianus	Small Burrgrass																
Poaceae	Rytidosperma setaceum	Small-flowered Wallaby-grass			0.1	10												
Poaceae	Austrostipa scabra	Speargrass			0.2	20									0.1	1		
Poaceae	Amphibromus nervosus	Swamp Wallaby Grass																
Poaceae	Paspalidium jubiflorum	Warrego Grass																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Eragrostis australasica	Canegrass																
Poaceae	Cynodon dactylon	Common Couch																
Poaceae	Enteropogon acicularis	Curly Windmill Grass			0.3	20	4	200	1	100			0.1	10	5	50	25	2000
Poaceae	Enteropogon ramosus	Curly Windmill Grass																
Poaceae	Eriochloa pseudoacrotricha	Early Spring Grass																
Poaceae	Sporobolus caroli	Fairy Grass			0.1	10	2	200	0.1	50	0.1	20					0.1	10
Poaceae	Paspalidium constrictum	Knottybutt Grass																
Poaceae	Eragrostis setifolia	Neverfail																
Poaceae	Austrostipa nodosa	None									0.1	1					0.2	20
Poaceae	Austrostipa spp.	None																
Poaceae	Eragrostis spp.	None																
Poaceae	Lachnagrostis filiformis	None																
Poaceae	Rytidosperma spp.	None																
Poaceae	Walwhalleya proluta	None	0.3	30	3	100	40	2000	5	100	0.2	20			5	2000	0.5	10
Poaceae	Eragrostis leptostachya	Paddock Lovegrass																
Poaceae	Panicum spp.	Panicum																
Poaceae	Austrostipa aristiglumis	Plains Grass					5	400	20	1000							0.1	1
Poaceae	Eragrostis lacunaria	Purple Lovegrass																
Poaceae	Bothriochloa macra	Red Grass	5	200			0.2	40	0.5	80					0.1	10		
Poaceae	Rytidosperma caespitosum	Ringed Wallaby Grass			0.5	50					2	400					0.5	20
Poaceae	Austrostipa scabra subsp. falcata	Rough Speargrass																
Poaceae	Austrostipa scabra subsp. scabra	Rough Speargrass																
Poaceae	Rytidosperma carphoides	Short Wallaby Grass							2	100								
Poaceae	Tragus australianus	Small Burrgrass																
Poaceae	Rytidosperma setaceum	Small-flowered Wallaby-gra					0.1	50	0.3	100					1	500	0.1	5
Poaceae	Austrostipa scabra	Speargrass	25	3000					20	2000	2	400	9	300			3	100
Poaceae	Amphibromus nervosus	Swamp Wallaby Grass																
Poaceae	Paspalidium jubiflorum	Warrego Grass																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Poaceae	Eragrostis australasica	Canegrass																	
Poaceae	Cynodon dactylon	Common Couch																	
Poaceae	Enteropogon acicularis	Curly Windmill Grass			0.5	50	0.5	60	10	100	2		20	800	0.1	9	0.1	7	0.3
Poaceae	Enteropogon ramosus	Curly Windmill Grass																	
Poaceae	Eriochloa pseudoacrotricha	Early Spring Grass																	
Poaceae	Sporobolus caroli	Fairy Grass			0.2	50	0.1	5	15	200	0.1	10			0.2	30	2	100	
Poaceae	Paspalidium constrictum	Knottybutt Grass																	
Poaceae	Eragrostis setifolia	Neverfail																	
Poaceae	Austrostipa nodosa	None	0.1	5													10	500	
Poaceae	Austrostipa spp.	None							30	400									
Poaceae	Eragrostis spp.	None																	
Poaceae	Lachnagrostis filiformis	None																	
Poaceae	Rytidosperma spp.	None							15	300	0.5	50							
Poaceae	Walwhalleya proluta	None	0.2	10	1	100	0.2	30			25		6	300	0.5	50	0.2	5	3
Poaceae	Eragrostis leptostachya	Paddock Lovegrass																	
Poaceae	Panicum spp.	Panicum																	
Poaceae	Austrostipa aristiglumis	Plains Grass									0.1	2	0.5	100	0.3	50	20	1000	
Poaceae	Eragrostis lacunaria	Purple Lovegrass																	
Poaceae	Bothriochloa macra	Red Grass			1	200													
Poaceae	Rytidosperma caespitosum	Ringed Wallaby Grass	2	500			0.3	30					10	500					
Poaceae	Austrostipa scabra subsp. falcata	Rough Speargrass																	0.5
Poaceae	Austrostipa scabra subsp. scabra	Rough Speargrass																	
Poaceae	Rytidosperma carphoides	Short Wallaby Grass																	
Poaceae	Tragus australianus	Small Burrgrass																	
Poaceae	Rytidosperma setaceum	Small-flowered Wallaby-gra											0.2	50			0.1	5	0.3
Poaceae	Austrostipa scabra	Speargrass	3	200			1	200					4	600	0.2	50	15	500	
Poaceae	Amphibromus nervosus	Swamp Wallaby Grass																	
Poaceae	Paspalidium jubiflorum	Warrego Grass																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Poaceae	Eragrostis australasica	Canegrass																		
Poaceae	Cynodon dactylon	Common Couch																		
Poaceae	Enteropogon acicularis	Curly Windmill Grass	100	2	100			0.5	90					20	500	0.2	20	20	500	
Poaceae	Enteropogon ramosus	Curly Windmill Grass																		
Poaceae	Eriochloa pseudoacrotricha	Early Spring Grass																		
Poaceae	Sporobolus caroli	Fairy Grass												0.2	200					
Poaceae	Paspalidium constrictum	Knottybutt Grass																		
Poaceae	Eragrostis setifolia	Neverfail																		
Poaceae	Austrostipa nodosa	None		30	5000	40	5000	15	700	15						0.1	5			
Poaceae	Austrostipa spp.	None																		
Poaceae	Eragrostis spp.	None																		
Poaceae	Lachnagrostis filiformis	None																		
Poaceae	Rytidosperma spp.	None				1	70													
Poaceae	Walwhalleya proluta	None	200	0.1	5	0.1	1			1		0.1	2	2	200			15	400	
Poaceae	Eragrostis leptostachya	Paddock Lovegrass																		
Poaceae	Panicum spp.	Panicum																		
Poaceae	Austrostipa aristiglumis	Plains Grass		5	1000	10	1000	15	2000							1		20	1000	
Poaceae	Eragrostis lacunaria	Purple Lovegrass																		
Poaceae	Bothriochloa macra	Red Grass				0.1	5													
Poaceae	Rytidosperma caespitosum	Ringed Wallaby Grass						3	200	3				5	300	0.1	5	10	300	
Poaceae	Austrostipa scabra subsp. falcata	Rough Speargrass	30									0.1	5							
Poaceae	Austrostipa scabra subsp. scabra	Rough Speargrass																		
Poaceae	Rytidosperma carphoides	Short Wallaby Grass		0.1	100															
Poaceae	Tragus australianus	Small Burrgrass																		
Poaceae	Rytidosperma setaceum	Small-flowered Wallaby-gra	60	3	400	3	200	3	200			0.1	10	0.1	20			10	400	
Poaceae	Austrostipa scabra	Speargrass				5	200							5	200	15	300	5	200	
Poaceae	Amphibromus nervosus	Swamp Wallaby Grass																		
Poaceae	Paspalidium jubiflorum	Warrego Grass																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Eragrostis australasica	Canegrass																
Poaceae	Cynodon dactylon	Common Couch																
Poaceae	Enteropogon acicularis	Curly Windmill Grass	0.2	20	20	1000	1	100	3	300	1		15		0.2	10	1	100
Poaceae	Enteropogon ramosus	Curly Windmill Grass																
Poaceae	Eriochloa pseudoacrotricha	Early Spring Grass			0.1	10												
Poaceae	Sporobolus caroli	Fairy Grass			0.1	5	0.2	80	2	200	0.2	20					0.3	100
Poaceae	Paspalidium constrictum	Knottybutt Grass																
Poaceae	Eragrostis setifolia	Neverfail																
Poaceae	Austrostipa nodosa	None	4	300									0.1	5				
Poaceae	Austrostipa spp.	None																
Poaceae	Eragrostis spp.	None																
Poaceae	Lachnagrostis filiformis	None																
Poaceae	Rytidosperma spp.	None									0.1	10						
Poaceae	Walwhalleya proluta	None	2	50	35	2000	30	2000	35	3000	5		20		0.5	20	15	2000
Poaceae	Eragrostis leptostachya	Paddock Lovegrass																
Poaceae	Panicum spp.	Panicum																
Poaceae	Austrostipa aristiglumis	Plains Grass	10	1000	5		5		5		5		1				4	100
Poaceae	Eragrostis lacunaria	Purple Lovegrass																
Poaceae	Bothriochloa macra	Red Grass	2	50													5	200
Poaceae	Rytidosperma caespitosum	Ringed Wallaby Grass	0.2	50	2	200							0.1	20	0.1	1	1	50
Poaceae	Austrostipa scabra subsp. falcata	Rough Speargrass																
Poaceae	Austrostipa scabra subsp. scabra	Rough Speargrass																
Poaceae	Rytidosperma carphoides	Short Wallaby Grass																
Poaceae	Tragus australianus	Small Burrgrass																
Poaceae	Rytidosperma setaceum	Small-flowered Wallaby-gra	0.5	100	0.1	5	0.2	20	5	500								
Poaceae	Austrostipa scabra	Speargrass	7	200														
Poaceae	Amphibromus nervosus	Swamp Wallaby Grass																
Poaceae	Paspalidium jubiflorum	Warrego Grass																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_55		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Eragrostis australasica	Canegrass																		
Poaceae	Cynodon dactylon	Common Couch			0.5	10														
Poaceae	Enteropogon acicularis	Curly Windmill Grass			25	2000	0.2	20			2	200	0.1	3			5			
Poaceae	Enteropogon ramosus	Curly Windmill Grass	0.1	5					0.1	10										
Poaceae	Eriochloa pseudoacrotricha	Early Spring Grass																		
Poaceae	Sporobolus caroli	Fairy Grass			0.5	30	0.2	30			0.1	5								
Poaceae	Paspalidium constrictum	Knottybutt Grass																		
Poaceae	Eragrostis setifolia	Neverfail																		
Poaceae	Austrostipa nodosa	None							0.1	3									0.5	50
Poaceae	Austrostipa spp.	None																		
Poaceae	Eragrostis spp.	None																		
Poaceae	Lachnagrostis filiformis	None																		
Poaceae	Rytidosperma spp.	None																		
Poaceae	Walwhalleya proluta	None	10	600	3	300	2				0.5	40					15	500		
Poaceae	Eragrostis leptostachya	Paddock Lovegrass																		
Poaceae	Panicum spp.	Panicum																		
Poaceae	Austrostipa aristiglumis	Plains Grass	0.5	40			20						0.1	2						
Poaceae	Eragrostis lacunaria	Purple Lovegrass																		
Poaceae	Bothriochloa macra	Red Grass																		
Poaceae	Rytidosperma caespitosum	Ringed Wallaby Grass					5				0.5	20					20	500	2	
Poaceae	Austrostipa scabra subsp. falcata	Rough Speargrass																		
Poaceae	Austrostipa scabra subsp. scabra	Rough Speargrass																		
Poaceae	Rytidosperma carphoides	Short Wallaby Grass																		
Poaceae	Tragus australianus	Small Burrgrass																		
Poaceae	Rytidosperma setaceum	Small-flowered Wallaby-gra							0.5	40										
Poaceae	Austrostipa scabra	Speargrass			0.1	2			0.2	50	0.2	10							5	
Poaceae	Amphibromus nervosus	Swamp Wallaby Grass																		
Poaceae	Paspalidium jubiflorum	Warrego Grass																		

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Microlaena stipoides	Weeping Grass																
Poaceae	Eragrostis parviflora	Weeping Lovegrass																
Poaceae	Anthosachne scabra	Wheatgrass, Common Wheatgrass																
Poaceae	Chloris truncata	Windmill Grass															0.5	50
Poaceae	Austrostipa bigeniculata	Yanganbil									0.1	1					0.1	5
Polygonaceae	Persicaria prostrata	Creeping Knotweed							5	600	0.1	5						
Polygonaceae	Duma florulenta	Lignum	20	50			10	30	30	50	10	50	30	100	35	50		
Polygonaceae	Rumex tenax	Shiny Dock					0.1	5			0.1	5			0.1	5	0.2	30
Polygonaceae	Rumex dumosus	Wiry Dock																
Potamogetonaceae	Potamogeton cheesemanii	None	0.1	2														
Proteaceae	Hakea leucoptera	Needlewood																
Pteridaceae	Cheilanthes sieberi	Rock Fern																
Rubiaceae	Asperula conferta	Common Woodruff	0.1	5													0.2	400
Sapindaceae	Alectryon oleifolius	Western Rosewood																
Scrophulariaceae	Limosella curdieana	Large Mudwort															0.1	10
Solanaceae	Lycium australe	Australian Boxthorn																
Solanaceae	Solanum esuriale	Quena															0.1	2
Solanaceae	Solanum coactiliferum	Western Nightshade																
Urticaceae	Urtica spp.	None																
Urticaceae	Urtica incisa	Stinging Nettle																
Introduced species																		
Poaceae	Aira caryophyllea	Silvery Hairgrass																
Asteraceae	Arctotheca calendula	Capeweed			1												0.1	20
Poaceae	Avena barbata	Bearded Oats																
Poaceae	Avena fatua	Wild Oats																
Poaceae	Avena spp.	Oats																
Brassicaceae	Brassica spp.	Brassica																
Poaceae	Bromus hordeaceus	Soft Brome																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Microlaena stipoides	Weeping Grass																
Poaceae	Eragrostis parviflora	Weeping Lovegrass																
Poaceae	Anthosachne scabra	Wheatgrass, Common Whe																
Poaceae	Chloris truncata	Windmill Grass	0.1	2	0.1	10	3	200	0.3	50	1	300	0.1	9	0.5	90	0.1	10
Poaceae	Austrostipa bigeniculata	Yanganbil	40	5000			8	500	25	1000	65	2000	7	100	0.1	10	5	200
Polygonaceae	Persicaria prostrata	Creeping Knotweed																
Polygonaceae	Duma florulenta	Lignum			5	20												
Polygonaceae	Rumex tenax	Shiny Dock			0.1	10	0.1	10							0.1	10	0.1	1
Polygonaceae	Rumex dumosus	Wiry Dock																
Potamogetonaceae	Potamogeton cheesemanii	None																
Proteaceae	Hakea leucoptera	Needlewood																
Pteridaceae	Cheilanthes sieberi	Rock Fern	0.1	3														
Rubiaceae	Asperula conferta	Common Woodruff			0.1	10					0.1	10						
Sapindaceae	Alectryon oleifolius	Western Rosewood																
Scrophulariaceae	Limosella curdieana	Large Mudwort																
Solanaceae	Lycium australe	Australian Boxthorn																
Solanaceae	Solanum esuriale	Quena	0.1	5							0.1	20			0.1	10	0.3	40
Solanaceae	Solanum coactiliferum	Western Nightshade																
Urticaceae	Urtica spp.	None																
Urticaceae	Urtica incisa	Stinging Nettle																
Introduced species																		
Poaceae	Aira caryophyllea	Silvery Hairgrass																
Asteraceae	Arctotheca calendula	Capeweed	1	100					0.1	10	0.1	5						
Poaceae	Avena barbata	Bearded Oats															0.1	2
Poaceae	Avena fatua	Wild Oats																
Poaceae	Avena spp.	Oats	8	200			7	500	2	100	0.5	100			0.2	60		
Brassicaceae	Brassica spp.	Brassica																
Poaceae	Bromus hordeaceus	Soft Brome							0.1	10								

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Poaceae	Microlaena stipoides	Weeping Grass																	0.2
Poaceae	Eragrostis parviflora	Weeping Lovegrass																	
Poaceae	Anthosachne scabra	Wheatgrass, Common Whe																	
Poaceae	Chloris truncata	Windmill Grass	0.1	10	0.5	100	5	100	10	200					1	200	4	200	0.4
Poaceae	Austrostipa bigeniculata	Yanganbil	2	80	0.5	50	20	500					50	1000	4	400	15	1000	60
Polygonaceae	Persicaria prostrata	Creeping Knotweed																	
Polygonaceae	Duma florulenta	Lignum	0.1	5			0.3	1			8								
Polygonaceae	Rumex tenax	Shiny Dock	0.1	5	0.1	10									0.1	10			0.1
Polygonaceae	Rumex dumosus	Wiry Dock																	
Potamogetonaceae	Potamogeton cheesemanii	None																	
Proteaceae	Hakea leucoptera	Needlewood																	
Pteridaceae	Cheilanthes sieberi	Rock Fern	0.1	1															
Rubiaceae	Asperula conferta	Common Woodruff			0.1	50			2	500									0.2
Sapindaceae	Alectryon oleifolius	Western Rosewood																	
Scrophulariaceae	Limosella curdieana	Large Mudwort																	
Solanaceae	Lycium australe	Australian Boxthorn																	
Solanaceae	Solanum esuriale	Quena	0.1	5			0.3	50					0.1	8	0.1	10	0.1	2	0.3
Solanaceae	Solanum coactiliferum	Western Nightshade																	
Urticaceae	Urtica spp.	None																	
Urticaceae	Urtica incisa	Stinging Nettle																	
Introduced species																			
Poaceae	Aira caryophyllea	Silvery Hairgrass																	
Asteraceae	Arctotheca calendula	Capeweed	0.1	20	0.1	1	0.2	60	0.1	2					0.1	5	0.1	5	
Poaceae	Avena barbata	Bearded Oats																	
Poaceae	Avena fatua	Wild Oats																	
Poaceae	Avena spp.	Oats					4	90							1	800	0.2	20	0.1
Brassicaceae	Brassica spp.	Brassica																	
Poaceae	Bromus hordeaceus	Soft Brome																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Poaceae	Microlaena stipoides	Weeping Grass																		
Poaceae	Eragrostis parviflora	Weeping Lovegrass																		
Poaceae	Anthosachne scabra	Wheatgrass, Common Whe																		
Poaceae	Chloris truncata	Windmill Grass	200	2	300	5	500	3	200	10							0.5	80	0.1	20
Poaceae	Austrostipa bigeniculata	Yanganbil	2000	5	500	10	300	5	300	5		0.1	5	30	500	20	500	10	200	
Polygonaceae	Persicaria prostrata	Creeping Knotweed																		
Polygonaceae	Duma florulenta	Lignum																	0.1	2
Polygonaceae	Rumex tenax	Shiny Dock	3																	
Polygonaceae	Rumex dumosus	Wiry Dock																		
Potamogetonaceae	Potamogeton cheesemanii	None																		
Proteaceae	Hakea leucoptera	Needlewood																		
Pteridaceae	Cheilanthes sieberi	Rock Fern																		
Rubiaceae	Asperula conferta	Common Woodruff	200																	
Sapindaceae	Alectryon oleifolius	Western Rosewood																		
Scrophulariaceae	Limosella curdieana	Large Mudwort																		
Solanaceae	Lycium australe	Australian Boxthorn																		
Solanaceae	Solanum esuriale	Quena	10								1		0.1	2					0.1	3
Solanaceae	Solanum coactiliferum	Western Nightshade																		
Urticaceae	Urtica spp.	None																		
Urticaceae	Urtica incisa	Stinging Nettle																		
Introduced species																				
Poaceae	Aira caryophyllea	Silvery Hairgrass																		
Asteraceae	Arctotheca calendula	Capeweed				0.1	5	0.1	3								0.1	5		
Poaceae	Avena barbata	Bearded Oats																		
Poaceae	Avena fatua	Wild Oats																		
Poaceae	Avena spp.	Oats	10			0.1	30					0.1	40							
Brassicaceae	Brassica spp.	Brassica																		
Poaceae	Bromus hordeaceus	Soft Brome																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Microlaena stipoides	Weeping Grass																
Poaceae	Eragrostis parviflora	Weeping Lovegrass																
Poaceae	Anthosachne scabra	Wheatgrass, Common Whe																
Poaceae	Chloris truncata	Windmill Grass	2	300	0.1	20	0.2	10	0.1	10	0.2	20	5					
Poaceae	Austrostipa bigeniculata	Yanganbil	20	2000									0.3	20			0.5	50
Polygonaceae	Persicaria prostrata	Creeping Knotweed																
Polygonaceae	Duma florulenta	Lignum			0.2	5	0.2	10	3	5	3							
Polygonaceae	Rumex tenax	Shiny Dock			0.1	5			0.1	40							0.1	20
Polygonaceae	Rumex dumosus	Wiry Dock																
Potamogetonaceae	Potamogeton cheesemanii	None																
Proteaceae	Hakea leucoptera	Needlewood																
Pteridaceae	Cheilanthes sieberi	Rock Fern																
Rubiaceae	Asperula conferta	Common Woodruff																
Sapindaceae	Alectryon oleifolius	Western Rosewood																
Scrophulariaceae	Limosella curdieana	Large Mudwort																
Solanaceae	Lycium australe	Australian Boxthorn																
Solanaceae	Solanum esuriale	Quena	0.1	10	0.1	10							0.1	1	0.1	1	0.1	10
Solanaceae	Solanum coactiliferum	Western Nightshade																
Urticaceae	Urtica spp.	None																
Urticaceae	Urtica incisa	Stinging Nettle																
Introduced species																		
Poaceae	Aira caryophyllea	Silvery Hairgrass																
Asteraceae	Arctotheca calendula	Capeweed	0.2	50														
Poaceae	Avena barbata	Bearded Oats													0.1	5		
Poaceae	Avena fatua	Wild Oats																
Poaceae	Avena spp.	Oats	0.5	40			0.1	10									2	50
Brassicaceae	Brassica spp.	Brassica																
Poaceae	Bromus hordeaceus	Soft Brome																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_55		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Microlaena stipoides	Weeping Grass																		
Poaceae	Eragrostis parviflora	Weeping Lovegrass																		
Poaceae	Anthosachne scabra	Wheatgrass, Common Whe																		
Poaceae	Chloris truncata	Windmill Grass					1										0.1	10	0.5	50
Poaceae	Austrostipa bigeniculata	Yanganbil			0.2	10			0.1	10	0.1	2			0.1	5			0.1	5
Polygonaceae	Persicaria prostrata	Creeping Knotweed			3	200			0.1	10										
Polygonaceae	Duma florulenta	Lignum			1	5							1				0.5	8		
Polygonaceae	Rumex tenax	Shiny Dock	0.1	5	0.2	10											0.1	1		
Polygonaceae	Rumex dumosus	Wiry Dock																		
Potamogetonaceae	Potamogeton cheesemanii	None																		
Proteaceae	Hakea leucoptera	Needlewood																		
Pteridaceae	Cheilanthes sieberi	Rock Fern																		
Rubiaceae	Asperula conferta	Common Woodruff	0.2	30																
Sapindaceae	Alectryon oleifolius	Western Rosewood																		
Scrophulariaceae	Limosella curdieana	Large Mudwort																		
Solanaceae	Lycium australe	Australian Boxthorn																		
Solanaceae	Solanum esuriale	Quena			0.1	2	0.1	10			0.5	70			0.1	5				
Solanaceae	Solanum coactiliferum	Western Nightshade																		
Urticaceae	Urtica spp.	None																		
Urticaceae	Urtica incisa	Stinging Nettle							0.1	10					0.1	10				
Introduced species																				
Poaceae	Aira caryophyllea	Silvery Hairgrass																		
Asteraceae	Arctotheca calendula	Capeweed							0.1	10			0.1	1						
Poaceae	Avena barbata	Bearded Oats																		
Poaceae	Avena fatua	Wild Oats	0.2	40																
Poaceae	Avena spp.	Oats																		
Brassicaceae	Brassica spp.	Brassica																		
Poaceae	Bromus hordeaceus	Soft Brome							0.2	10										

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Chenopodium murale	Nettle-leaf Goosefoot																
Asteraceae	Chondrilla juncea	Skeleton Weed																
Asteraceae	Cirsium vulgare	Spear Thistle																
	Citrullus amarus																	
Asteraceae	Conyza bonariensis	Flaxleaf Fleabane																
Asteraceae	Conyza spp.	None																
Asteraceae	Cotula bipinnata	Ferny Cotula																
	Cucumis myriocarpus subsp. myriocarpus																	
Poaceae	Cynosurus echinatus	Rough Dog's Tail																
Boraginaceae	Echium plantagineum	Patterson's Curse															0.1	5
Boraginaceae	Echium spp.	None																
Boraginaceae	Echium vulgare	Viper's Bugloss																
Poaceae	Ehrharta longiflora	Annual Veldtgrass																
Poaceae	Eragrostis cilianensis	Stinkgrass																
Euphorbiaceae	Euphorbia prostrata	Red Caustic Weed																
Boraginaceae	Heliotropium amplexicaule	Blue Heliotrope																
Boraginaceae	Heliotropium europaeum	Potato Weed																
Poaceae	Hordeum leporinum	Barley Grass			0.3	100												
Poaceae	Hordeum spp.	None															0.1	1
Clusiaceae	Hypericum perforatum	St. Johns Wort																
Asteraceae	Hypochaeris glabra	Smooth Catsear																
Asteraceae	Hypochaeris radicata	Catsear																
Juncaceae	Juncus articulatus	None																
Asteraceae	Lactuca serriola	Prickly Lettuce															0.1	1
Asteraceae	Lactuca spp.	None																
Poaceae	Lamarckia aurea	Goldentop																
Brassicaceae	Lepidium africanum	Common Peppercress																
Brassicaceae	Lepidium bonariense	Argentine Peppercress																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Chenopodium murale	Nettle-leaf Goosefoot																
Asteraceae	Chondrilla juncea	Skeleton Weed																
Asteraceae	Cirsium vulgare	Spear Thistle																
	Citrullus amarus																	
Asteraceae	Conyza bonariensis	Flaxleaf Fleabane																
Asteraceae	Conyza spp.	None																
Asteraceae	Cotula bipinnata	Ferny Cotula									0.1	1						
	Cucumis myriocarpus subsp. myriocarpus																	
Poaceae	Cynosurus echinatus	Rough Dog's Tail																
Boraginaceae	Echium plantagineum	Patterson's Curse							0.1	5	0.1	10			0.1	10		
Boraginaceae	Echium spp.	None																
Boraginaceae	Echium vulgare	Viper's Bugloss																
Poaceae	Ehrharta longiflora	Annual Veldtgrass																
Poaceae	Eragrostis cilianensis	Stinkgrass																
Euphorbiaceae	Euphorbia prostrata	Red Caustic Weed					0.1	3	0.1	4			0.1	1				
Boraginaceae	Heliotropium amplexicaule	Blue Heliotrope																
Boraginaceae	Heliotropium europaeum	Potato Weed															0.1	2
Poaceae	Hordeum leporinum	Barley Grass																
Poaceae	Hordeum spp.	None	0.1	3			0.1	3			0.2	20	0.1	10				
Clusiaceae	Hypericum perforatum	St. Johns Wort																
Asteraceae	Hypochaeris glabra	Smooth Catsear																
Asteraceae	Hypochaeris radicata	Catsear							0.1	10							0.1	1
Juncaceae	Juncus articulatus	None																
Asteraceae	Lactuca serriola	Prickly Lettuce									0.1	1	0.1	2				
Asteraceae	Lactuca spp.	None																
Poaceae	Lamarckia aurea	Goldentop																
Brassicaceae	Lepidium africanum	Common Peppercress																
Brassicaceae	Lepidium bonariense	Argentine Peppercress																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Chenopodiaceae	Chenopodium murale	Nettle-leaf Goosefoot																	
Asteraceae	Chondrilla juncea	Skeleton Weed																	
Asteraceae	Cirsium vulgare	Spear Thistle																	0.1
	Citrullus amarus																		
Asteraceae	Conyza bonariensis	Flaxleaf Fleabane																	
Asteraceae	Conyza spp.	None																	
Asteraceae	Cotula bipinnata	Ferny Cotula	0.2	100															
	Cucumis myriocarpus subsp. myriocarpus																		
Poaceae	Cynosurus echinatus	Rough Dog's Tail																	
Boraginaceae	Echium plantagineum	Patterson's Curse			0.1	1	0.1	10							0.1	10	0.1	10	
Boraginaceae	Echium spp.	None																	
Boraginaceae	Echium vulgare	Viper's Bugloss																	
Poaceae	Ehrharta longiflora	Annual Veldtgrass																	
Poaceae	Eragrostis cilianensis	Stinkgrass																	
Euphorbiaceae	Euphorbia prostrata	Red Caustic Weed	0.1	5			0.1	10							0.1	10	0.1	1	
Boraginaceae	Heliotropium amplexicaule	Blue Heliotrope																	
Boraginaceae	Heliotropium europaeum	Potato Weed																	
Poaceae	Hordeum leporinum	Barley Grass																	
Poaceae	Hordeum spp.	None	0.1	20			1	200							0.2	40	0.1	2	0.1
Clusiaceae	Hypericum perforatum	St. Johns Wort					0.2	50											
Asteraceae	Hypochaeris glabra	Smooth Catsear					0.1	5									0.1	2	0.1
Asteraceae	Hypochaeris radicata	Catsear																	
Juncaceae	Juncus articulatus	None																	
Asteraceae	Lactuca serriola	Prickly Lettuce					0.1	5											0.1
Asteraceae	Lactuca spp.	None																	
Poaceae	Lamarckia aurea	Goldentop																	
Brassicaceae	Lepidium africanum	Common Peppercress																	
Brassicaceae	Lepidium bonariense	Argentine Peppercress																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Chenopodiaceae	Chenopodium murale	Nettle-leaf Goosefoot											20	0.3						
Asteraceae	Chondrilla juncea	Skeleton Weed																		
Asteraceae	Cirsium vulgare	Spear Thistle	10										10	0.1						
	Citrullus amarus																			
Asteraceae	Conyza bonariensis	Flaxleaf Fleabane																		
Asteraceae	Conyza spp.	None																		
Asteraceae	Cotula bipinnata	Ferny Cotula															5	0.1		
	Cucumis myriocarpus subsp. myriocarpus																			
Poaceae	Cynosurus echinatus	Rough Dog's Tail																		
Boraginaceae	Echium plantagineum	Patterson's Curse		0.1	2	0.1	5	0.1	2			0.1	20				5	0.1		
Boraginaceae	Echium spp.	None																		
Boraginaceae	Echium vulgare	Viper's Bugloss																		
Poaceae	Ehrharta longiflora	Annual Veldtgrass																		
Poaceae	Eragrostis cilianensis	Stinkgrass																		
Euphorbiaceae	Euphorbia prostrata	Red Caustic Weed		0.1	3	0.1	3										10	0.1		
Boraginaceae	Heliotropium amplexicaule	Blue Heliotrope																		
Boraginaceae	Heliotropium europaeum	Potato Weed																	0.1	5
Poaceae	Hordeum leporinum	Barley Grass																		
Poaceae	Hordeum spp.	None	10										30	###			10	0.1		
Clusiaceae	Hypericum perforatum	St. Johns Wort																		
Asteraceae	Hypochaeris glabra	Smooth Catsear	1										5	0.1						
Asteraceae	Hypochaeris radicata	Catsear																		
Juncaceae	Juncus articulatus	None																		
Asteraceae	Lactuca serriola	Prickly Lettuce	1										10	0.1			10	0.1		
Asteraceae	Lactuca spp.	None																		
Poaceae	Lamarckia aurea	Goldentop																		
Brassicaceae	Lepidium africanum	Common Peppercress																		
Brassicaceae	Lepidium bonariense	Argentine Peppercress																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Chenopodium murale	Nettle-leaf Goosefoot													0.3	20		
Asteraceae	Chondrilla juncea	Skeleton Weed																
Asteraceae	Cirsium vulgare	Spear Thistle													0.1	5		
	Citrullus amarus														0.5	20		
Asteraceae	Conyza bonariensis	Flaxleaf Fleabane																
Asteraceae	Conyza spp.	None																
Asteraceae	Cotula bipinnata	Ferny Cotula																
	Cucumis myriocarpus subsp. myriocarpus																	
Poaceae	Cynosurus echinatus	Rough Dog's Tail																
Boraginaceae	Echium plantagineum	Patterson's Curse	0.1	1			0.1	2	0.1	10							0.1	10
Boraginaceae	Echium spp.	None																
Boraginaceae	Echium vulgare	Viper's Bugloss																
Poaceae	Ehrharta longiflora	Annual Veldtgrass																
Poaceae	Eragrostis cilianensis	Stinkgrass																
Euphorbiaceae	Euphorbia prostrata	Red Caustic Weed	0.1	10														
Boraginaceae	Heliotropium amplexicaule	Blue Heliotrope																
Boraginaceae	Heliotropium europaeum	Potato Weed									0.1	50			0.1	10		
Poaceae	Hordeum leporinum	Barley Grass																
Poaceae	Hordeum spp.	None	0.3	40														
Clusiaceae	Hypericum perforatum	St. Johns Wort																
Asteraceae	Hypochaeris glabra	Smooth Catsear							0.1	20								
Asteraceae	Hypochaeris radicata	Catsear																
Juncaceae	Juncus articulatus	None																
Asteraceae	Lactuca serriola	Prickly Lettuce					0.1	1							0.1	10		
Asteraceae	Lactuca spp.	None																
Poaceae	Lamarckia aurea	Goldentop																
Brassicaceae	Lepidium africanum	Common Peppercress																
Brassicaceae	Lepidium bonariense	Argentine Peppercress																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_55		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Chenopodiaceae	Chenopodium murale	Nettle-leaf Goosefoot									0.3	30								
Asteraceae	Chondrilla juncea	Skeleton Weed																		
Asteraceae	Cirsium vulgare	Spear Thistle									0.1	1								
	Citrullus amarus																			
Asteraceae	Conyza bonariensis	Flaxleaf Fleabane																		
Asteraceae	Conyza spp.	None																		
Asteraceae	Cotula bipinnata	Ferny Cotula																		
	Cucumis myriocarpus subsp. myriocarpus																			
Poaceae	Cynosurus echinatus	Rough Dog's Tail																		
Boraginaceae	Echium plantagineum	Patterson's Curse	0.1	10					0.1	10	0.1	5			0.1	10				
Boraginaceae	Echium spp.	None																		
Boraginaceae	Echium vulgare	Viper's Bugloss																		
Poaceae	Ehrharta longiflora	Annual Veldtgrass							0.1	10										
Poaceae	Eragrostis cilianensis	Stinkgrass																		
Euphorbiaceae	Euphorbia prostrata	Red Caustic Weed																		
Boraginaceae	Heliotropium amplexicaule	Blue Heliotrope																		
Boraginaceae	Heliotropium europaeum	Potato Weed									0.4	60					0.1	1		
Poaceae	Hordeum leporinum	Barley Grass																		
Poaceae	Hordeum spp.	None							15	###	0.5	50	20	###	15	800				
Clusiaceae	Hypericum perforatum	St. Johns Wort																		
Asteraceae	Hypochaeris glabra	Smooth Catsear							0.1	3										
Asteraceae	Hypochaeris radicata	Catsear																		
Juncaceae	Juncus articulatus	None																		
Asteraceae	Lactuca serriola	Prickly Lettuce							0.1	5	0.1	2	0.1	2	0.1	5				
Asteraceae	Lactuca spp.	None																		
Poaceae	Lamarckia aurea	Goldentop																		
Brassicaceae	Lepidium africanum	Common Peppercress									0.1	10								
Brassicaceae	Lepidium bonariense	Argentine Peppercress																		

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Lolium perenne	Perennial Ryegrass																
Poaceae	Lolium rigidum	Wimmera Ryegrass			10												50	###
Poaceae	Lolium spp.	None																
Fabaceae (Faboideae	Lotus angustissimus	Slender Birds-foot Trefoil																
Solanaceae	Lycium ferocissimum	African Boxthorn																
Malvaceae	Malva parviflora	Small-flowered Mallow																
Lamiaceae	Marrubium vulgare	White Horehound																
Fabaceae (Faboideae	Medicago polymorpha	Burr Medic			1												0.3	30
Fabaceae (Faboideae	Medicago spp.	None																
Fabaceae (Faboideae	Medicago truncatula	Barrel Medic																
Malvaceae	Modiola caroliniana	Red-flowered Mallow																
Oleaceae	Olea europaea	Common Olive																
Asteraceae	Onopordum acanthium subsp. aca	Scotch Thistle																
Oxalidaceae	Oxalis pes-caprae	Soursob																
Poaceae	Phalaris paradoxa	Paradoxa Grass																
Plantaginaceae	Plantago lanceolata	Lamb's Tongues																
Polygonaceae	Polygonum aviculare	Wireweed																
Iridaceae	Romulea rosea var. australis	Onion Grass									0.1	3						
Polygonaceae	Rumex crispus	Curled Dock																
Malvaceae	Sida rhombifolia	Paddy's Lucerne																
Brassicaceae	Sisymbrium erysimoides	Smooth Mustard																
Brassicaceae	Sisymbrium irio	London Rocket																
Brassicaceae	Sisymbrium orientale	Indian Hedge Mustard																
Solanaceae	Solanum nigrum	Black-berry Nightshade																
Asteraceae	Sonchus oleraceus	Common Sowthistle															0.1	8
Asteraceae	Taraxacum officinale	Dandelion																
Fabaceae (Faboideae	Trifolium arvense	Haresfoot Clover			0.5	100												
Fabaceae (Faboideae	Trifolium repens	White Clover																

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Lolium perenne	Perennial Ryegrass																
Poaceae	Lolium rigidum	Wimmera Ryegrass	3	100	0.5	200	15	1000	0.1	20			0.1	50	0.1	10		
Poaceae	Lolium spp.	None																
Fabaceae (Faboideae	Lotus angustissimus	Slender Birds-foot Trefoil																
Solanaceae	Lycium ferocissimum	African Boxthorn											0.1	2	0.1	2	0.5	10
Malvaceae	Malva parviflora	Small-flowered Mallow							0.1	2	0.1	20						
Lamiaceae	Marrubium vulgare	White Horehound																
Fabaceae (Faboideae	Medicago polymorpha	Burr Medic	5	300			5	200	2	30	0.2	90	0.5	200				
Fabaceae (Faboideae	Medicago spp.	None	3	300					6	200								
Fabaceae (Faboideae	Medicago truncatula	Barrel Medic											2	60				
Malvaceae	Modiola caroliniana	Red-flowered Mallow	0.1	10														
Oleaceae	Olea europaea	Common Olive																
Asteraceae	Onopordum acanthium subsp. aca	Scotch Thistle																
Oxalidaceae	Oxalis pes-caprae	Soursob																
Poaceae	Phalaris paradoxa	Paradoxa Grass																
Plantaginaceae	Plantago lanceolata	Lamb's Tongues									0.1	20						
Polygonaceae	Polygonum aviculare	Wireweed															0.1	1
Iridaceae	Romulea rosea var. australis	Onion Grass																
Polygonaceae	Rumex crispus	Curled Dock					0.1	10										
Malvaceae	Sida rhombifolia	Paddy's Lucerne																
Brassicaceae	Sisymbrium erysimoides	Smooth Mustard																
Brassicaceae	Sisymbrium irio	London Rocket																
Brassicaceae	Sisymbrium orientale	Indian Hedge Mustard																
Solanaceae	Solanum nigrum	Black-berry Nightshade																
Asteraceae	Sonchus oleraceus	Common Sowthistle	0.2	30			0.2	50	0.1	20	0.1	5	0.1	10	0.1	10		
Asteraceae	Taraxacum officinale	Dandelion									0.1	10						
Fabaceae (Faboideae	Trifolium arvense	Haresfoot Clover																
Fabaceae (Faboideae	Trifolium repens	White Clover													0.1	50		

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Poaceae	Lolium perenne	Perennial Ryegrass																	
Poaceae	Lolium rigidum	Wimmera Ryegrass	0.1	20	0.3	50	1	100			2				25	###			0.1
Poaceae	Lolium spp.	None							2	###									
Fabaceae (Faboideae	Lotus angustissimus	Slender Birds-foot Trefoil											0.1	2					
Solanaceae	Lycium ferocissimum	African Boxthorn																	
Malvaceae	Malva parviflora	Small-flowered Mallow					0.1	10											0.1
Lamiaceae	Marrubium vulgare	White Horehound																	
Fabaceae (Faboideae	Medicago polymorpha	Burr Medic					0.3	300	5	500					5	900	1	40	2
Fabaceae (Faboideae	Medicago spp.	None																	
Fabaceae (Faboideae	Medicago truncatula	Barrel Medic			0.1	40											5	200	
Malvaceae	Modiola caroliniana	Red-flowered Mallow																	
Oleaceae	Olea europaea	Common Olive																	
Asteraceae	Onopordum acanthium subsp. aca	Scotch Thistle																	
Oxalidaceae	Oxalis pes-caprae	Soursob			0.2	80													
Poaceae	Phalaris paradoxa	Paradoxa Grass																	
Plantaginaceae	Plantago lanceolata	Lamb's Tongues																	0.1
Polygonaceae	Polygonum aviculare	Wireweed																	
Iridaceae	Romulea rosea var. australis	Onion Grass																	
Polygonaceae	Rumex crispus	Curled Dock																	
Malvaceae	Sida rhombifolia	Paddy's Lucerne																	
Brassicaceae	Sisymbrium erysimoides	Smooth Mustard																	
Brassicaceae	Sisymbrium irio	London Rocket																	
Brassicaceae	Sisymbrium orientale	Indian Hedge Mustard																	
Solanaceae	Solanum nigrum	Black-berry Nightshade																	
Asteraceae	Sonchus oleraceus	Common Sowthistle	0.1	6	0.1	6	0.1	1							0.1	10	0.1	5	0.1
Asteraceae	Taraxacum officinale	Dandelion																	0.1
Fabaceae (Faboideae	Trifolium arvense	Haresfoot Clover																	
Fabaceae (Faboideae	Trifolium repens	White Clover																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Poaceae	Lolium perenne	Perennial Ryegrass																	0.1	20
Poaceae	Lolium rigidum	Wimmera Ryegrass	10	0.2	50	0.1	30	0.1	50	3		5	500	5		0.1	10			
Poaceae	Lolium spp.	None																		
Fabaceae (Faboideae	Lotus angustissimus	Slender Birds-foot Trefoil																		
Solanaceae	Lycium ferocissimum	African Boxthorn										0.5	5							
Malvaceae	Malva parviflora	Small-flowered Mallow	10									1	300							
Lamiaceae	Marrubium vulgare	White Horehound										0.5	200							
Fabaceae (Faboideae	Medicago polymorpha	Burr Medic	200	15	500	15	400	10	500			0.5	30			5	###			
Fabaceae (Faboideae	Medicago spp.	None				3	70	3	100											
Fabaceae (Faboideae	Medicago truncatula	Barrel Medic																		
Malvaceae	Modiola caroliniana	Red-flowered Mallow																		
Oleaceae	Olea europaea	Common Olive																		
Asteraceae	Onopordum acanthium subsp. aca	Scotch Thistle																		
Oxalidaceae	Oxalis pes-caprae	Soursob																		
Poaceae	Phalaris paradoxa	Paradoxa Grass																		
Plantaginaceae	Plantago lanceolata	Lamb's Tongues	20																	
Polygonaceae	Polygonum aviculare	Wireweed																		
Iridaceae	Romulea rosea var. australis	Onion Grass																		
Polygonaceae	Rumex crispus	Curled Dock																		
Malvaceae	Sida rhombifolia	Paddy's Lucerne																		
Brassicaceae	Sisymbrium erysimoides	Smooth Mustard																		
Brassicaceae	Sisymbrium irio	London Rocket										2	300							
Brassicaceae	Sisymbrium orientale	Indian Hedge Mustard																		
Solanaceae	Solanum nigrum	Black-berry Nightshade										0.1	4							
Asteraceae	Sonchus oleraceus	Common Sowthistle	20	0.1	10			0.1	2			0.1	20			0.1	20			
Asteraceae	Taraxacum officinale	Dandelion	10									0.1	2							
Fabaceae (Faboideae	Trifolium arvense	Haresfoot Clover																		
Fabaceae (Faboideae	Trifolium repens	White Clover														0.1	5			

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Lolium perenne	Perennial Ryegrass																
Poaceae	Lolium rigidum	Wimmera Ryegrass	5	300			0.2	20	4	300			5				10	1000
Poaceae	Lolium spp.	None																
Fabaceae (Faboideae	Lotus angustissimus	Slender Birds-foot Trefoil																
Solanaceae	Lycium ferocissimum	African Boxthorn													1	60		
Malvaceae	Malva parviflora	Small-flowered Mallow																
Lamiaceae	Marrubium vulgare	White Horehound																
Fabaceae (Faboideae	Medicago polymorpha	Burr Medic	3	50					0.1	40								
Fabaceae (Faboideae	Medicago spp.	None																
Fabaceae (Faboideae	Medicago truncatula	Barrel Medic	4	200														
Malvaceae	Modiola caroliniana	Red-flowered Mallow													0.1	3		
Oleaceae	Olea europaea	Common Olive																
Asteraceae	Onopordum acanthium subsp. aca	Scotch Thistle									0.1	1						
Oxalidaceae	Oxalis pes-caprae	Soursob	0.1	10														
Poaceae	Phalaris paradoxa	Paradoxa Grass																
Plantaginaceae	Plantago lanceolata	Lamb's Tongues					0.1	5										
Polygonaceae	Polygonum aviculare	Wireweed																
Iridaceae	Romulea rosea var. australis	Onion Grass			0.1	10												
Polygonaceae	Rumex crispus	Curled Dock																
Malvaceae	Sida rhombifolia	Paddy's Lucerne																
Brassicaceae	Sisymbrium erysimoides	Smooth Mustard													0.2	20		
Brassicaceae	Sisymbrium irio	London Rocket																
Brassicaceae	Sisymbrium orientale	Indian Hedge Mustard																
Solanaceae	Solanum nigrum	Black-berry Nightshade													0.1	2		
Asteraceae	Sonchus oleraceus	Common Sowthistle	0.1	3			0.1	10							0.1	3	0.1	10
Asteraceae	Taraxacum officinale	Dandelion																
Fabaceae (Faboideae	Trifolium arvense	Haresfoot Clover																
Fabaceae (Faboideae	Trifolium repens	White Clover																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_55		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Poaceae	Lolium perenne	Perennial Ryegrass																		
Poaceae	Lolium rigidum	Wimmera Ryegrass	1	200			2		10	600	0.5	50	50	###	5	500				
Poaceae	Lolium spp.	None																		
Fabaceae (Faboideae	Lotus angustissimus	Slender Birds-foot Trefoil																		
Solanaceae	Lycium ferocissimum	African Boxthorn							0.2	3	0.3	10	0.3	3	0.3	10				
Malvaceae	Malva parviflora	Small-flowered Mallow							0.2	40					0.2	60				
Lamiaceae	Marrubium vulgare	White Horehound																		
Fabaceae (Faboideae	Medicago polymorpha	Burr Medic							0.4	400			0.5	10	0.3	300				
Fabaceae (Faboideae	Medicago spp.	None																		
Fabaceae (Faboideae	Medicago truncatula	Barrel Medic																		
Malvaceae	Modiola caroliniana	Red-flowered Mallow									0.1	2	3	30						
Oleaceae	Olea europaea	Common Olive							0.2	1										
Asteraceae	Onopordum acanthium subsp. aca	Scotch Thistle																		
Oxalidaceae	Oxalis pes-caprae	Soursob							0.1	10										
Poaceae	Phalaris paradoxa	Paradoxa Grass																		
Plantaginaceae	Plantago lanceolata	Lamb's Tongues																		
Polygonaceae	Polygonum aviculare	Wireweed							0.1	10	0.1	4			0.1	20				
Iridaceae	Romulea rosea var. australis	Onion Grass																		
Polygonaceae	Rumex crispus	Curled Dock											0.1	1						
Malvaceae	Sida rhombifolia	Paddy's Lucerne																		
Brassicaceae	Sisymbrium erysimoides	Smooth Mustard									0.1	10								
Brassicaceae	Sisymbrium irio	London Rocket																		
Brassicaceae	Sisymbrium orientale	Indian Hedge Mustard							0.4	200			2	30	0.2	60				
Solanaceae	Solanum nigrum	Black-berry Nightshade							0.1	2	0.1	4								
Asteraceae	Sonchus oleraceus	Common Sowthistle	0.1	7					0.1	20			0.1	1	0.1	5				
Asteraceae	Taraxacum officinale	Dandelion																		
Fabaceae (Faboideae	Trifolium arvense	Haresfoot Clover																		
Fabaceae (Faboideae	Trifolium repens	White Clover																		

Family	Scientific name	Common name	DEH_S_1		DEH_S_1000		DEH_S_11		DEH_S_12		DEH_S_13		DEH_S_14		DEH_S_15		DEH_S_16	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Fabaceae (Faboideae	Trifolium spp.	None																
Poaceae	Vulpia myuros	Rat's Tail Fescue																
Asteraceae	Xanthium spinosum	Bathurst Burr									0.1	1			0.1	1		
Asteraceae	Xanthium strumarium	None															0.1	1

Family	Scientific name	Common name	DEH_S_17		DEH_S_2		DEH_S_20		DEH_S_22		DEH_S_23		DEH_S_24		DEH_S_25		DEH_S_27	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Fabaceae (Faboideae	Trifolium spp.	None																
Poaceae	Vulpia myuros	Rat's Tail Fescue																
Asteraceae	Xanthium spinosum	Bathurst Burr									0.1	5			0.1	1	0.1	10
Asteraceae	Xanthium strumarium	None																

Family	Scientific name	Common name	DEH_S_28		DEH_S_29		DEH_S_3		DEH_S_300		DEH_S_31		DEH_S_32		DEH_S_33		DEH_S_34		DEH
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Fabaceae (Faboideae	Trifolium spp.	None																	
Poaceae	Vulpia myuros	Rat's Tail Fescue																	
Asteraceae	Xanthium spinosum	Bathurst Burr	0.1	1															
Asteraceae	Xanthium strumarium	None																	

Family	Scientific name	Common name	_S_35		DEH_S_36		DEH_S_37		DEH_S_38		DEH_S_39		DEH_S_4		DEH_S_40		DEH_S_41		DEH_S_43	
			Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%
Fabaceae (Faboideae	Trifolium spp.	None																		
Poaceae	Vulpia myuros	Rat's Tail Fescue																		
Asteraceae	Xanthium spinosum	Bathurst Burr									5	0.2	5	0.1					1	0.1
Asteraceae	Xanthium strumarium	None																		

Family	Scientific name	Common name	DEH_S_44		DEH_S_45		DEH_S_46		DEH_S_47		DEH_S_48		DEH_S_49		DEH_S_5		DEH_S_50	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Fabaceae (Faboideae	Trifolium spp.	None																
Poaceae	Vulpia myuros	Rat's Tail Fescue																
Asteraceae	Xanthium spinosum	Bathurst Burr									5				0.5	80	0.2	5
Asteraceae	Xanthium strumarium	None																

Family	Scientific name	Common name	DEH_S_51		DEH_S_52		DEH_S_53		DEH_S_555		DEH_S_6		DEH_S_7		DEH_S_8		DEH_S_9		DEH_W_820	
			Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun	Cvr%	Abun
Fabaceae (Faboideae	Trifolium spp.	None																		
Poaceae	Vulpia myuros	Rat's Tail Fescue																		
Asteraceae	Xanthium spinosum	Bathurst Burr							0.1	10	0.2	20			0.1	20	0.1	2		
Asteraceae	Xanthium strumarium	None																		

Table A 4: BAM plot summary

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Plot ID	PCT	Area (Ha)	Patch size	Condition	Zone	Easting	Northing	Bearing	Comp. Tree	Comp. Shrub	Comp. Grass	Comp. Forbs	Comp. Ferns
DEH_S_6	13	8.14	101	Moderate	55	391302	6117926	250	1	5	6	6	0
DEH_S_7	13	8.14	101	Moderate	55	391374	6118063	70	1	7	3	3	0
DEH_S_8	13	8.14	101	Moderate	55	391170	6117956	63	1	6	2	4	0
DEH_S_5	15	1.43	101	Mod_Good	55	385738	6118507	40	1	5	3	5	0
DEH_S_555	15	1.43	101	Mod_Good	55	394698	6117449	235	2	4	5	7	0
DEH_S_4	15	1.04	101	Moderate	55	387110	6116710	239	1	6	5	6	0
DEH_S_1	17	42.79	101	Mod_Good	55	391112	6118150	47	0	2	4	4	2
DEH_S_11	17	42.79	101	Mod_Good	55	389911	6119366	308	0	2	8	1	1
DEH_S_12	17	42.79	101	Mod_Good	55	382321	6116931	134	0	2	5	1	1
DEH_S_13	17	42.79	101	Mod_Good	55	384803	6117845	90	0	3	6	6	2
DEH_S_14	17	42.79	101	Mod_Good	55	386897	6118372	37	0	1	7	2	2
DEH_S_15	17	42.79	101	Mod_Good	55	386997	6118459	60	1	4	8	6	2
DEH_S_2	17	42.79	101	Mod_Good	55	391324	6118053	175	0	6	9	9	1
DEH_S_31	17	21.31	101	Moderate	55	383902	6118765	286	0	2	8	0	1
DEH_S_48	17	21.31	101	Moderate	55	384344	6118789	174	0	2	7	5	1
DEH_S_52	17	21.31	101	Moderate	55	382090	6116926	80	0	3	10	7	2
DEH_S_20	26	1110.59	101	DNG	55	389354	6118060	273	0	3	10	7	0
DEH_S_22	26	1110.59	101	DNG	55	384776	6119663	186	1	1	10	7	0
DEH_S_23	26	1110.59	101	DNG	55	385189	6118720	265	0	2	7	11	0
DEH_S_36	26	1110.59	101	DNG	55	393049	6117172	317	0	4	8	6	0
DEH_S_37	26	1110.59	101	DNG	55	390320	6117006	65	1	6	9	7	0
DEH_S_38	26	1110.59	101	DNG	55	390793	6117725	56	0	6	7	8	0
DEH_S_39	26	1110.59	101	DNG	55	392036	6118295	270	1	7	7	6	0
DEH_S_40	26	1110.59	101	DNG	55	391378	6117880	248	0	9	7	7	0
DEH_S_41	26	1110.59	101	DNG	55	391714	6117031	272	0	6	8	12	0
DEH_S_24	26	248.51	101	Intact	55	382492	6119225	290	1	7	5	6	0
DEH_S_25	26	248.51	101	Intact	55	381485	6116262	168	1	2	8	8	1
DEH_S_27	26	248.51	101	Intact	55	386355	6117516	80	2	6	10	9	0

Plot ID	Comp. Other	Struc. Tree	Struc. Shrub	Struc. Grass	Struc. Forbs	Stuc. Ferns	Stuc. Other
DEH_S_6	0	4.0	36.2	3.4	1.3	0.0	0.0
DEH_S_7	0	3.0	8.9	0.3	0.5	0.0	0.0
DEH_S_8	0	15.0	3.9	0.2	0.5	0.0	0.0
DEH_S_5	0	10.0	70.4	0.8	3.4	0.0	0.0
DEH_S_555	0	35.2	4.1	1.0	1.0	0.0	0.0
DEH_S_4	0	25.0	0.9	0.6	0.7	0.0	0.0
DEH_S_1	0	0.0	20.1	55.3	12.2	10.1	0.0
DEH_S_11	0	0.0	11.0	78.2	0.1	10.0	0.0
DEH_S_12	0	0.0	30.1	45.3	5.0	10.0	0.0
DEH_S_13	0	0.0	10.4	74.2	1.0	3.5	0.0
DEH_S_14	1	0.0	30.0	67.8	0.2	5.5	0.1
DEH_S_15	0	0.1	35.6	36.8	0.6	1.3	0.0
DEH_S_2	0	0.0	5.8	9.5	0.9	0.3	0.0
DEH_S_31	0	0.0	8.3	49.8	0.0	0.2	0.0
DEH_S_48	0	0.0	4.0	21.5	0.5	0.1	0.0
DEH_S_52	0	0.0	1.4	50.4	3.7	3.5	0.0
DEH_S_20	0	0.0	1.2	62.9	0.8	0.0	0.0
DEH_S_22	1	0.1	0.1	74.2	0.8	0.0	0.1
DEH_S_23	1	0.0	0.2	70.4	1.9	0.0	0.1
DEH_S_36	1	0.0	0.6	47.2	2.5	0.0	0.1
DEH_S_37	1	0.1	0.8	74.2	1.1	0.0	0.1
DEH_S_38	0	0.0	0.6	44.5	0.9	0.0	0.0
DEH_S_39	1	0.1	12.6	34.3	1.7	0.0	0.1
DEH_S_40	1	0.0	3.2	62.3	0.7	0.0	0.1
DEH_S_41	1	0.0	0.8	37.1	1.6	0.0	0.1
DEH_S_24	0	5.0	3.4	18.2	0.9	0.0	0.0
DEH_S_25	0	10.0	0.2	12.8	1.0	0.3	0.0
DEH_S_27	1	5.1	16.1	34.6	1.7	0.0	0.1

Plot ID	PCT	Area (Ha)	Patch size	Condition	Zone	Easting	Northing	Bearing	Comp. Tree	Comp. Shrub	Comp. Grass	Comp. Forbs	Comp. Ferns
DEH_S_28	26	248.51	101	Intact	55	384309	6119690	104	1	4	8	10	1
DEH_S_50	26	248.51	101	Intact	55	385815	6116824	87	1	3	11	7	1
DEH_S_51	26	248.51	101	Intact	55	386054	6116832	270	1	2	8	8	1
DEH_S_16	26	1775	101	Sparse	55	381857	6116299	324	1	2	8	10	1
DEH_S_17	26	1775	101	Sparse	55	386387	6116732	283	1	3	5	6	1
DEH_S_29	26	1775	101	Sparse	55	382087	6118783	116	2	3	11	5	1
DEH_S_3	26	1775	101	Sparse	55	386826	6117848	313	1	3	9	7	1
DEH_S_32	26	1775	101	Sparse	55	386111	6117640	187	0	4	7	13	0
DEH_S_33	26	1775	101	Sparse	55	388519	6116827	27	1	3	8	8	0
DEH_S_34	26	1775	101	Sparse	55	387623	6116760	276	1	3	10	8	0
DEH_S_35	26	1775	101	Sparse	55	382282	6119129	336	2	2	9	10	0
DEH_W_82(	26	1775	101	Sparse	55	381861	6117368	260	1	2	7	4	0
DEH_S_43	45	86.55	101	Mod_Good	55	384746	6118250	201	0	5	9	14	1
DEH_S_44	45	86.55	101	Mod_Good	55	387465	6118622	120	0	6	13	11	0
DEH_S_45	45	86.55	101	Mod_Good	55	390631	6118910	300	1	3	12	5	2
DEH_S_46	45	86.55	101	Mod_Good	55	393953	6117880	4	1	5	9	6	1
DEH_S_47	45	86.55	101	Mod_Good	55	393847	6117482	43	0	6	11	3	1
DEH_S_100(	46	67.55	101	High	55	392981	6118167	340	0	0	7	10	0
DEH_S_300	46	67.55	101	Moderate	55	392851	6118954	234	1	8	6	8	0
DEH_S_49	46	67.55	101	Moderate	55	387063	6117712	115	0	1	10	3	0
DEH_S_53	46	67.55	101	Moderate	55	391663	6117979	273	1	6	8	6	1
DEH_S_9	46	67.55	101	Moderate	55	391003	6117443	359	0	4	7	7	1

Plot ID	Comp. Other	Struc. Tree	Struc. Shrub	Struc. Grass	Struc. Forbs	Stuc. Ferns	Stuc. Other
DEH_S_28	0	15.0	0.5	10.5	1.7	0.1	0.0
DEH_S_50	0	3.0	0.3	34.2	0.7	1.0	0.0
DEH_S_51	0	1.0	0.2	41.9	0.9	1.0	0.0
DEH_S_16	0	0.2	0.2	16.2	1.6	0.1	0.0
DEH_S_17	1	0.5	1.2	70.4	1.6	0.1	0.1
DEH_S_29	1	1.1	0.5	47.8	1.5	0.1	0.1
DEH_S_3	0	0.5	0.6	27.7	1.0	0.3	0.0
DEH_S_32	1	0.0	0.5	90.7	1.6	0.0	0.1
DEH_S_33	1	1.0	0.3	6.6	1.3	0.0	0.1
DEH_S_34	0	0.5	1.6	68.4	4.7	0.0	0.0
DEH_S_35	1	0.3	0.3	64.9	1.8	0.0	0.1
DEH_W_82(	1	0.5	0.7	10.3	0.4	0.0	0.1
DEH_S_43	1	0.0	1.4	90.2	1.4	0.1	0.1
DEH_S_44	0	0.0	0.6	48.2	8.0	0.0	0.0
DEH_S_45	0	0.1	0.8	67.9	0.5	3.3	0.0
DEH_S_46	1	0.1	0.7	39.3	0.6	0.3	0.1
DEH_S_47	1	0.0	3.6	62.3	2.2	0.1	0.1
DEH_S_100(	0	0.0	0.0	51.5	5.3	0.0	0.0
DEH_S_300	0	0.1	1.2	80.1	2.7	0.0	0.0
DEH_S_49	0	0.0	2.0	51.7	0.3	0.0	0.0
DEH_S_53	0	0.1	1.5	33.8	0.6	0.6	0.0
DEH_S_9	0	0.0	5.7	46.3	0.7	1.0	0.0

Plot ID	PCT	Area (Ha)	Patch size	Condition	Zone	Easting	Northing	Bearing	Comp. Tree	Comp. Shrub	Comp. Grass	Comp. Forbs	Comp. Ferns	Comp. Other	Struc. Tree	Struc. Shrub	Struc. Grass	Struc. Forbs	Stuc. Ferns
DEH_S_93	26	860.03	100	DNG	55	390241	6118208	299	0	6	6	3	0	0	0.0	5.3	27.1	0.4	0.0
DEH_S_94	26	860.03	100	DNG	55	391798	6118739	2	0	4	9	6	0	0	0.0	0.7	39.1	0.6	0.0
DEH_S_95	26	860.03	100	DNG	55	392806	6117640	136	1	4	9	5	1	0	0.1	1.3	41.3	1.2	0.1
DEH_S_90	26	919.19	100	Sparse	55	383144	6117416	54	0	1	6	7	1	1	0.0	0.1	82.1	0.9	0.1
DEH_S_91	26	919.19	100	Sparse	55	385500	6117248	119	1	4	6	7	1	1	0.5	1.9	46.2	1.2	0.1
DEH_S_92	26	919.19	100	Sparse	55	387843	6117373	117	1	1	8	5	1	1	0.1	0.1	42.8	1.0	0.1

Stuc. Other
0.0
0.0
0.0
0.1
0.1
0.1

Appendix 3.2 BAM plot data sheets

BAM Plot Data Sheet								Site Sheet no: 1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	19/03/2024	Dinawan Solar		Other	CK NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_90	Plot dimensions	50x20	Orientation of middle	54	
Easting 383145	Northing 6117416	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	1
	Grasses etc.	6
	Forbs	7
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.1
	Grasses etc.	82.1
	Forbs	0.9
	Ferns	0.1
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	15	10	5	10	5
Average of the 5 subplots	9				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	grey-brown	Site Drainage	South-west	Distance to nearest water	500m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			

Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	19/03/2024	Dinawan Solar	DEH_S_90	CK NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.1	10	
GG	Austrostipa bigeniculata	N	5	300	
GG	Chloris truncata	N	6	600	
OG	Convolvulus angustissimus	N	0.1	1	
GG	Enteropogon acicularis	N	35	2000	
FG	Euphorbia drummondii	N	0.2	90	
FG	Maireana ciliata	N	0.1	30	
FG	Maireana enchylaenoides	N	0.1	1	
	Marrubium vulgare	E	0.1	1	
EG	Marsilea drummondii	N	0.1	20	
	Medicago polymorpha	E	3	300	
FG	Ptilotus semilanatus	N	0.1	1	
GG	Rytidosperma caespitosum	N	1	100	
GG	Rytidosperma setaceum	N	0.1	50	
SG	Sclerolaena muricata var.	N	0.1	5	
FG	Sida cunninghamii	N	0.2	100	
FG	Solanum esuriale	N	0.1	1	
GG	Walwhalleya proluta	N	35	2000	

BAM Plot Data Sheet								Site Sheet no: 1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	19/03/2024	Dinawan Solar		Other	NL CK			
Zone 55	Datum GDA94	Plot ID	DEH_S_91	Plot dimensions	50x20	Orientation of middle	119	
Easting 385500	Northing 6117248	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	4
	Grasses etc.	6
	Forbs	7
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.5
	Shrubs	1.9
	Grasses etc.	46.2
	Forbs	1.2
	Ferns	0.1
	Other	0.1
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	20	40	25	10	11
Average of the 5 subplots	21.2				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown-red to red	Site Drainage	South-east	Distance to nearest water	900 m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			

Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	19/03/2024	Dinawan Solar	DEH_S_91	NL CK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.5	1	
FG	Alternanthera denticulata	N	0.1	1	
SG	Atriplex semibaccata	N	1	10	
GG	Austrostipa bigeniculata	N	3	200	
GG	Austrostipa scabra	N	35	2000	
EG	Cheilanthes sieberi	N	0.1	10	
GG	Chloris truncata	N	0.1	1	
OG	Convolvulus angustissimus	N	0.1	10	
GG	Enteropogon acicularis	N	3	200	
GG	Juncus spp.	N	0.1	1	
FG	Maireana enchylaenoides	N	0.3	100	
SG	Maireana humillima	N	0.5	100	
	Marrubium vulgare	E	0.1	1	
	Medicago polymorpha	E	3	200	
FG	Ptilotus semilanatus	N	0.1	1	
GG	Rytidosperma caespitosum	N	5	400	
SG	Salsola tragus	N	0.1	1	
SG	Sclerolaena muricata var.	N	0.3	10	
FG	Sida corrugata	N	0.1	40	
FG	Sida cunninghamii	N	0.3	200	
FG	Teucrium racemosum	N	0.2	100	
FG	Vittadinia gracilis	N	0.1	1	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	19/03/2024	Dinawan Solar		Other	CK NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_92	Plot dimensions	50x20	Orientation of middle	117	
Easting 387843	Northing 6117374	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	1
	Grasses etc.	8
	Forbs	5
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	0.1
	Grasses etc.	42.8
	Forbs	1
	Ferns	0.1
	Other	0.1
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	16	13	40	25	35
Average of the 5 subplots	25.8				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay to loamy clay
Soil Colour	Red to brkwn-red	Site Drainage	South-east	Distance to nearest water	1.8 km

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			

Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	19/03/2024	Dinawan Solar	DEH_S_92	CK NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	1	
GG	Austrostipa bigeniculata	N	4	400	
GG	Austrostipa nodosa	N	20	1000	
	Avena spp.	E	0.1	1	
EG	Cheilanthes sieberi	N	0.1	1	
GG	Chloris truncata	N	3	300	
OG	Convolvulus angustissimus	N	0.1	1	
GG	Enteropogon acicularis	N	15	1000	
GG	Eragrostis spp.	N	0.1	1	
FG	Euphorbia drummondii	N	0.1	1	
	Heliotropium europaeum	E	0.1	1	
FG	Maireana enchylaenoides	N	0.1	20	
	Medicago polymorpha	E	2	200	
GG	Rytidosperma caespitosum	N	0.5	100	
GG	Rytidosperma setaceum	N	0.1	1	
SG	Sclerolaena muricata var.	N	0.1	5	
FG	Sida corrugata	N	0.5	50	
FG	Sida cunninghamii	N	0.2	200	
FG	Solanum esuriale	N	0.1	1	
GG	Walwhalleya proluta	N	0.1	50	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	20/03/2024	Dinawan Solar		DNG	NL CK			
Zone 55	Datum GDA94	Plot ID	DEH_S_93	Plot dimensions	50x20	Orientation of middle	299	
Easting 390242	Northing 6118208	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	6
	Grasses etc.	6
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	5.3
	Grasses etc.	27.1
	Forbs	0.4
	Ferns	0
	Other	0
High Threat Weed cover		0.2

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	17	35	30	18	10
Average of the 5 subplots	22				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay to loam clay
Soil Colour	Red to brown red	Site Drainage	West	Distance to nearest water	3km

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	2	R	
Fire damage			
Storm damage			
Weediness			

Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	20/03/2024	Dinawan Solar	DEH_S_93	NL CK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	2	50	
GG	Austrostipa nodosa	N	5	200	
GG	Austrostipa scabra	N	15	2000	
	Avena spp.	E	0.1	1	
GG	Chloris truncata	N	0.1	1	
GG	Enteropogon acicularis	N	2	100	
	Heliotropium europaeum	E	0.1	1	
	Lycium ferocissimum	HTE	0.1	1	
FG	Maireana ciliata	N	0.2	100	
SG	Maireana decalvans	N	0.2	20	
SG	Maireana excavata	N	0.1	40	
	Medicago polymorpha	E	2	100	
GG	Rytidosperma setaceum	N	3	400	
SG	Salsola tragus	N	1	40	
SG	Sclerolaena bicornis	N	1	10	
SG	Sclerolaena muricata var.	N	1	10	
FG	Sida corrugata	N	0.1	1	
FG	Sida cunninghamii	N	0.1	1	
GG	Walwhalleya proluta	N	2	100	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet								Site Sheet no: 1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	20/03/2024	Dinawan Solar		DNG	NL CK			
Zone 55	Datum GDA94	Plot ID	DEH_S_94	Plot dimensions	50x20	Orientation of middle	2	
Easting 391798	Northing 6118739	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	4
	Grasses etc.	9
	Forbs	6
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.7
	Grasses etc.	39.1
	Forbs	0.6
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	16	8	6	7	11
Average of the 5 subplots	9.6				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown	Site Drainage	North	Distance to nearest water	3km

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			

Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	20/03/2024	Dinawan Solar	DEH_S_94	NL CK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	0.3	20	
GG	Austrostipa bigeniculata	N	2	100	
GG	Austrostipa nodosa	N	4	300	
GG	Austrostipa scabra	N	4	300	
GG	Chloris truncata	N	4	300	
GG	Enteropogon acicularis	N	9	500	
FG	Euphorbia drummondii	N	0.1	1	
GG	Juncus spp.	N	0.1	1	
SG	Maireana decalvans	N	0.1	1	
FG	Oxalis perennans	N	0.1	1	
GG	Rytidosperma caespitosum	N	4	300	
GG	Rytidosperma setaceum	N	3	300	
SG	Salsola tragus	N	0.1	1	
SG	Sclerolaena muricata var.	N	0.2	20	
FG	Sida cunninghamii	N	0.1	1	
FG	Sida trichopoda	N	0.1	1	
FG	Solanum esuriale	N	0.1	1	
FG	Teucrium racemosum	N	0.1	1	
GG	Walwhalleya proluta	N	9	500	

BAM Plot Data Sheet								Site Sheet no: 1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	20/03/2024	Dinawan Solar		DNG	CK NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_95	Plot dimensions	50x20	Orientation of middle	136	
Easting 392807	Northing 6117641	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	4
	Grasses etc.	9
	Forbs	5
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	1.3
	Grasses etc.	41.3
	Forbs	1.2
	Ferns	0.1
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	40	32	22	38	28
Average of the 5 subplots	32				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay to loamy clay
Soil Colour	Red to red brown	Site Drainage	West	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			

Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	20/03/2024	Dinawan Solar	DEH_S_95	CK NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	1	
SG	Atriplex semibaccata	N	1	40	
GG	Austrostipa bigeniculata	N	5	300	
GG	Austrostipa nodosa	N	10	1000	
GG	Austrostipa scabra	N	3	300	
GG	Chloris truncata	N	15	1000	
GG	Enteropogon acicularis	N	5	200	
GG	Juncus spp.	N	0.1	1	
SG	Maireana decalvans	N	0.1	1	
FG	Maireana enchylaenoides	N	0.1	1	
EG	Marsilea drummondii	N	0.1	1	
	Medicago polymorpha	E	4	200	
FG	Oxalis perennans	N	0.1	1	
GG	Rytidosperma caespitosum	N	3	300	
SG	Salsola tragus	N	0.1	1	
SG	Sclerolaena muricata var.	N	0.1	1	
FG	Sida cunninghamii	N	0.8	200	
FG	Solanum esuriale	N	0.1	1	
GG	Sporobolus caroli	N	0.1	1	
FG	Teucrium racemosum	N	0.1	1	
GG	Walwhalleya proluta	N	0.1	50	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	03/02/2023	DEH_S_1		Mod_Good	JRS		
Zone 55	Datum GDA94	Plot ID	DEH_S_1	Plot dimensions	50x20	Orientation of middle	47
Easting 391112	Northing 6118150	IBRA region	Riverina	Photo #			
Plant Community Type		17				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	4
	Forbs	4
	Ferns	2
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	20.1
	Grasses etc.	55.3
	Forbs	12.2
	Ferns	10.1
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	5	0	5	0
Average of the 5 subplots	2				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay silt
Soil Colour	Grey brown	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	03/02/2023	DEH_S_1	DEH_S_1	JRS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alisma plantago-aquatica	N	2	200	
FG	Asperula conferta	N	0.1	5	
SG	Duma florulenta	N	20	50	
GG	Eleocharis acuta	N	50	5000	
GG	Eleocharis pallens	N	5	400	
GG	Juncus filicaulis	N	0.1	50	
GG	Juncus subsecundus	N	0.2	100	
EG	Marsilea costulifera	N	0.1	100	
EG	Marsilea drummondii	N	10	500	
FG	Potamogeton cheesemanii	N	0.1	2	
SG	Sclerolaena muricata	N	0.1	10	
FG	Triglochin spp.	N	10	300	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	11/09/2023	Dinawan		Moderate	Mgp			
Zone 55	Datum GDA94	Plot ID	DEH_S_1000	Plot dimensions	50x20	Orientation of middle	340	
Easting 392981	Northing 6118167	IBRA region	Riverina	Photo #				
Plant Community Type		46				EEC: Natural grasslands epbc	Confidence M	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	7
	Forbs	10
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	51.5
	Forbs	5.3
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	2	1	2	1
Average of the 5 subplots	2.2				

Notes	Similar to 45 and 44

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Micro relif and forbage	Soil Surface Texture	Brown grey clay someares od red. Mix
Soil Colour	Red to brown	Site Drainage	Minimal	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	2		
Fire damage			

Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	11/09/2023	Dinawan	DEH_S_1000	Mgp

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Arctotheca calendula	E	1		
GG	Austrostipa aristiglumis	N	1		
GG	Austrostipa nodosa	N	10		
GG	Austrostipa scabra	N	0.2	20	
FG	Bulbine bulbosa	N	0.1	5	
FG	Calotis scabiosifolia	N	0.7	100	
FG	Centipeda cunninghamii	N	0.1	100	
FG	Chrysocephalum apiculatum	N	1		
FG	Crassula colorata	N	1		
GG	Enteropogon acicularis	N	10		
	Hordeum leporinum	E	0.3	100	
FG	Leucochrysum molle	N	2		
	Lolium rigidum	E	10		
FG	Maireana pentagona	N	0.1	5	
	Medicago polymorpha	E	1		
FG	Rhodanthe corymbiflora	N	0.1	10	
GG	Rytidosperma duttonianum	N	0.2	30	
GG	Rytidosperma setaceum	N	0.1	10	
FG	Swainsona procumbens	N	0.1	2	
	Trifolium arvense	E	0.5	100	
FG	Vittadinia cuneata	N	0.1	5	
GG	Walwhalleya proluta	N	30		

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	03/02/2023	Dinewan		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_11	Plot dimensions	50x20	Orientation of middle	308	
Easting 389911	Northing 6119366	IBRA region	Riverina	Photo #				
Plant Community Type		17				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	8
	Forbs	1
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	11
	Grasses etc.	78.2
	Forbs	0.1
	Ferns	10
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	5	5	5
Average of the 5 subplots	3				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Orange brown	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	03/02/2023	Dinewan	DEH_S_11	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
GG	Austrostipa aristiglumis	N	1		
SG	Duma florulenta	N	10	30	
GG	Eleocharis acuta	N	60	5000	
GG	Eleocharis pallens	N	5	400	
GG	Enteropogon acicularis	N	2	80	
GG	Juncus filicaulis	N	0.1	10	
GG	Juncus subsecundus	N	0.1	20	
EG	Marsilea drummondii	N	10	400	
FG	Rumex tenax	N	0.1	5	
GG	Rytidosperma duttonianum	N	8	300	
SG	Sclerolaena muricata	N	1	70	
GG	Walwhalleya proluta	N	2	100	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	02/02/2023	Dinewan		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_12	Plot dimensions	50x20	Orientation of middle	134	
Easting 382321	Northing 6116931	IBRA region	New England Tablelands	Photo #				
Plant Community Type		17				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	5
	Forbs	1
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	30.1
	Grasses etc.	45.3
	Forbs	5
	Ferns	10
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	30	10	5	10	5
Average of the 5 subplots	12				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay sand
Soil Colour	Dark brown	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	2	R	Chewed plants, sheep scat
Fire damage			
Storm damage			
Weediness			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Dinewan	DEH_S_12	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Duma florulenta	N	30	50	
GG	Eleocharis acuta	N	40	1000	
GG	Eleocharis pallens	N	5	200	
GG	Juncus filicaulis	N	0.1	5	
GG	Juncus subsecundus	N	0.1	10	
EG	Marsilea drummondii	N	10	500	
FG	Persicaria prostrata	N	5	600	
GG	Rytidosperma duttonianum	N	0.1	5	
SG	Sclerolaena muricata	N	0.1	3	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	02/02/2023	Solar Farm		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_13	Plot dimensions	50x20	Orientation of middle	90	
Easting 384803	Northing 6117845	IBRA region	Riverina	Photo #				
Plant Community Type		17				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	3
	Grasses etc.	6
	Forbs	6
	Ferns	2
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	10.4
	Grasses etc.	74.2
	Forbs	1
	Ferns	3.5
	Other	0
High Threat Weed cover		0.2

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	5	0	0	0
Average of the 5 subplots	2				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0	Soil Surface Texture	Clay very hard
Soil Colour	Grey brown	Site Drainage	Low	Distance to nearest water	0m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	NR	
Fire damage			
Storm damage			
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Solar Farm	DEH_S_13	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.5	60	
SG	Atriplex semibaccata	N	0.3	1	
GG	Austrostipa bigeniculata	N	0.1	1	
SG	Duma florulenta	N	10	50	
FG	Eclipta platyglossa	N	0.1	1	
GG	Eleocharis acuta	N	65	3000	
GG	Eleocharis pallens	N	1	100	
GG	Enteropogon acicularis	N	3	300	
FG	Goodenia pusilliflora	N	0.1	5	
EG	Marsilea costulifera	N	0.5	20	
EG	Marsilea drummondii	N	3	400	
FG	Persicaria prostrata	N	0.1	5	
	Romulea rosea var. australis	HTE	0.1	3	
FG	Rumex tenax	N	0.1	5	
GG	Rytidosperma duttonianum	N	0.1	1	
SG	Sclerolaena muricata	N	0.1	3	
FG	Triglochin spp.	N	0.1	5	
GG	Walwhalleya proluta	N	5	500	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	02/02/2023	Dinewan		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_14	Plot dimensions	50x20	Orientation of middle	37	
Easting 386897	Northing 6118372	IBRA region	Riverina	Photo #				
Plant Community Type		17				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	1
	Grasses etc.	7
	Forbs	2
	Ferns	2
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	30
	Grasses etc.	67.8
	Forbs	0.2
	Ferns	5.5
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	0	15	20	0
Average of the 5 subplots	8				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Dinewan	DEH_S_14	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
OG	Convolvulus angustissimus	N	0.1	2	
SG	Duma florulenta	N	30	100	
GG	Eleocharis acuta	N	60	5000	
GG	Eleocharis pallens	N	5	500	
GG	Enteropogon acicularis	N	0.2	200	
FG	Goodenia fascicularis	N	0.1	2	
FG	Goodenia pusilliflora	N	0.1	1	
GG	Juncus flavidus	N	0.1	10	
GG	Juncus subsecundus	N	2	400	
EG	Marsilea costulifera	N	0.5	200	
EG	Marsilea drummondii	N	5	500	
GG	Rytidosperma duttonianum	N	0.1	20	
GG	Walwhalleya proluta	N	0.4	300	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	02/02/2023	Solar Farm		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_15	Plot dimensions	50x20	Orientation of middle	60	
Easting 386997	Northing 6118459	IBRA region	Riverina	Photo #				
Plant Community Type		17				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	4
	Grasses etc.	8
	Forbs	6
	Ferns	2
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	35.6
	Grasses etc.	36.8
	Forbs	0.6
	Ferns	1.3
	Other	0
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	20	0	0	5	10
Average of the 5 subplots	7				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0	Soil Surface Texture	Clay very hard
Soil Colour	Greyish brown	Site Drainage	Low	Distance to nearest water	0m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	2	R	
Fire damage			
Storm damage			
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Solar Farm	DEH_S_15	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	1	
FG	Alternanthera denticulata	N	0.1	20	
SG	Atriplex nummularia	N	0.3	1	
SG	Atriplex semibaccata	N	0.2	10	
GG	Austrostipa scabra	N	0.1	1	
SG	Duma florulenta	N	35	50	
FG	Eclipta platyglossa	N	0.1	5	
GG	Eleocharis acuta	N	30	3000	
GG	Eleocharis pallens	N	5	300	
GG	Enteropogon acicularis	N	0.3	60	
FG	Euphorbia drummondii	N	0.1	1	
FG	Goodenia pusilliflora	N	0.1	20	
GG	Juncus spp.	N	0.2	20	
GG	Juncus subsecundus	N	0.1	5	
EG	Marsilea costulifera	N	0.3	50	
EG	Marsilea drummondii	N	1	200	
FG	Rumex tenax	N	0.1	5	
GG	Rytidosperma duttonianum	N	0.1	1	
SG	Sclerolaena muricata	N	0.1	5	
FG	Wahlenbergia fluminalis	N	0.1	1	
GG	Walwhalleya proluta	N	1	40	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	21/11/2022	Dinawan		Sparse	NL JRS		
Zone 55	Datum GDA94	Plot ID	DEH_S_16	Plot dimensions	50x20	Orientation of middle	324
Easting 381857	Northing 6116299	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	2
	Grasses etc.	8
	Forbs	10
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.2
	Shrubs	0.2
	Grasses etc.	16.2
	Forbs	1.6
	Ferns	0.1
	Other	0
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	0	10	5	0
Average of the 5 subplots	5				

Notes	NL; NL; NL; NL

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	21/11/2022	Dinawan	DEH_S_16	NL JRS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.2	1	
FG	Alternanthera denticulata	N	0.2	400	
	Arctotheca calendula	E	0.1	20	
FG	Asperula conferta	N	0.2	400	
GG	Austrostipa bigeniculata	N	0.1	5	
GG	Carex inversa	N	0.2	30	
FG	Centipeda cunninghamii	N	0.3	200	
GG	Chloris truncata	N	0.5	50	
	Echium plantagineum	E	0.1	5	
GG	Eleocharis acuta	N	10	900	
GG	Enteropogon acicularis	N	0.1	10	
FG	Goodenia pusilliflora	N	0.1	20	
	Hordeum spp.	E	0.1	1	
GG	Isolepis cernua	N	0.3	80	
	Lactuca serriola	E	0.1	1	
FG	Limosella curdieana	N	0.1	10	
	Lolium rigidum	E	50	3000	
SG	Maireana humillima	N	0.1	1	
EG	Marsilea drummondii	N	0.1	50	
	Medicago polymorpha	E	0.3	30	
FG	Oxalis perennans	N	0.1	20	
FG	Rhodanthe corymbiflora	N	0.1	1	
FG	Rumex tenax	N	0.2	30	
GG	Rytidosperma duttonianum	N	1	20	
SG	Sclerolaena divaricata	N	0.1	10	
FG	Sida corrugata	N	0.2	50	
FG	Solanum esuriale	N	0.1	2	
	Sonchus oleraceus	E	0.1	8	
GG	Walwhalleya proluta	N	4	40	
	Xanthium strumarium	HTE	0.1	1	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	22/11/2022	Dinawan		Sparse	JRS NL		
Zone 55	Datum GDA94	Plot ID	DEH_S_17	Plot dimensions	50x20	Orientation of middle	283
Easting 386387	Northing 6116732	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	3
	Grasses etc.	5
	Forbs	6
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.5
	Shrubs	1.2
	Grasses etc.	70.4
	Forbs	1.6
	Ferns	0.1
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	2	0	5	15
Average of the 5 subplots	5.4				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown	Site Drainage	Moderate. Slightly damp soil	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	22/11/2022	Dinawan	DEH_S_17	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.5	1	
	Arctotheca calendula	E	1	100	
SG	Atriplex semibaccata	N	0.1	2	
GG	Austrostipa bigeniculata	N	40	5000	
GG	Austrostipa scabra	N	25	3000	
	Avena spp.	E	8	200	
GG	Bothriochloa macra	N	5	200	
EG	Cheilanthes sieberi	N	0.1	3	
GG	Chloris truncata	N	0.1	2	
OG	Convolvulus angustissimus	N	0.1	3	
FG	Erodium crinitum	N	0.1	20	
	Hordeum spp.	E	0.1	3	
	Lolium rigidum	E	3	100	
SG	Maireana humillima	N	1	50	
	Medicago polymorpha	E	5	300	
	Medicago spp.	E	3	300	
	Modiola caroliniana	E	0.1	10	
FG	Oxalis perennans	N	1	100	
FG	Ptilotus semilanatus	N	0.1	1	
SG	Sclerolaena muricata	N	0.1	1	
FG	Sida corrugata	N	0.1	20	
FG	Solanum esuriale	N	0.1	5	
	Sonchus oleraceus	E	0.2	30	
FG	Vittadinia cuneata	N	0.2	20	
GG	Walwhalleya proluta	N	0.3	30	

BAM Plot Data Sheet								Site Sheet no: 1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	25/11/2022	Dinewan		Mod_Good	NL JHS			
Zone 55	Datum GDA94	Plot ID	DEH_S_2	Plot dimensions	50x20	Orientation of middle	175	
Easting 391324	Northing 6118053	IBRA region	Riverina	Photo #				
Plant Community Type		17				EEC: No	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	6
	Grasses etc.	9
	Forbs	9
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	5.8
	Grasses etc.	9.5
	Forbs	0.9
	Ferns	0.3
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	0	0	0
Average of the 5 subplots	0				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	25/11/2022	Dinewan	DEH_S_2	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.1	10	
FG	Asperula conferta	N	0.1	10	
SG	Atriplex semibaccata	N	0.2	40	
GG	Chloris truncata	N	0.1	10	
SG	Duma florulenta	N	5	20	
GG	Eleocharis acuta	N	5	1000	
GG	Eleocharis pallens	N	0.2	40	
SG	Enchylaena tomentosa	N	0.1	10	
GG	Enteropogon acicularis	N	0.3	20	
GG	Juncus filicaulis	N	0.2	30	
GG	Juncus subsecundus	N	0.1	5	
	Lolium rigidum	E	0.5	200	
EG	Marsilea drummondii	N	0.3	80	
FG	Oxalis perennans	N	0.1	1	
FG	Rhodanthe corymbiflora	N	0.1	1	
FG	Rumex tenax	N	0.1	10	
GG	Rytidosperma caespitosum	N	0.5	50	
SG	Sclerolaena bicornis	N	0.1	2	
SG	Sclerolaena diacantha	N	0.1	5	
SG	Sclerolaena muricata	N	0.3	30	
FG	Sida corrugata	N	0.1	1	
GG	Sporobolus caroli	N	0.1	10	
FG	Swainsona procumbens	N	0.1	10	
FG	Triglochin striata	N	0.1	5	
FG	Vittadinia cuneata	N	0.1	5	
GG	Walwhalleya proluta	N	3	100	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	23/11/2022	Dinewan		DNG	NL JRS		
Zone 55	Datum GDA94	Plot ID	DEH_S_20	Plot dimensions	50x20	Orientation of middle	273
Easting 389354	Northing 6118060	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	3
	Grasses etc.	10
	Forbs	7
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	1.2
	Grasses etc.	62.9
	Forbs	0.8
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	20	0	5	15
Average of the 5 subplots	10				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Light brown	Site Drainage	Moderate with some wet patches	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	23/11/2022	Dinewan	DEH_S_20	NL JRS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.1	10	
GG	Austrostipa aristiglumis	N	5	400	
GG	Austrostipa bigeniculata	N	8	500	
	Avena spp.	E	7	500	
GG	Bothriochloa macra	N	0.2	40	
GG	Chloris truncata	N	3	200	
GG	Eleocharis acuta	N	0.1	50	
GG	Enteropogon acicularis	N	4	200	
	Euphorbia prostrata	E	0.1	3	
FG	Goodenia pusilliflora	N	0.1	6	
	Hordeum spp.	E	0.1	3	
	Lolium rigidum	E	15	1000	
SG	Maireana humillima	N	0.1	10	
FG	Maireana pentagona	N	0.1	20	
	Medicago polymorpha	E	5	200	
FG	Oxalis perennans	N	0.2	100	
	Rumex crispus	E	0.1	10	
FG	Rumex tenax	N	0.1	10	
GG	Rytidosperma duttonianum	N	0.5	50	
GG	Rytidosperma setaceum	N	0.1	50	
SG	Sclerolaena diacantha	N	0.1	5	
SG	Sclerolaena muricata	N	1	50	
FG	Sida corrugata	N	0.1	10	
	Sonchus oleraceus	E	0.2	50	
GG	Sporobolus caroli	N	2	200	
FG	Vittadinia cuneata	N	0.1	10	
GG	Walwhalleya proluta	N	40	2000	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	23/11/2022	DEH_S_22		DNG	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_22	Plot dimensions	50x20	Orientation of middle	186	
Easting 384776	Northing 6119663	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	1
	Grasses etc.	10
	Forbs	7
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	0.1
	Grasses etc.	74.2
	Forbs	0.8
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	15	0	5	5
Average of the 5 subplots	7				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Light brown	Site Drainage	Moderate	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	23/11/2022	DEH_S_22	DEH_S_22	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	1	
	Arctotheca calendula	E	0.1	10	
GG	Austrostipa aristiglumis	N	20	1000	
GG	Austrostipa bigeniculata	N	25	1000	
GG	Austrostipa scabra	N	20	2000	
	Avena spp.	E	2	100	
GG	Bothriochloa macra	N	0.5	80	
	Bromus hordeaceus	E	0.1	10	
GG	Chloris truncata	N	0.3	50	
OG	Convolvulus angustissimus	N	0.1	1	
	Echium plantagineum	E	0.1	5	
GG	Enteropogon acicularis	N	1	100	
FG	Erodium crinitum	N	0.1	5	
	Euphorbia prostrata	E	0.1	4	
	Hypochaeris radicata	E	0.1	10	
	Lolium rigidum	E	0.1	20	
SG	Maireana humillima	N	0.1	30	
FG	Maireana pentagona	N	0.1	1	
	Malva parviflora	E	0.1	2	
	Medicago polymorpha	E	2	30	
	Medicago spp.	E	6	200	
FG	Oxalis perennans	N	0.1	20	
FG	Ptilotus semilanatus	N	0.1	6	
FG	Rhodanthe corymbiflora	N	0.1	20	
GG	Rytidosperma carphoides	N	2	100	
GG	Rytidosperma setaceum	N	0.3	100	
FG	Sida corrugata	N	0.2	100	
	Sonchus oleraceus	E	0.1	20	
GG	Sporobolus caroli	N	0.1	50	
FG	Vittadinia cuneata	N	0.1	10	
GG	Walwhalleya proluta	N	5	100	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	23/11/2022	37263 pct26 DNG		DNG	NL JHS			
Zone 55	Datum GDA94	Plot ID	DEH_S_23	Plot dimensions	50x20	Orientation of middle	265	
Easting 385189	Northing 6118720	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: No	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	7
	Forbs	11
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.2
	Grasses etc.	70.4
	Forbs	1.9
	Ferns	0
	Other	0.1
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	0	5	3	1
Average of the 5 subplots	3.8				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Light brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	23/11/2022	37263 pct26 DNG DEH_S_21	DEH_S_23	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Arctotheca calendula	E	0.1	5	
FG	Asperula conferta	N	0.1	10	
GG	Austrostipa bigeniculata	N	65	2000	
GG	Austrostipa nodosa	N	0.1	1	
GG	Austrostipa scabra	N	2	400	
	Avena spp.	E	0.5	100	
GG	Chloris truncata	N	1	300	
OG	Convolvulus angustissimus	N	0.1	5	
	Cotula bipinnata	E	0.1	1	
	Echium plantagineum	E	0.1	10	
FG	Erodium crinitum	N	0.1	5	
FG	Goodenia pusilliflora	N	0.1	10	
	Hordeum spp.	E	0.2	20	
	Lactuca serriola	E	0.1	1	
FG	Maireana pentagona	N	0.5	200	
	Malva parviflora	E	0.1	20	
	Medicago polymorpha	E	0.2	90	
FG	Oxalis perennans	N	0.1	20	
	Plantago lanceolata	E	0.1	20	
FG	Ptilotus nobilis	N	0.2	60	
FG	Ptilotus semilanatus	N	0.1	20	
FG	Rhodanthe corymbiflora	N	0.1	20	
GG	Rytidosperma caespitosum	N	2	400	
SG	Sclerolaena diacantha	N	0.1	20	
SG	Sclerolaena muricata	N	0.1	10	
FG	Sida corrugata	N	0.4	200	
FG	Solanum esuriale	N	0.1	20	
	Sonchus oleraceus	E	0.1	5	
GG	Sporobolus caroli	N	0.1	20	
	Taraxacum officinale	E	0.1	10	
FG	Vittadinia cuneata	N	0.1	20	
GG	Walwhalleya proluta	N	0.2	20	
	Xanthium spinosum	HTE	0.1	5	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	21/11/2022	Dinawan 26 intact		Intact	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_24	Plot dimensions	50x20	Orientation of middle	290	
Easting 382492	Northing 6119225	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	7
	Grasses etc.	5
	Forbs	6
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	5
	Shrubs	3.4
	Grasses etc.	18.2
	Forbs	0.9
	Ferns	0
	Other	0
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	1
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	0	0	0	2
Average of the 5 subplots	1.4				

Notes	Nl; Nl; Nl; Nl

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Silty clay
Soil Colour	Orange	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion	1		Patches of slight erosion
Firewood/CWD removal			
Grazing (identify native/livestock	1		
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	21/11/2022	Dinawan 26 intact	DEH_S_24	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	5	1	
SG	Atriplex leptocarpa	N	1	30	
SG	Atriplex semibaccata	N	0.4	20	
GG	Austrostipa bigeniculata	N	7	100	
GG	Austrostipa scabra	N	9	300	
GG	Chloris truncata	N	0.1	9	
FG	Chrysocephalum apiculatum	N	0.1	1	
GG	Enteropogon acicularis	N	0.1	10	
	Euphorbia prostrata	E	0.1	1	
FG	Goodenia pusilliflora	N	0.1	10	
	Hordeum spp.	E	0.1	10	
	Lactuca serriola	E	0.1	2	
	Lolium rigidum	E	0.1	50	
	Lycium ferocissimum	HTE	0.1	2	
SG	Maireana aphylla	N	0.2	2	
SG	Maireana humillima	N	0.3	20	
	Medicago polymorpha	E	0.5	200	
	Medicago truncatula	E	2	60	
FG	Oxalis perennans	N	0.1	10	
FG	Ptilotus semilanatus	N	0.2	50	
SG	Rhagodia spinescens	N	0.1	10	
FG	Rhodanthe corymbiflora	N	0.1	5	
GG	Rytidosperma duttonianum	N	2	100	
SG	Sclerolaena diacantha	N	0.4	5	
SG	Sclerolaena divaricata	N	1	10	
	Sonchus oleraceus	E	0.1	10	
FG	Vittadinia cuneata	N	0.3	20	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	21/11/2022	Dinawan 26 intact		Intact	NL		
Zone 55	Datum GDA94	Plot ID	DEH_S_25	Plot dimensions	50x20	Orientation of middle	168
Easting 381485	Northing 6116262	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	2
	Grasses etc.	8
	Forbs	8
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	10
	Shrubs	0.2
	Grasses etc.	12.8
	Forbs	1
	Ferns	0.3
	Other	0
High Threat Weed cover		0.2

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	1
10 - 19 cm	1
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	20
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	20	15	20	10	20
Average of the 5 subplots	17				

Notes	NL; NL; NL; NL

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay loam
Soil Colour	Brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	21/11/2022	Dinawan 26 intact	DEH_S_25	NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	10	10	
FG	Alternanthera denticulata	N	0.1	10	
GG	Austrostipa bigeniculata	N	0.1	10	
	Avena spp.	E	0.2	60	
GG	Bothriochloa macra	N	0.1	10	
GG	Carex inversa	N	0.1	20	
GG	Chloris truncata	N	0.5	90	
FG	Chrysocephalum apiculatum	N	0.1	10	
	Echium plantagineum	E	0.1	10	
GG	Eleocharis acuta	N	1	20	
GG	Enteropogon acicularis	N	5	50	
FG	Goodenia pusilliflora	N	0.1	30	
	Lolium rigidum	E	0.1	10	
	Lycium ferocissimum	HTE	0.1	2	
EG	Marsilea drummondii	N	0.3	200	
FG	Rumex tenax	N	0.1	10	
GG	Rytidosperma setaceum	N	1	500	
SG	Sclerolaena diacantha	N	0.1	1	
SG	Sclerolaena muricata	N	0.1	20	
FG	Sida corrugata	N	0.3	60	
FG	Solanum esuriale	N	0.1	10	
	Sonchus oleraceus	E	0.1	10	
FG	Swainsona procumbens	N	0.1	1	
	Trifolium repens	E	0.1	50	
FG	Vittadinia cuneata	N	0.1	10	
GG	Walwhalleya proluta	N	5	2000	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet					Site Sheet no:1 of 2		
		Survey Name		Veg Zone ID	Recorders		
Date	02/02/2023	Dinewan		Intact	JRS STC		
Zone 55	Datum GDA94	Plot ID	DEH_S_27	Plot dimensions	50x20	Orientation of middle	80
Easting 386355	Northing 6117516	IBRA region	New England Tablelands	Photo #			
Plant Community Type		26				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	6
	Grasses etc.	10
	Forbs	9
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	5.1
	Shrubs	16.1
	Grasses etc.	34.6
	Forbs	1.7
	Ferns	0
	Other	0.1
High Threat Weed cover		0.6

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	1
20 - 29cm	1
10 - 19 cm	1
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	25	35	5	20	5
Average of the 5 subplots	18				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0-5	Soil Surface Texture	Sandy clay
Soil Colour	Orange brown	Site Drainage	Moderate	Distance to nearest water	2km

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	2	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Dinewan	DEH_S_27	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia oswaldii	N	0.1	1	
TG	Acacia pendula	N	5	10	
SG	Atriplex semibaccata	N	0.5	20	
GG	Austrostipa aristiglumis	N	0.1	1	
GG	Austrostipa bigeniculata	N	5	200	
GG	Austrostipa nodosa	N	0.2	20	
GG	Austrostipa scabra	N	3	100	
	Avena barbata	E	0.1	2	
FG	Boerhavia dominii	N	0.5	50	
SG	Chenopodium desertorum	N	0.1	5	
GG	Chloris truncata	N	0.1	10	
OG	Convolvulus angustissimus	N	0.1	10	
FG	Dysphania cristata	N	0.1	10	
SG	Enchylaena tomentosa	N	0.1	5	
GG	Enteropogon acicularis	N	25	2000	
FG	Euphorbia drummondii	N	0.1	20	
FG	Goodenia pusilliflora	N	0.1	5	
	Heliotropium europaeum	E	0.1	2	
	Hypochaeris radicata	E	0.1	1	
	Lycium ferocissimum	HTE	0.5	10	
SG	Maireana excavata	N	0.3	20	
FG	Maireana pentagona	N	0.3	20	
FG	Oxalis perennans	N	0.1	5	
	Polygonum aviculare	E	0.1	1	
FG	Rumex tenax	N	0.1	1	
GG	Rytidosperma caespitosum	N	0.5	20	
GG	Rytidosperma setaceum	N	0.1	5	
SG	Salsola tragus	N	0.1	10	
SG	Sclerolaena muricata	N	15	90	
FG	Sida corrugata	N	0.1	20	
FG	Solanum esuriale	N	0.3	40	
GG	Sporobolus caroli	N	0.1	10	
GG	Walwhalleya proluta	N	0.5	10	
	Xanthium spinosum	HTE	0.1	10	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	23/11/2022	Dinewan		Intact	NL JHS		
Zone 55	Datum GDA94	Plot ID	DEH_S_28	Plot dimensions	50x20	Orientation of middle	104
Easting 384309	Northing 6119690	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	4
	Grasses etc.	8
	Forbs	10
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	15
	Shrubs	0.5
	Grasses etc.	10.5
	Forbs	1.7
	Ferns	0.1
	Other	0
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	2
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	1
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	3
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	5	0	2	0
Average of the 5 subplots	3.4				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	23/11/2022	Dinewan	DEH_S_28	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	15	4	
	Arctotheca calendula	E	0.1	20	
SG	Atriplex semibaccata	N	0.1	30	
GG	Austrostipa bigeniculata	N	2	80	
GG	Austrostipa nodosa	N	0.1	5	
GG	Austrostipa scabra	N	3	200	
EG	Cheilanthes sieberi	N	0.1	1	
GG	Chloris truncata	N	0.1	10	
FG	Chrysocephalum apiculatum	N	0.1	5	
	Cotula bipinnata	E	0.2	100	
SG	Duma florulenta	N	0.1	5	
FG	Erodium crinitum	N	0.1	1	
	Euphorbia prostrata	E	0.1	5	
	Hordeum spp.	E	0.1	20	
GG	Juncus subsecundus	N	0.1	1	
	Lolium rigidum	E	0.1	20	
SG	Maireana humillima	N	0.2	30	
FG	Maireana pentagona	N	0.5	200	
FG	Oxalis perennans	N	0.2	100	
FG	Ptilotus semilanatus	N	0.1	30	
FG	Rhodanthe corymbiflora	N	0.1	20	
FG	Rumex tenax	N	0.1	5	
GG	Rytidosperma caespitosum	N	2	500	
GG	Rytidosperma duttonianum	N	3	800	
SG	Sclerolaena muricata	N	0.1	10	
FG	Sida corrugata	N	0.2	40	
FG	Solanum esuriale	N	0.1	5	
	Sonchus oleraceus	E	0.1	6	
FG	Vittadinia cuneata	N	0.2	20	
GG	Walwhalleya proluta	N	0.2	10	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	21/11/2022	37263		Sparse	JRS NL		
Zone 55	Datum GDA94	Plot ID	DEH_S_29	Plot dimensions	50x20	Orientation of middle	116
Easting 382087	Northing 6118783	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: None	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	3
	Grasses etc.	11
	Forbs	5
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	1.1
	Shrubs	0.5
	Grasses etc.	47.8
	Forbs	1.5
	Ferns	0.1
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	1
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	0	0	0
Average of the 5 subplots	0				

Notes	NL; NL; NL; NL

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Fllodplain, no slope	Soil Surface Texture	Clay
Soil Colour	Light brown	Site Drainage	Extremely poor, plot inundated	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	21/11/2022	37263	DEH_S_29	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia oswaldii	N	0.1	1	
TG	Acacia pendula	N	1	2	
FG	Alternanthera denticulata	N	0.2	50	
	Arctotheca calendula	E	0.1	1	
FG	Asperula conferta	N	0.1	50	
SG	Atriplex semibaccata	N	0.1	5	
GG	Austrostipa bigeniculata	N	0.5	50	
GG	Bothriochloa macra	N	1	200	
FG	Centipeda cunninghamii	N	0.1	1	
GG	Chloris truncata	N	0.5	100	
OG	Convolvulus angustissimus	N	0.1	2	
	Echium plantagineum	E	0.1	1	
GG	Eleocharis acuta	N	20	3000	
GG	Eleocharis pallens	N	5	1000	
GG	Enteropogon acicularis	N	0.5	50	
FG	Goodenia pusilliflora	N	1	500	
GG	Isolepis cernua	N	0.1	10	
GG	Juncus subsecundus	N	4	1000	
	Lolium rigidum	E	0.3	50	
EG	Marsilea drummondii	N	0.1	50	
	Medicago truncatula	E	0.1	40	
	Oxalis pes-caprae	E	0.2	80	
FG	Rumex tenax	N	0.1	10	
GG	Rytidosperma duttonianum	N	15	2000	
SG	Sclerolaena diacantha	N	0.2	20	
SG	Sclerolaena divaricata	N	0.2	20	
	Sonchus oleraceus	E	0.1	6	
GG	Sporobolus caroli	N	0.2	50	
GG	Walwhalleya proluta	N	1	100	

BAM Plot Data Sheet							Site Sheet no: 1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	22/11/2022	Dinewan		Sparse	NL JHS		
Zone 55	Datum GDA94	Plot ID	DEH_S_3	Plot dimensions	50x20	Orientation of middle	313
Easting 386826	Northing 6117848	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	3
	Grasses etc.	9
	Forbs	7
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.5
	Shrubs	0.6
	Grasses etc.	27.7
	Forbs	1
	Ferns	0.3
	Other	0
High Threat Weed cover		0.2

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	0	10	5	0
Average of the 5 subplots	4				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat to slight slope to nearby lignum depression	Soil Surface Texture	Loam
Soil Colour	Red/brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			

Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	22/11/2022	Dinewan	DEH_S_3	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.5	1	
	Arctotheca calendula	E	0.2	60	
GG	Austrostipa bigeniculata	N	20	500	
GG	Austrostipa scabra	N	1	200	
	Avena spp.	E	4	90	
FG	Boerhavia dominii	N	0.1	5	
GG	Chloris truncata	N	5	100	
SG	Duma florulenta	N	0.3	1	
	Echium plantagineum	E	0.1	10	
GG	Enteropogon acicularis	N	0.5	60	
FG	Erodium crinitum	N	0.1	10	
	Euphorbia prostrata	E	0.1	10	
	Hordeum spp.	E	1	200	
	Hypericum perforatum	HTE	0.2	50	
	Hypochaeris glabra	E	0.1	5	
GG	Juncus subsecundus	N	0.1	1	
	Lactuca serriola	E	0.1	5	
	Lolium rigidum	E	1	100	
SG	Maireana humillima	N	0.1	10	
	Malva parviflora	E	0.1	10	
EG	Marsilea drummondii	N	0.3	200	
	Medicago polymorpha	E	0.3	300	
FG	Oxalis perennans	N	0.1	10	
FG	Rhodanthe corymbiflora	N	0.1	1	
GG	Rytidosperma caespitosum	N	0.3	30	
GG	Rytidosperma duttonianum	N	0.5	200	
SG	Sclerolaena muricata	N	0.2	50	
FG	Sida corrugata	N	0.1	40	
FG	Solanum esuriale	N	0.3	50	
	Sonchus oleraceus	E	0.1	1	
GG	Sporobolus caroli	N	0.1	5	
FG	Vittadinia cuneata	N	0.2	60	
GG	Walwhalleya proluta	N	0.2	30	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	13/06/2023	Dinawan		Moderate	DB, JC			
Zone 55	Datum GDA94	Plot ID	DEH_S_300	Plot dimensions	50x20	Orientation of middle	234	
Easting 392851	Northing 6118954	IBRA region	Riverina	Photo #				
Plant Community Type		46				EEC: Yes	Confidence M	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	8
	Grasses etc.	6
	Forbs	8
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	1.2
	Grasses etc.	80.1
	Forbs	2.7
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	1
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	3	5	2	3	5
Average of the 5 subplots	3.6				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	None	Soil Surface Texture	Clay loam
Soil Colour	Red brown trending grey to the nth	Site Drainage	None	Distance to nearest water	10m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	Cows
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	13/06/2023	Dinawan	DEH_S_300	DB, JC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	1	
	Arctotheca calendula	E	0.1	2	
FG	Asperula conferta	N	2	500	
SG	Atriplex semibaccata	N	0.1	50	
GG	Austrostipa spp.	N	30	400	
FG	Calotis cuneata	N	0.1	50	
GG	Chloris truncata	N	10	200	
GG	Enteropogon acicularis	N	10	100	
FG	Erodium crinitum	N	0.1	10	
FG	Goodenia spp.	N	0.1	2	
GG	Juncus spp.	N	0.1	3	
	Lolium spp.	E	2	1000	
SG	Maireana decalvans	N	0.1	20	
FG	Maireana pentagona	N	0.1	5	
	Medicago polymorpha	E	5	500	
FG	Ptilotus spp.	N	0.1	1	
GG	Rytidosperma spp.	N	15	300	
SG	Salsola australis	N	0.1	3	
SG	Sclerolaena bicornis	N	0.1	1	
SG	Sclerolaena brachyptera	N	0.5	100	
SG	Sclerolaena diacantha	N	0.1	1	
SG	Sclerolaena muricata	N	0.1	10	
SG	Sclerolaena spp.	N	0.1	1	
FG	Sida corrugata	N	0.1	50	
GG	Sporobolus caroli	N	15	200	
FG	Vittadinia cuneata	N	0.1	10	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	14/02/2023	Dinewan		Moderate	MGP KK		
Zone 55	Datum GDA94	Plot ID	DEH_S_31	Plot dimensions	50x20	Orientation of middle	286
Easting 383902	Northing 6118765	IBRA region	Riverina	Photo #			
Plant Community Type		17				EEC: Yes	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	8
	Forbs	0
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	8.3
	Grasses etc.	49.8
	Forbs	0
	Ferns	0.2
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	45	60	50	30	70
Average of the 5 subplots	51				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	2	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	2	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	1	R	
Fire damage	0		
Storm damage	0		
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	14/02/2023	Dinewan	DEH_S_31	MGP KK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
GG	Austrostipa aristiglumis	N	0.1	2	
SG	Duma florulenta	N	8		
GG	Eleocharis pallens	N	20		
GG	Enteropogon acicularis	N	2		
GG	Juncus spp.	N	0.1	20	
	Lolium rigidum	E	2		
EG	Marsilea drummondii	N	0.2	200	
GG	Rytidosperma duttonianum	N	2		
GG	Rytidosperma spp.	N	0.5	50	
SG	Sclerolaena muricata var.	N	0.3	10	
GG	Sporobolus caroli	N	0.1	10	
GG	Walwhalleya proluta	N	25		

BAM Plot Data Sheet					Site Sheet no: 1 of 2		
		Survey Name		Veg Zone ID	Recorders		
Date	02/02/2023	Dinewan		Sparse	JRS STC		
Zone 55	Datum GDA94	Plot ID	DEH_S_32	Plot dimensions	50x20	Orientation of middle	187
Easting 386111	Northing 6117640	IBRA region	New England Tablelands	Photo #			
Plant Community Type		26				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	4
	Grasses etc.	7
	Forbs	13
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.5
	Grasses etc.	90.7
	Forbs	1.6
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	25	5	65	5	0
Average of the 5 subplots	20				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Orange brown	Site Drainage	Good	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Dinewan	DEH_S_32	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
GG	Austrostipa aristiglumis	N	0.5	100	
GG	Austrostipa bigeniculata	N	50	1000	
GG	Austrostipa scabra	N	4	600	
FG	Calotis cuneifolia	N	0.2	200	
FG	Chrysocephalum apiculatum	N	0.1	2	
OG	Convolvulus angustissimus	N	0.1	3	
SG	Enchylaena tomentosa	N	0.1	1	
GG	Enteropogon acicularis	N	20	800	
FG	Erodium crinitum	N	0.2	50	
FG	Euphorbia drummondii	N	0.1	6	
FG	Goodenia fascicularis	N	0.1	2	
	Lotus angustissimus	E	0.1	2	
FG	Maireana ciliata	N	0.1	2	
SG	Maireana excavata	N	0.1	2	
FG	Maireana pentagona	N	0.2	80	
FG	Oxalis perennans	N	0.1	5	
FG	Ptilotus nobilis	N	0.1	1	
GG	Rytidosperma caespitosum	N	10	500	
GG	Rytidosperma setaceum	N	0.2	50	
SG	Sclerolaena diacantha	N	0.1	2	
SG	Sclerolaena muricata	N	0.2	50	
FG	Sida corrugata	N	0.1	5	
FG	Solanum esuriale	N	0.1	8	
FG	Teucrium racemosum	N	0.1	2	
FG	Vittadinia cuneata	N	0.1	5	
GG	Walwhalleya proluta	N	6	300	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	24/11/2022	Dinewan		Sparse	NL JHS			
Zone 55	Datum GDA94	Plot ID	DEH_S_33	Plot dimensions	50x20	Orientation of middle	27	
Easting 388519	Northing 6116827	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: No	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	3
	Grasses etc.	8
	Forbs	8
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	1
	Shrubs	0.3
	Grasses etc.	6.6
	Forbs	1.3
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	15	10	2	5	2
Average of the 5 subplots	6.8				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay loam
Soil Colour	Dark brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	24/11/2022	Dinewan	DEH_S_33	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	1		
	Arctotheca calendula	E	0.1	5	
GG	Austrostipa aristiglumis	N	0.3	50	
GG	Austrostipa bigeniculata	N	4	400	
GG	Austrostipa scabra	N	0.2	50	
	Avena spp.	E	1	800	
GG	Chloris truncata	N	1	200	
OG	Convolvulus angustissimus	N	0.1	10	
	Echium plantagineum	E	0.1	10	
GG	Enteropogon acicularis	N	0.1	9	
	Euphorbia prostrata	E	0.1	10	
FG	Goodenia fascicularis	N	0.1	5	
	Hordeum spp.	E	0.2	40	
	Lolium rigidum	E	25	1000	
SG	Maireana humillima	N	0.1	4	
FG	Maireana pentagona	N	0.5	50	
	Medicago polymorpha	E	5	900	
FG	Oxalis perennans	N	0.1	30	
FG	Ptilotus semilanatus	N	0.1	1	
FG	Rumex tenax	N	0.1	10	
GG	Rytidosperma duttonianum	N	0.3	50	
SG	Sclerolaena divaricata	N	0.1	1	
SG	Sclerolaena muricata	N	0.1	20	
FG	Sida corrugata	N	0.1	10	
FG	Solanum esuriale	N	0.1	10	
	Sonchus oleraceus	E	0.1	10	
GG	Sporobolus caroli	N	0.2	30	
FG	Vittadinia cuneata	N	0.2	50	
GG	Walwhalleya proluta	N	0.5	50	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	23/11/2022	Dinewan		Sparse	JRS		
Zone 55	Datum GDA94	Plot ID	DEH_S_34	Plot dimensions	50x20	Orientation of middle	276
Easting 387623	Northing 6116760	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	3
	Grasses etc.	10
	Forbs	8
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.5
	Shrubs	1.6
	Grasses etc.	68.4
	Forbs	4.7
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	10	15	0	5
Average of the 5 subplots	6				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay silt
Soil Colour	Orange brown	Site Drainage	Moderare - Some wet patches, mostly dry	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	Sheep
Fire damage			
Storm damage			
Weediness			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	23/11/2022	Dinewan	DEH_S_34	JRS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.5	2	
	Arctotheca calendula	E	0.1	5	
GG	Austrostipa aristiglumis	N	20	1000	
GG	Austrostipa bigeniculata	N	15	1000	
GG	Austrostipa nodosa	N	10	500	
GG	Austrostipa scabra	N	15	500	
	Avena spp.	E	0.2	20	
GG	Chloris truncata	N	4	200	
	Echium plantagineum	E	0.1	10	
GG	Enteropogon acicularis	N	0.1	7	
	Euphorbia prostrata	E	0.1	1	
	Hordeum spp.	E	0.1	2	
	Hypochaeris glabra	E	0.1	2	
SG	Maireana humillima	N	1	100	
FG	Maireana pentagona	N	0.1	50	
	Medicago polymorpha	E	1	40	
	Medicago truncatula	E	5	200	
FG	Oxalis perennans	N	4	200	
FG	Ptilotus nobilis	N	0.1	2	
FG	Ptilotus semilanatus	N	0.1	5	
FG	Rhodanthe corymbiflora	N	0.1	5	
GG	Rytidosperma duttonianum	N	2	50	
GG	Rytidosperma setaceum	N	0.1	5	
SG	Sclerolaena divaricata	N	0.1	2	
SG	Sclerolaena muricata	N	0.5	10	
FG	Sida corrugata	N	0.1	5	
FG	Solanum esuriale	N	0.1	2	
	Sonchus oleraceus	E	0.1	5	
GG	Sporobolus caroli	N	2	100	
FG	Vittadinia cuneata	N	0.1	10	
GG	Walwhalleya proluta	N	0.2	5	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	21/11/2022	Dinawan 26 intact		Sparse	NL JRS			
Zone 55	Datum GDA94	Plot ID	DEH_S_35	Plot dimensions	50x20	Orientation of middle	336	
Easting 382282	Northing 6119129	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: No	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	2
	Grasses etc.	9
	Forbs	10
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.3
	Shrubs	0.3
	Grasses etc.	64.9
	Forbs	1.8
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	75	10	0	0
Average of the 5 subplots	18				

Notes	NL; NL; NL; NL

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	21/11/2022	Dinawan 26 intact	DEH_S_35	NL JRS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia oswaldii	N	0.2	3	
TG	Acacia pendula	N	0.1	3	
FG	Asperula conferta	N	0.2	200	
GG	Austrostipa bigeniculata	N	60	2000	
GG	Austrostipa scabra subsp. falcata	N	0.5	30	
	Avena spp.	E	0.1	10	
GG	Carex inversa	N	0.1	10	
GG	Chloris truncata	N	0.4	200	
FG	Chrysocephalum apiculatum	N	0.1	10	
	Cirsium vulgare	E	0.1	10	
OG	Convolvulus angustissimus	N	0.1	1	
GG	Enteropogon acicularis	N	0.3	100	
FG	Erodium crinitum	N	0.1	10	
	Hordeum spp.	E	0.1	10	
	Hypochaeris glabra	E	0.1	1	
GG	Juncus subsecundus	N	0.1	10	
	Lactuca serriola	E	0.1	1	
	Lolium rigidum	E	0.1	10	
SG	Maireana humillima	N	0.1	20	
	Malva parviflora	E	0.1	10	
	Medicago polymorpha	E	2	200	
GG	Microlaena stipoides	N	0.2		
FG	Oxalis perennans	N	0.3	300	
	Plantago lanceolata	E	0.1	20	
FG	Ptilotus semilanatus	N	0.2	50	
FG	Rhodanthe corymbiflora	N	0.1	1	
FG	Rumex tenax	N	0.1	3	
GG	Rytidosperma setaceum	N	0.3	60	
SG	Sclerolaena diacantha	N	0.2	20	
FG	Sida corrugata	N	0.1	5	
FG	Solanum esuriale	N	0.3	10	
	Sonchus oleraceus	E	0.1	20	
	Taraxacum officinale	E	0.1	10	
FG	Vittadinia cuneata	N	0.3	40	
GG	Walwhalleya proluta	N	3	200	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	24/11/2022	Dinewan		DNG	JRS NL		
Zone 55	Datum GDA94	Plot ID	DEH_S_36	Plot dimensions	50x20	Orientation of middle	317
Easting 393049	Northing 6117172	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	4
	Grasses etc.	8
	Forbs	6
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.6
	Grasses etc.	47.2
	Forbs	2.5
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	20	0	10	5
Average of the 5 subplots	8				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Orange brown	Site Drainage	Moderate, mostly dry	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1		Cows in paddock
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	24/11/2022	Dinewan	DEH_S_36	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	0.1	2	
GG	Austrostipa aristiglumis	N	5	1000	
GG	Austrostipa bigeniculata	N	5	500	
GG	Austrostipa nodosa	N	30	5000	
GG	Chloris truncata	N	2	300	
OG	Convolvulus angustissimus	N	0.1	8	
	Echium plantagineum	E	0.1	2	
SG	Enchylaena tomentosa	N	0.1	1	
GG	Enteropogon acicularis	N	2	100	
	Euphorbia prostrata	E	0.1	3	
FG	Goodenia pusilliflora	N	0.1	2	
FG	Leucochrysum molle	N	2	300	
	Lolium rigidum	E	0.2	50	
SG	Maireana humillima	N	0.3	200	
	Medicago polymorpha	E	15	500	
FG	Oxalis perennans	N	0.1	20	
FG	Ptilotus semilanatus	N	0.1	10	
GG	Rytidosperma carphoides	N	0.1	100	
GG	Rytidosperma setaceum	N	3	400	
SG	Sclerolaena muricata	N	0.1	3	
FG	Sida corrugata	N	0.1	80	
	Sonchus oleraceus	E	0.1	10	
FG	Vittadinia gracilis	N	0.1	10	
GG	Walwhalleya proluta	N	0.1	5	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	24/11/2022	Dinewan		DNG	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_37	Plot dimensions	50x20	Orientation of middle	65	
Easting 390320	Northing 6117006	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	6
	Grasses etc.	9
	Forbs	7
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	0.8
	Grasses etc.	74.2
	Forbs	1.1
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	30	0	5	10	5
Average of the 5 subplots	10				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Orange brown	Site Drainage	moderate, area mostly dry	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	24/11/2022	Dinewan	DEH_S_37	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	1	
	Arctotheca calendula	E	0.1	5	
SG	Atriplex semibaccata	N	0.1	3	
GG	Austrostipa aristiglumis	N	10	1000	
GG	Austrostipa bigeniculata	N	10	300	
GG	Austrostipa nodosa	N	40	5000	
GG	Austrostipa scabra	N	5	200	
	Avena spp.	E	0.1	30	
GG	Bothriochloa macra	N	0.1	5	
GG	Chloris truncata	N	5	500	
FG	Chrysocephalum apiculatum	N	0.1	20	
OG	Convolvulus angustissimus	N	0.1	20	
	Echium plantagineum	E	0.1	5	
FG	Erodium crinitum	N	0.1	2	
	Euphorbia prostrata	E	0.1	3	
FG	Goodenia pusilliflora	N	0.1	4	
	Lolium rigidum	E	0.1	30	
SG	Maireana excavata	N	0.2	80	
SG	Maireana humillima	N	0.2	80	
	Medicago polymorpha	E	15	400	
	Medicago spp.	E	3	70	
FG	Oxalis perennans	N	0.2	50	
FG	Ptilotus semilanatus	N	0.1	10	
GG	Rytidosperma setaceum	N	3	200	
GG	Rytidosperma spp.	N	1	70	
SG	Sclerolaena bicornis	N	0.1	1	
SG	Sclerolaena diacantha	N	0.1	1	
SG	Sclerolaena muricata	N	0.1	1	
FG	Sida corrugata	N	0.1	50	
FG	Vittadinia cuneata	N	0.4	100	
GG	Walwhalleya proluta	N	0.1	1	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	24/11/2022	DEH_S_38		DNG	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_38	Plot dimensions	50x20	Orientation of middle	56	
Easting 390793	Northing 6117725	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	6
	Grasses etc.	7
	Forbs	8
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.6
	Grasses etc.	44.5
	Forbs	0.9
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	20	20	10	0
Average of the 5 subplots	11				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Orange	Site Drainage	Moderate	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	24/11/2022	DEH_S_38	DEH_S_38	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Arctotheca calendula	E	0.1	3	
SG	Atriplex leptocarpa	N	0.1	2	
SG	Atriplex semibaccata	N	0.1	6	
GG	Austrostipa aristiglumis	N	15	2000	
GG	Austrostipa bigeniculata	N	5	300	
GG	Austrostipa nodosa	N	15	700	
GG	Chloris truncata	N	3	200	
FG	Chrysocephalum apiculatum	N	0.1	10	
	Echium plantagineum	E	0.1	2	
SG	Enchylaena tomentosa	N	0.1	5	
GG	Enteropogon acicularis	N	0.5	90	
FG	Goodenia pusilliflora	N	0.1	20	
FG	Leucochrysum molle	N	0.1	8	
	Lolium rigidum	E	0.1	50	
SG	Maireana excavata	N	0.1	20	
SG	Maireana humillima	N	0.1	40	
	Medicago polymorpha	E	10	500	
	Medicago spp.	E	3	100	
FG	Oxalis perennans	N	0.1	1	
FG	Ptilotus semilanatus	N	0.1	10	
FG	Rhodanthe corymbiflora	N	0.1	1	
GG	Rytidosperma caespitosum	N	3	200	
GG	Rytidosperma setaceum	N	3	200	
SG	Sclerolaena bicornis	N	0.1	1	
FG	Sida corrugata	N	0.1	20	
	Sonchus oleraceus	E	0.1	2	
FG	Vittadinia cuneata	N	0.2	30	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	13/02/2023	Dinawan		DNG	MGP KK		
Zone 55	Datum GDA94	Plot ID	DEH_S_39	Plot dimensions	50x20	Orientation of middle	270
Easting 392036	Northing 6118295	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: Yes	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	7
	Grasses etc.	7
	Forbs	6
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	12.6
	Grasses etc.	34.3
	Forbs	1.7
	Ferns	0
	Other	0.1
High Threat Weed cover		0.2

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	17
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	30	40	55	65	25
Average of the 5 subplots	43				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0	Soil Surface Texture	Clay
Soil Colour	Red brown	Site Drainage	0	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	2	NR	
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	1	R	
Fire damage	0		
Storm damage	0		
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	13/02/2023	Dinawan	DEH_S_39	MGP KK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	2	
SG	Atriplex leptocarpa	N	0.2	20	
GG	Austrostipa bigeniculata	N	5		
GG	Austrostipa nodosa	N	15		
FG	Boerhavia dominii	N	0.1	3	
GG	Chloris truncata	N	10		
OG	Convolvulus spp.	N	0.1	20	
SG	Enchylaena tomentosa	N	0.1	10	
GG	Juncus spp.	N	0.2	10	
	Lolium rigidum	E	3		
SG	Maireana decalvans	N	0.1	10	
SG	Maireana excavata	N	0.1	10	
FG	Ptilotus semilanatus	N	0.1	5	
FG	Rhodanthe corymbiflora	N	0.1	10	
GG	Rytidosperma caespitosum	N	3		
GG	Rytidosperma duttonianum	N	0.1	10	
SG	Salsola tragus	N	0.1	1	
SG	Sclerolaena bicornis	N	7		
SG	Sclerolaena muricata	N	5		
FG	Sida corrugata	N	0.1	40	
FG	Solanum esuriale	N	1		
FG	Vittadinia cuneata	N	0.3	10	
GG	Walwhalleya proluta	N	1		
	Xanthium spinosum	HTE	0.2	5	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	23/11/2022	Dinewan		Moderate	NL JHS		
Zone 55	Datum GDA94	Plot ID	DEH_S_4	Plot dimensions	50x20	Orientation of middle	239
Easting 387110	Northing 6116710	IBRA region	Riverina	Photo #			
Plant Community Type		15				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	6
	Grasses etc.	5
	Forbs	6
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	25
	Shrubs	0.9
	Grasses etc.	0.6
	Forbs	0.7
	Ferns	0
	Other	0
High Threat Weed cover		0.6

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	7
50 - 79 cm	0
30 - 49 cm	1
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	18
No. trees with hollows	8

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	70	50	75	20	40
Average of the 5 subplots	51				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Loam
Soil Colour	Brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	23/11/2022	Dinewan	DEH_S_4	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex leptocarpa	N	0.2	50	
SG	Atriplex nummularia	N	0.1	10	
SG	Atriplex semibaccata	N	0.1	10	
GG	Austrostipa bigeniculata	N	0.1	5	
GG	Austrostipa scabra subsp. falcata	N	0.1	5	
	Avena spp.	E	0.1	40	
FG	Boerhavia dominii	N	0.1	5	
	Chenopodium murale	E	0.3	20	
	Cirsium vulgare	E	0.1	10	
	Echium plantagineum	E	0.1	20	
FG	Einadia hastata	N	0.1	5	
FG	Einadia trigonos	N	0.2	30	
TG	Eucalyptus largiflorens	N	25	6	
	Hordeum spp.	E	30	2000	
	Hypochaeris glabra	E	0.1	5	
	Lactuca serriola	E	0.1	10	
	Lolium rigidum	E	5	500	
	Lycium ferocissimum	HTE	0.5	5	
SG	Maireana humillima	N	0.1	10	
	Malva parviflora	E	1	300	
	Marrubium vulgare	E	0.5	200	
	Medicago polymorpha	E	0.5	30	
FG	Oxalis perennans	N	0.1	10	
GG	Rytidosperma duttonianum	N	0.2	10	
GG	Rytidosperma setaceum	N	0.1	10	
SG	Sclerolaena diacantha	N	0.1	8	
SG	Sclerolaena muricata	N	0.3	70	
FG	Sida corrugata	N	0.1	5	
	Sisymbrium irio	E	2	300	
FG	Solanum esuriale	N	0.1	2	
	Solanum nigrum	E	0.1	4	
	Sonchus oleraceus	E	0.1	20	
	Taraxacum officinale	E	0.1	2	
GG	Walwhalleya proluta	N	0.1	2	
	Xanthium spinosum	HTE	0.1	5	

BAM Plot Data Sheet							
		Survey Name		Veg Zone ID	Recorders		
Date	03/02/2023	DEH_S_40		DNG	JRS STC		
Zone 55	Datum GDA94	Plot ID	DEH_S_40	Plot dimensions	50x20	Orientation of middle	248
Easting 391378	Northing 6117880	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	9
	Grasses etc.	7
	Forbs	7
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	3.2
	Grasses etc.	62.3
	Forbs	0.7
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	5	0	5	5
Average of the 5 subplots	5				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay sand
Soil Colour	Orange brown	Site Drainage	Moderate	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	Cows in paddock
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	03/02/2023	DEH_S_40	DEH_S_40	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	2	50	
GG	Austrostipa bigeniculata	N	30	500	
GG	Austrostipa scabra	N	5	200	
FG	Calotis scabiosifolia	N	0.1	1	
FG	Chrysocephalum apiculatum	N	0.1	2	
OG	Convolvulus angustissimus	N	0.1	5	
FG	Cotula australis	N	0.1	1	
SG	Enchylaena tomentosa	N	0.1	5	
GG	Enteropogon acicularis	N	20	500	
FG	Euphorbia drummondii	N	0.1	20	
	Lolium rigidum	E	5		
SG	Maireana aphylla	N	0.1	1	
SG	Maireana decalvans	N	0.1	1	
SG	Maireana excavata	N	0.1	2	
FG	Oxalis perennans	N	0.1	5	
GG	Rytidosperma caespitosum	N	5	300	
GG	Rytidosperma setaceum	N	0.1	20	
SG	Salsola tragus	N	0.1	3	
SG	Sclerolaena bicornis	N	0.1	2	
SG	Sclerolaena diacantha	N	0.5	50	
SG	Sclerolaena muricata	N	0.1	10	
FG	Sida corrugata	N	0.1	10	
GG	Sporobolus caroli	N	0.2	200	
FG	Vittadinia cuneata	N	0.1	6	
GG	Walwhalleya proluta	N	2	200	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	24/11/2022	Dinewan		DNG	NL JRS		
Zone 55	Datum GDA94	Plot ID	DEH_S_41	Plot dimensions	50x20	Orientation of middle	272
Easting 391714	Northing 6117031	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	6
	Grasses etc.	8
	Forbs	12
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.8
	Grasses etc.	37.1
	Forbs	1.6
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	10	15	10	10
Average of the 5 subplots	11				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Aeolian
Soil Colour	Red	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	24/11/2022	Dinewan	DEH_S_41	NL JRS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Arctotheca calendula	E	0.1	5	
SG	Atriplex semibaccata	N	0.2	50	
GG	Austrostipa aristiglumis	N	1		
GG	Austrostipa bigeniculata	N	20	500	
GG	Austrostipa nodosa	N	0.1	5	
GG	Austrostipa scabra	N	15	300	
GG	Chloris truncata	N	0.5	80	
OG	Convolvulus angustissimus	N	0.1	2	
	Cotula bipinnata	E	0.1	5	
SG	Dissocarpus biflorus var. biflorus	N	0.1	1	
	Echium plantagineum	E	0.1	5	
SG	Enchylaena tomentosa	N	0.1	5	
GG	Enteropogon acicularis	N	0.2	20	
FG	Erodium crinitum	N	0.1	1	
	Euphorbia prostrata	E	0.1	10	
FG	Goodenia fascicularis	N	0.1	10	
FG	Goodenia pusilliflora	N	0.1	20	
	Hordeum spp.	E	0.1	10	
	Lactuca serriola	E	0.1	10	
FG	Leucochrysum molle	N	0.5	60	
	Lolium rigidum	E	0.1	10	
SG	Maireana humillima	N	0.1	20	
FG	Maireana pentagona	N	0.1	10	
	Medicago polymorpha	E	5	1000	
FG	Oxalis perennans	N	0.1	1	
FG	Ptilotus nobilis	N	0.1	10	
FG	Ptilotus semilanatus	N	0.1	10	
FG	Rhodanthe corymbiflora	N	0.1	2	
GG	Rytidosperma caespitosum	N	0.1	5	
GG	Rytidosperma duttonianum	N	0.2	30	
SG	Sclerolaena bicornis	N	0.1	1	
SG	Sclerolaena muricata	N	0.2	20	
FG	Sida corrugata	N	0.1	20	
	Sonchus oleraceus	E	0.1	20	
FG	Swainsona procumbens	N	0.1	1	
	Trifolium repens	E	0.1	5	
FG	Vittadinia cuneata	N	0.1	20	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	02/02/2023	Dinewan		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_43	Plot dimensions	50x20	Orientation of middle	201	
Easting 384746	Northing 6118250	IBRA region	Riverina	Photo #				
Plant Community Type		45				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	5
	Grasses etc.	9
	Forbs	14
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	1.4
	Grasses etc.	90.2
	Forbs	1.4
	Ferns	0.1
	Other	0.1
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	5	15	5	20	30
Average of the 5 subplots	15				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Dark brown	Site Drainage	Moderate	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Dinewan	DEH_S_43	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.1	10	
GG	Austrostipa aristiglumis	N	20	1000	
GG	Austrostipa bigeniculata	N	10	200	
GG	Austrostipa scabra	N	5	200	
FG	Calotis cuneifolia	N	0.1	1	
GG	Chloris truncata	N	0.1	20	
FG	Chrysocephalum apiculatum	N	0.1	2	
FG	Chrysocephalum semipapposum	N	0.1	1	
OG	Convolvulus angustissimus	N	0.1	8	
FG	Cotula australis	N	0.1	1	
SG	Duma florulenta	N	0.1	2	
SG	Enchylaena tomentosa	N	0.1	10	
GG	Enteropogon acicularis	N	20	500	
FG	Euphorbia drummondii	N	0.1	5	
FG	Goodenia fascicularis	N	0.1	2	
	Heliotropium europaeum	E	0.1	5	
GG	Juncus subsecundus	N	0.1	2	
	Lolium perenne	E	0.1	20	
SG	Maireana aphylla	N	0.1	2	
FG	Maireana pentagona	N	0.1	2	
EG	Marsilea drummondii	N	0.1	4	
FG	Oxalis perennans	N	0.1	10	
FG	Ptilotus nobilis	N	0.1	2	
GG	Rytidosperma caespitosum	N	10	300	
GG	Rytidosperma setaceum	N	10	400	
SG	Sclerolaena birchii	N	0.1	1	
SG	Sclerolaena muricata	N	1	30	
FG	Sida corrugata	N	0.1	20	
FG	Solanum esuriale	N	0.1	3	
FG	Teucrium racemosum	N	0.1	2	
FG	Vittadinia cuneata	N	0.1	20	
GG	Walwhalleya proluta	N	15	400	
	Xanthium spinosum	HTE	0.1	1	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	22/11/2022	Dinawan		Mod_Good	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_44	Plot dimensions	50x20	Orientation of middle	120	
Easting 387465	Northing 6118622	IBRA region	Riverina	Photo #				
Plant Community Type		45				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	6
	Grasses etc.	13
	Forbs	11
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	0.6
	Grasses etc.	48.2
	Forbs	8
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	5	5	0	5
Average of the 5 subplots	3				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Fkat	Soil Surface Texture	Clay
Soil Colour	Light browm/orange	Site Drainage	Moderate - mostly drt ground with few wet patches	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			

Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	22/11/2022	Dinawan	DEH_S_44	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Arctotheca calendula	E	0.2	50	
SG	Atriplex leptocarpa	N	0.1	5	
SG	Atriplex semibaccata	N	0.1	5	
GG	Austrostipa aristiglumis	N	10	1000	
GG	Austrostipa bigeniculata	N	20	2000	
GG	Austrostipa nodosa	N	4	300	
GG	Austrostipa scabra	N	7	200	
	Avena spp.	E	0.5	40	
GG	Bothriochloa macra	N	2	50	
FG	Brachyscome lineariloba	N	0.3	60	
GG	Carpha nivicola	N	0.1	6	
GG	Chloris truncata	N	2	300	
FG	Chrysocephalum apiculatum	N	3	200	
	Echium plantagineum	E	0.1	1	
GG	Enteropogon acicularis	N	0.2	20	
FG	Erodium crinitum	N	0.1	10	
	Euphorbia prostrata	E	0.1	10	
FG	Goodenia pusilliflora	N	0.1	5	
	Hordeum spp.	E	0.3	40	
FG	Hypericum spp.	N	0.1	5	
GG	Isolepis cernua	N	0.1	2	
GG	Juncus subsecundus	N	0.1	5	
	Lolium rigidum	E	5	300	
SG	Maireana excavata	N	0.1	10	
SG	Maireana humillima	N	0.1	20	
	Medicago polymorpha	E	3	50	
	Medicago truncatula	E	4	200	
FG	Oxalis perennans	N	2	200	
	Oxalis pes-caprae	E	0.1	10	
FG	Ptilotus semilanatus	N	0.1	20	
FG	Rhodanthe corymbiflora	N	0.1	6	
GG	Rytidosperma caespitosum	N	0.2	50	
GG	Rytidosperma setaceum	N	0.5	100	
SG	Sclerolaena divaricata	N	0.1	10	
SG	Sclerolaena muricata	N	0.1	5	
FG	Sida corrugata	N	2	200	
FG	Solanum esuriale	N	0.1	10	
	Sonchus oleraceus	E	0.1	3	
FG	Vittadinia cuneata	N	0.1	20	
GG	Walwhalleya proluta	N	2	50	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	03/02/2023	Dinewan		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_45	Plot dimensions	50x20	Orientation of middle	300	
Easting 390631	Northing 6118910	IBRA region	Riverina	Photo #				
Plant Community Type		45				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	3
	Grasses etc.	12
	Forbs	5
	Ferns	2
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	0.8
	Grasses etc.	67.9
	Forbs	0.5
	Ferns	3.3
	Other	0
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	0	5	10
Average of the 5 subplots	3				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	Low	Distance to nearest water	50m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	2	R	
Fire damage			
Storm damage			
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	03/02/2023	Dinewan	DEH_S_45	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	6	
GG	Austrostipa aristiglumis	N	5		
GG	Chloris truncata	N	0.1	20	
SG	Duma florulenta	N	0.2	5	
FG	Eclipta platyglossa	N	0.1	1	
GG	Eleocharis acuta	N	5	500	
GG	Eleocharis pallens	N	0.3	30	
SG	Enchylaena tomentosa	N	0.1	10	
GG	Enteropogon acicularis	N	20	1000	
GG	Eriochloa pseudoacrotricha	N	0.1	10	
GG	Juncus flavidus	N	0.1	1	
GG	Juncus subsecundus	N	0.1	10	
EG	Marsilea costulifera	N	0.3	40	
EG	Marsilea drummondii	N	3	300	
FG	Oxalis perennans	N	0.1	6	
	Romulea rosea var. australis	HTE	0.1	10	
FG	Rumex tenax	N	0.1	5	
GG	Rytidosperma caespitosum	N	2	200	
GG	Rytidosperma setaceum	N	0.1	5	
SG	Sclerolaena muricata	N	0.5	20	
FG	Sida corrugata	N	0.1	10	
FG	Solanum esuriale	N	0.1	10	
GG	Sporobolus caroli	N	0.1	5	
GG	Walwhalleya proluta	N	35	2000	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	24/11/2022	Dinewan		Mod_Good	NL JHS			
Zone 55	Datum GDA94	Plot ID	DEH_S_46	Plot dimensions	50x20	Orientation of middle	4	
Easting 393953	Northing 6117880	IBRA region	Riverina	Photo #				
Plant Community Type		45				EEC: No	Confidence L	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	5
	Grasses etc.	9
	Forbs	6
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	0.7
	Grasses etc.	39.3
	Forbs	0.6
	Ferns	0.3
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	1
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	0	0	0
Average of the 5 subplots	0				

Notes	Actually Lignum/Eleochaeris ephemeral wetland

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	24/11/2022	Dinewan	DEH_S_46	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	1	
FG	Alternanthera denticulata	N	0.1	10	
SG	Atriplex semibaccata	N	0.1	10	
GG	Austrostipa aristiglumis	N	5		
	Avena spp.	E	0.1	10	
FG	Calotis scabiosifolia	N	0.1	1	
GG	Chloris truncata	N	0.2	10	
OG	Convolvulus angustissimus	N	0.1	10	
SG	Duma florulenta	N	0.2	10	
	Echium plantagineum	E	0.1	2	
GG	Eleocharis acuta	N	0.6	600	
GG	Eleocharis pallens	N	0.1	20	
SG	Enchylaena tomentosa	N	0.1	10	
GG	Enteropogon acicularis	N	1	100	
FG	Goodenia pusilliflora	N	0.1	10	
	Lactuca serriola	E	0.1	1	
	Lolium rigidum	E	0.2	20	
SG	Maireana humillima	N	0.1	1	
EG	Marsilea drummondii	N	0.3	100	
FG	Oxalis perennans	N	0.1	10	
	Plantago lanceolata	E	0.1	5	
GG	Rytidosperma duttonianum	N	2	300	
GG	Rytidosperma setaceum	N	0.2	20	
SG	Sclerolaena muricata	N	0.2	50	
FG	Sida corrugata	N	0.1	1	
	Sonchus oleraceus	E	0.1	10	
GG	Sporobolus caroli	N	0.2	80	
FG	Swainsona procumbens	N	0.1	10	
GG	Walwhalleya proluta	N	30	2000	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	24/11/2022	DEH_S_47		Mod_Good	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_47	Plot dimensions	50x20	Orientation of middle	43	
Easting 393847	Northing 6117482	IBRA region	Riverina	Photo #				
Plant Community Type		45				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	6
	Grasses etc.	11
	Forbs	3
	Ferns	1
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	3.6
	Grasses etc.	62.3
	Forbs	2.2
	Ferns	0.1
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	0	0	0
Average of the 5 subplots	0				

Notes	Site 10-30cm underwater

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Light brown to orange/yellow	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other	2		Flooding

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	24/11/2022	DEH_S_47	DEH_S_47	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	0.1	4	
GG	Austrostipa aristiglumis	N	5		
GG	Carex inversa	N	0.2	40	
SG	Chenopodium nitrariaceum	N	0.1	1	
GG	Chloris truncata	N	0.1	10	
OG	Convolvulus angustissimus	N	0.1	2	
SG	Duma florulenta	N	3	5	
	Echium plantagineum	E	0.1	10	
FG	Eclipta platyglossa	N	2	50	
GG	Eleocharis acuta	N	4	200	
GG	Eleocharis pallens	N	2	200	
SG	Enchylaena tomentosa	N	0.1	2	
GG	Enteropogon acicularis	N	3	300	
	Hypochaeris glabra	E	0.1	20	
GG	Juncus spp.	N	1	60	
	Lolium rigidum	E	4	300	
EG	Marsilea drummondii	N	0.1	40	
	Medicago polymorpha	E	0.1	40	
FG	Oxalis perennans	N	0.1	60	
FG	Rumex tenax	N	0.1	40	
GG	Rytidosperma duttonianum	N	5	1000	
GG	Rytidosperma setaceum	N	5	500	
SG	Sclerolaena divaricata	N	0.2	20	
SG	Sclerolaena muricata	N	0.1	10	
GG	Sporobolus caroli	N	2	200	
GG	Walwhalleya proluta	N	35	3000	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	14/02/2023	Dinewan		Moderate	MGP KK		
Zone 55	Datum GDA94	Plot ID	DEH_S_48	Plot dimensions	50x20	Orientation of middle	174
Easting 384344	Northing 6118789	IBRA region	Riverina	Photo #			
Plant Community Type		17				EEC: Yes	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	7
	Forbs	5
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	4
	Grasses etc.	21.5
	Forbs	0.5
	Ferns	0.1
	Other	0
High Threat Weed cover		5

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	55	50	25	60	60
Average of the 5 subplots	50				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	3	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	3	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	2	O	
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	1	R	
Fire damage	0		
Storm damage	0		
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	14/02/2023	Dinewan	DEH_S_48	MGP KK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.1	10	
GG	Austrostipa aristiglumis	N	5		
FG	Calotis scabiosifolia	N	0.1	6	
FG	Centipeda cunninghamii	N	0.1	20	
GG	Chloris truncata	N	0.2	20	
SG	Duma florulenta	N	3		
GG	Eleocharis pallens	N	10		
GG	Enteropogon acicularis	N	1		
FG	Euphorbia drummondii	N	0.1	5	
	Heliotropium europaeum	E	0.1	50	
EG	Marsilea drummondii	N	0.1	200	
	Onopordum acanthium subsp.	E	0.1	1	
FG	Oxalis perennans	N	0.1	20	
GG	Rytidosperma spp.	N	0.1	10	
SG	Sclerolaena muricata var.	N	1		
GG	Sporobolus caroli	N	0.2	20	
GG	Walwhalleya proluta	N	5		
	Xanthium spinosum	HTE	5		

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	14/02/2023	Dinewan		Moderate	MGP KK		
Zone 55	Datum GDA94	Plot ID	DEH_S_49	Plot dimensions	50x20	Orientation of middle	115
Easting 387063	Northing 6117712	IBRA region	Riverina	Photo #			
Plant Community Type		46				EEC: Yes	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	1
	Grasses etc.	10
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	2
	Grasses etc.	51.7
	Forbs	0.3
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	60	45	70	35	20
Average of the 5 subplots	46				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	0	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	2	NR	
Cultivation (inc. pasture)	0		
Soil erosion	0		
Firewood/CWD removal	0		
Grazing (identify native/livestock	1	R	
Fire damage	0		
Storm damage	0		
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	14/02/2023	Dinewan	DEH_S_49	MGP KK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
GG	Austrostipa aristiglumis	N	1		
GG	Austrostipa bigeniculata	N	0.3	20	
GG	Austrostipa nodosa	N	0.1	5	
FG	Centipeda cunninghamii	N	0.1	1	
GG	Chloris truncata	N	5		
GG	Eleocharis pallens	N	5		
GG	Enteropogon acicularis	N	15		
GG	Juncus spp.	N	0.2	30	
	Lolium rigidum	E	5		
FG	Rhodanthe corymbiflora	N	0.1	1	
GG	Rytidosperma caespitosum	N	0.1	20	
GG	Rytidosperma duttonianum	N	5		
SG	Sclerolaena muricata	N	2		
FG	Solanum esuriale	N	0.1	1	
GG	Walwhalleya proluta	N	20		

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	02/02/2023	Dinewan		Mod_Good	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_5	Plot dimensions	50x20	Orientation of middle	40	
Easting 385738	Northing 6118507	IBRA region	Riverina	Photo #				
Plant Community Type		15				EEC: None	Confidence M	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	5
	Grasses etc.	3
	Forbs	5
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	10
	Shrubs	70.4
	Grasses etc.	0.8
	Forbs	3.4
	Ferns	0
	Other	0
High Threat Weed cover		1.5

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	2
50 - 79 cm	1
30 - 49 cm	1
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	5
No. trees with hollows	3

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	20	10	0	2
Average of the 5 subplots	8.4				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0-5	Soil Surface Texture	Clay silt
Soil Colour	Grey brown	Site Drainage	Low	Distance to nearest water	200m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	2	NR	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	1	NR	
Fire damage			
Storm damage			
Weediness	2	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Dinewan	DEH_S_5	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex nummularia	N	0.1	10	
SG	Atriplex semibaccata	N	0.1	1	
	Avena barbata	E	0.1	5	
	Chenopodium murale	E	0.3	20	
	Cirsium vulgare	E	0.1	5	
	Citrullus amarus	E	0.5	20	
FG	Dysphania cristata	N	3	200	
FG	Einadia nutans	N	0.1	10	
SG	Enchylaena tomentosa	N	0.1	3	
GG	Enteropogon acicularis	N	0.2	10	
FG	Erodium crinitum	N	0.1	1	
TG	Eucalyptus largiflorens	N	10	2	
	Heliotropium europaeum	E	0.1	10	
	Lactuca serriola	E	0.1	10	
	Lycium ferocissimum	HTE	1	60	
SG	Maireana excavata	N	0.1	10	
	Modiola caroliniana	E	0.1	3	
GG	Rytidosperma caespitosum	N	0.1	1	
SG	Sclerolaena muricata	N	70	1000	
FG	Sida corrugata	N	0.1	10	
	Sisymbrium erysimoides	E	0.2	20	
FG	Solanum esuriale	N	0.1	1	
	Solanum nigrum	E	0.1	2	
	Sonchus oleraceus	E	0.1	3	
GG	Walwhalleya proluta	N	0.5	20	
	Xanthium spinosum	HTE	0.5	80	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	22/11/2022	Dinewan		Intact	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_50	Plot dimensions	50x20	Orientation of middle	87	
Easting 385815	Northing 6116824	IBRA region	Riverina	Photo #				
Plant Community Type		26				EEC: None	Confidence M	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	3
	Grasses etc.	11
	Forbs	7
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	3
	Shrubs	0.3
	Grasses etc.	34.2
	Forbs	0.7
	Ferns	1
	Other	0
High Threat Weed cover		0.2

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	1
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	0	0	0	0
Average of the 5 subplots	0				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Light brown	Site Drainage	Poor, site inundated	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)	1	NR	Lolium
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	22/11/2022	Dinewan	DEH_S_50	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	3	3	
FG	Alternanthera denticulata	N	0.1	2	
SG	Atriplex leptocarpa	N	0.1	2	
GG	Austrostipa aristiglumis	N	4	100	
GG	Austrostipa bigeniculata	N	0.5	50	
	Avena spp.	E	2	50	
GG	Bothriochloa macra	N	5	200	
	Echium plantagineum	E	0.1	10	
GG	Eleocharis acuta	N	2	400	
GG	Enteropogon acicularis	N	1	100	
FG	Goodenia pusilliflora	N	0.1	5	
GG	Isolepis cernua	N	0.1	2	
GG	Juncus subsecundus	N	0.3	50	
	Lolium rigidum	E	10	1000	
EG	Marsilea drummondii	N	1	100	
FG	Oxalis perennans	N	0.1	10	
FG	Rumex tenax	N	0.1	20	
GG	Rytidosperma caespitosum	N	1	50	
GG	Rytidosperma duttonianum	N	5	200	
SG	Sclerolaena divaricata	N	0.1	3	
SG	Sclerolaena muricata	N	0.1	2	
FG	Sida corrugata	N	0.1	20	
FG	Solanum esuriale	N	0.1	10	
	Sonchus oleraceus	E	0.1	10	
GG	Sporobolus caroli	N	0.3	100	
FG	Vittadinia cuneata	N	0.1	2	
GG	Walwhalleya proluta	N	15	2000	
	Xanthium spinosum	HTE	0.2	5	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	22/11/2022	Dinewan		Intact	NL JHS		
Zone 55	Datum GDA94	Plot ID	DEH_S_51	Plot dimensions	50x20	Orientation of middle	270
Easting 386054	Northing 6116832	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	2
	Grasses etc.	8
	Forbs	8
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	1
	Shrubs	0.2
	Grasses etc.	41.9
	Forbs	0.9
	Ferns	1
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	1
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	1
5 - 9 cm	1
< 5 cm	1
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	5	0	0	0
Average of the 5 subplots	3				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	22/11/2022	Dinewan	DEH_S_51	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	1	1	
FG	Alternanthera denticulata	N	0.1	20	
FG	Asperula conferta	N	0.2	30	
SG	Atriplex semibaccata	N	0.1	3	
GG	Austrostipa aristiglumis	N	0.5	40	
	Avena fatua	E	0.2	40	
FG	Centipeda cunninghamii	N	0.1	30	
	Echium plantagineum	E	0.1	10	
GG	Eleocharis acuta	N	25	900	
GG	Eleocharis pallens	N	5	300	
GG	Enteropogon ramosus	N	0.1	5	
FG	Goodenia pusilliflora	N	0.1	50	
GG	Isolepis cernua	N	0.2	100	
GG	Juncus subsecundus	N	0.1	10	
	Lolium rigidum	E	1	200	
EG	Marsilea drummondii	N	1	700	
FG	Mimulus gracilis	N	0.1	5	
FG	Oxalis perennans	N	0.1	20	
FG	Rumex tenax	N	0.1	5	
GG	Rytidosperma duttonianum	N	1	500	
SG	Sclerolaena muricata	N	0.1	20	
	Sonchus oleraceus	E	0.1	7	
FG	Swainsona procumbens	N	0.1	5	
GG	Walwhalleya proluta	N	10	600	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	02/02/2023	Solar Farm		Moderate	JRS STC			
Zone 55	Datum GDA94	Plot ID	DEH_S_52	Plot dimensions	50x20	Orientation of middle	80	
Easting 382090	Northing 6116926	IBRA region	Riverina	Photo #				
Plant Community Type		17				EEC: None	Confidence M	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	3
	Grasses etc.	10
	Forbs	7
	Ferns	2
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	1.4
	Grasses etc.	50.4
	Forbs	3.7
	Ferns	3.5
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	3
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	0	5	15	5	10
Average of the 5 subplots	7				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0	Soil Surface Texture	Clay
Soil Colour	Grey light brown	Site Drainage	Low	Distance to nearest water	0m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	3	R	Sheep grazing - fresh scat
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	02/02/2023	Solar Farm	DEH_S_52	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	0.1	2	
GG	Austrostipa bigeniculata	N	0.2	10	
GG	Austrostipa scabra	N	0.1	2	
GG	Cynodon dactylon	N	0.5	10	
SG	Duma florulenta	N	1	5	
FG	Eclipta platyglossa	N	0.1	2	
GG	Eleocharis acuta	N	20	2000	
GG	Eleocharis pallens	N	0.5	200	
GG	Enteropogon acicularis	N	25	2000	
FG	Euphorbia drummondii	N	0.1	10	
GG	Juncus subsecundus	N	0.1	2	
EG	Marsilea costulifera	N	0.5	10	
EG	Marsilea drummondii	N	3	300	
FG	Oxalis perennans	N	0.1	2	
FG	Persicaria prostrata	N	3	200	
FG	Rumex tenax	N	0.2	10	
GG	Rytidosperma duttonianum	N	0.5	20	
SG	Sclerolaena muricata	N	0.3	10	
FG	Sida corrugata	N	0.1	2	
FG	Solanum esuriale	N	0.1	2	
GG	Sporobolus caroli	N	0.5	30	
GG	Walwhalleya proluta	N	3	300	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	13/02/2023	Dinnewan		Moderate	MGP KK		
Zone 55	Datum GDA94	Plot ID	DEH_S_53	Plot dimensions	4x202	Orientation of middle	273
Easting 391663	Northing 6117979	IBRA region	Riverina	Photo #			
Plant Community Type		46				EEC: Yes	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	6
	Grasses etc.	8
	Forbs	6
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0.1
	Shrubs	1.5
	Grasses etc.	33.8
	Forbs	0.6
	Ferns	0.6
	Other	0
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	40	60	65	55	45
Average of the 5 subplots	53				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	1	Soil Surface Texture	Clay
Soil Colour	Grey	Site Drainage	1	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	2	NR	
Cultivation (inc. pasture)	0		
Soil erosion	1	R	
Firewood/CWD removal	0		
Grazing (identify native/livestock	1	R	
Fire damage	0		
Storm damage	0		
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	13/02/2023	Dinnewan	DEH_S_53	MGP KK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.1	2	
SG	Atriplex leptocarpa	N	0.1	10	
GG	Austrostipa aristiglumis	N	20		
FG	Centipeda cunninghamii	N	0.1	20	
GG	Chloris truncata	N	1		
GG	Eleocharis pallens	N	0.4	50	
GG	Enteropogon acicularis	N	0.2	20	
FG	Goodenia spp.	N	0.1	10	
	Lolium rigidum	E	2		
SG	Maireana decalvans	N	0.1	10	
SG	Maireana excavata	N	0.1	10	
EG	Marsilea drummondii	N	0.6	200	
FG	Oxalis perennans	N	0.1	5	
FG	Rhodanthe corymbiflora	N	0.1	5	
GG	Rytidosperma caespitosum	N	5		
GG	Rytidosperma duttonianum	N	5		
SG	Sclerolaena brachyptera	N	0.1	5	
SG	Sclerolaena eriacantha	N	0.1	20	
SG	Sclerolaena muricata	N	1		
FG	Sida corrugata	N	0.1	20	
FG	Solanum esuriale	N	0.1	10	
GG	Sporobolus caroli	N	0.2	30	
GG	Walwhalleya proluta	N	2		

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	23/11/2022	Dinewan		Mod_Good	NL JHS			
Zone 55	Datum GDA94	Plot ID	DEH_S_555	Plot dimensions	50x20	Orientation of middle	235	
Easting 394698	Northing 6117449	IBRA region	Riverina	Photo #				
Plant Community Type		15				EEC: No	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	4
	Grasses etc.	5
	Forbs	7
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	35.2
	Shrubs	4.1
	Grasses etc.	1
	Forbs	1
	Ferns	0
	Other	0
High Threat Weed cover		0.5

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	6
50 - 79 cm	0
30 - 49 cm	1
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	11
No. trees with hollows	6

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	65	65	20	40	15
Average of the 5 subplots	41				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Slight depression	Soil Surface Texture	Loam
Soil Colour	Dark brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	23/11/2022	Dinewan	DEH_S_555	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia oswaldii	N	0.2	3	
	Arctotheca calendula	E	0.1	10	
SG	Atriplex semibaccata	N	1	70	
GG	Austrostipa bigeniculata	N	0.1	10	
GG	Austrostipa nodosa	N	0.1	3	
GG	Austrostipa scabra	N	0.2	50	
	Bromus hordeaceus	E	0.2	10	
SG	Chenopodium nitrariaceum	N	0.1	10	
	Echium plantagineum	E	0.1	10	
	Ehrharta longiflora	E	0.1	10	
FG	Einadia nutans	N	0.2	20	
GG	Enteropogon ramosus	N	0.1	10	
FG	Erodium crinitum	N	0.2	40	
TG	Eucalyptus largiflorens	N	35	10	
	Hordeum spp.	E	15	1000	
	Hypochaeris glabra	E	0.1	3	
	Lactuca serriola	E	0.1	5	
	Lolium rigidum	E	10	600	
	Lycium ferocissimum	HTE	0.2	3	
FG	Lythrum hyssopifolia	N	0.1	3	
	Malva parviflora	E	0.2	40	
	Medicago polymorpha	E	0.4	400	
	Olea europaea	HTE	0.2	1	
FG	Oxalis perennans	N	0.2	100	
	Oxalis pes-caprae	E	0.1	10	
FG	Persicaria prostrata	N	0.1	10	
	Polygonum aviculare	E	0.1	10	
GG	Rytidosperma setaceum	N	0.5	40	
SG	Sclerolaena diacantha	N	1	40	
SG	Sclerolaena muricata	N	2	200	
FG	Sida corrugata	N	0.1	2	
	Sisymbrium orientale	E	0.4	200	
	Solanum nigrum	E	0.1	2	
	Sonchus oleraceus	E	0.1	20	
FG	Urtica incisa	N	0.1	10	
	Xanthium spinosum	HTE	0.1	10	

BAM Plot Data Sheet							
		Survey Name		Veg Zone ID	Site Sheet no:1 of 2 Recorders		
Date	03/02/2023	Solar Farm		Moderate	JRS STC		
Zone 55	Datum GDA94	Plot ID	DEH_S_6	Plot dimensions	50x20	Orientation of middle	250
Easting 391302	Northing 6117926	IBRA region	Riverina	Photo #			
Plant Community Type		13				EEC: None	Confidence M

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	5
	Grasses etc.	6
	Forbs	6
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	4
	Shrubs	36.2
	Grasses etc.	3.4
	Forbs	1.3
	Ferns	0
	Other	0
High Threat Weed cover		0.5

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	3
50 - 79 cm	2
30 - 49 cm	1
20 - 29cm	1
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	28
No. trees with hollows	6

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	50	55	20	0	0
Average of the 5 subplots	25				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	0-5	Soil Surface Texture	Sandy
Soil Colour	Dark brown	Site Drainage	Moderate	Distance to nearest water	500m

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	2	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	3	R	Cattle observed resting, scat everywhere
Fire damage			
Storm damage			
Weediness	2	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	03/02/2023	Solar Farm	DEH_S_6	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	0.5	50	
GG	Austrostipa bigeniculata	N	0.1	2	
GG	Austrostipa scabra	N	0.2	10	
FG	Boerhavia dominii	N	0.2	20	
	Chenopodium murale	E	0.3	30	
	Cirsium vulgare	E	0.1	1	
FG	Dysphania cristata	N	0.3	40	
	Echium plantagineum	E	0.1	5	
FG	Einadia nutans	N	0.1	10	
SG	Enchylaena tomentosa	N	0.1	1	
GG	Enteropogon acicularis	N	2	200	
TG	Eucalyptus largiflorens	N	4	2	
	Heliotropium europaeum	E	0.4	60	
	Hordeum spp.	E	0.5	50	
	Lactuca serriola	E	0.1	2	
	Lepidium africanum	E	0.1	10	
	Lolium rigidum	E	0.5	50	
	Lycium ferocissimum	HTE	0.3	10	
SG	Maireana excavata	N	0.1	2	
	Modiola caroliniana	E	0.1	2	
FG	Oxalis perennans	N	0.1	1	
	Polygonum aviculare	E	0.1	4	
GG	Rytidosperma caespitosum	N	0.5	20	
SG	Sclerolaena bicornis	N	0.5	30	
SG	Sclerolaena muricata	N	35	800	
FG	Sida corrugata	N	0.1	2	
	Sisymbrium erysimoides	E	0.1	10	
FG	Solanum esuriale	N	0.5	70	
	Solanum nigrum	E	0.1	4	
GG	Sporobolus caroli	N	0.1	5	
GG	Walwhalleya proluta	N	0.5	40	
	Xanthium spinosum	HTE	0.2	20	

BAM Plot Data Sheet								Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders			
Date	25/11/2022	DEH_S_7		Moderate	JRS NL			
Zone 55	Datum GDA94	Plot ID	DEH_S_7	Plot dimensions	50x20	Orientation of middle	70	
Easting 391374	Northing 6118063	IBRA region	Riverina	Photo #				
Plant Community Type		13				EEC: None	Confidence H	

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	7
	Grasses etc.	3
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	3
	Shrubs	8.9
	Grasses etc.	0.3
	Forbs	0.5
	Ferns	0
	Other	0
High Threat Weed cover		0.3

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	2
50 - 79 cm	0
30 - 49 cm	1
20 - 29cm	1
10 - 19 cm	1
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	6
No. trees with hollows	3

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	10	50	20	30	40
Average of the 5 subplots	30				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay
Soil Colour	Brown	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	25/11/2022	DEH_S_7	DEH_S_7	JRS NL

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
	Arctotheca calendula	E	0.1	1	
SG	Atriplex semibaccata	N	0.3	6	
GG	Austrostipa aristiglumis	N	0.1	2	
FG	Boerhavia dominii	N	0.1	1	
SG	Duma florulenta	N	1		
FG	Einadia nutans	N	0.3	5	
SG	Enchylaena tomentosa	N	0.1	4	
GG	Enteropogon acicularis	N	0.1	3	
TG	Eucalyptus largiflorens	N	3	3	
	Hordeum spp.	E	20	2000	
	Lactuca serriola	E	0.1	2	
	Lolium rigidum	E	50	5000	
	Lycium ferocissimum	HTE	0.3	3	
	Medicago polymorpha	E	0.5	10	
	Modiola caroliniana	E	3	30	
FG	Oxalis perennans	N	0.1	3	
SG	Rhagodia spinescens	N	0.1	1	
	Rumex crispus	E	0.1	1	
GG	Rytidosperma duttonianum	N	0.1	20	
SG	Sclerolaena bicornis	N	0.3	1	
SG	Sclerolaena diacantha	N	0.1	2	
SG	Sclerolaena muricata	N	7	20	
	Sisymbrium orientale	E	2	30	
	Sonchus oleraceus	E	0.1	1	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	25/11/2022	Dinewan		Moderate	NL JHS		
Zone 55	Datum GDA94	Plot ID	DEH_S_8	Plot dimensions	50x20	Orientation of middle	63
Easting 391170	Northing 6117956	IBRA region	Riverina	Photo #			
Plant Community Type		13				EEC: No	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	6
	Grasses etc.	2
	Forbs	4
	Ferns	0
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	15
	Shrubs	3.9
	Grasses etc.	0.2
	Forbs	0.5
	Ferns	0
	Other	0
High Threat Weed cover		0.4

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	4
50 - 79 cm	0
30 - 49 cm	1
20 - 29cm	1
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	29
No. trees with hollows	7

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	35	30	10	40	30
Average of the 5 subplots	29				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Loam
Soil Colour	Brown	Site Drainage	Flat	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock			
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	25/11/2022	Dinewan	DEH_S_8	NL JHS

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
SG	Atriplex semibaccata	N	0.5	100	
GG	Austrostipa bigeniculata	N	0.1	5	
FG	Boerhavia dominii	N	0.2	50	
	Echium plantagineum	E	0.1	10	
SG	Enchylaena tomentosa	N	0.1	3	
TG	Eucalyptus largiflorens	N	15	8	
	Hordeum spp.	E	15	800	
	Lactuca serriola	E	0.1	5	
	Lolium rigidum	E	5	500	
	Lycium ferocissimum	HTE	0.3	10	
SG	Maireana humillima	N	0.1	2	
	Malva parviflora	E	0.2	60	
	Medicago polymorpha	E	0.3	300	
FG	Oxalis perennans	N	0.1	10	
	Polygonum aviculare	E	0.1	20	
GG	Rytidosperma duttonianum	N	0.1	5	
SG	Sclerolaena bicornis	N	0.1	1	
SG	Sclerolaena diacantha	N	0.1	5	
SG	Sclerolaena muricata	N	3	300	
	Sisymbrium orientale	E	0.2	60	
FG	Solanum esuriale	N	0.1	5	
	Sonchus oleraceus	E	0.1	5	
FG	Urtica incisa	N	0.1	10	
	Xanthium spinosum	HTE	0.1	20	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	30/01/2023	DEH_S_9		Moderate	JRS STC		
Zone 55	Datum GDA94	Plot ID	DEH_S_9	Plot dimensions	50x20	Orientation of middle	359
Easting 391003	Northing 6117443	IBRA region	Riverina	Photo #			
Plant Community Type		46				EEC: None	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	4
	Grasses etc.	7
	Forbs	7
	Ferns	1
	Other	0
Sum of Cover of native vascular plans by growth form group	Trees	0
	Shrubs	5.7
	Grasses etc.	46.3
	Forbs	0.7
	Ferns	1
	Other	0
High Threat Weed cover		0.1

BAM Attribute (1000m2 plot)	# Tree Stems Count
DBH	
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	0
Length of logs (m)	0
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	60	10	0	20	10
Average of the 5 subplots	20				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Flat	Soil Surface Texture	Clay silt
Soil Colour	Light brown	Site Drainage	Poor	Distance to nearest water	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/livestock	2	R	
Fire damage			
Storm damage			
Weediness			
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	30/01/2023	DEH_S_9	DEH_S_9	JRS STC

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
FG	Alternanthera denticulata	N	0.1	10	
FG	Calotis scabiosifolia var.	N	0.1	2	
GG	Chloris truncata	N	0.1	10	
SG	Duma florulenta	N	0.5	8	
FG	Eclipta platyglossa	N	0.1	2	
GG	Eleocharis pallens	N	1	500	
SG	Enchylaena tomentosa	N	0.1	1	
GG	Enteropogon acicularis	N	5		
FG	Euphorbia drummondii	N	0.1	5	
	Heliotropium europaeum	E	0.1	1	
GG	Juncus subsecundus	N	0.2	20	
EG	Marsilea drummondii	N	1	40	
FG	Oxalis perennans	N	0.1	5	
FG	Rumex tenax	N	0.1	1	
GG	Rytidosperma caespitosum	N	20	500	
GG	Rytidosperma duttonianum	N	5	200	
SG	Salsola tragus subsp. tragus	N	0.1	1	
SG	Sclerolaena muricata	N	5	50	
FG	Senecio glossanthus	N	0.1	1	
GG	Walwhalleya proluta	N	15	500	
	Xanthium spinosum	HTE	0.1	2	

BAM Plot Data Sheet							Site Sheet no:1 of 2
		Survey Name		Veg Zone ID	Recorders		
Date	17/02/2023	37263		Sparse	MGP KK		
Zone 55	Datum GDA94	Plot ID	DEH_W_820	Plot dimensions	50x20	Orientation of middle	260
Easting 381861	Northing 6117368	IBRA region	Riverina	Photo #			
Plant Community Type		26				EEC: Myall	Confidence H

BAM Attribute (400m2 plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	2
	Grasses etc.	7
	Forbs	4
	Ferns	0
	Other	1
Sum of Cover of native vascular plans by growth form group	Trees	0.5
	Shrubs	0.7
	Grasses etc.	10.3
	Forbs	0.4
	Ferns	0
	Other	0.1
High Threat Weed cover		0

BAM Attribute (1000m2 plot)	
DBH	# Tree Stems Count
80+ cm	0
50 - 79 cm	0
30 - 49 cm	0
20 - 29cm	0
10 - 19 cm	0
5 - 9 cm	0
< 5 cm	1
Length of logs (m)	3
No. trees with hollows	0

BAM Attibute (1 x 1m plots)	Litter cover (%)				
Subplot score (% in each)	2	5	2	5	5
Average of the 5 subplots	3.8				

Notes	

Physiography + site features that may help in determining PCT and Management Zone

Landform Pattern		Slope	Nil	Soil Surface Texture	Compacted red clay loam
Soil Colour	Red	Site Drainage	Nil	Distance to nearest water	Unk

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing inc. logging)	1	O	
Cultivation (inc. pasture)			
Soil erosion	1	R	
Firewood/CWD removal			
Grazing (identify native/livestock	1	R	
Fire damage			
Storm damage			
Weediness	1	R	
Other			

400 m2 plot: Sheet 2 of 2		**Survey Name**	**Plot ID**	**Recorders**
Date	17/02/2023	37263	DEH_W_820	MGP KK

GF Code	Genus species	N,E or HTE	Cover	Abund	Stratum
TG	Acacia pendula	N	0.5	4	
GG	Austrostipa bigeniculata	N	0.1	5	
GG	Austrostipa nodosa	N	0.5	50	
GG	Austrostipa scabra	N	5		
FG	Calocephalus sonderi	N	0.1	1	
GG	Chloris truncata	N	0.5	50	
OG	Convolvulus spp.	N	0.1	5	
GG	Juncus spp.	N	0.2	40	
SG	Maireana excavata	N	0.5	50	
FG	Maireana pentagona	N	0.1	5	
FG	Ptilotus semilanatus	N	0.1	2	
GG	Rytidosperma caespitosum	N	2		
GG	Rytidosperma duttonianum	N	2		
SG	Sclerolaena muricata	N	0.2		
FG	Sida corrugata	N	0.1	20	

Appendix 4 Fauna

Table A 5: Fauna species recorded at the subject land

Scientific Name	Common Name	EPBC Act status	NSW status
Birds			
Struthidea cinerea	Apostlebird		
Tachybaptus novaehollandiae	Australasian Grebe		
Falco longipennis	Australian Hobby		
Barnardius zonarius	Australian Ringneck		
Porzana fluminea	Australian Spotted Crake		
Chenonetta jubata	Australian Wood Duck		
Vanellus tricolor	Banded Lapwing		
Falco subniger	Black Falcon		VU
Milvus migrans	Black Kite		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Artamus cinereus	Black-faced Woodswallow		
Elseyornis melanops	Black-fronted Dotterel		
Tribonyx ventralis	Black-tailed Native-hen		
Himantopus himantopus	Black-winged Stilt		
Falco berigora	Brown Falcon		
Stagonopleura guttata	Diamond Firetail	VU	VU
Dromaius novaehollandiae	Emu		
Eolophus roseicapillus	Galah		
Pomatostomus temporalis	Grey-crowned Babbler		VU
Colluricincla harmonica	Grey Shrike-thrush		
Anas gracilis	Grey Teal		
Aythya australis	Hardhead		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Ardea intermedia	Intermediate Egret		
Microeca fascinans	Jacky Winter		
Cacatua sanguinea	Little Corella		
Microcarbo melanoleucos	Little Pied Cormorant		
Grallina cyanoleuca	Magpie-lark		
Vanellus miles	Masked Lapwing		
Psephotus varius	Mulga Parrot		
Grantiella picta	Painted Honeyeater	VU	VU
Geopelia striata	Peaceful Dove		
Malacorhynchus membranaceus	Pink-eared Duck		
Dendrocygna eytoni	Plumed Whistling-Duck		
Porphyrio porphyrio	Purple Swamphen		
Petroica goodenovii	Red-capped Robin		

Scientific Name	Common Name	EPBC Act status	NSW status
Todiramphus sanctus	Sacred Kingfisher		
Gavicalis virescens	Singing Honeyeater		
Aphelocephala leucopsis	Southern Whiteface	VU	
Circus assimilis	Spotted Harrier		
Threskiornis spinicollis	Straw-necked Ibis		
Pardalotus striatus	Striated Pardalote		
Polytelis swainsonii	Superb Parrot	VU	VU
Aquila audax	Wedge-tailed Eagle		
Hirundo neoxena	Welcome Swallow		
Egretta novaehollandiae	White-faced Heron		
Epthianura albifrons	White-fronted Chat		VU
Ardea pacifica	White-necked Heron		
Malurus leucopterus	White-winged Fairy-wren		
Rhipidura leucophrys	Willie Wagtail		
Platalea flavipes	Yellow-billed Spoonbill		
Taeniopygia guttata	Zebra Finch		
Mammals			
Felis catus	Cat		
Vulpes vulpes	Fox		
Mus musculus	House Mouse		
Oryctolagus cuniculus	Rabbit		
Reptiles			
Pogona barbata	Bearded Dragon		
Pogona vitticeps	Central Bearded Dragon		
Pseudonaja textilis	Eastern Brown Snake		
Varanus gouldii	Gould's Goanna		
Varanus varius	Lace Monitor		
Delma inornata	Patternless Delma		
Tiliqua rugosa	Shingle-back		
Frogs			
Notaden bennettii	Crucifix Frog		
Limnodynastes dumerilii	Eastern Banjo Frog		
Litoria peronii	Peron's Tree Frog		
Litoria raniformis	Southern Bell Frog	VU	VU
Limnodynastes tasmaniensis	Spotted Grass Frog		
Neobatrachus sudelli	Sudell's Frog		

Appendix 5 SAII

Appendix 5.1 Plains Wanderer *Pedionomus torquatus*

Information required (BAM Section 9.1.2)	Response
1. Impacts to the species and the action and measures taken to avoid the direct and indirect impact on the species at risk of an SAII.	
-	Plains Wanderer *Pedionomus torquatus* is listed under Principle 1 in TBDC. Listed has having a population reduction of >80% in 10 years or three generations. Surveys for Plains Wanderer were conducted in November 2022, March and April 2023, all well as opportunistically through all survey periods. Detailed habitat assessment was undertaken, as well as nocturnal surveys and acoustic detection. No records were detected. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. Specifically, due to the cryptic nature of this species and critically endangered listing, avoidance of suitable habitat and mapped important areas were incorporated early into project designs. Due to the dynamic nature of natural and derived grasslands, other areas of the subject land may provide habitat for Plains Wanderer at certain times pending fluctuating, long term environmental conditions. Buffers of 100m and 300m were employed on important mapped areas. All important mapped areas have been avoided. Impacts to 0.94 ha have been calculated to occur to areas within 100m of an important mapped area east of Kidman Way. Areas of important mapped habitat for the Plains Wanderer will not be isolated. Gates and perimeter fencing follow the southern and western portions of the important mapped habitat buffer. The portion of the development footprint that progresses around the northern and eastern buffer area is for vehicle access only, and links up to, and follows, an existing farm track network that crosses the Coleambally irrigation channel and existing bridge. Connectivity will still be retained in a northeast direction, and indirect impacts substantially mitigated. Potential indirect impacts will be managed through mitigation measures which are outlined in Section 7, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.
2a. evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:	
i. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or	It is estimated that the species population has fallen from between approximately 1,000-3,000 individuals to approximately 700 individuals over the last twenty years (WSP, 2022), and potentially as low as 300 (LLS, 2020). Approximately 300 - 700 individuals are thought to occur within the Riverina.
ii. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effect of introduced species, hybridisation,	This decline in population estimates of Plains Wanderer are tied to habitat condition, which has been compromised by persisting dry conditions and land management practices throughout its range over the last 20 years (WSP, 2022). Additionally, to the loss and degradation of sparse, lowland native grasslands, caused by the conversion of native grasslands to dense introduced pasture or croplands (DoE, 2016). The vast majority (>99%) of records of Plains Wanderer in NSW now come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west, the Billabong Creek in the south, and Urana in the east. Recent analysis of monitoring data collected between 2001 and 2014 from across sites in the Riverina region indicate that there was an overall decline in numbers of 93% over this time period (DoE 2016).

Information required (BAM Section 9.1.2)	Response
pathogens, pollutants, competitors or parasites	
2b. evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:	
i. an estimate of the species' current population size in NSW, and	The current estimate is between 300 to 700 individuals in NSW and between 1000 to 3000 in Australia (NSW and Victoria)
ii. an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and	Current detail in regard to Plains Wanderer population estimates are centered on the area of mapped habitat distribution in the Riverina area of NSW and monitoring of sites. (WSP,2022).
iii. where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations	It is difficult to pinpoint the exact cause of rapid decline, but likely a combination of effects of sustained drought, clearing or conversion of native vegetation, particularly grasslands on grey soils where tussock forming grass remain optimal and more stable, as well as increased predation by species such as foxes. However, when conditions are considered favorable, this species is capable of recovering.
2c. evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:	
i. extent of occurrence	It is difficult to determine the current extent as data is limited but as of 2011, the estimated extent of occurrence of the species was 930 000 km square (DoE 2016). Likewise, the current area of occupancy, but as of 2011, the estimated area of occupancy was 330 km square (DoE 2016). Due to the dynamic nature of natural and derived grasslands to which habitat for the Plains Wanderer is critical, the area of occupancy maybe constantly changing.
ii. area of occupancy	
iii. number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and	The Riverina region is considered a population stronghold (DoE 2016).
iv. whether the species' population is likely to undergo extreme	It is likely that the population of the Plains Wanderer will undergo extreme fluctuations with a decrease in numbers following significant drought events, as well sustained periods of above average rainfall, as a result of lower breeding success. However, during repeated

Information required (BAM Section 9.1.2)	Response
fluctuations	average years, and on the bounce from drought events, the Plains Wanderer have been shown to recover, however these events have been somewhat inconsistent in the last 20 years.
2d. evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:	
i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site	Plains Wanderer breed in solitary pairs in a territory defended by the larger female, though they can be serially polyandrous. They are capable of breeding in their first year. The male does most of the incubation during the 23 day incubation period and is also primarily responsible for attending the young (DoE 2016). The species is considered to not have reproductive characteristics that limit its reproductive capacity. Other than the dynamic nature of the grasslands habitat and condition states the Plains Wanderer relies upon, it does not have abiotic factors or traits considered critical. Key threatening processes applicable to this species are: • Clearing on native vegetation, particularly grasslands • Predation by foxes. • Invasion of exotic perennial grasses
ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or	
iii. life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus)	
3. data deficient	
Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.2(2.), the assessor must record this in the BDAR	Plains Wanderer are not listed in TBDC as a data deficient species. Due to the dynamic nature of natural and derived grasslands to which habitat for the Plains Wanderer is critical, area of optimal habitat is considered uncertain.
4a. the impact on the species' population (Principles 1 and 2) presented by:	
i. an estimate of the	Surveys undertaken within the subject land did not detect any individuals. However, it is

Information required (BAM Section 9.1.2)	Response
number of individuals (mature and immature) present in the subpopulation on the development site (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and	difficult to accurately estimate numbers within the broader locality. Estimated numbers in Oolambeyan National Park as at 2021 was 5 individuals, whilst an additional 3 individuals were recorded at Bundure Travelling Stock Route (TSR) to the south of the subject land. Anecdotal evidence from the landowner indicated individuals are semi regularly seen historically on the Goolgumbla property. It is not anticipated the project will impact upon Plains Wanderer individuals. Future occupancy will be reduced, however due to variability and dynamic nature of grasslands that provides habitat for this species, this is difficult to quantify. Areas of important mapped habitat for the Plains Wanderer will not be isolated. Gates and perimeter fencing follow the southern and western portions of important mapped habitat buffer. The portion of the development footprint that progresses around the northern and eastern buffer area is for vehicle access only, and links up to, and follows an existing farm track network that crosses the Coleambally irrigation channel and existing bridge. Connectivity will still be retained in a northeast direction, and indirect impacts substantially mitigated. Potential habitat within 50km of the subject land, being derived grassland communities from Weeping Myall as well as Riverina grasslands communities such as PCT 46 is estimated at 4,453 ha. No known individuals will be impacted by the project. Mitigation measures are listed in Section 7, which includes specific measures for Plains Wanderer.
ii. an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or	
iii. if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal	
4b. impact on geographic range (Principles 1 and 3) presented by:	
i. the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW	This species was not recorded in detailed surveys undertaken in November 2022, March 2023 and April 2023 and therefore considered unlikely to be present currently, or at least not in any substantial numbers within the subject land. Due to the dynamic nature of the grasslands critical to this species, areas within the subject land may be suitable for this species in the future, however, the most optimal areas of habitat have been avoided within the development footprint as far as practicable. Potentially suitable (but sub-optimal) areas within the subject land and development footprint include; Subject Land • PCT 46 Moderate 67.55 ha. • PCT 26 DNG 277 ha. • Mapped important habitat 11.09 ha. • 100m buffer of mapped important habitat 29.98 ha • 300m buffer of mapped important habitat 55.07 ha Development Footprint • PCT 46 and PCT 45 Moderate 1.73 ha • PCT 26 DNG 0.94 ha (within 100m buffer of mapped important habitat)
ii. the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect	

Information required (BAM Section 9.1.2)	Response
some habitat, but no individuals of the species will be directly impacted	It is not anticipated that any direct impacts will occur to this species currently. Within 10 km of the subject land, it is estimated there is the following amount of habitat. • 596.8 ha (Development footprint impacts equate to 0.01%) Within 50km of the subject land, it is estimated there is the following amount of habitat as mapped by the SVTM NSW vegetation. • 4,453 ha (Development footprint impacts equate to 0.001%) The total area of occupancy is estimated at 33,000 ha. Extensive area of habitat will remain within the subject land and broader locality. Important mapped areas of habitat, and similar within the development footprint have been prioritised for avoidance. Mitigation measures such as coordinated fox control and grasslands management will likely provide more optimal habitat within the subject land and have positive effects more broadly in the landscape.
iii. to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species	
iv. to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of	

Information required (BAM Section 9.1.2)	Response
disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR	

Appendix 6 Significant Impact Criteria assessments

The following section provides for Significant Impact Criteria assessments as outlined in the *Matters of National Environmental Significance: Significant impact guidelines 1.1* Commonwealth of Australia) for species that have likelihood of impact or occurrence rated as moderate or uncertain. *It is already anticipated the potential for significant impacts to Weeping Myall TEC, Plains Wanderer and Swainsona murrayana* , therefore assessment of significance have not been completed for these entities.

Appendix 6.1 Painted Honeyeater *Grantiella picta*

Species background

Painted Honeyeater is listed as vulnerable under the EPBC Act. It has a specialised diet consisting mainly of mistletoe fruits, but also includes nectar (from flowering mistletoe, eucalypts and possibly banksias) and arthropods (DAWE 2021). Painted Honeyeater is endemic to mainland Australia, found on the inland slopes of the Great Dividing Range from the Grampians, Victoria to Roma, Queensland. The species exhibits dispersive, seasonal north-south movements governed principally by the fruiting of mistletoe (Barea L.P & Watson D.M 2007). Many birds move after breeding to semi-arid regions such as north-eastern South Australia, central and western Queensland, and central Northern Territory.

The species inhabits mistletoes in eucalypt forests, woodlands, riparian woodlands of Black Box and River Red Gum, preferring a higher number of mature trees as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips. The key threat to the species is habitat loss in both breeding and non-breeding habitats. Degraded private lands used for agriculture or grazing provide small opportunities for Painted Honeyeaters to persist in fragmented landscapes, but with many landowners considering mistletoes as a pest their ongoing removal threatens the survival of the species.

Occurrence in study area

Painted Honeyeater was recorded foraging adjacent to the subject land in high condition Weeping Myall vegetation. Suitable habitat is available within the study area in woodland, scattered trees and open farmland associated with PCTs 13, 15, however particularly PCT 26. There are no records in the subject land or the nearby surrounds. Historic records for the species occur north of the subject land, as well as to the southwest around Deniliquin.

SIC assessment for Painted Honeyeater

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
There is a low likelihood that the project would lead to a long-term decrease in the size of an important population of the Painted Honeyeater. Important populations of Painted Honeyeater have not been defined in the Commonwealth Conservation Advice (Commonwealth of Australia 2015). There are no recognised subpopulations and due to its dispersive movements it is considered to comprise a single population (Garnett, Szabo, & Dutson 2011). The number of individuals is estimated to be <10,000 and the population is thought to be in decline (DAWE 2021). As it is considered a

SIC assessment for vulnerable species
single population, individuals occurring within the study area would be part of an 'important population' for the purpose of the SIC assessment. Factors likely to contribute to a long-term decrease in the size of an important population of the Painted Honeyeater primarily relate to habitat loss, land clearance, and decreased abundance of mistletoe that is a vital foraging and breeding resource for the species. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This includes larger patches of native woodland vegetation, and higher quality, intact remnants of Weeping Myall. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will still occur and not be fragmented. Residual direct impacts to 0.42 ha of intact Weeping Myall woodland and 0.29 ha of Black Box Woodland containing mature woody vegetation would occur as result of the project. Although these areas represent potential habitat for Painted Honeyeater, they occur as mostly smaller patches which are considered less suitable, or the fringing areas of larger patches of habitat, and as such are of lesser quality for Painted Honeyeater. No Painted Honeyeaters were recorded in this habitat, and mistletoe was observed sparsely. Painted Honeyeaters were observed however adjacent to the subject land, approximately 5km to the North west, within a large patch of Intact Weeping Myall. This has been taken into account when assessing the relative importance of the areas being removed for Painted Honeyeaters, in line with the recommendations in the National Recovery Plan (DAWE 2021). Given that Painted Honeyeater prefers large remnants of vegetation, and selects nest sites in habitats where mistletoe prevalence and parasitism rates are high, combined with the absence of both current and historic records for the species in the subject land it is considered unlikely that the project would lead to a long-term decrease in the size of the population.
Reduce the area of occupancy of an important population.
The area of occupancy for Painted Honeyeater is thought to have declined but is not defined in the National Recovery Plan (DAWE 2021). The project would result in direct impacts to 0.42 ha of intact Weeping Myall woodland and 0.29 ha of Black Box Woodland areas containing mature woody vegetation representing potential habitat for Painted Honeyeater. However, the areas being removed are mostly smaller patches which are considered less suitable, or the fringing areas of larger patches of habitat, the majority of which would be retained. No Painted Honeyeaters were recorded in this habitat, and Mistletoe was sparsely present. There are also no historic records for the species within the subject land or areas immediately adjacent to it. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. This has been taken into account when assessing the relative importance of the areas being removed for Painted Honeyeaters, in line with the recommendations in the National Recovery Plan (DAWE 2021). Based on the size and quality of the areas proposed for removal, and their context in the broader landscape and areas to be retained, the project would result in a negligible reduction to the area of occupancy for the species.
Fragment an existing important population into two or more populations.
Due to its complex movement patterns typified by migration and local nomadism, the Painted Honeyeater has what is effectively a single national population. The species is highly mobile and individuals can move freely through areas of unsuitable and marginal habitat to seek out and exploit favourable habitat patches. The project would result in direct impacts to 0.71 ha of habitat for Painted Honeyeater, and indirectly on 89.30 ha, however with later substantially mitigated, but is considered unlikely to result in any barriers to movement for the species such that it would fragment the

SIC assessment for vulnerable species

population. The areas of vegetation being removed are smaller patches or the fringing areas of larger patches, and as such would not impact on the connectivity of habitat within the broader landscape for this species.

Adversely affect habitat critical to the survival of a species.

Habitat critical to the survival of the species identified in the National Recovery Plan includes:

- Known or likely breeding habitat in Boree/Weeping Myall, Brigalow woodlands, box-gum woodlands and box-ironbark forests on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland.
- All preferred foraging species within known and likely foraging habitat particularly mistletoes of the genus Amyema growing on forest and woodland eucalypts and acacias.
- All Key Biodiversity Areas for Painted Honeyeater.
- Suitable habitat in future climate niches as information becomes available.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This includes avoidance of large, intact patches of Weeping Myall, likely to constitute critical habitat for Painted Honeyeater. Within the subject land, 248 ha of suitable vegetation considered potential critical habitat would be retained, and an additional 44,000 ha within 50 km of the subject land will also remain. As this is consistent with the definition of critical habitat for the species, this represents a large area of retention in comparison to the vegetation being impacted by the project.

Direct impacts to 0.42 ha of intact Weeping Myall areas and 0.29 ha of Black Box Woodland containing mature woody vegetation are predicted, which would also meet the definition of critical habitat for Painted Honeyeater. However, the areas of Weeping Myall being removed are mostly smaller patches which are considered less suitable for the species, or the fringing areas of larger patches of habitat. No Painted Honeyeaters were recorded in this habitat, and Mistletoe was sparsely present suggesting it is less likely to be suitable as breeding habitat. There are also no historic records for the species within the subject land or areas immediately adjacent to it, however Painted Honeyeaters were observed adjacent to the subject land, approximately 5km to the North west, within a large patch of Intact Weeping Myall as part of assessments for the adjacent wind farm.

This has been taken into account when assessing the relative importance of the areas being removed for Painted Honeyeaters, in line with the recommendations in the National Recovery Plan (DAWE 2021). In the broader landscape context, records are concentrated north of the subject land, and to the south-west around Deniliquin. Although the habitat being removed does meet the definition of critical habitat, its relative importance in the landscape is likely to be less than the areas being retained in both the subject land itself and within the broader landscape context.

The National Recovery Plan lists Key Biodiversity Areas (KBAs) relevant to the Painted Honeyeater, which do not include the subject land or nearby surrounds.

There is no current information on habitat associated with future climate niches.

Overall, the project will have direct impacts on 0.71 ha of habitat that meets the definition of critical habitat in the National Recovery Plan for Painted Honeyeater. However, as described in the National Recovery Plan, the habitat being impacted has been assessed in the broader landscape context to determine its relative importance for Painted Honeyeater. Given that the habitat being impacted is largely smaller patches, or the fringes of larger patches, that do not contain abundant Mistletoe, combined with an absence of both current and historical records within and in close proximity to the subject land, it is overall considered unlikely that the project would result in a significant adverse impact to critical habitat for the Painted Honeyeater. The overall retention of 248 ha of suitable vegetation that consists of higher quality potential habitat, is likely to outweigh the removal of 0.71 ha of lower quality potential habitat.

Disrupt the breeding cycle of an important population.

SIC assessment for vulnerable species
The project is expected to result in the removal of 0.71 ha of potential habitat. This habitat is associated with smaller patches of Weeping Myall or the fringes of larger patches, and is considered less suitable for Painted Honeyeater. The species selects nest sites in habitats where mistletoe prevalence and parasitism rates are high, which was not observed in the areas of habitat being removed, suggestion these areas are unlikely to represent preferred breeding habitat. The 0.42 ha of Weeping Myall woodland being removed and 0.29 ha of Black Box Woodland therefore constitutes a very small proportion of available breeding habitat throughout the species' range. Within the subject land, 248 ha of suitable vegetation considered potential breeding habitat would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. The removal of 0.71 ha of potential habitat would not be expected to disrupt the breeding cycle of the population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
The project is expected to result in the removal of 0.71 ha of potential habitat. This habitat is associated with smaller patches of woodland or the fringes of larger patches, and is considered less suitable for Painted Honeyeater. This habitat is not considered to be quality Painted Honeyeater habitat and it is unlikely that removal of this habitat would result in species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control. It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.
Introduce disease that may cause the species to decline.
There are no known diseases causing potential species decline to the Painted Honeyeater, or diseases to its preferred food source, mistletoe. The project would be unlikely to result in any increased risk of disease transmission to Painted Honeyeater such that the species would be at risk of decline. The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.
Interfere substantially with the recovery of the species.
Habitat loss and degradation is a key threat to the species. The project would result in direct impacts to 0.42 ha of intact Weeping Myall areas and 0.29 ha of Black Box Woodland containing mature woody vegetation. The National Recovery Plan also states that protection of Painted Honeyeater breeding and foraging habitats at the local, regional and landscape scale is also an important objective. The project would include the retention of 248 ha within the subject land, and an additional 44,000 ha within 50 km of the subject land will also be retained. It is considered unlikely that the amount of potential clearing would interfere substantially with the recovery of the species, particularly in the context of the higher quality areas of potential habitat that is being retained.
Conclusion.

SIC assessment for vulnerable species

Based on the assessment above, it is concluded that Painted Honeyeater is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works:

- Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population.
- Will not disrupt the breeding cycle of an important population, the local population or species as a whole.
- Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread.
- Will not interfere will the recovery of the species.

Appendix 6.2 Southern Bell Frog *Litoria raniformis*

Species background

Southern Bell Frog (also known as the Growling Grass Frog) is listed as vulnerable under the EPBC Act. The species has declined in both distribution and abundance in NSW, but has persisted in irrigated rice-growing areas along the Murrumbidgee and Murray Rivers (Pyke, Muir, & G 2008), including the Coleambally Irrigation Area and the Lowbidgee floodplain which occur in close proximity to the subject land. In the semi-arid part of its range, the species typically requires large, continuous areas containing both permanent and ephemeral waterbodies that undergo regular flooding. Waterbodies containing diverse aquatic vegetation are needed for floating, calling and foraging, surrounded by habitat that contains suitable refugia (Clemann & Gillespie 2012). In the study area, suitable habitat is associated with permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.

Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn (Sept to April) following a rise in water levels.

The main threats to Southern Bell Frog include habitat loss, degradation and modification, fragmentation and isolation of populations, and introduced predators and disease (DEWHA 2009).

Occurrence in study area

The Coleambally Irrigation Area occurs north of the study area, and is listed as a Priority Management Site under the NSW Saving Our Species strategy (SOS). It comprises a series of wetlands (primarily on private land), interspersed with irrigated crops, primarily rice. Irrigated rice crops are thought to be key breeding habitat for the species within the Coleambally Irrigation Area, so much so that they are considered unlikely to breed in waterbodies other than rice fields, including supply channels, drainage channels or other water bodies (Pyke, Muir, & G 2008). Permanent wetlands are more likely to be occupied by the species and to provide important core breeding habitat. Seasonally flooded sites are also likely to be used during high-rainfall years (DEWHA 2009). In the semi-arid zone, individuals are unlikely to move further than 5 kilometres between water bodies in the absence of major flood events. Within the subject land, there is habitat connectivity (terrestrial and aquatic) between waterbodies on site, and between waterbodies at neighbouring sites, including the Coleambally Irrigation Area via the Coleambally Irrigation Channel that runs through the eastern portion of the subject land.

Surveys for Southern Bell Frog within the subject land occurred following above average rainfall and flooding events throughout 2022. As a result, Southern Bell Frog was recorded in high numbers throughout the subject land, reflecting the species' ability to occupy marginal habitats to exploit seasonal conditions and disperse terrestrially through the landscape in wet years (DEWHA 2009).

Outside high rainfall events and flood years, areas that provide permanent water sources occur within the irrigation channel, as well as farm dams and the larger areas of lignum swamp. The site also contains numerous topographic depressions that may be utilised seasonally depending on local rainfall. The irrigation channel is not considered to be optimal habitat as it lacks diverse aquatic flora required for breeding. It is likely to act as a dispersal pathway however, likely bringing frogs down from the priority sites associated with the Coleambally Irrigation Area.

Further surveys in Summer 2024 will be undertaken to quantify numbers of Southern Bell Frog during more average conditions. It is expected that with less rainfall, the distribution of the species is likely to have contracted to permanent and semi-permanent waterbodies.

SIC assessment for Southern Bell Frog

SIC assessment for vulnerable species

Lead to the long-term decrease in the size of an important population of a species.

There is a low likelihood that the project would lead to a long-term decrease in the size of an important population of the Southern Bell Frog. The Significant Impact Guidelines for Growling Grass Frog consider any viable population as an important population for the species (DEWHA, 2009b). The guidelines define a viable population as 'one which is not isolated from other populations or water bodies, such that it has the opportunity to interact with other nearby populations or has the ability to establish new populations when water bodies fill and become available'.

Southern Bell Frogs were recorded opportunistically in large numbers during field survey within the subject site. As the population meets the criteria in the definition above, records within the subject land are considered to represent an important population for the species. Individuals are likely to be connected with those in the Coleambally Irrigation Area priority management site located to the north. The area was experiencing a seasonal boom at the time of survey following above average rainfall in the region that had led to localised flooding, a known mechanism for facilitating dispersal and widespread breeding events for the species (DEWHA 2009), resulting in movement between the two areas and into the surrounding landscape. Outside of these times, the subject land is connected to the Coleambally Irrigation Area via the Coleambally Irrigation Channel that runs through the eastern portion of the subject land, and may act as a dispersal pathway.

Factors likely to lead to a long-term decrease in the size of a population include land clearing, changed hydrological regimes, increasing salinity, draining and removal of wetlands, isolation of breeding habitats and fragmentation of dispersal corridors (Clemann & Gillespie 2012).

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitats for the Southern Bell Frog, were avoided as much as possible. Within the subject land, there are numerous ephemeral wetlands and drainage lines associated with topographic depressions of the floodplain. Suitable aquatic habitat and low-lying areas with potential for seasonal inundation throughout the subject land have been buffered and excluded by design from development, resulting in retention of larger lignum swamps and farm dams. Direct impacts will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) and suboptimal ephemeral habitat, and 122.16 ha of adjacent dispersal habitat. Direct impacts to potential Southern Bell Frog habitat are likely to represent marginal and opportunistic habitat, rather than core breeding habitat. These areas may be occupied on a seasonal or transient basis in response to flooding events, but are unlikely to maintain a resident population.

The main area of suitable permanent habitat for Southern Bell Frog is associated with the Coleambally Irrigation Channel,

SIC assessment for vulnerable species
though it lacks aquatic vegetation diversity that may be necessary for breeding. The project would involve some minor construction associated with the Coleambally Irrigation Channel, that would not result in any permanent removal or modification to this habitat that would prevent future occupation or dispersal by the Southern Bell Frog. Impacts to this area of potential habitat are considered temporary and short-term, and unlikely to lead to long-term impacts on the population. The project would not result in changed hydrological regimes. The project would result in some removal of suitable terrestrial dispersal habitat however, critical areas associated with waterbodies have been largely avoided through the design stage and the application of 200 metre buffers. The operation phase of the project is considered compatible with Southern Bell Frog dispersal, and although the project would modify the terrestrial habitat it is unlikely to result in permanent barriers or obstructions to movement in the landscape for the Southern Bell Frog during periods of high rainfall. All potential indirect impacts such as sediments and pollutants will be managed through the Biodiversity Management Plan to ensure that the project does not compromise surrounding water quality which in turn, could impact on the species' habitat and food resources. In consideration of the above, the project is considered unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population.
The area of occupancy for the Southern Bell Frog has not been defined in the National Recovery Plan. The species has a broad distribution with two distinct biogeographical groups. In the northern part of its range, frogs are concentrated in landscape refugia such as permanent waterbodies, and breeding and landscape dispersal are triggered by high rainfall and flood events (Clemann & Gillespie 2012). Southern Bell Frog was observed opportunistically and repeatedly within the subject land. This is likely in response to the above average rainfall experienced in the area prior to survey, which facilitates landscape dispersal and breeding in this species (Clemann & Gillespie 2012). The area of occupancy within the landscape for Southern Bell Frog at the time of survey was likely to be near the maximum extent for the species. Occupation is expected to contract to permanent and semi-permanent wetlands following the receding of floodwaters. Subsequent surveys for Southern Bell Frog in the subject land are likely to reflect these seasonal changes. There is a low likelihood that the project would reduce the area of occupancy for an important population of Southern Bell Frog. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Suitable wetland habitat and low-lying areas have been largely excluded from the development by design, with direct impacts limited to small areas around Coleambally irrigation channel (up to 8.4 ha) and suboptimal ephemeral habitat, and 122.16 ha of adjacent dispersal habitat. Where impacts to known habitat are likely to occur (such as crossings along the Coleambally Irrigation Channel), these would be temporary and would not result in permanent changes to the habitat such that it would be rendered unsuitable for Southern Bell Frog. Although the project would result in some removal of suitable dispersal habitat, critical areas of habitat surrounding permanent or semi-permanent waterbodies have largely been avoided through the design stage. The operation of the project is considered compatible with Southern Bell Frog dispersal, and although the project would modify the terrestrial habitat it is unlikely to preclude Southern Bell Frog from dispersal during periods of high rainfall to areas of retained habitat within the subject land. There is a low likelihood that the project would result in a significant reduction in the area of occupancy of the Southern Bell Frog.

SIC assessment for vulnerable species

Fragment an existing important population into two or more populations.

Spatial arrangement and connectivity among waterbodies within the landscape is a key factor in determining presence of Southern Bell Frog at a given site (DEWHA 2009). The long-term viability of individual populations is dependent on a matrix of aquatic and terrestrial habitats that provide dispersal corridors to and from local breeding sites (DEWHA 2009). Landscape alterations that decrease connectivity between habitat patches are therefore likely to impact the viability of individual populations (DEWHA 2009).

The project is considered unlikely to lead to fragmentation of an important population into two or more populations. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Direct impacts will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) and suboptimal ephemeral habitat, and 122.16 ha of adjacent dispersal habitat. Suitable wetlands, including ephemeral water bodies and the Coleambally Irrigation Channel would be retained as part of the project. This would result in a matrix of suitable wetlands remaining available for the Southern Bell Frog within the landscape, which would still be connected by suitable dispersal corridors. Impacts to suitable habitat such as the Coleambally Irrigation Channel, are short-term and temporary, and would not affect the long-term suitability of these sites for occupation by the Southern Bell Frog.

The species is known to be capable of colonising agricultural and moderate to high rainfall pastoral land provided there are adequate waterbodies present both permanent and ephemeral (Clemann & Gillespie 2012). The nature of the project, which would result in modification to dispersal pathways rather than removal, is considered compatible with long-term dispersal for the species within the landscape. It is therefore unlikely that the development would alter the availability or accessibility of waterbodies within the landscape that may be utilised by Southern Bell Frog either permanently or seasonally.

Adversely affect habitat critical to the survival of a species.

Habitat critical to the survival of the species would include all breeding habitats, as well as associated waterbodies within the landscape matrix used during periods of dispersal, and surrounding refugia for individuals during hibernation. Habitat critical to the survival of the species has been identified in the SOS strategy for Southern Bell Frog, which includes the Coleambally Irrigation Area north of the site, a priority management site for the Southern Bell Frog. The habitat associated with this site is considered of high quality and vital in the long-term survival of the species and preventing further declines. Impacts to this habitat would therefore be a mechanism that may contribute to the species decline. It is therefore important to note that the project would not modify, destroy, remove or isolate the availability or quality of habitat associated with the priority management site that is critical to the ongoing survival of the Southern Bell Frog.

There is a low likelihood that the project would adversely affect habitat critical to the survival of the Southern Bell Frog through impacts within the subject land. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Direct impacts will be limited to small areas around Coleambally irrigation channel (8.4 ha) and suboptimal ephemeral habitat, and 122.16 ha of adjacent dispersal habitat. This means that that the number and diversity of water bodies available to the species remains largely unchanged as a result of the project, and there would be no permanent alteration to connectivity during flood events.

The project does not include the construction of physical barriers to movement between water bodies, such as roads or buildings, and does not involve the permanent removal of terrestrial habitat surrounding suitable water bodies. Although impacts within 200 metres of suitable habitat have been included in the species polygon under the requirements of the BAM to calculate direct impacts and species credits, these areas are not subject to permanent impacts as a result of the project, and would still be available to the Southern Bell Frog as terrestrial movement pathways following completion of the development.

Residual direct impacts are unlikely to represent habitat critical to the survival of the species. Although these areas may

SIC assessment for vulnerable species
be exploited during suitable high rainfall events, they would not represent core habitat and as such are not considered to be critical to the survival of the species. The project would not limit dispersal corridors or access to other suitable low-lying areas in the landscape, that would remain available to the Southern Bell Frog during periods of high-rainfall.
Disrupt the breeding cycle of an important population.
The Southern Bell Frog is reliant on aquatic and riparian habitats for breeding and the subsequent development of the larval stage (Clemann & Gillespie 2012). Following breeding, the species is known to disperse into the landscape, particularly during flooding events. There is a low likelihood that the project would disrupt the breeding cycle of an important population. Direct impacts will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) and suboptimal ephemeral habitat, and 122.16 ha of adjacent dispersal habitat, and is unlikely to result in any disruption to the breeding cycle, given the availability of other larger and more suitable wetland areas within the subject land and the broader landscape, particularly the Coleambally Irrigation Area priority site which is a key source population in the region. The project would not lead to the permanent degradation or removal of habitat such that the recruitment, survival or dispersal rates of an important population would be lowered enough to have a significant impact on the species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Quality habitat for Southern Bell Frog includes permanent and semi-permanent waterbodies, particularly those subject to seasonal flooding, containing submergent and emergent vegetation for calling, foraging and floating. Thick vegetation, rocks, logs and other debris adjacent to waterways are also important for shelter, particularly during winter hibernation (DEWHA 2009). Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Direct impacts will be limited to small areas around Coleambally irrigation channel (8.4 ha) and suboptimal ephemeral habitat, and 122.16 ha of adjacent dispersal habitat. This is considered a relatively minor impact in available habitat in the landscape. The project would not lead to the permanent degradation or removal of habitat such that the recruitment, survival or dispersal rates for Southern Bell Frog would be impacted such that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
The project does not include any known mechanism that would result in the establishment of invasive species harmful to Southern Bell Frog that are not already present in the area. The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control. It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.
Introduce disease that may cause the species to decline.
The project does not include any known mechanism that would result in the establishment of disease (i.e. Chytrid fungus) harmful to Southern Bell Frog that is not already present in the area. The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and

SIC assessment for vulnerable species
operation of the project.
Interfere substantially with the recovery of the species.
The project will not interfere with the recovery of the species in respect to the specific objectives for recovery outlined in the in the *National Recovery Plan for Growling Grass Frog* (Clemann and Gillespie 2012).
Conclusion.
Based on the assessment above, it is concluded that Southern Bell Frog is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population. • Will not disrupt the breeding cycle of an important population, the local population or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.3 Superb Parrot *Polytelis swainsonii*

Species background

Superb Parrot is listed as vulnerable under the EPBC Act. Superb Parrots are absent from large areas of the Riverina and northern Victoria, confined to the Barmah forest area with the core distribution being west of the Great Dividing Range in NSW from Canberra, Goulburn and as far west as Nyngan and Swan Hill. There are only three main breeding areas: an area of the south-west slopes bounded by Molong, Rye Park, Yass, Coolac, Cootamundra and Young (NSW); along the Murrumbidgee River, between Wagga Wagga and Toganmain Station, and farther north at Goolgowi (NSW); and along the Murray and Edward Rivers, from east of Barmah and Millewa State Forest to south of Taylors Bridge (NSW and Victoria). The species occurs in box-gum and acacia woodlands and riverine woodlands. They mostly feed on the ground on fruits and seeds from a variety of plants but also feed extensively in shrubs and trees. In the Riverina area, the Superb Parot nests in loose colonies in large, living or dead trees with many hollow branches, typically near watercourses. The same nest hollows are used in successive years, often by the same pair (Baker-Gabb 2011).

It was formerly considered that there were two separate populations of the Superb Parrot, one in southern NSW and northern Victoria, and the other further north in NSW (Forshaw & Cooper 1981), but it is now apparent that only a single population exists (Forshaw & Cooper 2002; Garnett & Crowley 2000; Higgins 1999; Webster & Ahern 1992).

Major threats to the superb Parrot are loss and degradation of habitat, competition for nest hollows, road kills, illegal removal of wild birds, Psittacine beak and feather disease (PBFD) and climate change.

Occurrence in study area

Superb parrot was recorded foraging onsite. Suitable habitat for this species is present within grazing land, and native woodland and grassland vegetation within PCTs 13, 26 and 45, which provide foraging, shelter,

movement and breeding resources. There was no evidence of breeding observed within the subject land, and potential hollows were found to be preferentially in use by common species such as Blue Bonnets and Galahs.

SIC assessment for Superb Parrot

SIC assessment for vulnerable species

Lead to the long-term decrease in the size of an important population of a species.

There is a low likelihood that the project would lead to a long-term decrease in the size of an important population of the Superb Parrot. There are no recognised subpopulations for the Superb Parrot and the species is considered to comprise a single population. Recent estimates suggest the population consists of approximately 20,000 mature individuals, and is considered to be in decline (Baker-Gabb 2011). Individuals occurring within the study area would therefore be considered to be part of an 'important population' for the purpose of this SIC assessment.

The main cause of population decline for Superb Parrot is habitat loss, particularly breeding habitat and nest sites in large hollow-bearing trees. Core breeding habitat is associated with the Barmah-Millewa River Red Gum Forest and Murrumbidgee Red Gum forest Key Biodiversity Areas (KBA), as well as the South-west Slopes of NSW KBA. Impacts to these critical habitat locations are a primary threat to the species (Baker-Gabb 2011).

The subject land contains suitable foraging habitat for the Superb Parrot in the form of woodlands and grasslands where seed, nectar and fruits are available for foraging. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This includes larger patches of native woodland vegetation, and higher quality, intact remnants. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained.

Residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland areas containing mature woody vegetation that constitute potential habitat for the Superb Parrot would occur as a result of the project. The habitat being removed occurs as smaller patches and the edges of larger patches. Higher quality areas along water courses and larger remnants have been largely avoided.

Superb Parrot is a hollow-nesting species, and the project would result in impacts to one hollow-bearing tree. However, these are considered unlikely breeding habitat for the Superb Parrot, which is known to prefer riparian forests for breeding, particularly in the Barmah Forest in Victoria and the Millewa and Moira forests in NSW, as well as stretches of the Murrumbidgee River near Wagga Wagga and Darlington Point in NSW (Baker-Gabb 2011). No evidence of breeding was recorded during surveys for Superb Parrot, though other common species were observed occupying hollows. Hollow-bearing trees subject to removal are considered less suitable for Superb Parrot as they are not associated with riparian vegetation. No records occur within the subject site of breeding by this species.

The project would also result in indirect impact to 89.30 ha of habitat adjacent to the development footprint, however this is substantially mitigated, and ~861 ha of native grassland vegetation, which does represent potential foraging habitat and transient habitat for the Superb Parrot during optimal seasons. These areas may be utilised on a seasonal and transient basis by the species but are unlikely to be relied upon for its persistence in the landscape given the vast areas of similar or better quality habitat in the surrounding landscape. The operational phase of the project is considered compatible with the foraging activity of Superb Parrots, which would still be able to exploit seasonal grassland resources following construction of the project, most likely within retained patches of vegetation, between panel alignments and along on fringing areas of the solar array and APZs. This has been noted previously at the Beryl Solar Farm, near Gulgong in NSW, along with other species such as Grey-crowned Babblers.

As there are no impacts to breeding habitat, and only minor impacts to areas of foraging habitat in the context of the broader landscape, there is a low likelihood that the project would lead to the long-term decrease in the size of the population of Superb Parrot.

SIC assessment for vulnerable species

Reduce the area of occupancy of an important population.

The Superb Parrot is highly mobile, and their exact movements are not fully understood. An ongoing decline has been documented across their range, which is projected to further contract and undergo a south-eastern shift in response to climate change. The area of occupancy for the species has not been defined however, actions that remove critical habitat are considered likely to reduce the area of occupancy (Baker-Gabb 2011). Critical habitat primarily refers to breeding habitat (tree hollows in riparian areas), and suitable foraging habitat in proximity to breeding areas.

The project would not include the removal of areas of critical habitat for the Superb Parrot. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained.

Residual direct impacts would occur to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland. The project would also result in indirect impact to 89.30 ha of habitat adjacent to the development footprint, however this is substantially mitigated, and ~861 ha of native grassland vegetation, which does represent potential foraging habitat and transient habitat for the Superb Parrot during optimal seasons. These areas may be utilised on a seasonal and transient basis by the species but are unlikely to be relied upon for its persistence in the landscape given the vast areas of similar or better quality habitat in the surrounding landscape, and are not considered critical habitat. As such, there is a low likelihood that the project would reduce the area of occupancy of an important population of Superb Parrot.

Fragment an existing important population into two or more populations.

The Superb Parrot is a mobile species, capable of undertaking large movements as it migrates seasonally between breeding and non-breeding areas (Baker-Gabb 2011). Individuals can also move through the landscape matrix to exploit favourable habitat patches and seasonal resources. Higher quality feeding habitats in the form of woodland areas with nectar, fruit and seed resources and adjacent grassland areas have largely been avoided and buffered during the design process. There would be direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland, but it is unlikely that these impacts would result in any barriers to movement for the species such that it would fragment the population. The areas being removed are smaller patches or the fringing areas of larger patches, and as such would not impact on the connectivity of habitat within the broader landscape for this mobile species.

Adversely affect habitat critical to the survival of a species.

Key Biodiversity Areas (KBAs) defined in the National Recovery Plan are considered critical for supporting the long-term persistence of the species. Other critical habitat is associated with areas containing riparian woodlands, with suitable large, hollow-bearing trees for nesting and breeding. The project is not within a KBA and does not involve the removal of riparian woodlands that could be considered breeding habitat critical to the survival of the species.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. There will be residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland, that could be considered potential habitat for Superb Parrot. This habitat occurs as small patches and the edges of larger patches, and is likely of lesser quality than larger, intact remnants and is therefore not consistent with habitat critical to the survival of the species.

Only one hollow-bearing tree is anticipated to require removal as part of the project. No breeding has been recorded in these hollows either historically or during the current survey. There is a low likelihood that these trees represent critical habitat to the species' survival, particularly in the broader landscape context where it is likely individuals would target hollow-bearing trees in riparian vegetation for nesting.

Within the subject land, 248 ha of high quality foraging vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. These larger, intact patches are likely to be more critical to the survival of the species than those being removed.

SIC assessment for vulnerable species
As described in the National Recovery Plan, where habitat cannot be avoided it should be offset. Under the BAM, foraging habitat for Superb Parrot impacted by the project would generate ecosystem credits that would be retired prior to construction.
Disrupt the breeding cycle of an important population.
No known breeding habitat will be impacted by the project. One hollow-bearing tree is being removed however, this is considered unlikely to be utilised by Superb Parrot as they are not associated with riparian habitats. All riparian vegetation has been avoided and buffered as part of the detailed design of the project. Given the large amount of suitable habitat being retained, it is considered unlikely that the project would result in any disruption to the breeding cycle of the population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Additionally, no known breeding site will be impacted. The project would result 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland and would also result in indirect impact to 89.30 ha of habitat adjacent to the development footprint, however this is substantially mitigated. Approximately 861 ha of native grassland vegetation, which does represent potential foraging habitat for the Superb Parrot during optimal seasons would also be modified and have reduced capacity. This vegetation would not be completely removed, and is considered to still be accessible for use by Superb Parrot during the operation phase of the project. The operational phase of the project is considered compatible with the foraging activity of Superb Parrots, which would still be able to exploit seasonal grassland resources following construction of the project, most likely within retained patches of vegetation, between panel alignments and along on fringing areas of the solar array and APZs. This has been noted previously at the Beryl Solar Farm, near Gulgong in NSW, by the assessor. As large areas of similar habitat exist in the landscape, it is unlikely that the foraging habitat within the subject land is critical to the species' survival. Impacts to this habitat would be offset in accordance with the BAM. There is a low likelihood that the project would decrease the availability of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control. It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.
Introduce disease that may cause the species to decline.
The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.
Interfere substantially with the recovery of the species.
Habitat loss is a key threat to the Superb Parrot, particularly removal of critical breeding resources associated with large,

SIC assessment for vulnerable species
hollow-bearing trees in riparian areas. The project would result in direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland and the removal of one hollow-bearing tree, however none of this vegetation is considered suitable breeding habitat for Superb Parrot. The project would also result in indirect impacts to 89.30 ha of habitat adjacent to the development footprint, however this is substantially mitigated. Approximately 861 ha of native grassland vegetation, which does represent potential foraging habitat for the Superb Parrot during optimal seasons would also be modified. The project would include the retention of 248 ha of high quality woodland vegetation within the subject land, and an additional 44,000 ha within 50 km of the subject land that would also be retained. As there is no impact to breeding habitat, most high quality foraging habitat would be retained, and modification to remaining areas of potential habitat is not considered likely to result in exclusion of the species, the project is unlikely to interfere with the recovery of the Superb Parrot.
Conclusion.
Based on the assessment above, it is concluded that Superb Parrot is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population. • Will not disrupt the breeding cycle of an important population, the local population or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.4 Eastern Major Mitchell's Cockatoo *Lophochroa leadbeateri*

Eastern Major Mitchell's Cockatoo is listed as endangered under the EPBC Act. The eastern Major Mitchell's cockatoo lives in arid and semi-arid woodlands dominated by mulga (*Acacia aneura*), mallee and box eucalypts, slender cypress pine (*Callitris gracilis*) or belah (*Casuarina cristata*). Within these vegetation types, the subspecies main requirements are fresh surface water, and trees with suitable nesting hollows. The main threat causing the decline of the subspecies is habitat loss and degradation. A major aspect of habitat loss is the loss of large hollow-bearing trees which provide nest sites.

The subspecies occur in the Murray-Darling, Eyre and Bulloo River basins, from Isisford and Roma in the north, through western New South Wales to north-west Victoria and west to eastern South Australia.

Occurrence in study area

Surveys for eastern Major Mitchell's Cockatoo were undertaken as part of the diurnal bird surveys. The species was not recorded during these surveys, but has been recorded approximately 13 kilometres from the subject land. Foraging and breeding habitat is represented by large hollows and woodland communities within PCT's 13, 15 and 26.

SIC assessment for Major Mitchell's Cockatoo

SIC assessment for Major Mitchell's Cockatoo

Lead to the long-term decrease in the size of a population.

There is a low likelihood that the project would lead to a long-term decrease in the size of the population of the eastern Major Mitchell's Cockatoo. The subspecies *Lophochroa leadbeateri leadbeateri* is commonly known as the Eastern Major Mitchell's Cockatoo. It is considered to exist as a single population, with no sub-populations identified in the Conservation Advice for the species (DCCEEW 2023a). The population has undergone a severe reduction, and was estimated at around 15,000 mature individuals in 2011.

The main threat causing decline of the subspecies is habitat loss and degradation, particularly the removal of large hollow-bearing trees which are used for nesting. Eastern Major Mitchell's Cockatoo requires large areas of intact woodland vegetation and corridors for movement across the landscape, with specific requirements for nesting tree species and hollow characteristics. Impacts that result in a decline of these requirements are considered likely to contribute to a decrease in the size of the population.

The subject land contains habitat considered suitable for the subspecies. Large hollows occur in woodland communities within the site. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this subspecies, were avoided as much as possible. This includes larger patches of native woodland vegetation, and higher quality, intact remnants. Within the subject land, 228 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained.

Residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland and the removal of one hollow-bearing tree would occur as a result of the project that could be considered potential habitat for the eastern Major Mitchell's Cockatoo. This habitat being removed occurs as smaller patches and the edges of larger patches. Higher quality areas along water courses and larger remnants have been largely avoided.

Eastern Major Mitchell's Cockatoo is a hollow-nesting species, and the project would result in the removal of one hollow-bearing tree, out of 39 recorded within the subject land. No evidence of breeding was recorded during surveys for Major Mitchell's Cockatoo, and no historic records occur within the subject site of breeding by this species. It is considered unlikely that the species is utilising these hollows for breeding.

As the project is unlikely to result in the loss or alteration of critical foraging or breeding habitat for this species, it is unlikely to lead to the long-term decrease in the size of the population of this subspecies.

Reduce the area of occupancy of the species

The species area of occupancy has not been defined, but is considered to have undergone a decline due to the ongoing loss and degradation of breeding habitat (DCCEEW 2023a). Uncleared rangeland comprises much of its range, and it is thought that 20 – 30% of this range is still occupied.

The eastern Major Mitchell's Cockatoo prefers to feed in or close to wooded areas, and utilise wooded corridors for movement through fragmented landscapes. Wooded areas are therefore likely to be key habitat for the species.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, including intact woodland areas that are the most likely habitat for this subspecies, were avoided as much as possible. There will be residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland that could be considered potential habitat for the eastern Major Mitchell's Cockatoo. This would constitute a minor reduction in the potential area of occupancy available to the species that is unlikely to represent a significant impact. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained.

SIC assessment for Major Mitchell's Cockatoo

Fragment an existing population into two or more populations.

Eastern Major Mitchell's Cockatoo are highly mobile and individuals can move through areas of less suitable and marginal habitat to seek out and exploit favourable habitat patches. The subspecies prefer to feed in or close to wooded areas, and use wooded areas for travel between feeding areas and nesting or roosting sites (DCCEEW 2023a). These habitats have largely been avoided and buffered during the design process. There would be direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland, however these impacts are largely associated with fringes of larger patches or small isolated patches and are therefore considered less suitable for eastern Major Mitchell's Cockatoo. The proposal is considered unlikely to result in fragmentation of the population, with suitable movement corridors being retained within the subject land and within the broader landscape context.

Adversely affect habitat critical to the survival of a species.

Eastern Major Mitchell's Cockatoos inhabit a wide range of plant communities, mostly in arid and semi-arid woodlands, always within easy reach of surface water. Habitat critical to the survival of the eastern Major Mitchell's cockatoo consist of:

- Arid and semi-arid woodlands dominated by mulga (Acacia aneura), mallee and box eucalypts, slender cypress pine (Callitris gracilis) or belah (Casuarina cristata).
- Known habitat containing suitable attributes, including potential habitat for the subspecies, especially where there are large mature trees with suitable hollows; and
- Surrounding matrix of these areas for the role of providing movement corridors for dispersal across the landscape.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this subspecies, were avoided as much as possible. Areas of intact woodland have predominantly been avoided during the design process. There will be direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland, that could be considered potential habitat for the eastern Major Mitchell's Cockatoo. This habitat occurs as small patches and the edges of larger patches, and is therefore considered to be less suitable for the subspecies.

One hollow-bearing tree may be removed as part of the project. No breeding has been recorded in these hollows either historically or during the current survey. There is a low likelihood that these trees represent critical habitat to the species' survival, particularly in the broader landscape context where it is likely individuals would target large, intact remnants for breeding.

Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. These larger, intact patches are likely to be more critical to the survival of the subspecies than those being removed, and thus the project is not expected to result in a significant impact to the species.

Disrupt the breeding cycle of a population.

No known breeding habitat will be impacted by the project. One hollow-bearing tree may be removed as part of the project. No breeding has been recorded in these hollows either historically or during the current survey. Given the large amount of suitable habitat being retained, it is considered unlikely that the project would result in any disruption to the breeding cycle of the population.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Additionally, no known breeding site will be impacted. Therefore, the magnitude of the impact is small in the context of other causes of habitat

SIC assessment for Major Mitchell's Cockatoo
loss operating across the species' range and in isolation is unlikely to impact the species to the extent that it would cause a decline in the population.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat.
The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control. It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.
Introduce disease that may cause the species to decline.
The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.
Interfere substantially with the recovery of the species.
The main threat causing the decline of the subspecies is habitat loss and degradation. A major aspect of habitat loss is the loss of large hollow-bearing trees which provide nest sites. Actions that remove habitat critical to the survival of the subspecies would interfere with the recovery of the subspecies (DCCEEW 2023a). The project would not be removing habitat critical to the survival of the subspecies, as no breeding habitat has been identified. High-quality woodland vegetation has largely been avoided, and this habitat is considered more likely to be critical to the subspecies' survival than that which is being removed.
Conclusion.
Based on the assessment above, it is concluded that Eastern Major Mitchell's Cockatoo is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the project: • Will not lead to the long term decrease of a population, reduce the areas of occupancy or fragment an existing population. • Will not disrupt the breeding cycle of a population, or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.5 Australian Painted Snipe *Rostratula australis*

Species background

Australian Painted Snipe is listed as endangered under the EPBC Act. This species is a small, freshwater wader with a long bill that droops slightly at the tip. This species occurs in shallow freshwater (occasionally brackish) wetlands, both ephemeral and permanent, such as lakes, swamps, dams and marshy areas where there is a cover of grasses, lignum, samphire, low scrub or open timber. Australian Painted Snipe nests on the ground

amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves. The species forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.

Australian Painted Snipe is a highly mobile species, their dispersive movements have been attributed to local conditions; with movements to flooded areas and from drying to permanent wetlands, away from areas affected by drought. Distribution includes scattered records across Australia. In NSW, many records are from the Murray-Darling Basin, with other important areas including the Hawkesbury River and the Clarence and lower Hunter Valleys.

Occurrence in the study area

Surveys for Australian Painted Snipe were undertaken as part of the diurnal bird surveys. The species was not recorded during these surveys, but has been recorded approximately 25 kilometers from the subject land over 15 years ago. Suitable habitat for this species is broadly available within farm dams, and freshwater Lignum wetlands and shrublands within PCTs 13 and 17.

SIC assessment for Australian Painted Snipe

SIC assessment for Australian Painted Snipe
Lead to the long-term decrease in the size of a population of a species.
There is a low likelihood that the project would lead to a long-term decrease in the size of the population of the Australian Painted Snipe. The Australian Painted Snipe is a highly cryptic and poorly known species. The species forms a single, homogenous breeding population across most of Australia. The main threat considered likely to decrease the size of the Painted Snipe population is the loss and degradation of wetlands through drainage and the diversion of water for agriculture and reservoirs (DCCEEW 2022a). Although no Painted Snipe were recorded within the subject land, suitable habitat does occur in wetland areas. Within the subject land, there are numerous ephemeral wetlands and drainage lines associated with topographic depressions of the floodplain. It is possible that these areas may be exploited by the Australian Painted Snipe on a seasonal or transient basis in response to suitable conditions. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitats for Painted Snipe were avoided as much as possible. Suitable aquatic habitat and low-lying areas with potential for seasonal inundation throughout the subject land have been buffered and excluded by design from development, resulting in retention of larger lignum swamps, farm dams and the Coleambally Irrigation Channel. Direct impacts to potential habitat for Painted Snipe will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of suboptimal ephemeral habitat within PCT 17 and PCT 13 associated with the removal of small areas of ephemeral lignum swamp and fringing areas. The project would retain larger and more intact areas subject to more frequent inundation and would not result in barriers or obstructions to movement in the landscape for the species. The project does not include any impacts that would result in the drainage and diversion of water or removal of large areas of key habitat. Bird deaths due to the 'lake effect' are most likely to occur among large-bodied aquatic birds such as ducks, geese, grebes, pelicans, cormorants, or swans. It is hypothesised that the birds mistake the reflective surface of solar panels for the surface of water. Birds strike the solar panel at a high velocity, believing that the water surface will absorb some of the impact of the landing without causing injury. No threatened species of large-bodied aquatic birds are likely to utilise the solar farm area currently. The lake effect is not likely to impact terrestrial threatened bird species, as these birds do not typically land on water. Also, the cause of death for large-bodied aquatic birds relates to their behaviour while landing; it is

SIC assessment for Australian Painted Snipe
noted that other aquatic birds which alight more softly, such as snipes and other species such as egrets, cranes, and various shorebirds, are not affected. Recent research indicates that the lake effect is most prevalent in arid conditions where there are few water bodies available. Water-obligate species which cannot take off from land are the most likely to be affected. However, when detailed surveys of behaviour of aquatic birds at photovoltaic solar facilities have been undertaken, changes in behaviour of aquatic birds flying near the facilities occurred so infrequently that it was difficult to detect. The proposed development is not considered likely to have lake effect impacts anticipated to occur, and therefore effect the movement of the Painted Snipe. The direct impacts that would occur to potential Painted Snipe habitat are considered negligible. The species is highly mobile, and capable of exploiting seasonally available resources across a large geographic area. As such, it is considered unlikely that Painted Snipe would be reliant on the marginal quality habitat being impacted as a result of the project for its persistence in the landscape. The project is therefore considered unlikely to lead to a long-term decrease in the size of an important population of the species.
Reduce the area of occupancy of a population.
The species is widespread and is not considered to have a restricted geographic distribution however, within its geographic range records are sparse and scattered, with movements of the species considered unpredictable. The area of occupancy is therefore much less than the extent of occurrence, 2000 km^2 compared with 7,100,000 km^2 (DSEWPC 2013). Suitable habitat within its range is relatively restricted, and associated with shallow terrestrial freshwater (occasionally brackish) wetlands including temporary or permanent lakes, swamps and claypans as well as periodically inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains. The species is highly mobile, and capable of travelling large distances to exploit these resources as they become available across the landscape in response to prevailing weather conditions. There is a low likelihood that the project would reduce the area of occupancy for the Australian Painted Snipe. Within the subject land, there are numerous ephemeral wetlands and drainage lines associated with topographic depressions of the floodplain that are most likely to represent suitable Painted Snipe habitat. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Suitable wetland habitat and low-lying areas have been largely excluded from the development by design, with direct impacts limited to small areas of potentially suitable habitat around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of suboptimal ephemeral habitat within PCT 17 and PCT 13 associated with the removal of small areas of ephemeral lignum swamp and fringing areas. Impacts to potentially suitable habitat such as the Coleambally Irrigation Channel, are short-term and temporary, and would not affect the long-term suitability of these sites for use by Painted Snipe. The project would not result in barriers or obstructions to movement in the landscape for the species, and the operation of the project would not preclude this species from occurring in the landscape during high rainfall events. The project is considered unlikely to result in a significant reduction to the area of occupancy for the Australian Painted Snipe.
Fragment an existing population into two or more populations.
The project is considered unlikely to lead to fragmentation of the population. The species is highly mobile and capable of travelling large distances to exploit suitable resources. The nature of the project would not preclude Painted Snipe from occupying the area during favourable conditions, and would not create any barriers to movement for Painted Snipe such that the population would become fragmented. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Suitable wetlands, including ephemeral water bodies and the Coleambally Irrigation Channel would be retained as part of the project. This would result in a matrix of suitable wetlands remaining available for Painted Snipe within the landscape.

SIC assessment for Australian Painted Snipe

Adversely affect habitat critical to the survival of a species.

Painted Snipe is a highly mobile species, capable of undertaking large-scale movements to exploit ephemeral resources. The species is known to rely on wetlands for both breeding and foraging, and these habitats within its range can be considered as critical to the survival of the species. The project would result in direct impacts to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of marginal ephemeral habitat within PCT 17 and PCT 13. Although these habitats are wetland habitats and therefore potentially utilised by Painted Snipe, they are considered low quality within the broader landscape context, where larger wetlands occur that would likely be preferred by Painted Snipe due to having increased foraging, breeding and sheltering opportunities.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This includes areas of riparian vegetation, and larger waterbodies that may be suitable habitat for Painted Snipe. Given the availability of higher quality habitat within the broader landscape, the impacts of the project on a small amount of potential habitat for Painted Snipe are considered minimal, and unlikely to affect the survival of the species.

Disrupt the breeding cycle of a population.

The Painted Snipe breeds in response to seasonal rainfall patterns and wetland conditions, relying on wetlands and inundated areas for breeding and foraging (DCCEEW 2022a). There is a low likelihood that the project would disrupt the breeding cycle of an important population. Direct impacts will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of suboptimal ephemeral habitat within PCT 17 and PCT 13, and is unlikely to result in any disruption to the breeding cycle, given the availability of other wetland areas within the subject land and the broader landscape and the high mobility of the species. The project would not lead to the permanent degradation or removal of habitat such that the recruitment, survival or dispersal rates of an important population would be lowered enough to have a significant impact on the species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The project would result in direct impacts to small areas of suitable wetland vegetation around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of suboptimal ephemeral habitat within PCT 17 and PCT 13. The project is unlikely to modify remaining potential habitat that may be available to the species during flooding events such that the species is likely to decline. Painted Snipe is a highly mobile species, and is capable of undertaking large spatial movements to exploit seasonally available resources. Removal of a minor amount of suboptimal habitat is unlikely to represent a significant loss of habitat for the species.

Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat.

The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control.

It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.

SIC assessment for Australian Painted Snipe
Introduce disease that may cause the species to decline.
The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.
Interfere substantially with the recovery of the species.
The project would not interfere with the recovery plan objectives, which are to sustain a positive population trend by minimising threats to the species, protecting its habitat and generating new knowledge. The project would remove a small amount of marginal quality potential habitat, but has avoided through design higher quality areas that may be utilised by the Painted Snipe.
Conclusion.
Based on the assessment above, it is concluded that Australian Painted Snipe is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of a population, reduce the areas of occupancy or fragment an existing population. • Will not disrupt the breeding cycle of a population, or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.6 Southern Whiteface *Aphelocephala leucopsis*

Species background

Southern Whiteface is listed as vulnerable under the EPBC Act. The species is a small and stocky, thornbill-like bird with a brown dorsum, dark brown wings, a white belly and a black tail with narrow white tip. The species has characteristic facial markings, consisting of a white band across the forehead, with a darker streak along the top edge (DCCEEW 2023b). The species lives in a wide range of open woodland and shrublands where there is an understorey of grasses and/or shrubs. Southern Whitefaces forage almost exclusively on the ground, favouring habitat with low tree densities and an herbaceous understorey litter cover. The species' diet consists of insects, spiders, and seeds. These birds usually forage in small groups, consisting of between two and eight individuals, but may be seen in larger flocks of up to 70, including mixed species feeding flocks (DCCEEW 2023b).

The species occurs across most of mainland Australia, south of the tropics. While there are currently an estimated 477,000 mature individuals in the wild, the population has declined by an estimated 30 to 50% every ten years since 1999 (DCCEEW 2023b). Habitat critical to the survival of Southern Whiteface includes areas of relatively undisturbed open woodland and shrublands with an understorey of shrubs and/or grasses, habitat with low tree density and an herbaceous understorey litter cover which provides essential foraging habitat, and living and dead trees with hollows and crevices which are essential for roosting and nesting. Habitat loss and fragmentation are considered the most likely causes of the species' current decline, through drought and extreme weather events also play a role.

Occurrence in study area

Southern Whiteface has been recorded within and adjacent to the subject land. Suitable habitat for this species is available in woodland, scattered trees and open farmland associated with PCTs 13, 15, and 26.

SIC assessment for Southern Whiteface

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
There is a low likelihood that the project would lead to a long-term decrease in the size of an important population of the Southern Whiteface. Important populations have not been defined in the Commonwealth Conservation Advice and a national recovery plan has not been prepared. The population is estimated to be 477,000 mature individuals in the wild, consisting of two subspecies: the south-east southern whiteface (410,000) and the south-west southern whiteface (67,000). Habitat loss and fragmentation is the likely cause of species decline, as a result of intensive agriculture and increasing drought. The subject land contains suitable habitat for the Southern Whiteface, which prefers open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. The subject land contains suitable habitat for the Southern Whiteface associated with open woodlands and shrublands with a grassland and shrubland understorey. The species favours habitat with low tree densities an herbaceous understorey with litter cover. Several observations were made of Southern Whiteface within the subject land and surrounding locality. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this subspecies, were avoided as much as possible. This includes larger patches of native woodland vegetation, and higher quality, intact remnants. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. Residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland areas containing mature woody vegetation would occur as a result of the project. This habitat being removed occurs as smaller patches and the edges of larger patches. Higher quality areas along water courses and larger remnants have been largely avoided. There is a low likelihood that the project would lead to the long-term decrease in the size of the population of the Southern Whiteface.
Reduce the area of occupancy of an important population.
No important populations have been identified for the Southern Whiteface. The extent of occurrence for the species is estimated to be 4,910,000 km^2, however the area of occupancy is contracting and is estimated to be 70,000 km^2. Reduced area of occupancy for the species is associated with the complete removal of habitat for intensive agriculture. Suitable habitat for this species occurs primarily in areas of open woodlands. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, including intact woodland areas that are the most likely habitat for this subspecies, were avoided as much as possible. There will be residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland, that

SIC assessment for vulnerable species
could be considered potential habitat for the Southern Whiteface. This would constitute a minor reduction in the potential area of occupancy available to the species that is unlikely to represent a significant impact. The project would also result in indirect impact to 89.30 ha of habitat adjacent to the development footprint, however this is substantially mitigated, and ~861 ha of native grassland vegetation, which does represent potential foraging habitat and transient habitat. These areas may be utilised on a seasonal and transient basis by the species but are unlikely to be relied upon for its persistence in the landscape given the vast areas of similar or better quality habitat in the surrounding landscape. The operational phase of the project is considered compatible with the foraging activity of the Southern Whiteface, which would still be able to exploit seasonal grassland resources following construction of the project, most likely within retained patches of vegetation, between panel alignments and along on fringing areas of the solar array and APZs. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. The operation phase of the project is considered compatible with continuing occupation of the site by the Southern Whiteface, which would still be able to utilise habitats within the subject land. The project is therefore considered unlikely to significantly impact the area of occupancy of the Southern Whiteface.
Fragment an existing important population into two or more populations.
Southern Whitefaces are considered sedentary, but may move into wetter areas outside of their normal range during wetter years. It is unlikely that the project would result in fragmentation for the species. The operation phase of the project is considered compatible with continued occupation by Southern Whiteface, which would be able to utilise retained habitats within the subject land. Areas of habitat being removed are associated with small remnants and the fringes of larger remnants, which is unlikely to result in any barriers to movement. The species is able to move through open areas as well as lightly timbered woodlands, and it is unlikely that the project would result in a barrier to movement for the species.
Adversely affect habitat critical to the survival of a species.
The Conservation Advice for the Southern Whiteface defines habitat critical to its survival as: Relatively undisturbed open woodlands and shrublands with an understorey of grasses or shrubs, or both; Habitat with low tree densities and an herbaceous understory litter cover which provides essential foraging habitat; Living and dead trees with hollows and crevices which are essential for roosting and nesting. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. These areas are likely to represent the most suitable patches of habitat for Southern Whiteface including 248 ha of suitable vegetation retained within the subject land, and an additional 44,000 ha within 50 km of the subject land will also be retained. There would be residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland of intact Weeping Myall woodland. Impacts are associated with the fringes of larger patches or small isolated patches, and these areas are unlikely to represent critical habitat. Trees with hollows or crevices are important resources for nest building and Southern Whiteface breeding. The project may result in the removal of one hollow-bearing tree. Overall however, the majority of hollow-bearing trees have been avoided and would be retained, in addition to intact woodland areas that would contain suitable breeding resources for the Southern Whiteface. These trees are unlikely to be critical to the species' survival in the broader landscape context where large areas of suitable habitat will be retained including 248 ha of vegetation within the subject land and an additional 44,000 ha within 50 km of the subject land. The operation phase of the project is considered compatible with ongoing occupation of the area by Southern Whiteface, which would be able to utilise grassland habitats following construction.

SIC assessment for vulnerable species

Disrupt the breeding cycle of an important population.

There is a low likelihood that the project would result in any disruption to the breeding cycle. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This includes larger patches of native woodland vegetation, and higher quality, intact remnants, representing the most suitable breeding habitat for Southern Whiteface . Residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland would occur. No known breeding habitat would be removed however, the project may include removal of one hollow-bearing tree that represents a potential breeding resource for the species. The majority of hollow-bearing trees within the subject land, however, have been avoided and would be retained. Within the subject land, 248 ha of suitable breeding habitat would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. It is considered unlikely that the areas subject to removal would result in disruption of the breeding cycle to the Southern Whiteface.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible

The project includes the removal of up to 0.29 ha of Black Box woodland, and 0.42 ha of intact Weeping Myall woodland representing habitat for this species, as well as one hollow-bearing tree.
Impacts as a result of the project are considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. Within the subject land, 248 ha of suitable habitat would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. In addition, mitigation methods implemented as part of a Biodiversity Management Plan for the project will ensure that indirect impacts including weed establishment are minimised for the duration of the works.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.

The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control.
It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.

Introduce disease that may cause the species to decline.

The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.

Interfere substantially with the recovery of the species.

There is currently no National Recovery Plan for the Southern Whiteface, however conservation and management priorities within the approved conservation advice for the species primarily relate to reducing clearing of critical habitat (particularly for agriculture), revegetation to expand and connect areas of existing habitat and minimising habitat

SIC assessment for vulnerable species
degradation caused by livestock. The project would result in direct impacts to 0.42 ha of intact Weeping Myall areas containing mature woody vegetation and the removal of one hollow-bearing tree. The project would include the retention of 248 ha of high quality woodland vegetation within the subject land, and an additional 44,000 ha within 50 km of the subject land that would also be retained. The operation phase of the project is considered compatible with persistence of Southern Whiteface in the landscape, and would not present a barrier to movement. The project is not likely to interfere substantially with the recovery of the species.
Conclusion.
Based on the assessment above, it is concluded that Southern Whiteface is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population. • Will not disrupt the breeding cycle of an important population, the local population or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.7 Diamond Firetail *Stagonopleua guttata*

Species background

The Diamond Firetail is listed as vulnerable under the EPBC Act. It is a large, striking finch with a bright red bill, and red eyes and rump. Diamond firetails occur on the south-east mainland of Australia from south-east Queensland to Eyre Peninsula, South Australia, and about 300 km inland from the sea. Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover. Diamond firetails usually occur in flocks of between 5 to 40, and occasionally more. The species appears to be sedentary, though some populations move locally. Their flight is described as low and direct in long lines with slight undulations. Birds roost in dense shrubs or in smaller nests built especially for roosting (DCCEEW 2023c).

Diamond Firetails are distributed across the south-east mainland of Australia, from south-east Queensland to south-east South Australia. While there are currently an estimated 136,000 mature individuals in the wild, the species' population has declined by approximately 30 to 50% within the last 10 years (DCCEEW 2023c). The biggest contributor to this decline is the clearance of quality nesting and breeding habitat, though habitat degradation also plays a role.

Occurrence in study area

No Diamond Firetail were recorded during detailed surveys, however the species was recorded as part of the surveys for Dinawan Wind Farm, further to north-west. The species is thought to be sedentary, though some populations move locally.

SIC assessment for Diamond Firetail

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
There is a low likelihood that the project would lead to a long-term decrease in the size of an important population of the Diamond Firetail. There are currently estimated to be 136,000 mature individuals in the wild, however the reliability of these estimates is low (DCCEEW 2023c) . No important populations have been identified for Diamond Firetail within the approved conservation advice for these species. The main threat causing local declines of Diamond Firetail populations is native vegetation clearance for large scale agriculture that has resulted in a decrease in the size and quality of important nesting and breeding habitats (DCCEEW 2023c). Overgrazing and the replacement of native perennial grasses with exotic annual grasses has also led to food shortages during autumn and winter. The subject land contains habitat suitable for the Diamond Firetail, which prefers open forests and lightly timbered habitats, including farmland and grassland with scattered trees. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this subspecies, were avoided as much as possible. This includes larger patches of native woodland vegetation, and higher quality, intact remnants. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. The project will result in direct impacts to 0.29 ha of Black Box woodland, and 0.42 ha of intact Weeping Myall woodland, which is potential breeding and foraging habitat for Diamond Firetail. There would also be ~1,781 ha of PCT 26, 45 and 46 representing potential foraging resources for this species that would be modified as a result of the project. Although PCT 26 contains suitable foraging resources, the species is most likely to occur in proximity to dense shrubs where they can shelter and roost. The operation phase of the project is also considered compatible with the foraging activity of Diamond Firetail, which would still be able to exploit seasonal grassland resources within the subject land following construction, most likely within retained patches of vegetation, between panel alignments and along on fringing areas of the solar array and APZs. Given the expansive areas of native vegetation in the broader landscape, and the large patches of suitable habitat within the project area to be retained, the project is not expected to lead to long-term decreases in the size of the population of Diamond Firetail.
Reduce the area of occupancy of an important population.
No important populations have been identified for Diamond Firetail. The extent of occurrence is estimated at 1,500,000 km^2 and the area of occupancy is estimated at 25,000 km^2. Suitable habitat for this species occurs throughout the subject land in grasslands, lightly timbered and intact woodland remnants. Activity is likely to be concentrated in more remnant vegetation where suitable shrubs occur for shelter and roosting, however, contain low tree densities.. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, including intact woodland areas that are the most likely habitat for species, were avoided as much as possible. There will be residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland would occur as a result of the project that represent potential breeding and foraging habitat for Diamond Firetail. Higher quality areas along water courses and larger remnants have been largely avoided and buffered. The habitat being removed occurs as smaller patches and the edges of larger patches. This would constitute a minor reduction in the potential area of occupancy available to the species that is unlikely to represent a significant impact. Within the subject land, 248 ha of suitable vegetation would be retained, and an additional 44,000 ha within 50 km of the subject land will also be retained. There would also be modification to ~1,781 ha of PCT 26, 45 and 46 representing more marginal potential foraging habitat for Diamond Firetail as a result of the project. However, the operation phase of the project is considered compatible with the foraging activity of Diamond Firetail, which would still be able to utilise grassland habitats within the subject land. The project is therefore considered unlikely to significantly impact the area of occupancy for the Diamond

SIC assessment for vulnerable species
Firetail.
Fragment an existing important population into two or more populations.
Diamond Firetail is thought to be mostly sedentary, though some populations do undergo local movements. It is unlikely that the project would result in fragmentation for the species. Areas of suitable habitat being removed include smaller patches of woodland vegetation and the fringes of larger patches, which is unlikely to result in any barriers to movement. The operation phase of the project is considered compatible with the foraging activity of Diamond Firetail, which would still be able to utilise grassland habitats within the subject land. The species is able to move through open areas as well as lightly timbered woodlands, and it is unlikely that the project would result in a barrier to movement for the species.
Adversely affect habitat critical to the survival of a species.
The Conservation Advice for the Diamond Firetail defines habitat critical to its survival as: • Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats; • low tree density, few large logs and little litter cover by high grass cover for foraging, roosting and breeding; • drooping she-oak within the Mt Lofty Ranges. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. These areas are likely to represent the most suitable patches of habitat for Diamond Firetail including 228 ha of suitable vegetation retained within the subject land, and an additional 44,000 ha within 50 km of the subject land will also be retained. There would be residual direct impacts to 0.29 ha of Black Box woodland and 0.42 ha of intact Weeping Myall woodland. Impacts are associated with the fringes of larger patches or small isolated patches, and these areas are unlikely to represent critical habitat. There would also be modification to ~1,781 ha of PCT 26 sparse and DNG areas, as well as PCT 45 and PCT 46 representing more marginal potential foraging habitat for Diamond Firetail as a result of the project. The operation phase of the project is considered compatible with ongoing occupation of the area by Diamond Firetail, which would be able to utilise grassland habitats following construction, most likely within retained patches of vegetation, between panel alignments and along on fringing areas of the solar array and APZs.
Disrupt the breeding cycle of an important population.
Suitable foraging and breeding habitat for this species occurs throughout the subject land in grasslands, lightly timbered and intact woodland remnants. Activity is likely to be concentrated in more intact remnants where suitable shrubs occur for shelter, roosting and breeding. Breeding habitat is also associated with the stick nests of raptors, which were present, would be located in tall trees in the landscape. There is a low likelihood that the project would result in any disruption to the breeding cycle. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This includes larger patches of native woodland vegetation, and higher quality, intact remnants, representing the most suitable breeding habitat for Diamond Firetail. Residual direct impacts to 0.42 ha of intact Weeping Myall and 0.29 ha of Black Box Woodland would occur. As large areas of similar habitat exist in the landscape, and would be retained as part of the project, it is unlikely that the areas subject to removal would result in disruption of the breeding cycle of Diamond Firetail.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Additionally, no known breeding site will be impacted. The project would result in the modification to ~1,781 ha of grassland and sparse woodland that represents potential

SIC assessment for vulnerable species

foraging habitat for Diamond Firetail. As large areas of similar habitat exist in the landscape, it is unlikely that the foraging habitat within the subject land is critical to the species' survival. Impacts to this habitat would be offset in accordance with the BAM.

The project includes the removal of up to 0.29 ha of Black Box woodland, and 0.42 ha of Weeping Myall (intact) woodland. Once operational, the subject site would continue to provide potential habitat for this species in the form of open grasslands that may provide foraging resources or movement corridors through the landscape.

Impacts as a result of the project are considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. In addition, mitigation methods implemented as part of a Biodiversity Management Plan for the project will be implemented to ensure that indirect impacts including weed establishment are minimised for the duration of the works.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.

The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control.

It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.

Introduce disease that may cause the species to decline.

The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.

Interfere substantially with the recovery of the species.

There is currently no National Recovery Plan Diamond Firetail, however recovery actions are outlined within the approved conservation advice for the species. Those relating to the project include:

- Retain and protect woodland, open forest, grassland and mallee habitat from clearing, fragmentation and disturbance (areas of 200 ha or greater within woody vegetation are particularly significant).
- Protect and maintain areas of high-quality habitat, which includes open forest, woodland, mallee and grasslands with a diverse ground layer dominated by a mixture of grass species which seed at different times of year (providing a year-round food supply) and provides scattered shrubs for shelter.
- Retain mistletoe and scattered patches of dense shrubs for nesting habitat, particularly in areas close to water.

While the project will result in the removal of sparse myall woodland and derived grasslands habitats including areas considered habitat critical to the survival of these species, the area of habitat to be removed by the project is surrounded by contiguous areas of suitable foraging and breeding habitat, with similar or higher quality resources. The project is unlikely to pose a barrier to movement of the species within the broader locality. Given these factors it is considered unlikely that the project will interfere with the recovery of these species.

Conclusion.

Considering the above factors, it is unlikely that the proposed work will impose a significant impact Diamond Firetail as:

- The project will not introduce any diseases or invasive species of Diamond Firetail.
- The project will not interfere significantly with the recovery actions for the species.
- The removal of native vegetation is considered to be a threat to the recovery and ongoing survival of the species however the project will impact up to 0.71 ha of potential woodland habitat, surrounded by large swathes of habitat that will be retained both within and adjacent to the project area, it is not likely to significantly impact the species.

Based on the factors above, it is concluded that the project is unlikely to lead to a significant impact on the Diamond Firetail.

Appendix 6.8 Glossy Black-Cockatoo *Calyptorhynchus lathami*

Species background

Glossy Black-Cockatoo, vulnerable under the EPBC Act and BC Act, is a medium-sized cockatoo with a diagnostic combination of black-brown head, neck and underbody, red or orange-red panel in tail, and otherwise black plumage. Adult females also exhibit extensive patches of yellow feathering on head and neck.

The species is closely associated with *Allocasuarina* spp. and *Casuarina* spp. dominated woodlands, or open sclerophyll forest where the middle stratum is *Allocasuarina* spp. They feed almost exclusively on the seed of *Allocasuarina* spp. but occasionally also take wood-boring insect larvae. The species is dependent on hollow-bearing trees for breeding habitat as they nest in the hollows formed in the trunk, stump, spout or limbs of eucalypt trees, living or dead (Higgins 1999, DPE 2022).

Occurrence in study area

Records for the species occur approximately 40 kilometres from the subject land, which is at the western edge of the species known range. Glossy Black-Cockatoo was not recorded during surveys. The subject land does not contain vegetation communities dominated by *Allocasuarina* species, which are known to be preferred foraging habitat for the Glossy Black-Cockatoo. The species is also not associated with any PCT's within the subject land. It is therefore considered unlikely that Glossy Black-Cockatoo occurs within the subject land, or that it relies on habitats within the subject land for critical life stages or ongoing persistence in the landscape.

SIC assessment for Glossy Black-Cockatoo

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
There is a low likelihood that the project would lead to a long-term decrease in the size of an important population of the Glossy Black-cockatoo. Glossy Black-cockatoo distribution is patchy and fragmented throughout its range, and is at risk of subpopulations becoming isolated. It is currently considered to occur as a single population consisting of approximately 7500 mature individuals. The main threat causing decline of the population is habitat loss, degradation and fragmentation. Glossy Black-cockatoo was not recorded during surveys, and the subject land occurs at the western extent of the known range of the species. Habitat within the subject land is considered unsuitable for Glossy Black-Cockatoo, as it does not contain vegetation types that include preferred feed trees such as *Allocasuarina* species. The species is not associated with any PCT's within the subject land under the BAM, and there is no suitable breeding habitat present. As no individuals were recorded during survey, and the project would not result in the loss or alteration of critical foraging or breeding habitat for this species, it is unlikely to lead to the long-term decrease in the size of an important population of Glossy-Black-Cockatoo.
Reduce the area of occupancy of an important population.
Glossy-black Cockatoos are uncommon but widespread, with an area of occupancy of approximately 40,000 km^2. Glossy-black Cockatoos are associated with forested parts of the Great Dividing Range in NSW, with their distribution extending inland towards the Riverina but becoming increasingly scattered (DCCEEW 2022b). The subject site occurs at the western extent of the species distribution, and the species has not been recorded within the subject land. The nearest record is approximately 40 km from the site.

SIC assessment for vulnerable species
Habitat within the subject land is considered unsuitable for Glossy Black-Cockatoo, as it does not contain vegetation types that include preferred feed trees such as *Allocasuarina* species. The species is not associated with any PCT's within the subject land under the BAM. The subject land is not considered to be suitable habitat for this species and as such the project would be considered unlikely to reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations.
Historic land clearance has been a significant cause of decline for Glossy Black-Cockatoo, leading to the loss of both feeding and breeding habitats. Wildfires have also caused further habitat loss and degradation. The distribution of the Glossy Black-Cockatoo is patchy and fragmented throughout its range, with loss of critical habitats recognised as a threat to the future of the species (DCCEEW 2022b). The subject land does not contain critical habitats for the Glossy Black-Cockatoo. The subject land occurs at the western extent of the species range, and is considered unlikely to be utilised by the species. As an important population is unlikely to occur within the subject land, and the project would not be removing habitat for the species such that it would contribute to fragmentation, it is considered unlikely that the project would fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species.
Habitat critical to the survival of the Glossy Black-Cockatoo includes areas that are necessary for foraging, breeding, roosting and dispersal such as vegetation types that include preferred feed trees (*Allocasuarina* spp. and *Casuarina* spp.) and suitable nesting hollows. These habitats do not occur within the subject land. The subject land also occurs at the western extent of the species' range, and is unlikely to be used for movement and dispersal. It is therefore unlikely that the project would affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.
The subject land does not contain suitable breeding habitat for the Glossy-black Cockatoo. The subject land also does not support suitable foraging habitat for the Glossy Black-Cockatoo. It occurs at the western extent of the species distribution, and is unlikely to be an important movement or dispersal corridor for the Glossy Black-Cockatoo. The subject site is therefore considered unlikely to contain habitat that supports the Glossy Black-Cockatoo, and the project is therefore unlikely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Quality habitat for the Glossy Black-Cockatoo includes areas that are necessary for foraging, breeding, roosting and dispersal such as vegetation types that include preferred feed trees (*Allocasuarina* spp. and *Casuarina* spp.) and suitable nesting hollows. These habitats do not occur within the subject land. The project is therefore unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control. It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.
Introduce disease that may cause the species to decline.
The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a

SIC assessment for vulnerable species
Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.
Interfere substantially with the recovery of the species.
There is no National Recovery Plan for the Glossy Black-Cockatoo, however, Saving our Species (SoS) has developed a strategy to secure the species from extinction. Key management sites are being identified, located in various sites across NSW. The study area is located outside the priority management sites. The proposed works will not impact on the recovery of the Glossy Black-Cockatoo or any areas mapped as priority management sites. Conservation Advice for the species identifies habitat loss, degradation and fragmentation from land clearing and wildfires as key threats to the species, as well as climate change. When considering habitat loss, it is also necessary to include areas where the species 'may occur'. The subject site is at the western extent of the species' range, and the species was not recorded during surveys. Existing records for the species occur 40 km from the subject site. The subject site also does not contain suitable foraging or breeding habitat for the Glossy Black-Cockatoo. The project would therefore not include impacts to critical habitat for the species, and is unlikely to impact on habitat where the species may occur. The proposal would therefore not interfere with the recovery of the species.
Conclusion.
Considering the above factors, it is unlikely that the proposed work will impose a significant impact on Glossy Black-Cockatoo or their habitats as: • Habitat within the subject land is unsuitable for Glossy Black Cockatoo, as it does not contain preferred foraging habitat or suitable breeding habitat. • The project would not impact on habitat critical to the species survival. • The project would not result in impacts to an important population. • The proposed works will not interfere with the recovery of the species or areas established by SoS as a priority management site. Based on the factors above, it is concluded that the proposed works are unlikely to lead to a significant impact on the Glossy Black-Cockatoo.

Appendix 6.9 Koala *Phascolarctos cinereus*

Species background

Koala populations in Queensland, NSW and ACT are listed as endangered under the EPBC Act. Koalas occupy a range of eucalypt-dominated forest and woodland types throughout their range, but favour habitats that support key forage species in more mesic microhabitats. Altitude (< 800 metres above sea level) and temperature restrict the Koalas distribution, as does leaf moisture at the western and northern ends of the range.

Key threats to Koala include habitat fragmentation, predation by dogs, vehicle strikes and disease. Climate change may also be affecting Koala populations through increased temperatures causing heat stress and a reduction in the level of moisture within the leaves of browse trees.

Koala populations throughout Australia are currently under increased pressure due to the 2019-2020 summer bushfires that occurred across the southern and eastern states of Australia. DAWE has provided several resources in response to these fires including analyses of listed species habitat within fire affected areas (DEE 2020), as well as provisional lists of fauna that require urgent management intervention (DAWE

2020). Twelve percent of the likely and known distribution of the combined Koala populations across Australia have been identified as occurring within fire affected areas, and Koala has been identified as one of the species requiring urgent management intervention. Given this context, any remaining areas of high-quality Koala habitat are now critical to the conservation of the species.

Occurrence in study area

Koala were not detected during detailed surveys, but have been recorded approximately 14 kilometres from the subject land. Suitable habitat is broadly available within woodland communities PCTs 13 and15,. The subject land contains sporadic occurrences and low condition patches of preferred Koala feed tree species *Eucalyptus camaldulensis* in suboptimal condition. Feed tree species present are predominantly secondary feed trees such as Black Box *Eucalyptus largiflorens*, and in relatively small, fragmented patches away from key corridors that contain preferred habitat in this region.

SIC assessment for Koala

SIC assessment for Koala
Lead to the long-term decrease in the size of a population.
It is unlikely that the project would lead to a long-term decrease in the size of the Koala population. There is limited habitat present with the subject land, and no evidence of Koalas was found. The subject land is not considered an area of high koala occupancy, with the nearest record occurring 14 km from the subject land, and therefore not consistent with a critical koala population (DPIE 2020). The main causes of decline for koala populations is habitat loss, with vegetation clearance for urbanisation, grazing, agriculture and mining significantly reducing the koala's distribution (DAWE 2022a). Recent bushfires have also contributed to loss of both individuals and habitat, as well as climate change and drought (DAWE 2022a). Although there are scattered feed trees present within the subject land, including occasional River Red Gums (preferred feed trees) predominantly secondary feed trees occur such as Black Box, and in relatively small, fragmented patches away from key corridors that contain preferred habitat in the region such as riparian woodlands. The project would not result in impacts to any River Red Gums but will impact upon 0.29 ha of Black Box woodland that constitute potential secondary koala foraging habitat. The River Red Gums noted in the subject land are in poor condition, suffering from dieback in the canopy, and will be retained due to design amendments. Patches of potential habitat subject to direct and indirect impacts are small, isolated patches and are not contiguous with other suitable koala habitat. Similarly, areas of Black Box woodland being removed represent smaller, isolated patches and the fringes of larger patches. Both these areas of habitat are unlikely to represent critical resources for Koala in the landscape. Areas of higher quality including preferred feed trees and major connectivity routes such as riparian corridors have been avoided during the design process. It is therefore considered unlikely that the project would lead to a long-term decrease in the size of the koala population.

SIC assessment for Koala

Reduce the area of occupancy of a population.

The area of occupancy for koala is estimated to be 19,428 km^2 and contracting (DAWE 2022a).

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Preferred feed trees and major connectivity and movement corridors have been avoided. No primary habitat such as River Red Gums will be impacted, with 0.29 ha of impacts to small patches of secondary habitat. The operation phase and mitigation measure implemented by the project is also considered compatible with movement of koalas through the landscape. Based on the above, the project would have a negligible impact on the area of occupancy for Koala with consideration to the small area to be impacted relative to the larger tracts of remnant native vegetation within the vicinity. The species will continue to forage and breed in retained habitat outside of the subject land and the proposal will not represent a barrier to the movement of individuals.

Fragment an existing population into two or more populations.

Koala is a mobile and wide-ranging species and in this region is likely to occur across large home-ranges (DAWE 2022b). Koalas are capable of travelling large distances through unfavourable habitat to seek out preferred feed trees. The presence of Koala primary and secondary feed trees within the subject area is limited, containing relatively small, fragmented patches away from key corridors that contain preferred habitat in this region. Larger areas of habitat that contain higher densities of preferred trees and increased connectivity have been avoided through the design stage of the project. It is unlikely that removal of a small number of trees and small, low-quality patches of potential habitat would fragment the population into two or more populations.

Adversely affect habitat critical to the survival of a species.

Habitat critical to the survival of a species is defined as: the areas that the species relies on to avoid or halt decline and promote the recovery of the species. Under the EPBC Act, the following factors and any other relevant factors may be considered when identifying habitat that is critical to the survival of a species:

- whether the habitat is used during periods of stress (examples: flood, drought or fire)
- whether the habitat is used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes)
- the extent to which the habitat is used by important populations
- whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development
- whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements
- whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation
- any other way in which habitat may be critical to the survival of a listed threatened species or a listed threatened ecological community.

The presence of Koala primary and secondary feed trees within the subject area is limited, containing relatively small, fragmented patches away from key corridors that contain preferred habitat in this region. This is unlikely to represent habitat critical to the survival of the species. It is possible that individuals may pass through the subject land on an occasional or transient basis, but it is unlikely that individuals would rely on these habitats for their long-term persistence in the landscape given the small and fragmented nature. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value that are most likely to be utilised by Koala would be retained as a result of the project.

SIC assessment for Koala

Disrupt the breeding cycle of an important population.

The species was not detected during detailed surveys and the small number of available preferred trees suggests that breeding habitat is limited within the subject land. No preferred or primary habitat would be removed as a result of the project, however 0.29 ha of Black Box woodland containing scattered secondary food trees would be impacted. The project is unlikely to result in the disruption to the breeding cycle of the local population or the species as a whole.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Koalas were not recorded on site during surveys. No River Red Gums or preferred/primary habitat will be impacted as a result of the project. Approximately 0.29 ha of Black Box woodland containing scattered secondary feed trees will be impacted. While there is a presence of secondary feed trees within the study area, these are in relatively small, fragmented patches away from key corridors that contain preferred habitat in this region. Koalas in semi-arid regions have large home ranges, related to the density of feed trees in the landscape. It is possible that individuals may pass through the study area on a seasonal or transient basis however, modification to these isolated, poor quality habitat patches is unlikely to lead to a decline in the species. Larger, intact remnants as well as connected vegetation corridors associated with riparian woodlands have been avoided in the design process and would be retained as a result of the project. Therefore, it is unlikely the project will modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat.

The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control.
It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes.

Introduce disease that may cause the species to decline.

The project is unlikely to result in the introduction of a disease (e.g., Chlamydia) that could reduce the reproductive output of Koala populations in or near the project area. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.

Interfere substantially with the recovery of the species.

The main threat to koalas is habitat loss and degradation, which is compounded by climate change, genetic isolation and disease (DAWE 2022b). Actions that remove critical koala habitat, such as intact remnants supporting high densities of koalas, could be considered as interfering with the recovery of the species. The project would not be removing habitat critical to the survival of the koala. The project would not impact any primary or preferred trees species for Koala, however, will impact 0.29 ha of Black Box woodland that contains scattered secondary food tree resources. The design phase of the project resulted in large areas of suitable koala habitat being retained, including riparian woodlands containing preferred feed trees (River Red Gums). The operation of the project would also not create a barrier to koala movement. The project is considered unlikely to interfere substantially with the recovery of the species.

SIC assessment for Koala
Conclusion.
In consideration of the above significant impact criteria, the proposal is not likely to significantly impact Koalas within the study area or wider locality, as: • The project will result in impacts to marginal Koala foraging and dispersal habitat. Given the availability of similar resources within the locality, impacts are not considered to constitute a significant impact. • The project is unlikely to result in the introduction of a disease (e.g., Chlamydia) that could reduce the reproductive output of the Koala populations in or near the project area. • The project does not substantially contribute to a KTP for Koala or impact upon any of the priority conservation actions for the species.

Appendix 6.10 Australasian Bittern *Botaurus poiciloptilus*

Species background

The Australasian Bittern is listed as endangered under the EPBC Act. It is a large, stocky, thick-necked, heron-like bird and has a prominent black-brown stripe running down the side of the neck, the eyebrow is pale, and the chin and upper throat are white. In Australia, the Australasian Bittern occurs from south-east Queensland to south-east South Australia as far as the Adelaide Region, southern Eyre Peninsula, Tasmania and in the southwest of Western Australia (Threatened Species Scientific Committee 2019).

The Australasian Bittern has primarily been impacted by the loss of wetland habitat through the diversion of water away from wetlands; drainage of swamps; and clearing for urban and agricultural development. Habitat degradation due to factors such as reduced water quality, invasion by weeds, impacts from grazing animals and reduced water flows due to a changing climate are also impacting on Australasian Bittern survival and breeding success. Predation by introduced species may also be limiting survival but more research is required to determine the relative importance of this threat.

Occurrence in study area

Australian Bittern has not been recorded within the subject land, but is known to move through the site during migration. Suitable habitat is present, represented by Lignum woodland and wetland PCT 13, but this is considered marginal habitat and unlikely to be used regularly or relied upon by the species. Habitat is also available associated with the Coleambally Irrigation Channel.

There is no optimal habitat for the Australasian Bittern within the subject land. The species is known to fly to and from breeding grounds in and around Leeton and Griffith in NSW, through to Victoria. It is very unlikely

that this species would occur within the subject land, other than rare transient use or during increased seasonal flooding events and on short term, temporary basis.

SIC assessment for Australasian Bittern

SIC assessment for Endangered species

Lead to the long-term decrease in the size of a population.

There is a low likelihood that the project would lead to a long-term decrease in the size of an important population of the Australasian Bittern. It is estimated that there are 1300 mature Australasian Bittern individuals in Australia. These can be divided into two subpopulations, the south-eastern and the south-western subpopulations. The rice fields of the Riverina, including the Murrumbidgee and Coleambally Irrigation Areas support the largest known population of Australasian Bittern, and up to 59% of the national population (DAWE 2022c).

It is thought that the population has been in decline for over 30 years, associated with the loss of key breeding habitats. Current threats to the species are primarily associated with hydrological changes and habitat removal or modification, that would further reduce the availability and quality of breeding and foraging habitat for the species.

Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitats for Australasian Bittern, were avoided as much as possible. Within the subject land, there are numerous ephemeral wetlands and drainage lines associated with topographic depressions of the floodplain. Suitable aquatic habitat and low-lying areas with potential for seasonal inundation throughout the subject land have been buffered and excluded by design from development, resulting in retention of larger lignum swamps, farm dams, and avoided long-term impacts to the Coleambally Irrigation Channel. Direct impacts will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of suboptimal ephemeral habitat within PCT 17 and PCT 13 associated with the removal of small areas of ephemeral lignum swamp and fringing areas. These areas are considered marginal for Australasian Bittern, which is known to breed and forage in rice crops further north in the Coleambally Irrigation Area. Although it may utilise these habitats within the subject land on a seasonal or transient basis in response to flooding events, it is unlikely that the species relies upon these habitats to complete its lifecycle. No Australasian Bittern populations were detected or are known to occur within the project area.

Bird deaths due to the 'lake effect' are most likely to occur among large-bodied aquatic birds such as ducks, geese, grebes, pelicans, cormorants, or swans. It is hypothesised that the birds mistake the reflective surface of solar panels for the surface of water. Birds strike the solar panel at a high velocity, believing that the water surface will absorb some of the impact of the landing without causing injury. No threatened species of large-bodied aquatic birds are likely to utilise the solar farm area currently. The lake effect is not likely to impact terrestrial threatened bird species, as these birds do not typically land on water. Also, the cause of death for large-bodied aquatic birds relates to their behaviour while landing; it is noted that other aquatic birds which alight more softly, such as bitterns and other species such as egrets, cranes, and various shorebirds, are not affected. Recent research indicates that the lake effect is most prevalent in arid conditions where there are few water bodies available. Water-obligate species which cannot take off from land are the most likely to be affected. However, when detailed surveys of behaviour of aquatic birds at photovoltaic solar facilities have been undertaken, changes in behaviour of aquatic birds flying near the facilities occurred so infrequently that it was difficult to detect. The proposed development is not considered likely to have lake effect impacts anticipated to occur, and therefore effect the movement of the Australasian Bittern.

There is a low likelihood that the project would result in the long-term decrease in the size of the population of Australasian Bittern.

Reduce the area of occupancy of the species.

The area of occupancy for Australasian Bittern is thought to have declined by 70 percent between 1977 and 2008 as a result of habitat loss, particularly breeding grounds (DAWE 2022c). Changing water regimes and the loss or modification of wetland habitats is considered an ongoing threatening process for the Australasian Bittern. The area of occupancy was

SIC assessment for Endangered species

estimated to be between 600 km^2 and 800 km^2 in 2000 (Threatened Species Scientific Committee 2019), but this has likely further declined as a result of subsequent wetland loss.

Within the subject land, there are numerous ephemeral wetlands and drainage lines associated with topographic depressions of the floodplain. These areas are considered most likely to represent suitable habitat for Australasian Bittern.

The project would result in direct impacts to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of suboptimal ephemeral habitat within PCT 17 and PCT 13 associated with the removal of small areas of ephemeral lignum swamp and fringing areas. These areas are not considered to be high quality habitat for Australasian Bittern, and are unlikely to be occupied by the species on a regular basis given the broader landscape context of more favourable habitat further north in the Coleambally Irrigation Area.

The project would not result in barriers or obstructions to movement in the landscape for the species. The species will continue to be able to forage and breed in retained habitat within and outside of the project area. It is considered unlikely that these minor impacts to potential habitat for this species would cause any meaningful reduction to the area of occupancy for the species, particularly given that areas of higher quality habitat would be retained as a result of the project.

Fragment an existing population into two or more populations.

The project is considered unlikely to lead to fragmentation of an existing population into two or more populations. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. Direct impacts will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of marginal ephemeral habitat within PCT 17 and PCT 13. Suitable wetlands, including ephemeral water bodies and the Coleambally Irrigation Channel would be retained as part of the project. This would result in a matrix of suitable wetlands remaining available for Australasian Bittern within the landscape. Impacts to potentially suitable habitat such as the Coleambally Irrigation Channel, are short-term and temporary, and would not affect the long-term suitability of these sites for use by Australasian Bittern.

The species is highly mobile and capable of travelling large distances to exploit suitable resources. The nature of the project would not preclude the species from occupying the area during favourable conditions, and would not create any barriers to movement for Australasian Bittern such that the population would become fragmented.

Adversely affect habitat critical to the survival of a species.

Given that the Australasian Bittern is presumed to have undergone a severe reduction in numbers, based on historic habitat loss and degradation across the core part of its range, all natural habitat (including constructed wetlands with suitable habitat) in which the Australasian Bittern is known or likely to occur should be considered critical to the survival of the species (Threatened Species Scientific Committee 2019).

The Australasian Bittern prefers wetlands with dense vegetation from 0.5-3.5 metres in height, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds as well as rice crops (DAWE 2022c).

The National Recovery Plan for the species defines critical habitat as any natural wetland habitat where the species is known or likely to occur (breeding or foraging habitat) within its known range. Critical habitat for the Australasian Bittern is therefore likely to occur within the subject land. Although it has not been recorded, there are nearby records associated with the Coleambally Irrigation Channel (Herring, M. 2023), and the Coleambally Irrigation Area further north. Tracking data also shows individuals undertaking migratory movements through the subject land, so it is reasonable to assume that suitable wetlands areas may be utilised by the species, presumably on a short-term and transient basis enroute to

SIC assessment for Endangered species

more suitable areas further north.
The majority of these potentially suitable areas, would be retained as a result of the project. Detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitats for the Australasian Bittern, were avoided as much as possible. Within the subject land, there are numerous ephemeral wetlands and drainage lines associated with topographic depressions of the floodplain. Suitable aquatic habitat and low-lying areas with potential for seasonal inundation throughout the subject land have been buffered and excluded by design from development, resulting in retention of larger lignum swamps, farm dams and the Coleambally Irrigation Channel.
Direct impacts will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of marginal ephemeral habitat within PCT 17 and PCT 13 associated with the removal of small areas of ephemeral lignum swamp and fringing areas. These areas are considered marginal for Australasian Bittern, as they do not have dense vegetative cover or suitable water depth to be considered optimal habitat for the species. It is however possible that they are exploited on a seasonal or transient basis in response to flooding events, or on a temporary basis during migratory movements.
Given that areas of higher quality habitat will be retained, and direct impacts would be associated with marginal potential habitat for the Australasian Bittern, it is considered unlikely the project will adversely affect habitat critical to the survival of the species.

Disrupt the breeding cycle of a population.

The Australasian Bittern breeds from October to February in solitary pairs. However, sometimes several nests may be placed in close proximity to each other (Marchant & Higgins 1993). The species nests adjacent to relatively deep, densely vegetated freshwater swamps and pools, building its nests under dense cover over shallow water (Marchant & Higgins 1990). The species prefers to nest in vegetation that is up to 2.5 m tall and the nests are placed about 30 cm above the water level (Marchant & Higgins 1990). The nest is a shallow structure of dry or green reeds, within a clump of reeds in water or a swamp and is built on a platform of bent-over reeds.
Despite occurring in a range of wetland types, breeding is known to occur in a much smaller sub-set of locations (DAWE 2022c). Breeding has been confirmed in areas of the Riverina, predominantly the Coleambally Irrigation Area where irrigated rice crops provide optimal habitat for Australasian Bitterns.
Direct impacts of the project will be limited to small areas around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of marginal ephemeral habitat within PCT 17 and PCT 13 associated with the removal of small areas of ephemeral lignum swamp and fringing areas. These are not considered suitable breeding habitat for the Australasian Bittern, which do not meet the requirements for breeding habitat described above. No breeding of Australasian Bittern has been recorded in the study area, despite tracking efforts of individual birds travelling to and from the Coleambally Irrigation Area as part of the Bitterns in Rice Project (Herring, M. 2023). It is considered unlikely that Australasian Bittern utilise habitats within the subject land for breeding, and removal of a small amount of non-breeding habitat is unlikely to result in a disruption to the breeding cycle of Australasian Bittern.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The project would result in direct impacts to small areas of suitable wetland vegetation around Coleambally irrigation channel (up to 8.4 ha) as well as 1.27 ha of suboptimal ephemeral habitat within PCT 17 and PCT 13. The project is unlikely to modify remaining potential habitat that may be available to the species during flooding events such that the species is likely to decline. Australasian Bittern is a highly mobile species, and is capable of undertaking large spatial movements to exploit seasonally available resources. Removal of a minor amount of suboptimal habitat is unlikely to represent a significant loss of habitat for the species, or contribute to its decline. Higher quality areas of habitat have been

SIC assessment for Endangered species
retained as a result of the project, and the nature of the project would not preclude the species from occupying habitats within the subject land during favourable conditions.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat.
The project would be subject to a Biodiversity Management Plan that would include biosecurity measures to limit the likelihood of introducing invasive species during construction and operation of the project and details regarding feral animal control. It is unlikely that the project would result in the establishment of new invasive species. The proposal is unlikely to exacerbate the current level of invasive species populations utilising the area, such as cats and foxes. Invasive weeds species are not known to directly harm populations of Australasian Bittern, but do have potential to reduce quality of habitat in wetland areas. The risk of introduction of weed species will be mitigated by the implementation of good soil transportation practices throughout works that will be detailed in the Construction Environment Management Plan (CEMP).
Introduce disease that may cause the species to decline.
The project is unlikely to introduce a disease that may cause the species to decline. The project would be subject to a Biodiversity Management Plan that would include measures for biosecurity and hygiene control to limit the introduction of pathogens as a result of the construction and operation of the project.
Interfere substantially with the recovery of the species.
A national recovery plan currently exists for Australasian Bittern. Actions outlined within the plan to aid in the recovery of the species relating to the project include: • Identify subpopulations of high conservation priority. • Identify key locations that require habitat protection and improvement. • Protect areas of 'habitat critical for survival' that are not currently managed for nature conservation. • Develop and implement a range of voluntary incentives for protecting Australasian Bittern habitat on private land. • Undertake wetland restoration activities, to create suitable habitats for Australasian Bittern. • Monitor habitat subject to restoration and enhancement. The project would result in direct impacts to small areas of marginal wetland vegetation that may be considered suitable habitat for the Australasian Bittern. In the broader landscape context, and based on tracking information of the species, the Coleambally Irrigation Area is considered to be a key location for breeding in the region and a key conservation priority. It is unlikely the project will result in substantial interference with the recovery actions listed for the species.
Conclusion
Based on the assessment above, it is concluded that Australasian Bittern is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of a population, reduce the areas of occupancy or fragment an existing population. • Will not disrupt the breeding cycle of a population, or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.11 A spear-grass *Austrostipa wakoolica*

Species background

Austrostipa wakoolica is listed as endangered under the EPBC Act. The species is a densely-tufted, perennial spear-grass species which grows over one metre tall. The species is characterised by leaves that are flattened or rolled, 1.5 to 2.5 millimetres wide at their bases, slightly too strongly ribbed and densely hairy. The flower-heads are spreading and moderately dense. The species flowers in response to rain, and has been recorded flowering from October to December (DCCEW 2014).

The species does not tolerate disturbance, and as such, requires protection from impacts of grazing and rabbits. Periodic flooding is required to maintain wet conditions within its habitat. *Austrostipa wakoolica's* distribution is confined to the floodplains of the Murray River tributaries of central-western and south-western NSW. The most significant threats to the population are habitat reduction and modification from pastoral development, irrigation and altered flooding regimes; grazing including that by domestic stock, rabbits, and kangaroos; drought due to rainfall-dependence of the species; and weed invasion and competition, particularly from exotic grasses (DCCEW 2014).

Austrostipa wakoolica within the subject land

Recorded habitats include the edge of a lignum swamp in brown loam, creek banks in grey silty clay, mallee and lignum sandy loam flat, open cypress pine forest on low range in sandy soil and a low rock rise fenced-off from stock for about 18 months (DECCW, 2014). Can be associated with PCT 13, PCT 17 and PCT 26 and has been assumed present in these zones. For PCT 26, this species has only been assumed in areas within this zone that is subject to more frequent periodic flooding for its habitat to maintain wetter conditions.

SIC assessment for *Austrostipa wakoolica*

SIC assessment for Endangered species
Lead to a long-term decrease in the size of a population
Austrostipa wakoolica has been surveyed adequately to date in November 2022 and November 2023 and has not been recorded. In terms of avoidance, detailed constraints assessment and modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat for this species, were avoided as much as possible. This included known habitats such as lignum swamp in brown loam with box and mallee, creek banks in grey silty clay, mallee and lignum sandy loam flat, open cypress pine forest on low range in sandy soil (DECCW, 2014). Potential indirect or unexpected impacts will be managed through mitigation measures which are outlined in the BDAR, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures. If the species is detected, further avoidance will be prioritised. It is considered unlikely that the project will lead to a long term decrease in the size of a population.

SIC assessment for Endangered species
Reduce the area of occupancy of a population
Austrostipa wakoolica has been surveyed adequately to date in November 2022 and November 2023 and has not been recorded. Areas surveyed were microhabitats that are subject to more frequent periodic flooding to maintain wetter conditions. This species can be associated with PCT 17 and PCT 26 were suitable microhabitats occur, and minor occurrences in PCT 13 and has been assumed present in these zones. Due to key avoidance measures of this species preferred habitats, it is estimated the total reduction in occupancy of 9.3 ha would occur and not likely to be significant.
Fragment an existing population into two or more populations.
Austrostipa wakoolica has been surveyed adequately to date in November 2022 and November 2023 and has not been recorded. Areas surveyed were microhabitats that are subject to more frequent periodic flooding to maintain wetter conditions. Habitat within the subject land is partially fragmented by historical and ongoing land clearing and grazing regimes. Regardless of the further surveys to be undertaken, it is unlikely the project would result in the fragmentation of a population.
Adversely affect habitat critical to the survival of a species.
No critical habitat for this species has been determined. Due to key avoidance measures, it is unlikely that any habitat critical for this species would occur in the subject land, and therefore be impacted.
Disrupt the breeding cycle of an important population.
It is not considered likely an important population of *Austrostipa wakoolica* occurs within the subject land.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Due to key avoidance measures, it is unlikely that impacts to 9.3 ha of potential habitat, and up to a further 248 ha of sub optimal habitat will lead to a decline in the availability of quality habitat for this species, due to the large expanses of similar habitat in the surrounding landscape.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
Proactive and adaptive mitigation measures will be implemented during construction and operation. Within the subject land, this species habitat is highly dynamic, subject to moderate levels of grazing and does contain patches of weeds such as *Lolium, Hordeum* and other environmental weeds. It is considered unlikely that the project would substantially reduce the quality or integrity of the community's occurrence or significantly increase the spread of invasive species locally and or more broadly.
Introduce disease that may cause the species to decline.
There currently no known diseases causing potential species decline to *Austrostipa wakoolica*.

SIC assessment for Endangered species
Interfere substantially with the recovery of the species.
There is currently no known recovery plan in place for this species, however key threats listed in the conservation advice do consider habitat reduction and altered flooding regimes, primarily related though to agricultural development, to be a key threatening process to this species. It is not considered likely that the project will result in substantial impacts to the recovery of *Austrostipa wakoolica*.
Conclusion.
Based on the assessment above, it is concluded that *Austrostipa wakoolica* is unlikely to be significantly impacted by the project. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of a population, reduce the areas of occupancy or fragment an existing population. • Will not disrupt the breeding cycle of a population or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not substantially interfere with the recovery of the species.

Appendix 6.12 Claypan Daisy *Brachyscome muelleroides*

Species background

Claypan Daisy is listed as vulnerable under the EPBC Act. The species is an annual herb which grows to 7-14 centimeters tall. The plant's single white flowers, which are only 4 millimetres across, are produced from September to November, at the ends of thread-like stems. Thread-like, 5.5 centimeter long leaves also grow from these stems. The species is endemic to south-eastern Australia, where it is restricted to the floodplains of the Murray and Murrumbidgee Rivers and their tributaries in northern Victoria and southern New South Wales, in the Riverina and South Western Slopes IBRA bioregions

While little is known about the former distribution and abundance of Claypan Daisy, is it likely that there has been a historical decline in abundance of the species, as much of the area within its distribution has been cleared for agriculture (DSE 2010a). The most significant threats to the species include altered hydrological regimes, invasive weeds, and grazing. A national recovery plan has been developed for the species. Claypan Daisy occurs in seasonally damp situations such as shallow depressions and around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland, grassy woodland and open forest habitats, growing in association with various grasses and seasonal aquatic plants such as *Marsilea* species.

Claypan Daisy within the subject land

This species prefers seasonally moist grey gilgaied soils on the floodplains within PCTs such as PCT 45 and PCT 46, which occur patchily across the subject land.

SIC assessment for Claypan Daisy

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
Targeted surveys for *Brachyscome muelleroides* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023. Detailed constraints assessment modelling of biodiversity values was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential habitat including within seasonally damp situations such as shallow depression sand around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland and grassy woodland. *Brachyscome muelleroides* has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. It is considered unlikely that the project will lead to a long term decrease in the size of an important population.
Reduce the area of occupancy of an important population.
An important population is considered to occur at Morundah Station and not linked or connected to the subject land. *Brachyscome muelleroides* has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023. Approximate area of occupancy is restricted to the highest areas of potential habitat within PCT 45 and PCT 46, and would be reduced by 1.73 ha, with potential indirect impacts upon 152.38 ha. However as the species has not been recorded, and an important population is not considered to occur, a substantial impact to an area of occupancy of an important population is not considered likely.
Fragment an existing important population into two or more populations.
Habitat within the subject land is partially fragmented by historical and ongoing land clearing and grazing regimes. An important population is not considered to occur. *Brachyscome muelleroides* has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. Therefore, it is considered unlikely any fragmentation would occur.
Adversely affect habitat critical to the survival of a species.
No habitat critical to the survival of this species is considered likely
Disrupt the breeding cycle of an important population.
Brachyscome muelleroides has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. The project is unlikely to significantly impact on the breeding cycle of an important population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Brachyscome muelleroides has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. In terms of avoidance, detailed constraints assessment modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential habitat including within seasonally damp situations such as shallow depression sand around the margins of swamps, lagoons and claypans, on heavy grey cracking clays to lighter clay loam soils, in grassland and grassy woodland.

SIC assessment for vulnerable species
Up to 1.73 ha, with potential indirect impacts upon 152.38 ha of habitat may be impacted but this is unlikely to decrease the availability or quality of habitat and result in species decline, due to the substantial areas of similar habitat in the surrounding landscape.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
Proactive and adaptive mitigation measures will be implemented during construction and operation. Within the subject land, this species habitat is highly dynamic, subject to moderate levels of grazing and does contain patches of weeds such as *Lolium, Hordeum* and other environmental weeds. It is considered unlikely that the project would substantially reduce the quality or integrity of the community's occurrence or significantly increase the spread of invasive species locally and or more broadly.
Introduce disease that may cause the species to decline.
There currently no known diseases causing potential species decline to *Brachyscome muelleroides*
Interfere substantially with the recovery of the species.
A current recovery plan is in place for this species (Lucas, 2010). Key threats included altered hydrological regimes, invasive weeds and grazing impacts. It is not considered likely that the project will result in exacerbating these threats and result in substantial impacts to the recovery of *Brachyscome muelleroides*. Potential impacts will be managed through mitigation measures which are outlined in the BDAR, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.
Conclusion.
Based on the assessment above, it is concluded that *Brachyscome muelleroides* is unlikely to be significantly impacted by the project. This conclusion was made on the basis that the proposed works: • The species was not recorded during surveys. • Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population. • Will not disrupt the breeding cycle of an important population, the local population or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not substantially interfere with the recovery of the species.

Appendix 6.13 Mossgiel Daisy *Brachyscome papillosa*

Species background

The Mossgiel Daisy is listed as vulnerable under the EPBC Act. The species is a multi-stemmed perennial herb that grows up to 40 centimetres tall. Its stemless leaves grow up to 7 centimetres long and leaf edges range from smooth edges to deeply indented. Solitary flowerheads are mauve with a yellow centre and occur on stems 10-25 centimeters tall between June and December. The species is known mainly to occur from Mossgiel to Urana, in south-western NSW. The main threat to the abundance and distribution of Mossgiel

Daisy is land clearing for pasture, with other possible threats including possible habitat disturbance by feral pigs, the presence of introduced weeds, and changes to fire regimes (DECC 2008).

Mossgiel Daisy within the subject land

This species prefers grey and brown clay soils dominated by chenopod species and associated with PCTs 15, PCT 17 and PCT 46, which occur within the subject land. Habitat within the subject land is considered suboptimal, with more optimal habitat occurring further to west of the subject land, within areas dominated by *Atriplex vesicaria* and *Maireana aphylla (OEH, 2018)*.

SIC assessment for Mossgiel Daisy

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
Detailed constraints assessment modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential yet sub optimal habitat including within PCT 15, PCT 17 and PCT 46. *Brachyscome papillosa* occurs over 25 km from the subject land, with the most recent record from over 20 years ago. *Brachyscome papillosa* has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. It is considered unlikely that the project will lead to a long term decrease in the size of an important population.
Reduce the area of occupancy of an important population.
Strongholds for the species occur between Hay and Balranald where it appears in large numbers. *Brachyscome papillosa* has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023. Approximate area of occupancy is restricted to the highest areas of potential habitat with PCT 15, PCT 17 and PCT 46 and would be reduced by 3.11 ha, however as the species has not been recorded and an important population is not considered to occur, a substantial impact to an area of occupancy of an important population is not considered likely.
Fragment an existing important population into two or more populations.
Habitat within the subject land is partially fragmented by historical and ongoing land clearing and grazing regimes. An important population is not considered to occur. *Brachyscome papillosa* has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. Therefore, it is considered unlikely any fragmentation would occur.
Adversely affect habitat critical to the survival of a species.
No critical habitat for this species has been determined. Due to key avoidance measures, it is unlikely that any habitat critical for this species would occur in the subject land, and therefore be impacted.
Disrupt the breeding cycle of an important population.
Brachyscome papillosa has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. The project is unlikely to significantly impact on the breeding cycle of an important population of this species.

SIC assessment for vulnerable species
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
The species was not recorded in the subject land. This local scale loss of habitat is not considered likely to cause *Brachyscome papillosa* to decline considering there are higher quality patches of habitat available in the region, and the wide-ranging nature of the species and large areas of more optimal habitats outside of the subject land.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
Proactive and adaptive mitigation measures will be implemented during construction and operation. Within the subject land, this species habitat is highly dynamic, subject to moderate levels of grazing and does contain patches of weeds such as *Lolium, Hordeum* and other environmental weeds. It is considered unlikely that the project would substantially reduce the quality or integrity of the community's occurrence or significantly increase the spread of invasive species locally and or more broadly.
Introduce disease that may cause the species to decline.
The project will not result in the introduction of a disease that is harmful to *Brachyscome papillosa*.
Interfere substantially with the recovery of the species.
There is currently no recovery plan in place for this species, however key threats listed in the conservation advice do consider habitat reduction due to agricultural practices such as cropping and improved pastures, as well stock trampling and road maintenance. It is not considered likely that the project will result in substantial impacts to the recovery of *Brachyscome papillosa*.
Conclusion.
Based on the assessment above, it is concluded that *Brachyscome papillosa* is unlikely to be significantly impacted by the project. This conclusion was made on the basis that the proposed works: • The species was not recorded during surveys. • Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population. • Will not disrupt the breeding cycle of an important population, the local population or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not substantially interfere with the recovery of the species.

Appendix 6.14 Winged Peppercress *Lepidium monoplocoides*

Species background

Winged Peppercress is listed as endangered under the EPBC Act. The species is an erect herb or perennial forb, which grows 15-20 centimetres high, with angular and striped stems which are roughened with small

warts. The plant grows narrow and linear leaves, mostly 2-7 centimetres long, with small flowers, borne in elongated clusters, with the petals minute or absent. Fruit in the form of a flattened circular pod grows on a spreading stalk (DSE 2010b).

Winged Peppercress is widely distributed on the inland plains of south-eastern Australia, occurring from northern NSW to western Victoria. The species is currently known from 13 locations, six in Victoria and seven in NSW. The total population is estimated at <3,000 plants each in Victoria and NSW.

Winged Peppercress within the subject land

Winged Peppercress is known to occur within the Murrumbidgee IBRA subregion, and historically within the Riverina and this distinctive perennial forb was not recorded in the subject land during field surveys that included targeted searches of suitable PCTs. BioNet lists Winged Peppercress as associated with the following PCTs 15, PCT 26, PCT 45 and PCT 46. Based on habitat quality, current survey effort and the localised nature of possible impacts if a population were to occur, it is concluded the Project is unlikely to lead to a significant impact.

SIC assessment for Winged Pepper-cress

SIC assessment for Endangered species
Lead to a long-term decrease in the size of a population
Targeted surveys for *Lepidium monoplocoides* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023 and this species has not been recorded. Detailed constraints assessment modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential habitat including within PCT 15, PCT 26, PCT 45 and PCT 46. *Lepidium monoplocoides* was not recorded within the subject land during targeted surveys. It is considered unlikely that the project will lead to a long term decrease in the size of an important population.
Reduce the area of occupancy of the species
Lepidium monoplocoides has been surveyed for throughout the development footprint in September 2022 and September 2023. Due to key avoidance measures of this species preferred habitats, it is estimated the area of occupancy restricted to the highest areas of potential microhabitat within PCT 15, PCT 26, PCT 45, and PCT 46, with a total reduction in occupancy to 9.3 ha of potential habitat, and up to a further 248 ha of sub optimal habitat ha, would occur and not likely to be significant.
Fragment an existing population into two or more populations.
Habitat within the subject land is partially fragmented by historical and ongoing land clearing and grazing regimes. A population is not considered to occur, and thus the project will not lead to fragmentation of an existing population.
Adversely affect habitat critical to the survival of a species.
Critical habitat has not been declared for *Lepidium monoplocoides*.

SIC assessment for Endangered species

Disrupt the breeding cycle of a population.

Lepidium monoplocoides regenerates from seed dispersal and often in response to rainfall events. Little is known of the biology and ecology of the *Lepidium monoplocoides.* Numbers of adult plants fluctuate from year to year and, like many annual species occurring in dry environments, some seed probably remains dormant in the soil for several years. Given partial vegetation clearing and soil disturbance will occur as part of the works, and there is the possibility to allow regeneration of low shrubs and groundcovers in between panel arrays, if individuals of a local *Lepidium monoplocoides* population remain undetected there could be potential natural regeneration post-disturbance given its life history. Land could be rehabilitated to allow ground layer recovery and management post construction. Therefore, the project is unlikely to disrupt the breeding cycle of a population.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The species was not recorded in the subject land. This local scale loss of habitat is not considered likely to cause *Lepidium monoplocoides* to decline considering there are higher quality patches of habitat available in in the region, and the wide-ranging nature of the species.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.

The localised occurrences of habitat for the species are subject to existing weed invasion and pest animals as a result of land clearing and surrounding agricultural land use. The proposed works are unlikely to result in an increase of invasive species within the known and potential habitat for *Lepidium monoplocoides.* Construction activities will be managed through standard practices to avoid new introductions and further spread of existing weeds.

Introduce disease that may cause the species to decline.

The project will not result in the introduction of a disease that is harmful to *Lepidium monoplocoides*.

Interfere substantially with the recovery of the species.

The National Recovery Plan for *Lepidium monoplocoides* identifies seven specific objectives for the recovery of the species are to:

- Determine distribution, abundance and population structure
- Determine habitat requirements
- Manage threats to populations
- Identify key biological functions
- Determine growth rates and viability of populations
- Establish a seed bank
- Build community support for conservation

Considering the above factors, the Project will not interfere substantially with the recovery of *Lepidium monoplocoides*.

SIC assessment for Endangered species
Conclusion.
Based on the assessment above, it is concluded that *Lepidium monoplocoides* is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of a population, reduce the areas of occupancy or fragment an existing population. • Will not disrupt the breeding cycle of a population, or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.15 Chariot Wheels *Maireana cheelii*

Species background

Chariot Wheels are listed as vulnerable under the EPBC Act. The species is a perennial forb which grows to approximately 20 centimetres high, with striped and woolly stems and a fleshy swollen taproot. Leaves are narrow, cylindrical, and slender. The distribution of the species is restricted to the southern Riverina region of NSW, mainly in the area between Deniliquin and Hay. The plant is usually found on heavier, grey clay soils with Bladder Saltbush *Atriplex vesicaria*. The species also tends to grow in shallow depressions, often on eroded or scalded surfaces (DSE 2010c).

While little is currently known about the former distribution of Chariot Wheels, it is likely that this species was once more extensively distributed and abundant throughout the inland plains from northern Victoria, through inland NSW to southern Queensland. While perennial saltbush and grassy/herb once dominated native vegetation communities throughout this region, their areas have been severely depleted due to agriculture, especially cropping and grazing. Current threats to the species include damage and destruction of habitat, weed invasion, grazing and rising salinity (DSE 2010c)

Chariot Wheels within the subject land

Recorded habitats include on the heavier grey soils and on the edge of a lignum swamp in brown loam and areas of grey silty clay with slight depressions and microrelief. Can be associated with PCT 46 and PCT 26 and has been subject to survey within these areas.

SIC assessment for Chariot Wheels

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
Targeted surveys for *Maireana cheelii* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023 and the species has not been recorded Detailed constraints assessment modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential yet habitat including within PCT 26 and PCT 46. *Maireana cheelii* occurs over 20 km from the subject land. It is considered unlikely that the project will

SIC assessment for vulnerable species
lead to a long term decrease in the size of an important population.
Reduce the area of occupancy of an important population.
Suitable habitat is broadly available within woodland and grassland PCTs 26 and 46 however does not fall within a known home range or on the limit of distribution. Strongholds for the species occur between Hay and Balranald where it appears in high numbers. Targeted surveys for *Maireana cheelii* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. It is unlikely that any reduction in occupancy is considered significant for this species.
Fragment an existing important population into two or more populations.
Habitat within the subject land is partially fragmented by historical and ongoing land clearing and grazing regimes. An important population is not considered to occur. *Maireana cheelii* has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. Therefore, it is considered unlikely any fragmentation would occur.
Adversely affect habitat critical to the survival of a species.
Critical habitat has not been declared for *Maireana cheelii*.
Disrupt the breeding cycle of an important population.
Maireana cheelii has been surveyed for throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. As such, genetic diversity and dispersal locally and regionally is unlikely to be effected and overall, it is considered unlikely to significantly impact on the breeding cycle of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
The species was not recorded in the subject land. This local scale loss of habitat is not considered likely to cause *Maireana cheelii* to decline considering there are higher quality patches of habitat available in the region, and the wide-ranging nature of the species and more optimal habitats outside of the subject land
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
Proactive and adaptive mitigation measures will be implemented during construction and operation. Within the subject land, this species habitat is highly dynamic, subject to moderate levels of grazing and does contain patches of weeds such as *Lolium, Hordeum* and other environmental weeds. It is considered unlikely that the project would substantially reduce the quality or integrity of the community's occurrence or significantly increase the spread of invasive species locally and or more broadly.
Introduce disease that may cause the species to decline.
The project will not result in the introduction of a disease that is harmful to *Maireana cheelii*.
Interfere substantially with the recovery of the species.

SIC assessment for vulnerable species
A current recovery plan is in place for this species (Mavromihalis, 2010). Key threats included altered threats to populations such as by land clearing and habitat reduction. It is not considered likely that the project will result in exacerbating these threats and result in substantial impacts to the recovery of *Maireana cheelii*. Potential impacts will be managed through mitigation measures which are outlined in the BDAR, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.
Conclusion.
Based on the assessment above, it is concluded that *Maireana cheelii* is unlikely to be significantly impacted by the project. This conclusion was made on the basis that the proposed works: • The species was not recorded during surveys. • Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population. • Will not disrupt the breeding cycle of an important population, the local population or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not substantially interfere with the recovery of the species.

Appendix 6.16 Turnip Copperburr *Sclerolaena napiformis*

Species background

Turnip Copperburr is listed as endangered under the EPBC Act. The species is a small perennial chenopod shrub, characterised by slender branches sparsely covered in short erect or curled hairs, and linear to narrowly obovate leaves, covered with appressed hairs. The plant's flowers are green and tiny while fruits have 5-6 spines and are sparsely to moderately pubescent. The species is endemic to south-eastern Australia, found in native grasslands and grassy woodlands on relatively fertile clay-loam soils (DSE 2010d).

A total of 25 populations of the species have been identified, with upper estimates of total abundance being less than 30,000 individuals. Previous distribution and abundance of the species is not known, however, judging by current distribution and habitat preferences, it is likely that the species was once distributed across a wide area of the Murray-Darling Basin in NSW and Victoria, across grasslands and grassy woodland communities. These habitats have been largely cleared for pasture. The current major threats to the species are considered to include weed invasion, habitat destruction and degradation, altered fire regimes, grazing and increased soil salinity (DSE 2010d).

Turnip Copperburr with the subject land

Recorded habitats include native grasslands and grassy woodlands on relatively fertile clay-loam soils particularly areas with *Austrostipa nodosa* and *Chloris truncata* tussock grasslands on grey to red-brown cracking clays and clay loams. Within the subject land, this includes areas of PCT 26 DNG and PCT 46. Vegetation structure may play an important role in the location of populations, with the species apparently absent from sites dominated by thick swards of grass, which forms majority of subject land, with only small areas of mosaic microrelief resulting in reduced grass cover, and increased forb richness.

SIC assessment for Turnip Copperburr

SIC assessment for Endangered species
Lead to a long-term decrease in the size of a population
Targeted surveys for *Sclerolaena napiformis* have been carried out throughout the development footprint in September 2022/2023 and November 2022/2023 and this species has not been recorded. Detailed constraints assessment modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential including within PCT 26 DNG, a particular area of less grass dominance and records of *Swainsona murrayana* and *Swainsona sericea,* as well as PCT 46, which has also been largely avoided. *Sclerolaena napiformis* was not recorded within the subject land during targeted surveys. It is considered unlikely that the project will lead to a long term decrease in the size of a population.
Reduce the area of occupancy of the species
Sclerolaena napiformis has been surveyed throughout the development footprint in September 2022/2023 and November 2022/2023. Due to key avoidance measures of this species preferred habitats, it is estimated the total potential reduction in area of occupancy restricted to the highest areas of potential habitat within PCT 26 DNG and PCT 46, approximately of 11.8 ha would occur and not likely to be significant.
Fragment an existing population into two or more populations.
Habitat within the subject land is partially fragmented by historical and ongoing land clearing and grazing regimes. A population is not considered to occur.
Adversely affect habitat critical to the survival of a species.
Critical habitat has not been declared for *Sclerolaena napiformis*
Disrupt the breeding cycle of an important population.
Sclerolaena napiformis has been surveyed throughout the development footprint in September 2022/2023 and November 2022/2023 and has not been recorded. As such, genetic diversity and dispersal locally and regionally is unlikely to be effected and overall, it is considered unlikely to significantly impact on the breeding cycle of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
The species was not recorded in the subject land. This local scale loss of habitat is not considered likely to cause *Sclerolaena napiformis* to decline considering there are higher quality patches of habitat available in in the region, and the wide-ranging nature of the species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
The localised occurrences of habitat for the species are subject to existing weed invasion and pest animals as a result of land clearing and surrounding agricultural land use. The proposed works are unlikely to result in an increase of invasive species within the known and potential habitat for *Sclerolaena napiformis.* Construction activities will be managed through standard practices to avoid new introductions and further spread of existing weeds.

SIC assessment for Endangered species
Introduce disease that may cause the species to decline.
The project will not result in the introduction of a disease that is harmful to *Sclerolaena napiformis.*
Interfere substantially with the recovery of the species.
The National Recovery Plan for *Sclerolaena napiformis* (Mavromihalis, 2010) identifies seven specific objectives for the recovery of the species are to: • Determine distribution, abundance and population structure • Determine habitat requirements • Manage threats to populations • Identify key biological characteristics • Determine life history and viability of populations • Establish a seed bank • Build community support for conservation Considering the above factors, the Project will not interfere substantially with the recovery of *Sclerolaena napiformis*.
Conclusion.
Based on the assessment above, it is concluded that *Sclerolaena napiformis* is unlikely to be significantly impacted by the proposed works. This conclusion was made on the basis that the proposed works: • Will not lead to the long term decrease of a population, reduce the areas of occupancy or fragment an existing population. • Will not disrupt the breeding cycle of a population, or species as a whole. • Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread. • Will not interfere will the recovery of the species.

Appendix 6.17 Red Darling Pea *Swainsona plagiotropis*

Species background

Red Darling Pea is listed as vulnerable under the EPBC Act. The species is a small, perennial herb which grows to 30 centimetres tall. The compound leaves are 5 to 10 centimetres long, with 17 to 23 narrow leaflets. Flowers are 10 to 15 millimetres long, have a characteristically sideways twisted keel and fade to violet with age. The species occurs on relatively open native grasslands with 350 to 450 millimetres average annual rainfall, and on seasonally waterlogged red-brown clay and clay loam soils.

Approximately 60 populations of the species are currently known. The species occurs in the upper Murray River valley in the south-western plains of NSW and into Victoria. The Red Darling Pea was apparently abundant and widely distributed within the main part of its range at the time of European settlement of the Riverina plains. While the species is still relatively widely distributed and can be locally abundant in years of good rainfall, it is predicted that the abundance had declined due to land use changes across much of its distribution. Current threats to the species include weed invasion, grazing, habitat destruction and degradation, rising soil salinity and climate change.

Red Darling Pea in the subject land

Recorded habitats include native grasslands and grassy woodlands on relatively fertile clay-loam soils particularly areas with *Austrostipa nodosa* and *Chloris truncata* tussock grasslands on grey to red-brown cracking clays and clay loams. Within the subject land, this includes areas of PCT 26 DNG and PCT 46. Vegetation structure may play an important role in the location of populations, with the species apparently absent from sites dominated by thick swards of grass, which forms majority of subject land, with only small areas of mosaic microrelief resulting in reduced grass cover, and increased forb richness. Weeping Myall communities, both woodland and DNG, are largely homogeneous through the broader region and subject land (i.e. similar species composition), small areas of microrelief do occur on occasion that form small mosaic alterations with the introduction of some additional species, more consistent with other vegetation types, and the overall structure. Areas of derived grassland with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust, and in the absence of *Walwhalleya proluta, Plains Grass Austrostipa aristiglumis* and *Enteropogon acicularis* as the dominant species. Swainsona habitat has also been observed to have a lower cover of grazing-tolerant robust chenopods and less dense grass sward, and where grazing activities were limited to cattle, and in the absence of heavier sheep grazing

SIC assessment for Red Darling Pea

SIC assessment for vulnerable species
Lead to the long-term decrease in the size of an important population of a species.
Targeted surveys for *Swainsona plagiotropis* have been carried out throughout the development footprint in September 2022 and September 2023 and this species has not been recorded. It was found to be flowering during surveys in September 2023 at a known reference population near Jerilderie. Detailed constraints assessment modelling of biodiversity vales was undertaken to ensure areas of high biodiversity value, and therefore most likely habitat, were avoided as much as possible. This includes areas within the subject land considered potential habitat including within PCT 26 and PCT 46. *Swainsona plagiotropis* occurs over 20km from the subject land. This species is primarily found on the Hay Plain, which occurs anecdotally west of Oolambeyan National park on the flat scalded plains towards Balranald, but also known to occur within the Jerilderie Nature Reserve, where this species was observed from in September 2023. It is considered unlikely that the project will lead to a long term decrease in the size of an important population.
Reduce the area of occupancy of an important population.
Suitable habitat is broadly available within woodland and grassland PCTs 26 and 46 where vegetation structure is limited to sites largely lacking thick swards of grass, in which approximately 11.8 ha would be impacted. Strongholds for the species occur between Hay and Balranald where it appears in high numbers. Known to occur within the Jerilderie Nature Reserve, to which this species was observed at the latter in September 2023. *Swainsona plagiotropis* has been surveyed for throughout the development footprint in September 2022 and September 2023 and has not been recorded. It is unlikely that any reduction in area of occupancy restricted to the highest areas of potential habitat within PCT 26 DNG and PCT 46 is considered significant for this species.
Fragment an existing important population into two or more populations.
Habitat within the subject land is partially fragmented by historical and ongoing land clearing and grazing regimes. An important population is not considered to occur. *Swainsona plagiotropis* has been surveyed for throughout the development footprint in September 2022 and September 2023 and has not been recorded. Therefore, it is considered unlikely any fragmentation would occur.

SIC assessment for vulnerable species
Adversely affect habitat critical to the survival of a species.
Critical habitat has not been declared for *Swainsona plagiotropis*.
Disrupt the breeding cycle of an important population.
Swainsona plagiotropis has been surveyed for throughout the development footprint in September 2022 and September 2023 and has not been recorded. As such, genetic diversity and dispersal locally and regionally is unlikely to be effected and overall, it is considered unlikely to significantly impact on the breeding cycle of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
The species was not recorded in the subject land. This local scale loss of habitat is not considered likely to *Swainsona plagiotropis* to decline considering there are higher quality patches of habitat available in the region, and the wide-ranging nature of the species and large areas of more optimal habitats outside of the subject land.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
Proactive and adaptive mitigation measures will be implemented during construction and operation. Within the subject land, this species habitat is highly dynamic, subject to moderate levels of grazing and does contain patches of weeds such as *Lolium, Hordeum* and other environmental weeds. It is considered unlikely that the project would substantially reduce the quality or integrity of the community's occurrence or significantly increase the spread of invasive species locally and or more broadly.
Introduce disease that may cause the species to decline.
The project will not result in the introduction of a disease that is harmful to *Swainsona plagiotropis.*
Interfere substantially with the recovery of the species.
A current recovery plan is in place for this species (Tonkinson, 2010) and identifies eight specific objectives for the recovery of the species are to: • Determine distribution, abundance and population structure • Identify habitat requirements • Ensure that all populations and their habitat are protected and managed appropriately • Manage threats to populations • Identify key biological characteristics • Determine life history and viability of populations • Maintain ex situ collections • Build community support for conservation Potential impacts will be managed through mitigation measures which are outlined in the BDAR, which includes but not limited to detailed BMP, pre-clearance surveys, adaptive management and unexpected finds procedures.

SIC assessment for vulnerable species

Conclusion.

Based on the assessment above, it is concluded that *Swainsona plagiotropis* is unlikely to be significantly impacted by the project. This conclusion was made on the basis that the proposed works:

- The species was not recorded during surveys.
- Will not lead to the long term decrease of an important population, reduce the areas of occupancy or fragment an existing important population.
- Will not disrupt the breeding cycle of an important population, the local population or species as a whole.
- Will not adversely modify the species habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread.
- Will not substantially interfere with the recovery of the species.

Appendix 6.18 Natural Grasslands of the Murray Valley Plains

Community background

The vegetation is dominated by the ground layer with range of perennial grasses, forbs and small shrubs with typical characteristic species including *Rytidosperma*, *Austrostipa, Chloris, Enteropogon, Bulbine, Calotis, Chrysocephalum, Ptilotus, Rhodanthe, Swainsona,* with occasional *Atriplex* and *Maireana* (SEWPAC, 2012). Past and present grazing regimes as well as drought and rainfall patterns influence the composition of the community, and as such, some species may not always be evident above-ground, but instead exist in the seedbank (Threatened Species Scientific Committee, 2012). Most occurrences of the community are associated with alluvial sediments and gently undulating gilgai plains on heavy-textured grey cracking clay soils, however, does have a minor association with red and brown clay soils (TS Committee, 2012). The community is similar to some other derived grassland forms of the Weeping Myall woodlands listed under both the BC Act and EPBC Act however, it generally differs in the proportional composition of species (TS Committee, 2012).

Natural grasslands in the subject land

Due to the seasonal and dynamic aspects of determining natural and derived grasslands in the Riverina, a precautionary approach was undertaken. Areas of PCT 45 and PCT 46 that are located within slightly lower lying grey loam to cracking clay loosely fit the description of the EPBC Act listed Murray Valley Plains Natural Grassland TEC despite the region being on the north western edge of the TEC distribution. These native grasslands are in moderate condition due to long term grazing. The grasslands are dominated by native Spear-grasses *Austrostipa spp*., Wallaby-grasses *Rytidosperma spp*., Windmill Grass *Chloris truncata*, Panic-grass *Walwhalleya proluta* and Curly Windmill Grass *Enteropogon acicularis.* A range of grazing tolerant native herbs are present and some less grazing-tolerant native plant species occur at low densities that form mosaic in amongst Weeping Myall woodland and derived areas.

SIC assessment for Natural grasslands

SIC assessment for critically endangered communities
Reduce the extent of an ecological community
The project would result in a reduction of the extent of the Natural Grasslands of the Murray Valley Plains by 1.73 ha. It is estimated in the Riverina that approximately 61,000 ha (TSSC,2012) remain in the region. Larger patches have been a key focus of avoidance throughout the project design. In total, the loss of small patches, and fringing areas to larger more significant patches, in conjunction with proactive and adaptive mitigation measures, determine that this reduction would not be classified as significant.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines
The project would result in a reduction of 1.73 ha, with potential indirect impacts to 152.58 ha, with this community generally occurring within a fragmented landscape impacted land use such as such as agriculture, transport and other rural infrastructure. Due to key avoidance measures implemented for these areas, it is unlikely that the project will exacerbate any impacts and result in significant increase in fragmentation of this community beyond the exiting environment and land use.

SIC assessment for critically endangered communities

Adversely affect habitat critical to the survival of an ecological community

The current advice on Natural Grasslands of the Murray Valley Plains (SEWPAC, 2012) does not indicate or describe any habitats or areas critical to the survival of this community. Due to key avoidance measures implemented for these areas, it is unlikely that the project will have impacts considered significant on critical habitat.

Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

The project is considered unlikely to substantially modify or destroy above mentioned abiotic factors due to small areas of local scale loss of habitat, mitigation measures and key avoidance of larger more viable patches.

Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The project would result in a reduction of 1.73 ha, with potential indirect impacts to 152.58 ha, which is generally in moderate to good condition, although subject to moderate levels of grazing regimes, both sheep and cattle. Impacts will occur to more smaller already fragmented patches, as well as to fringing areas of larger more viable patches only, meaning persistence of large high quality areas of grassland will be retained locally. The project is considered unlikely to cause substantial change to species composition of an occurrence of this TEC, particularly in retained areas and areas located more broadly, or outside of the subject land.

Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:
– assisting invasive species, that are harmful to the listed ecological community, to become established, or
– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological
- community which kill or inhibit the growth of species in the ecological community

Within the subject land, this TEC is highly dynamic, subject to moderate leaves of grazing and does contain patches of weeds such as *Lolium, Hordeum* and other environmental weeds. It is considered unlikely that the project would substantially reduce the quality or integrity of the community's occurrence or significantly increase the spread of invasive species locally and or more broadly. Proarctive and adaptive mitigation measures will be implemented.

Interfere with the recovery of an ecological community

No national recovery plan currently exists for this community. Although 1.73 ha, with potential indirect impacts to 152.58 ha, will be impacted, due to key avoidance measures implemented, retaining areas of this community and commitment to improve/maintain principles, it is unlikely that impacts resulting from the project will result in substantial impacts relating to the recovery of this TEC.

Conclusion.

Based on the assessment above, it is concluded that Natural Grasslands of the Murray Vallely Plains are unlikely to be significantly impacted by the project. This conclusion was made on the basis that the project:

- Will not lead to the long term significant decrease of extent.
- Will not disrupt critical habitat or increase fragmentation of this community.

SIC assessment for critically endangered communities

- Will not adversely modify the habitat or introduce invasive species/diseases – project mitigation measures are to be implemented to mitigate any potential weed incursion/disease spread.
- Will not significantly interfere will the recovery of the species.

Appendix 7 Biodiversity Offset Strategy

13 September 2023

Julian Kasby
Senior Development Manager
Spark Renewables
Via email
julian.kasby@sparkrenewables.com.au

Dear Julian,

Biodiversity Offset Strategy for the Dinawan Energy Hub

Project no. 39398

Background

Spark Renewables Pty Limited (Spark Renewables) proposes to develop land between the towns of Coleambally and Jerilderie in New South Wales (NSW) as a wind farm, solar farm and battery energy storage system (BESS), collectively described as the Dinawan Energy Hub (the project). The project is considered a State Significant Development (SSD) and will be assessed under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). A SSD triggers the Biodiversity Offsets Scheme (the Scheme), and an assessment is required in accordance with the NSW Biodiversity Assessment Method (BAM) (DPIE 2020) and the NSW *Biodiversity Conservation Act 2016* (BC Act). A Biodiversity Development Assessment Report (BDAR) is required to be prepared for each component of the project (being the wind farm, and the solar farm and BESS separately), and a Biodiversity Offset Strategy (BOS) is required for each as outlined in the Secretary's Environmental Assessment Requirements (SEARs) published for the project(s).

The project will involve the removal of native vegetation within the development sites for each component, and this, as well as impacts to threatened species habitat, is required to be offset in accordance with the Scheme. This BOS provides an outline of the biodiversity offsetting options available to Spark Renewables, as well as more detailed assessment of five properties, proximal to the project, considered potentially suitable for the establishment of Biodiversity Stewardship Sites, to provide offsets directly for the project.

Project offset requirements

Assessments in accordance with the BAM to determine the project's offset requirements are ongoing, however impacts to native vegetation (Plant Community Types [PCTs]) associated with the solar farm and BESS project component are the most progressed, and are provided in Table 1 below. These impacts are shown along with the associated Threatened Ecological Communities (TECs) for the impacted PCTs, as listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW BC Act).

Table 1 Summary of direct impacts to vegetation for Dinawan solar farm and BESS

PCT	TEC	Impacts (ha)	Credits required
13 Black Box - Lignum woodland wetland	N/A	0.2	6
15 Black Box open woodland wetland with chenopod understorey	N/A	1.0	26
17 Lignum shrubland wetland	N/A	9.2	212
26 Weeping Myall open woodland	Weeping Myall Woodlands (BC Act and EPBC Act)	2458.3	39,382
45 Plains Grass grassland	Natural Grasslands of the Murray Valley Plains (EPBC Act)	5.2	296
46 Curly Windmill Grass - speargrass - wallaby grass grassland	Natural Grasslands of the Murray Valley Plains (EPBC Act)	6.2	353
Total	-	**2480.1**	**40,275**

Impacts to native vegetation associated with the wind farm project component are expected to be broadly similar to those associated with the solar farm and BESS as provided in the table above. Based on an approximate impact area of 780 hectares, it can be assumed that the wind farm is likely to add approximately 30 % on to the total offset credit requirements outlined above.

The wind farm is also expected to impact upon the following PCTs not impacted by the solar farm and BESS:

- PCT 24 *Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains.*
- PCT 28 *White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone.*
- PCT 160 *Nitre Goosefoot shrubland wetland on clays of the inland floodplains.*

Impacts to certain BC Act listed threatened species, considered 'species credit species' in accordance with the BAM, also require species specific offsets over and above those required for impacts to PCTs. Target surveys for species credit species are ongoing, so impact areas and offset requirements are not yet known, however impacts to the following species credit species are expected (from the solar farm and BESS):

- Austral Pillwort *Pilularia novae-hollandiae.*
- *Austrostipa wakoolica*.
- Slender Darling Pea *Swainsona murrayana*.
- Silky Swainsona-pea *Swainsona sericea*.
- Southern Bell Frog *Litoria raniformis*.

Background to NSW Biodiversity Offset Scheme and Biodiversity Stewardship Site establishment

As outlined above, as a SSD the project triggers the Scheme requiring biodiversity assessment be undertaken in accordance with the BAM, preparation of a BDAR, and a resultant biodiversity offset liability for unavoidable impacts to native vegetation, threatened species, and in some cases protected (non-threatened) species as a result of BAM prescribed impacts.

In NSW biodiversity offsets are calculated as biodiversity credits, using the BAM, with the type and number of credits required directly dependent of the type and extent of a project's impacts. The type of biodiversity credits required is based on the impacted entities (PCTs and/or listed threatened species), and the quantum of offsets is based on a combination of total area of impact and the condition of the vegetation/habitats impacted. This quantum is calculated using the online BAM Credit Calculator based on mapped impact areas (hectares) and BAM floristic plot data captured on site. The project's offset requirement is a critical component of the BDAR and forms part of project approvals.

Once approved the project's offset liability will need to be secured prior to the commencement of construction. There is some scope to stage the security of biodiversity offsets, whereby only the offset liability for each stage needs to be secured prior commencement of that stage, this however requires some detailed planning to be undertaken prior to Environmental Impact statement (EIS) lodgement.

To secure an offset liability for an approved project a proponent has three broad options, which include:

- Payment to the Biodiversity Conservation Fund (the Fund) managed by the Biodiversity Conservation Trust (BCT).
- Purchase of credits from the open market.
- Establishment of a Biodiversity Stewardship Site(s) to generate credits for offsetting the project specifically.

Each of these options has some potential benefits and drawbacks, which are briefly outlined below.

Option 1: Payment to the Fund managed by the BCT

Satisfying an offset obligation by paying to the Fund has the major benefit of being an expedited and unambiguous way for a proponent to meet their obligations. However, it does include increased costs associated with the 'Risk premium', and an administrative cost per credit added on top of the costs to source/generate the credits, calculated by the BCT. As such, Payment to the Fund is considered likely to be the most expensive option available to a proponent, however it requires the least amount time and effort in offset security, which can both be substantial (e.g., compared to establishing a Stewardship Site).

Option 2: Purchase credits from the open market

Biodiversity credits exist in an open market-based system whereby an owner of a Biodiversity Stewardship Site, who has generated a range of biodiversity credits, lists their credits in an online database for proponents with a credit obligation to interrogate and enter into price negotiations with relevant credit holders. As an open market, the price of credits is set by supply and demand factors as well as requirements for credits generated at a Biodiversity Stewardship Site to be sold for at least the minimum portion each credit contributes to the management costs of that site (Part A cost, further detailed below). Initial credit sales must all go to funding the management actions required to be undertaken at the Biodiversity Stewardship Site (the costing of which is termed the 'Total Fund Deposit' [TFD]), however once the TFD has been fully satisfied, any future credit sales are generally direct profit to the credit owner.

Potential benefits from procuring credits from the open market include a potential increase in offsetting options when applying the 'Like-for-Like' rules included in the BAM, and then further again with the 'Like for Like Variation Rules', as well as the ability to negotiate with sellers on price, potentially with multiple credit holders. Drawbacks include an ongoing general paucity of credits available on the market (which is particularly relevant to projects with large credit obligations), sellers setting a high price and being unwilling to negotiate, timeframes associated with negotiations, timeframes associated with procurement of a range of credit types (where required), timeframes to process sales, and additional credit 'transfer' and 'retirement' fees.

Option 3: Establish a Biodiversity Stewardship Site (or multiple sites)

Establishment of a Biodiversity Stewardship Site (or multiple sites) with the intention of generating credits to satisfy the project's offset obligation is considered likely to be the most suitable option available to Spark Renewables for the project. This is due to the expected quantum of offsets that will be required for the project, and the associated cost of securing those offsets through either the open credit market or via payment to the Fund. The suitability of this option is however dependent on securing land that is both suitable for the establishment of a Biodiversity Stewardship Site and supports PCTs/habitats considered Like-for-Like with those impacted by the project.

The major benefit of establishing a Biodiversity Stewardship Site to offset the project's impacts is the expected substantial reduction in the cost of offset security. The price of biodiversity credits on the open market (and those secured by the BCT via the Fund) is made up of two parts:

- Part A (compulsory) – the cost associated with implementing the required management actions at the Biodiversity Stewardship Site where the credits are generated (equivalent to the TFD); and
- Part B (optional) – the cost to the landholder associated with the establishment of the offset site (i.e., cost recovery, and lost opportunity costs), and most significantly, the landholder's profit margin.

Under the situation where a proponent establishes a Biodiversity Stewardship Site to offset the impacts of their project, the Part B (optional) portion of the offset credits would generally be greatly reduced by excluding the profit margin, and any other non-essential cost recovery items. The price of the credits would therefore only comprise the Part A (compulsory) cost, or in other words the minimum dollar value required to generate the credits through on site protection and management of habitat. This exclusion (or reduction) of the Part B cost, generally results in substantial cost savings when compared to the price of credits on the open market, and/or the price paid to the Fund.

Drawbacks associated with the establishment of Biodiversity Stewardship Sites are associated with the large areas of land required to generate sufficient offset credits (generally between five to eight times the area of native vegetation impacted at the development site), sterilisation of the land for virtually all future uses other than in-perpetuity biodiversity conservation (some managed low-impact grazing may be allowable), and the ongoing requirement to manage the site to ensure the management actions, outlined in the Biodiversity Stewardship Site Management Plan, are implemented to the required standard.

One further drawback is the time required to establish a Biodiversity Stewardship Site and generate the credits required to offset a project's liability. It is common for the process to take 12 to 18 months from the time initial site suitability investigations commence, to the time credits and generated and become available for offsetting. Initial site investigations are followed by detailed site surveys in accordance with the BAM (essentially to the same level of detail required for the BDAR), which may be seasonally dependent, followed by preparation of a detailed Biodiversity Stewardship Site Assessment Report (BSSAR) and Biodiversity Stewardship Site Management Plan, submitted to, and reviewed by, a sub-branch of the Department of Planning and Environment (the Credit Supply Taskforce). Revisions to the mapping, reports and management

plans following regulator reviews are invariably required, all adding to the time taken to pass through the entire process. Early engagement with potential landowners therefore becomes essential to have the credits generated and available for offsetting at the time of commencement of the construction phase of the project.

As outlined above however, the establishment of Biodiversity Stewardship Sites is considered to be the most suitable and cost-effective option available to secure the expected quantum of biodiversity offsets required by the project, and an assessment of five subject properties is provided below.

Assessment of potential Biodiversity Stewardship Sites

The five properties subject to on-ground assessment to determine their suitability for establishment of Biodiversity Stewardship Sites, and to generate offset credits suitable for the project's requirements, are as follows, and illustrated on :

- Four Corners – Approx. 4200 ha area to the north-west of the wind farm project area.
- Goolgumbla – Approx. 2100 ha area to the north of the wind farm project area.
- Red Swamp – Approx. 1100 ha area to the north of the solar farm project area.
- Stuart – Approx. 3400 ha area to the south of the wind farm area.
- Turkey Plains – Approx. 950 ha area near the centre of the wind farm project area.

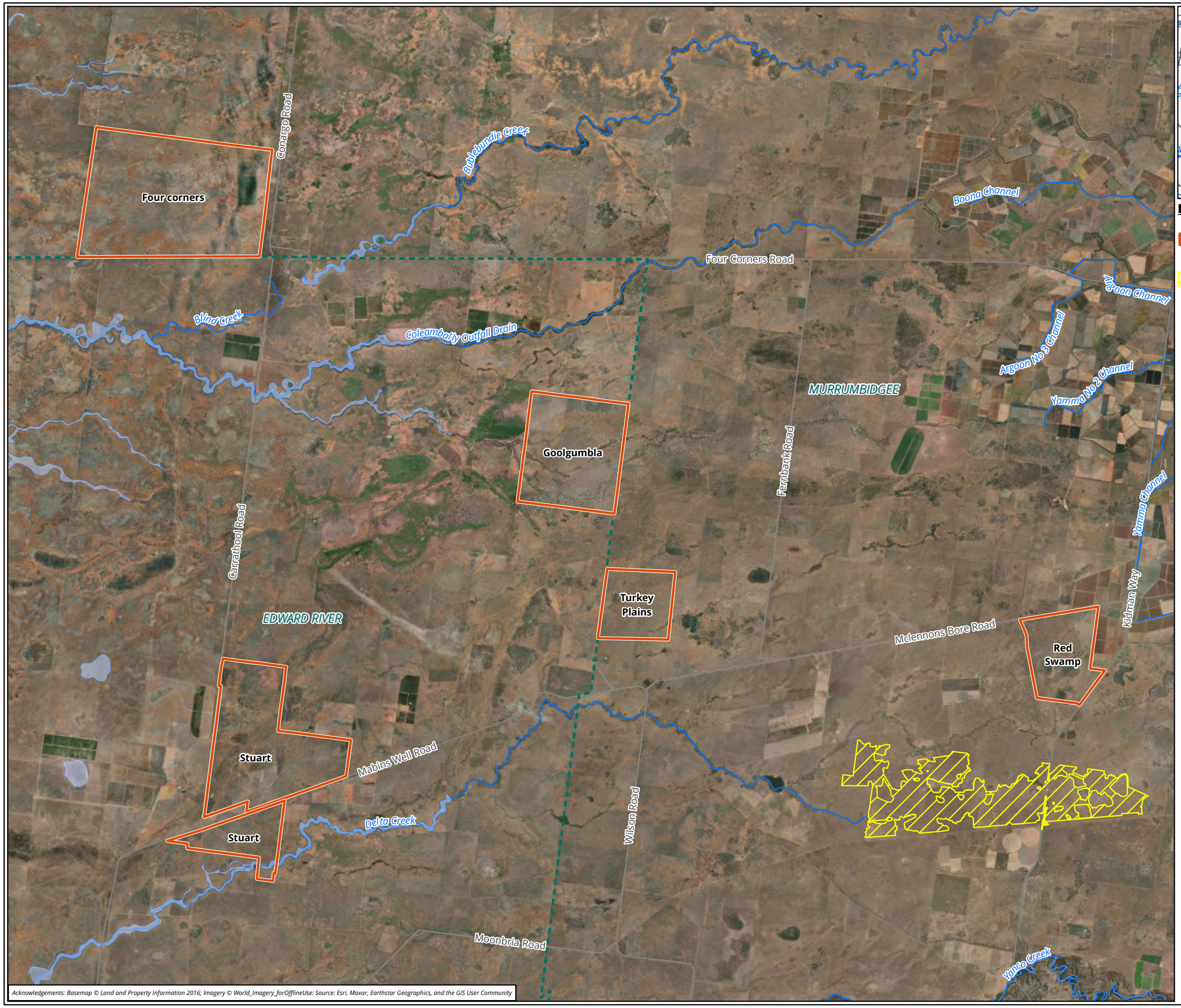


Figure 1 Location of the potential Biodiversity Stewardship Sites

Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Matter: 39098, Date: 18 August 2023,
GIS: JB, Checked by: NL, Last edited by: jbeckius
Location: P:\39000s\39098\Mapping\
39098_Dinawan_BSSAR.aprx
Layout: 39098_F1_Location

Method

Background research

Desktop review of background information was undertaken to provide ecological context to the subject properties and items to consider during further assessment, including:

- BioNet Atlas of NSW Wildlife for BC Act listed threatened entities.
- Protected Matters Search Tool for EPBC Act matters of national environmental significance.
- Vegetation mapping including:
  - Riverina State Vegetation Type Mapping (SVTM) (DPIE 2016).
  - Biosis PCT mapping undertaken across the broader project area to date.
- Establishment of a Stewardship Site case for the project in the BAM Calculator and assessment of predicted threatened species.
- Research into factors influencing the boundaries of the potential Biodiversity Stewardship Sites such as areas to be excluded via review of Land and Property Information easements spatial layers, MinView searches, current cadastral databases, land zoning, and research into any existing offset obligations.

Field investigation

Field investigations of the subject properties were completed by two experienced Biosis ecologists, over five days (24-26 July and 01-02 August 2023), and included:

- Rapid ground-validation of mapped vegetation to preliminary PCTs and broad scale mapping of ecological condition states.
- Determination of high-level expected management issues/actions required to be undertaken to generate the biodiversity credits if a Biodiversity Stewardship Site is established. Including assessment of any management issues considered substantial enough to preclude areas from being entered in a Biodiversity Stewardship Site.
- Collection of floristic plot data (BAM plots) used for calculation of credit generation potential.
- Assessment of areas of potential habitat for threatened species that could generate 'species credits', and/or confirmation of existing species records.

Credit calculations and suitability assessment

Following completion of the field investigations, analysis of the data collected was undertaken to:

- Map and calculate the areas of vegetation zones (PCTs x ecological condition states).
- Calculate the estimated number of biodiversity credits generated by the subject properties through entry of vegetation zone areas and relevant BAM plot data into the online BAM Credit Calculator.
  - BAM plot data collected across the subject properties was supplemented with data collected during the preparation of the solar farm and BESS BDAR. Where no plot data was available for certain PCTs present on the subject properties, appropriate credit generation ratios were applied based on similarities in ecological condition and BDAR/BOS field data.

- Complete a suitability assessment, based on Offset Trading Group (OTG), to determine which areas of the subject properties would be best suited to generate credits that could be used to offset the impacts of the projects.

Results

Background research

Desktop review of background information found a range of suitable PCTs as being mapped across the subject properties and exiting records of target species credit species, which have the potential to generate offset credits for the project. These items were ground validated with further detail provide below.

Desktop assessment into factors influencing the areas of each of the subject properties which can be entered into a Biodiversity Stewardship Site, such as the presence of utilities and assets and associated easements, mining leases, Crown Lands and other considerations such as existing conservation obligations, also found a range of items present across the subject properties. Such items generally require exclusion from a Biodiversity Stewardship Site, and as such coinciding areas of mapped vegetation and habitats cannot generate offset credits.

Table 2 provides the details of the factors influencing the potential boundaries of future Biodiversity Stewardship Sites at each of the subject properties, and provides an estimated percentage reduction in total area available for biodiversity credit generation (compared to the full extent of mapped vegetation and habitats on each site).

Table 2 Results of desktop research into factors influencing the Biodiversity Stewardship Site areas and boundaries

Biodiversity Stewardship site	Approx. area	Utilities from Dial Before You Dig searches	Mining leases	Crown lands	Other considerations	Percentage reduction in credit generation
Four corners	4203 ha	• Essential Energy easement present within the site along southern boundary adjacent to North Boundary Road.	• None present.	• A number of Crown Lands roads easements occur in a grid pattern through the site.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.
Goolgumbla	2131 ha	• Essential Energy underground earth/wires, poles and (assumed) overhead powerlines along Pooginook Road along site's western boundary, crossing through north-western lots away from the roadway. • Telstra cabling along Pooginook Road, unlikely to occur within or influence the site.	• None present.	• A Crown Lands road easement occurs through the centre of the site running in an east/west direction.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.
Red Swamp	1119 ha	• Transgrid communication cable in/adjacent to Kidman way, unlikely to occur within or influence the site. • Essential Energy underground earth/wires, poles and (assumed) overhead powerlines along Cadell Road along site's western boundary and Kidman Way along the site's south-eastern boundary. • Telstra cabling along Mclennons Bore Road, unlikely to occur within or influence the site. • Telstra cabling along Kidman Way appears to occur within the site.	• None present.	• Crown Lands road easements occur along the northern, western and southern boundaries of the site and encroach slightly into the site.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.

Biodiversity Stewardship site	Approx. area	Utilities from Dial Before You Dig searches	Mining leases	Crown lands	Other considerations	Percentage reduction in credit generation
Stuart	3365 ha	• Essential Energy underground earth/wires, poles and (assumed) overhead powerlines occur through the central portion of the site from Mabins Well Road in the southern portion of the site, and Carrathool Road along the site's western boundary. • Telstra cabling / infrastructure along Mabins Well Road and Carrathool Road may occur within the site. • Telstra cabling / infrastructure occurs within the central portion of site in Lots 22 and 28 DP756311, and Crown Land road easements.	• None present.	• A number of Crown Lands roads easements occur within the northern and southern portions of the site.	• A number of areas of Category 2 – Sensitive Regulated Land occur within the property assumed to represent historic and/or current conservation agreements or set-asides etc. these areas have been excluded from the potential BSA areas.	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers. • 633 ha (approx.) excluded for assumed conservation areas.
Turkey Plains	967 ha	• Essential Energy poles and (assumed) overhead powerlines occur through the north-western potion of the site	• None present.	• Crown Lands roads easements occur in the north and south of the site running in an east/west direction.	• Nil	• 5% reduction for utility asset maintenance corridors and Crown Roads buffers.

Field investigation, Credit calculations and suitability assessment

Field investigations confirmed the presence of nine different PCTs across the five subject properties, details of which are provided in Table 3 below.

Table 3 PCTs confirmed present within the subject properties

PCT	Offset Trading Group (OTG)	Four Corners	G'gumbla	Red Swamp	Stuart	Turkey Plains
10 River Red Gum - Black Box woodland wetland	Inland Riverine Forests <50% cleared				X	
13 Black Box - Lignum woodland wetland	Inland Floodplain Woodlands ≥50% to 70% cleared	X	X	X		X
15 Black Box open woodland wetland with chenopod understorey	Inland Floodplain Woodlands ≥50% to <70% cleared			X		
16 Black Box grassy open woodland wetland	Inland Floodplain Woodlands ≥50% to <70% cleared		X	X		X
17 Lignum shrubland wetland	Inland Floodplain Shrublands ≥50% to <70% cleared	X	X	X	X	
26 Weeping Myall open woodland	Weeping Myall Woodland TEC	X	X	X	X	X
28 White Cypress Pine open woodland	Sandhill Pine Woodland TEC		X		X	
44 Forb-rich Speargrass - Windmill Grass - White Top grassland	Riverine Plain Grasslands ≥70% to <90% cleared					X
164 Cotton Bush open shrubland	Riverine Chenopod Shrublands <50% cleared				X	

Ecological condition was found to range from good to low and derived native grasslands and are illustrated on Figure 2.

Threatened species habitat was assessed and habitat was recorded for species expected to require offsets as a result of the project, with Silky Swainson-pea record on the Turkey Plains property (Figure 2). Further assessment and targeted surveys would be required to determine the presence of the target threatened species across the subject properties.

Management actions that would be required to be undertaken following the establishment of a Biodiversity Stewardship Site across the subject properties were found to include fairly standard requirements such as; weed control, fence removal for fauna passage, fence installation/maintenance for stock exclusion, access track closures and maintenance, removal of dumped farm refuse and scrap building material, etc. None were found to be of significant concern in terms of preventing a BSA from being established over (portions of) the sites. High level management requirements are illustrated on Figure 3.

The offset credits that could potentially be generated at each property were assessed using BAM plot data collected across the subject properties, supplemented with relevant data collected from the solar farm and BESS BDAR. Table 4 provides the areas of each PCT and Offset Trading Group (OTG) recorded across the subject properties along with an estimate of the potential credits that could be generated (considering the exclusions detailed in Table 2). It should be noted that offset credit generation potential is considered an estimate only and further detailed assessment and collection of additional plot data is required to confirm the numbers presented herein. However the data in Table 4 provides a good indication of the amount of offsets each property would be able to provide, which match those expected to be required by the project.

Table 4 Summary of OTGs and PCTs mapped and potential credit generation across the subject properties

OTG	PCT ID	Area (ha) mapped					Potential credits generated					
		Four Corners	G'gumbla	Red Swamp	Stuart	Turkey Plains	Four Corners	G'gumbla	Red Swamp	Stuart	Turkey Plains	Total est. credits
Inland Riverine Forests <50% cleared	**10**				37					120		**120**
Inland Floodplain Woodlands ≥50% to 70% cleared	**13**	14	434	126		33	86	2492	639		178	**3395**
	15			3					16			**16**
	16		3	84		11		16	422		66	**504**
Inland Floodplain Shrublands ≥50% to <70% cleared	**17**	9	53	13	68		43	264	66	373		**746**
Weeping Myall Woodland TEC	**26**	3796	1478	838	2317	836	15160	6109	4077	8952	3018	**37316**
Sandhill Pine Woodland TEC	**28**		57		120			307		575		**882**
Riverine Plain Grasslands ≥70% to <90% cleared	**44**					10					29	**29**
Riverine Chenopod Shrublands <50% cleared	**164**				52					259		**259**
Totals		**3819**	**2025**	**1064**	**2594**	**890**	**15289**	**9188**	**5220**	**10279**	**3291**	**43267**

Table 5 below provides a comparison for the credits potentially generated across the subject properties to those known and expected to be required by the project.

Table 5 Estimated credits generated across subject properties and suitability for offsetting project impacts

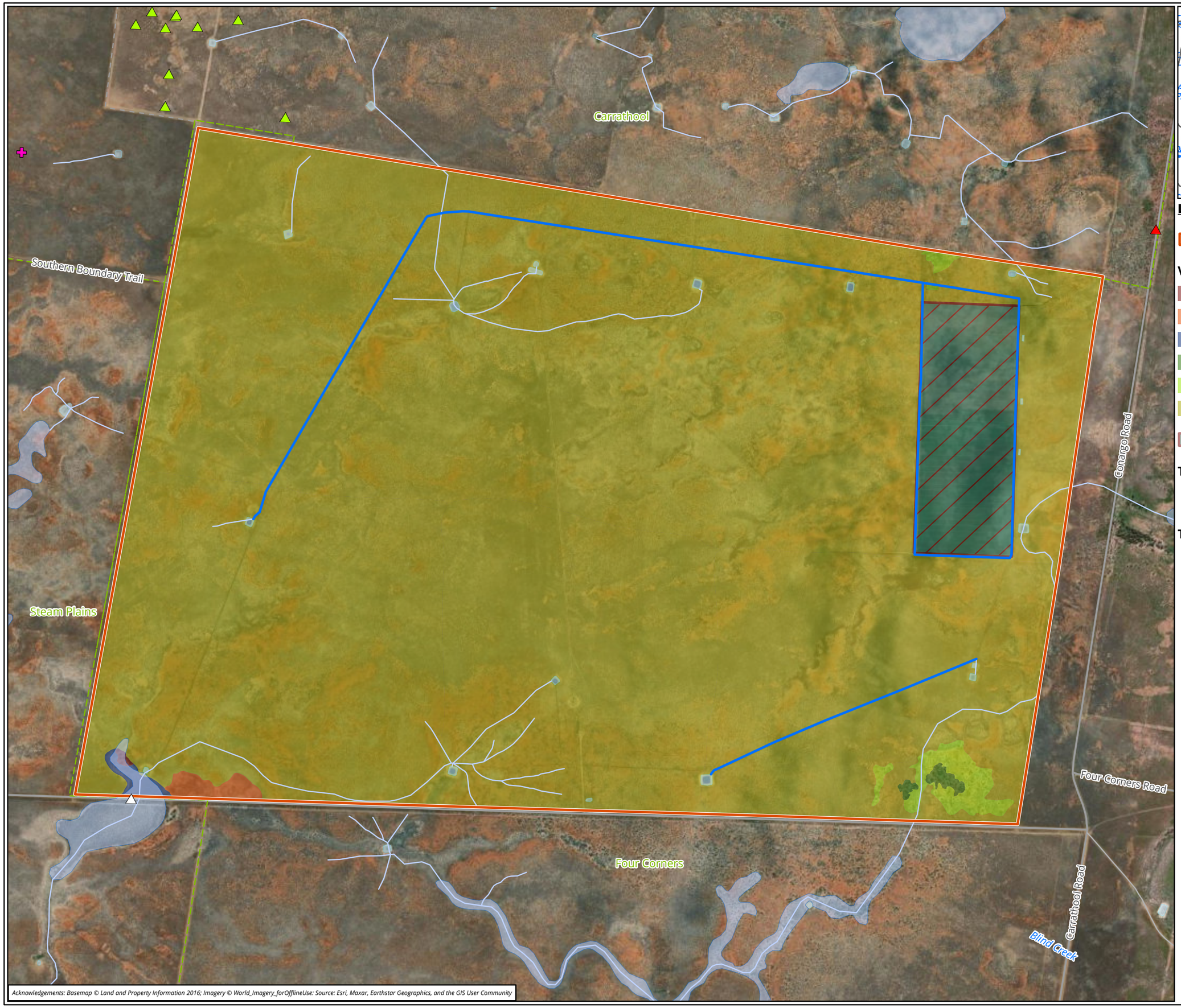
OTG	Est no. credits generated	Required by project
Inland Riverine Forests <50% cleared	120	• Not required.
Inland Floodplain Woodlands ≥50% to 70% cleared	3915	• Required for impacts to PCTs 13 and 15. • 26 credits required for the solar farm and BESS, plus an estimated 30% for the wind farm.
Inland Floodplain Shrublands ≥50% to <70% cleared	746	• Required for impacts to PCT 17, 24 and 160. • 212 credits required for the solar farm and BESS, plus an estimated 30% for the wind farm.
Weeping Myall Woodland TEC	37316	• Required for impacts to PCT 26. • 39382 credits required for the solar farm and BESS, plus an estimated 30% for the wind farm.
Sandhill Pine Woodland TEC	882	• Required for impacts to PCT 28 at the wind farm.
Riverine Plain Grasslands ≥70% to <90% cleared	29	• Required for impacts to PCTs 45 and 46. • 649 credits required for the solar farm and BESS, plus an estimated 30% for the wind farm.
Riverine Chenopod Shrublands <50% cleared	259	• Not required.

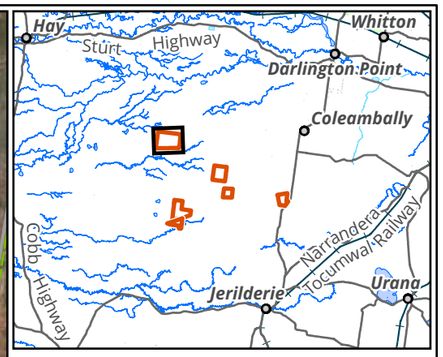
It can be seen from the above table that the majority of PCTs and OTGs that could generate credits at the subject properties are required to offset expected impacts of the project. All of the OTGs impacted by the project are represented at the subject properties, however there is likely to be shortfall in a number of credit types even if the entirety of the areas investigated at each of the subject properties is entered into a Biodiversity Stewardship Site.

This shortfall is likely to be most substantial for:

- Weeping Myall TEC (PCT 26) impacts where a shortfall in the order of 10,000 credits would likely remain.
- Riverine Plain Grasslands ≥70% to <90% cleared (PCT 45 and 46) impacts where a shortfall in the order of 800 credits would likely remain.

It is worth noting that offsets for both of these vegetation types may also be required due to their listing as TECs under the EPBC Act if impacts are determined to be 'significant' under that legislation. In which case offsets would also have to meet EPBC Act listing requirements for the relevant TECs.





Legend

Potential Biodiversity Stewardship Site

Vegetation zone

- 13_Good
- 13_Moderate
- 17_Good
- 26_Intact
- 26_Sparse
- 26_DNG
- Predominantly introduced vegetation

Threatened flora species (BioNet)

- Slender Darling Pea - *Swainsona murrayana*

Threatened fauna species (BioNet)

- Grey-crowned Babbler (eastern subspecies) - *Pomatostomus temporalis temporalis*
- Plains-wanderer - *Pedionomus torquatus*
- White-fronted Chat - *Epthianura albifrons*

Figure 2.1 Ecological features of Four corners

0 500 1,000

Meters
Scale: 1:30,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 39098, Date: 18 August 2023,
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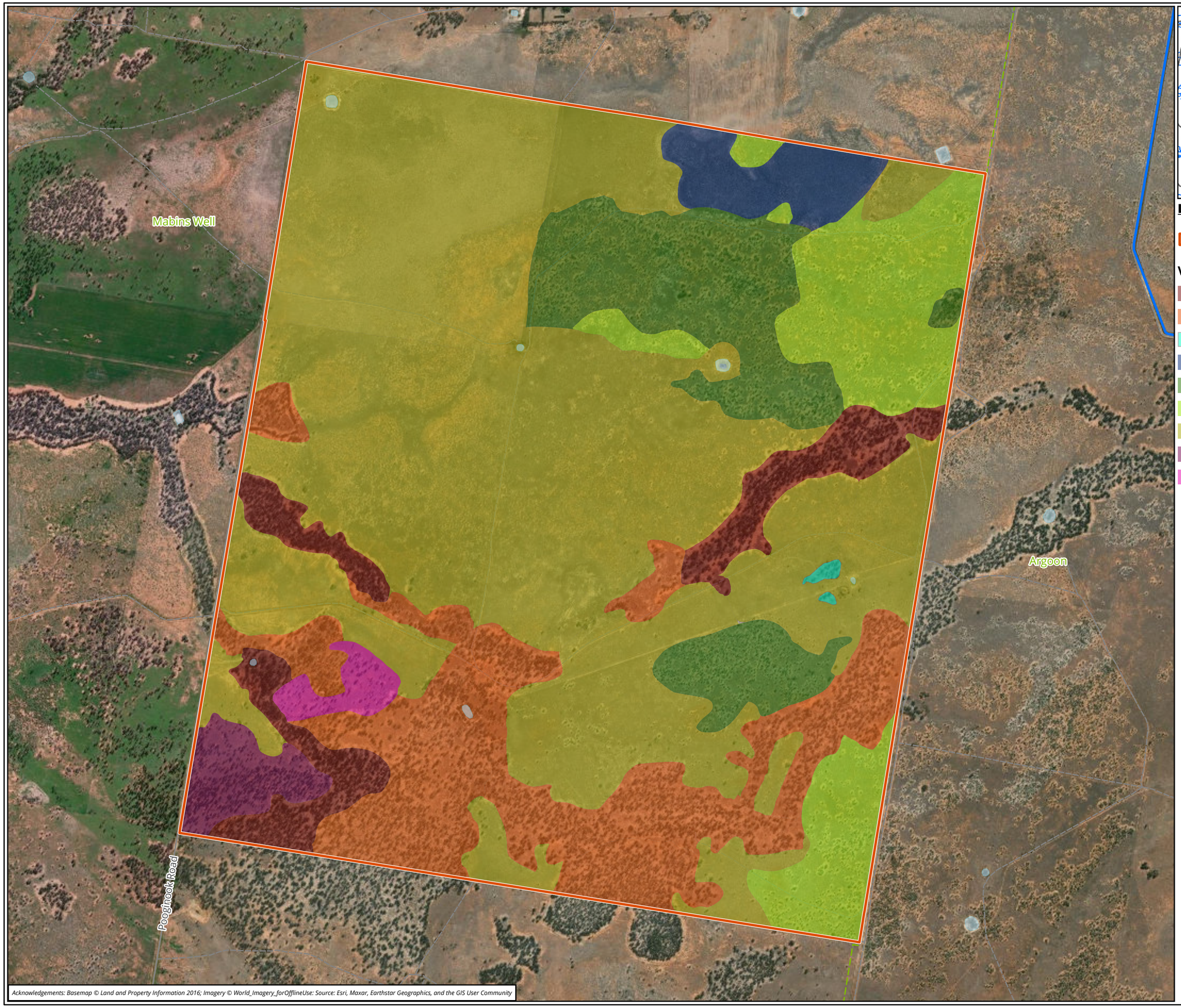

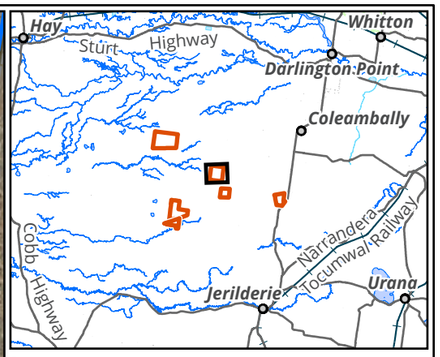

Legend

Potential Biodiversity Stewardship Site

Vegetation zone

- 13_Good
- 13_Moderate
- 16_Moderate
- 17_Good
- 26_Intact
- 26_Sparse
- 26_DNG
- 28_Good
- 28_Moderate

Figure 2.2 Ecological features of Goolgumbla

0 500

Meters
Scale: 1:22,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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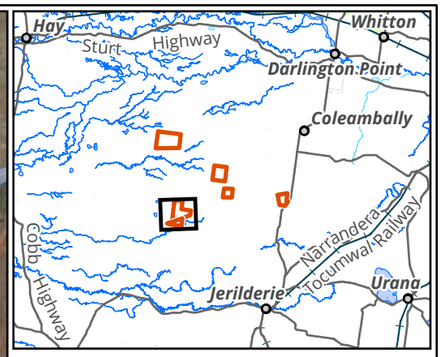
Threatened flora species (BioNet)

- Slender Darling Pea - *Swainsona murrayana*

Threatened fauna species (BioNet)

- Black Falcon - *Falco subniger*
- Diamond Firetail - *Stagonopleura guttata*
- Flame Robin - *Petroica phoenicea*
- Grey-crowned Babbler (eastern subspecies) - *Pomatostomus temporalis temporalis*
- Plains-wanderer - *Pedionomus torquatus*
- Spotted Harrier - *Circus assimilis*
- Superb Parrot - *Polytelis swainsonii*
- White-fronted Chat - *Epthianura albifrons*



Legend

- Potential Biodiversity Stewardship Site
- Category 2 Land - Excluded

Vegetation zone

- 10_Good
- 10_Moderate
- 10_Planted
- 13_Good
- 164_Good
- 17_Good
- 17_Moderate
- 26_Intact
- 26_Sparse
- 26_DNG
- 26_Planted
- 28_Good
- 28_Moderate
- 28_Derived
- 28_Low
- 28_Planted

Carrathool Road

Mabins Well Road

Delta Creek

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Figure 2.3 Ecological features of Stuart

0 500 1,000

Meters
Scale: 1:36,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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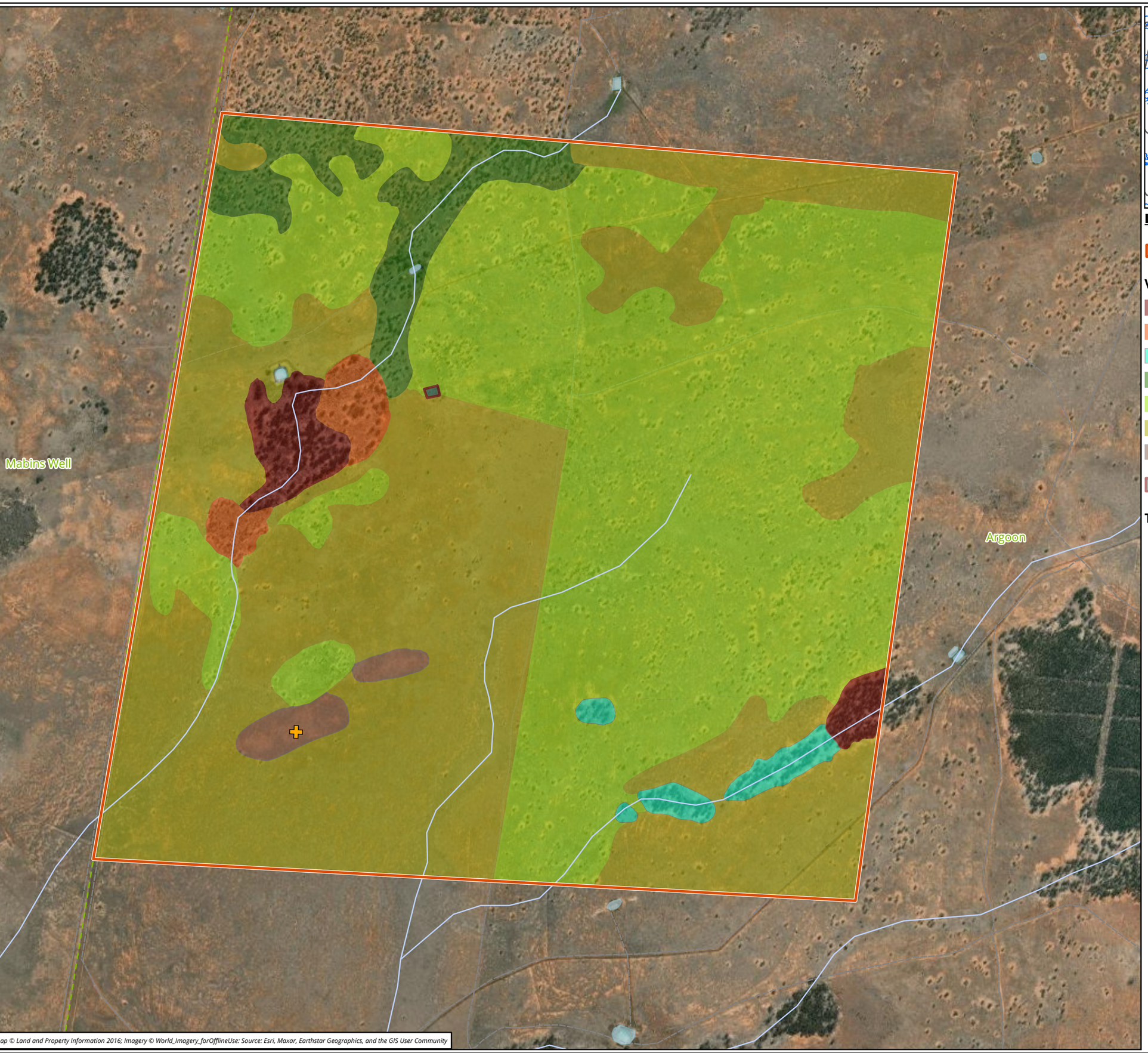

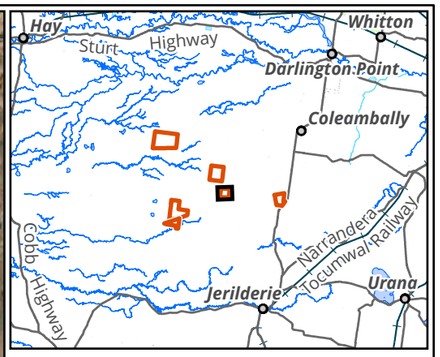

Legend

Potential Biodiversity Stewardship Site

Vegetation zone

- 13_Good
- 13_Moderate
- 16_Moderate
- 26_Intact
- 26_Sparse
- 26_DNG
- 44/46_Good
- Predominantly introduced vegetation

Threatened flora species (Biosis)

- Silky Swainson-pea - *Swainsona sericea*

Figure 2.4 Ecological features of Turkey Plains

0 500

Meters
Scale: 1:15,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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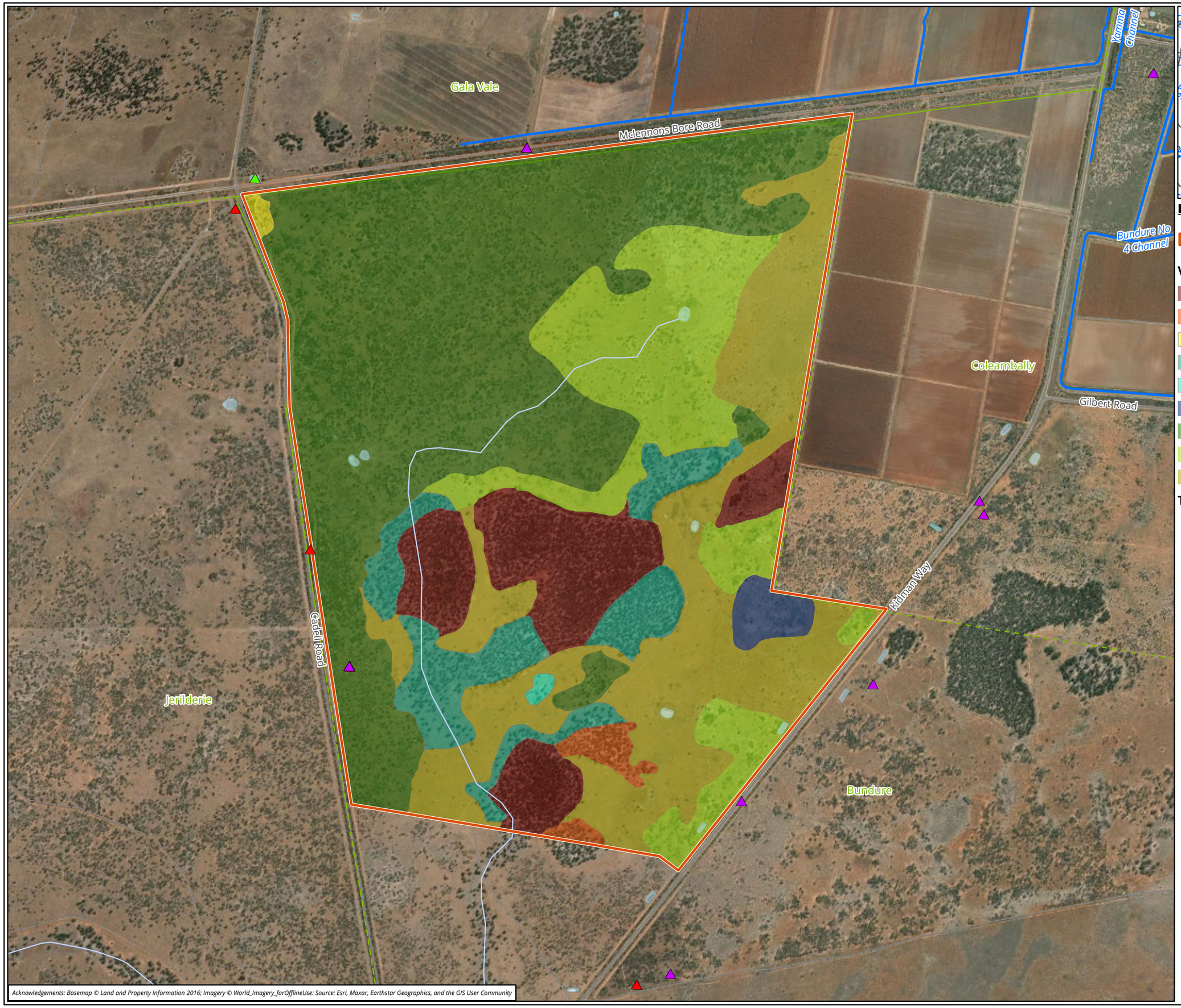

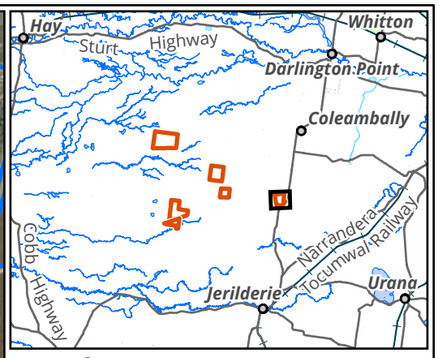

Legend

Potential Biodiversity Stewardship Site

Vegetation zone

- 13_Good
- 13_Moderate
- 15_Good
- 16_Good
- 16_Moderate
- 17_Good
- 26_Intact
- 26_Sparse
- 26_DNG

Threatened fauna species (BioNet)

- Grey-crowned Babbler (eastern subspecies) - *Pomatostomus temporalis temporalis*
- Southern Bell Frog - *Litoria raniformis*
- Superb Parrot - *Polytelis swainsonii*

Figure 2.5 Ecological features of Red Swamp

0 500

Meters
Scale: 1:20,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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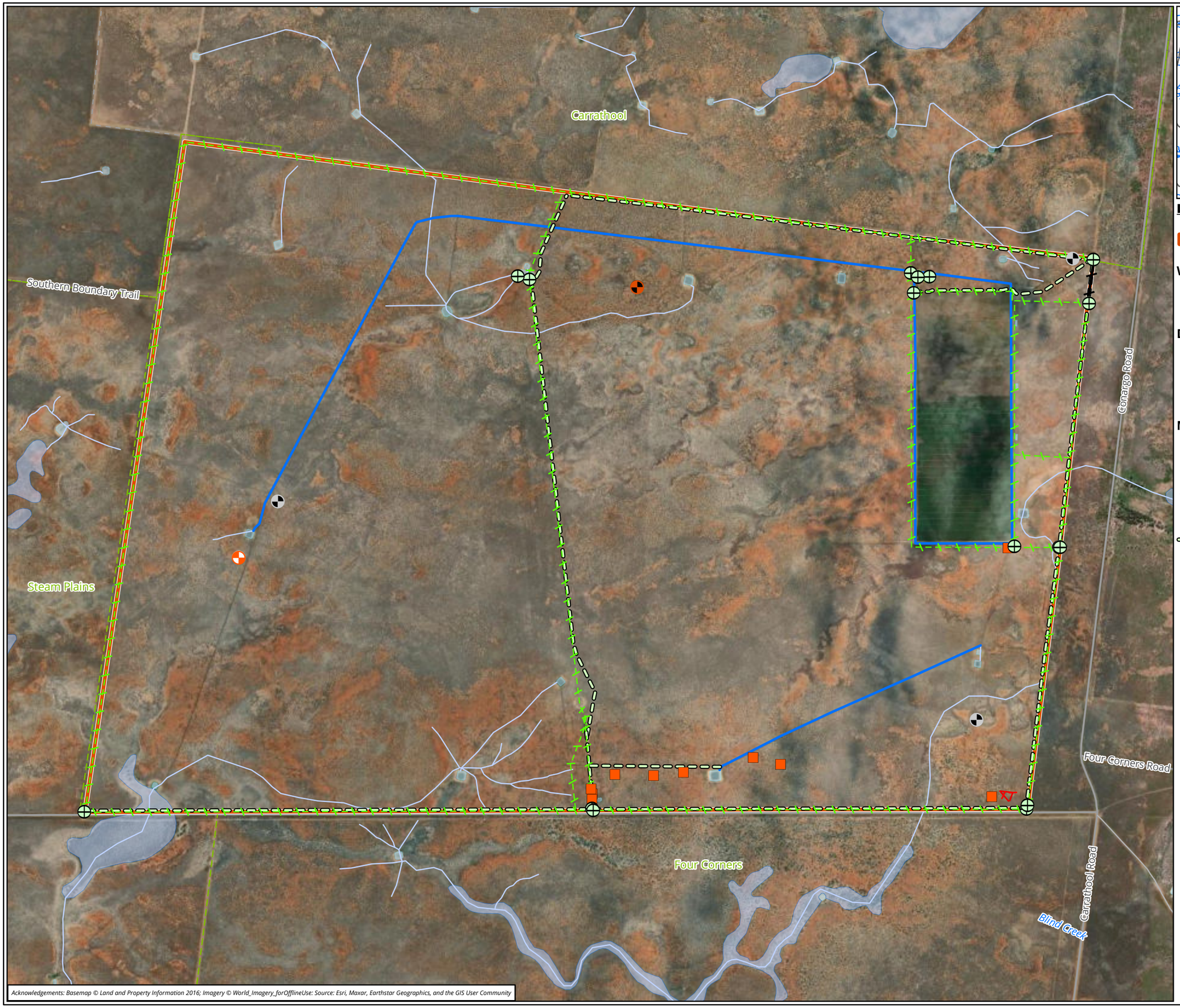

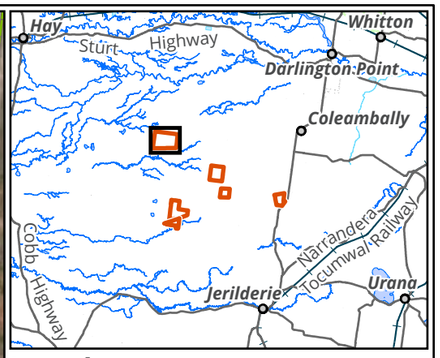

Legend

Potential Biodiversity Stewardship Site

Weed - population

African Boxthorn - *Lycium ferocissimum*

Dumping

Old tank fallen

Scrap metal

Tyres

Management requirements

Gate - Rural - Maintain

Fence - Barbed-wire - Maintain

Fence - Barbed-wire - Remove

Fence - heavy/security - Maintain

Track - Maintain

Figure 3.1 Management requirements of Four corners property

0 500 1,000

Meters
Scale: 1:30,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 39098, Date: 15 August 2023,
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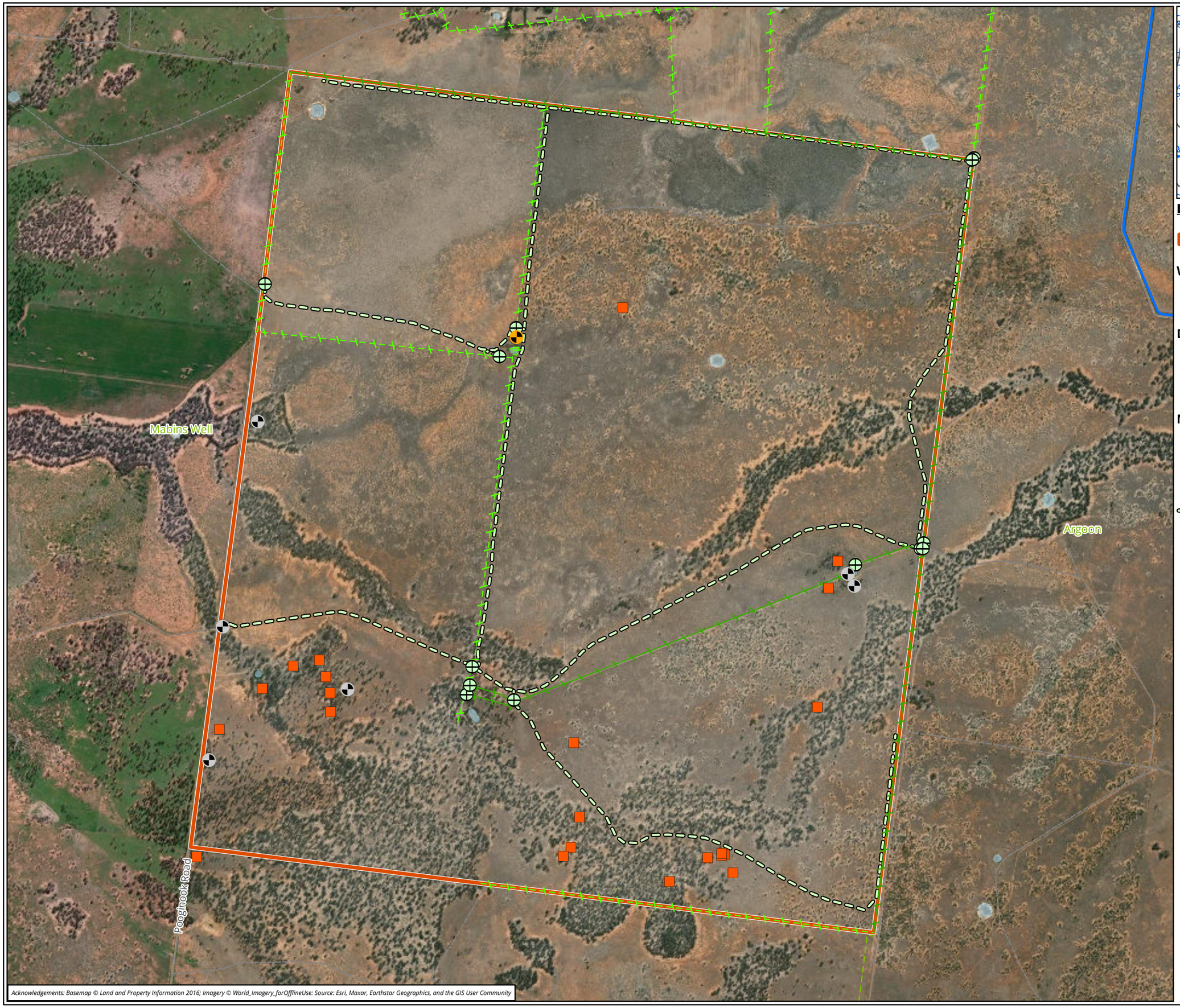

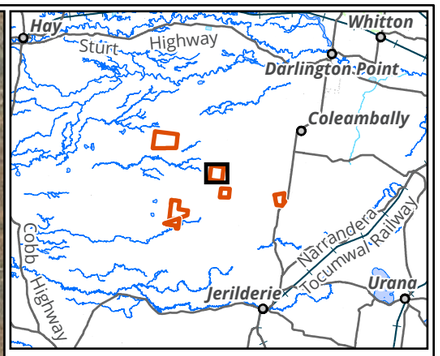

Legend

Potential Biodiversity Stewardship Site

Weed - population

African Boxthorn - *Lycium ferocissimum*

Dumping

Packaging or paper; plastic, cardboard, paper

Scrap metal

Management requirements

Gate - Rural - Maintain

Fence - Barbed-wire - Maintain

Fence - Wire-mesh - Maintain

Track - Maintain

Figure 3.2 Management requirements of Googlumbla property

0 500

Meters

Scale: 1:22,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

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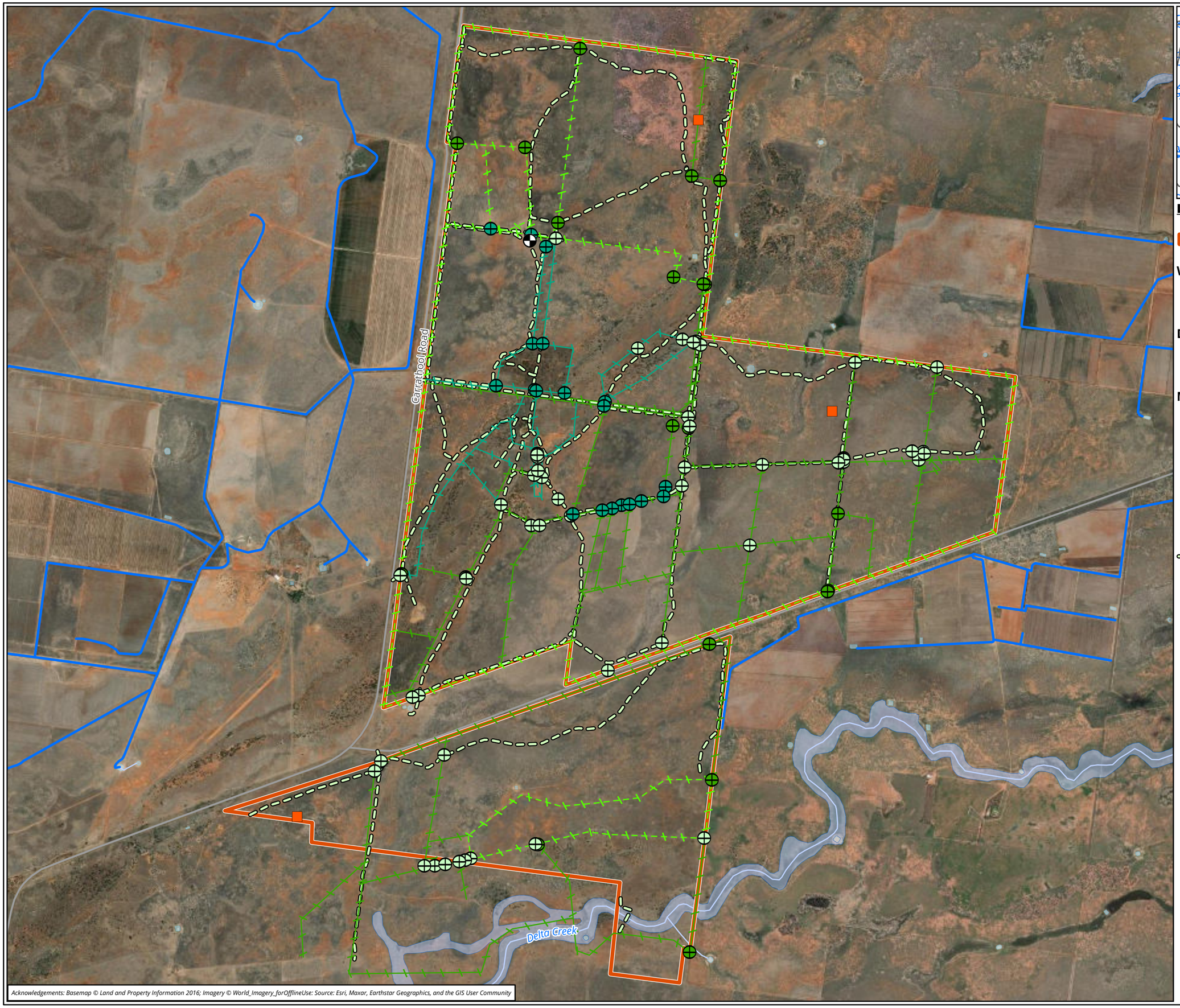

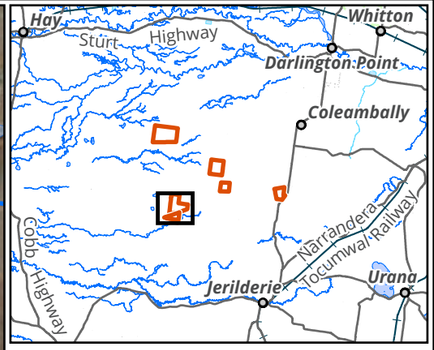

Legend

Potential Biodiversity Stewardship Site

Weed - population

African Boxthorn - *Lycium ferocissimum*

Dumping

Construction and demolition; bricks, tiles, timber and concrete

Management requirements

- Gate - Rural - Maintain
- Gate - Wire-mesh - Maintain
- Gate - Wire-strand - Maintain
- Fence - Barbed-wire - Maintain
- Fence - Wire-mesh - Maintain
- Fence - Wire-strand - Maintain
- Track - Maintain

Figure 3.3 Management requirements of Stuart property

0 500 1,000

Meters
Scale: 1:36,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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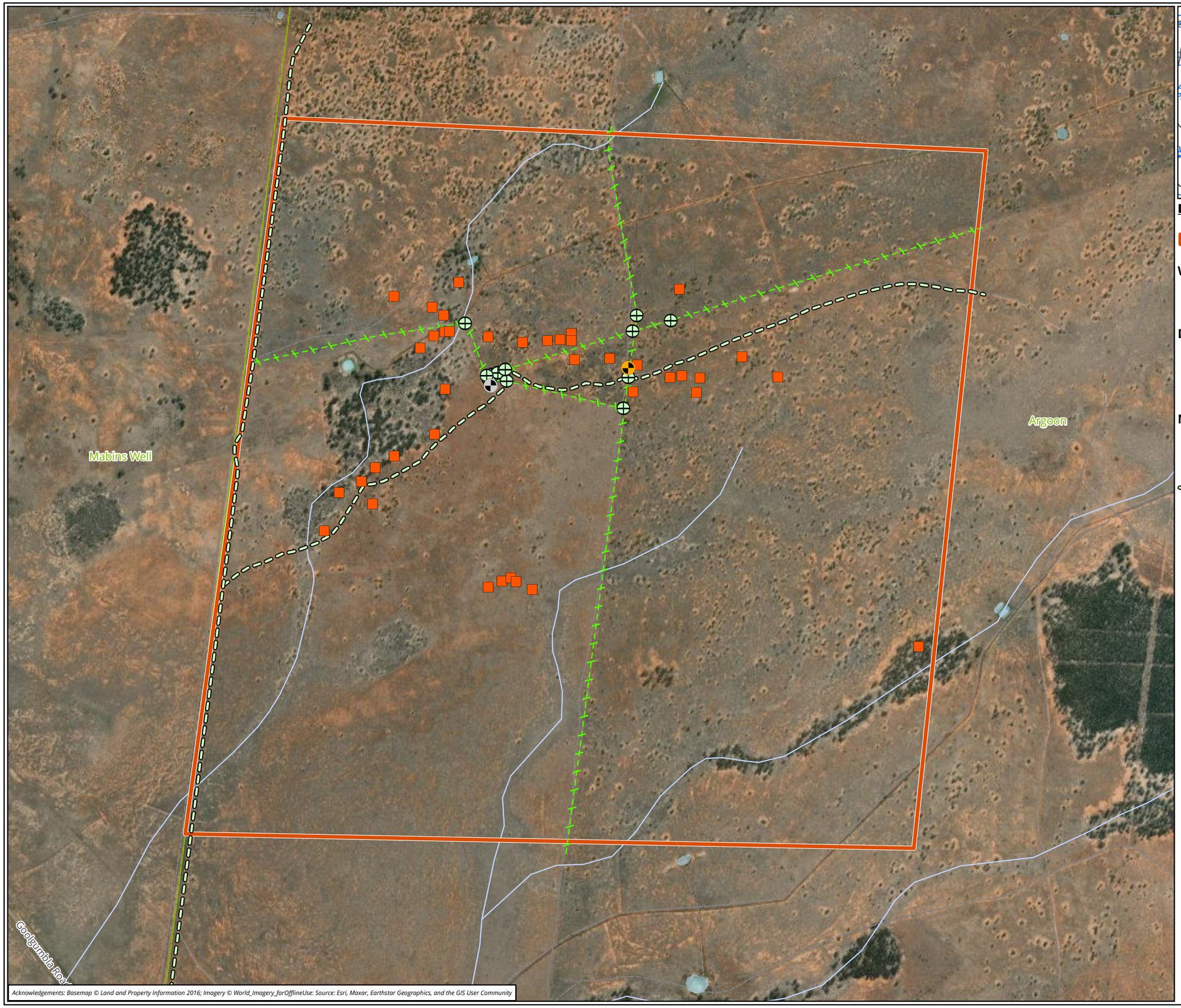

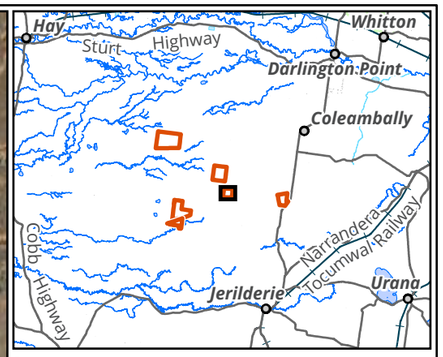

Legend

Potential Biodiversity Stewardship Site

Weed - population

African Boxthorn - *Lycium ferocissimum*

Dumping

Packaging or paper; plastic, cardboard, paper

Scrap metal

Management requirements

Gate - Rural - Maintain

Fence - Barbed-wire - Maintain

Track - Maintain

Figure 3.4 Management requirements of Turkey Plains property

0 500

Meters
Scale: 1:15,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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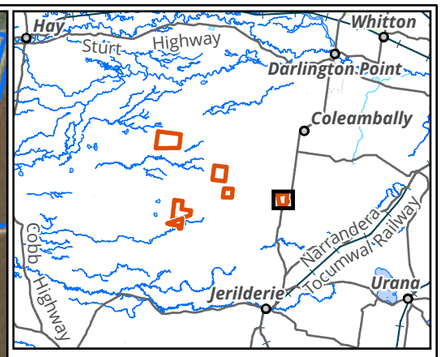

Legend

Potential Biodiversity Stewardship Site

Weed - population

African Boxthorn - *Lycium ferocissimum*

Dumping

Scrap metal

Management requirements

Gate - Rural - Maintain

Fence - Barbed-wire - Maintain

Track - Maintain

Figure 3.5 Management requirements of Red Swamp property

0 500

Meters
Scale: 1:20,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 39098, Date: 15 August 2023,
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Estimated cost of offset security

As outlined earlier the cost of offset credits is determined by the Total Fund Deposit (TFD) of a Biodiversity Stewardship Site, which is subsequently determined by the cost of management actions required to be undertake at the site to implement the management plan. The TFD takes into account the cost of all management actions determined to be required initially over the first 20 years of the Biodiversity Stewardship Site, and then on in-perpetuity, and is presented a lump sum figure. The TFD is then divided by the numbers of credits generated at a site to determine the Part A component of the credit pricing, or the minimum sale price of the credits.

The minimum price to purchase credits from the Biodiversity Stewardship Site is dictated by Clause 6.21 of the BC Act. This clause requires that before the Biodiversity Stewardship Site's TFD value has been reached (through ongoing sales of biodiversity credits), first transfers of biodiversity credits (i.e., from the Biodiversity Stewardship Site owner to Spark Renewables) must be of a value equal to the proportion of the TFD for the Biodiversity Stewardship Site where the credits were generated (i.e., if 70 % of the credits are sold, then at least 70 % of the TFD value must be paid). Once the 100% of the TFD value has been reached, the site enters active management and the sale price of any residual credits is entirely up to the credit owner, and all funds received are profits.

Further detailed field investigations would be required to calculate an accurate TFD for each of the subject properties, so data published by the BCT (who manage the Biodiversity Stewardship Fund and facilitate annual management payments to existing sites) has been used to estimate the cost of offset security from the subject properties. Data presented on the BCT website (BCT 2023) provides average TFD sums calculated from 234 existing Biodiversity Stewardship Sites established between 2010 and 2022 based on price per hectare, with relevant data is provide below in Table 6.

Table 6 BCT published TFD data for price per hectare from sites >500 hectares in area

TFD price per ha (sites >500ha)	Four Corners 4000 ha (approx.)	Goolgumbla 2100 ha (approx.)	Red Swamp 1100 ha (approx.)	Stuart 2700 ha (approx.)	Turkey Plains 900 ha (approx.)
Average $2700/ha	$10,800,000.00	$5,670,000.00	$2,970,000.00	$7,290,000.00	$2,430,000.00
Upper $4000/ha	$16,000,000.00	$8,400,000.00	$4,400,000.00	$10,800,000.00	$3,600,000.00
Lower $2000/ha	$8,000,000.00	$4,200,000.00	$2,200,000.00	$5,400,000.00	$1,800,000.00

It can be seen from the above table that TFDs required to fund management actions if a Biodiversity Stewardship Site was to be established at any of the above properties would run into the millions of dollars, which would need to paid (or a relevant proportion paid) to purchase credits and offset the project's impacts. Further detailed assessment relating to the cost of offset credits would be required based on the areas and make-up of PCTs entered into each Biodiversity Stewardship Site.

A comparison is provided below of the estimated cost of offsets via generating Weeping Myall Woodland (PCT 23) credits (only) at the subject properties (based on the average costs outlined in Table 6 above), versus the cost to offset Weeping Myall Woodland based on the most recent data published by the BCT for payments to the Biodiversity Conservation Fund.

Table 7 below provides an estimated TFD cost for each of the subject properties if only the areas of Weeping Myall Woodland (PCT 23) were entered into a Biodiversity Stewardship Site. In this theoretical example all 37316 credit generated (refer Table 4) would be purchased to offset the project's impacts, and as such the minimum cost of sales would equate to the full TFDs from each site.

Table 7 Estimated TFDs if PCT 26 only was included in Biodiversity Stewardship Sites

TFD price per Ha (sites >500ha)	Four Corners PCT 23 – 3796ha	Goolgumbla PCT 23 – 1478ha	Red Swamp PCT 23 – 838ha	Stuart PCT 23 – 2317ha	Turkey Plains PCT 23 – 836ha
Average $2700 / ha	$10,249,200.00	$3,990,600.00	$2,262,600.00	$6,255,900.00	$2,257,200.00

Total cost to purchase all Weeping Myall Woodland (PCT 23) credits from the subject properties would equate to $25,015,500.00, or $670.37 per credit (for 37316 total credits)

Price per credit, published by the BCT, for Weeping Myall Woodland (PCT 23) is $4,800 per credit, making the total sum of purchasing 37316 credits from the BCT $179,116,800.00.

It can be seen that the cost of offsetting Weeping Myall Woodland (PCT 23) via establishment of Biodiversity Stewardship Sites, whilst still high for the project, is markedly cheaper than purchasing offsets via paying to the Biodiversity Conservation Fund, and in above example equates to approximately 14 % of the price. Establishment of Biodiversity Stewardship Sites therefore can easily be shown to have a financial advantage over securing offsets from payments to the Biodiversity Conservation Fund.

Recommendations

The following recommendations are provided in relation to this BOS and to help ensure the continued progression of offset establishment for the project, noting that offsets will be required to be secured prior to construction:

- Commence/continue landholder discussion around the potential for establishment of Biodiversity Stewardship Sites on their land, ensuring the landholders are aware of the implications relating to sterilising the land for purposes other than in-perpetuity biodiversity conservation.
- Develop landholder agreements that ensure the requirements of the BC Act in relation to minimum cost of first transfers (initial sale of credits from the landowner to Spark Renewables) of biodiversity credit is accurately reflected.
- Continue to seek further opportunities for Biodiversity Stewardship Site establishment with a focus on sites supporting Weeping Myall Woodland (PCT 23) and Riverine Plain Grasslands ≥70% to <90% cleared (PCT 45 and 46) OTGs. It is estimated that a further 2000 ha – 3000 ha of Weeping Myall Woodland and 200 ha – 300 ha of additional Riverine Plain Grasslands would be required to meet the project's offset requirements and minimise the amount of residual credits likely to be secured via payments to the Biodiversity Offset Fund.
- Consider undertaking seasonal surveys at offset sites to further determine the presence of target species credit species.
- Commence detailed investigations of the subject properties to prepare BSA applications comprising; further detailed field work in accordance with the BAM, preparation of relevant reporting and

development of an accurate TFD, further due diligence checks, and submission of the application to the Credit Supply Taskforce.

- Consider the layout and boundaries of any proposed Biodiversity Stewardship Sites to maximise the credit yield (minimising the cost per credit) but preventing the generation of large numbers of residual credits that would be required to be sold before the TFD sum can be met and active management can begin.
- Undertake a pre-submission meeting with the Credit Supply Taskforce to consult on any issues with the proposed Biodiversity Stewardship Sites and gain an understanding of assessment requirements/expectations.

Conclusion

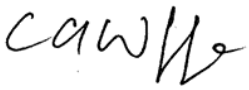
A combination of desktop assessment and rapid ground-validation surveys have determined that the subject properties support vegetation types that would be suitable for offsetting the impacts of the project, and a large portion of the offsets expected to be required for the solar farm and BESS could be secured via establishment of Biodiversity Stewardship Sites over these properties.

Further assessment of offset requirements for species credit species is required to determine the quantum of offsets required for the project, and rapid assessments have confirmed the presence of potential habitat and the recorded one target species within the subject properties. Further targeted surveys of the subject properties are required to better understand the species-specific offset potential at each of the sites, but areas are expected to be suitable and able to generate species credits for the project.

The five subject properties all have the potential to provide offsets for the project and further investigations and assessments should continue to ensure establishment of Biodiversity Stewardship Sites can occur in a timely manner and to meet project approval and construction timeframes.

I trust that this advice is of assistance to you however please contact me if you would like to discuss any elements further.

Yours sincerely,



Callan Wharfe
Senior Associate Botanist – Major Projects and Offset Lead

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Appendix 8 Survey method consultation

29 September 2023

Simon Maffei
Senior Project Officer Planning – South West
Biodiversity and Conservation, Department of Planning and Environment
Via email: simon.maffei@environment.nsw.gov.au

Dear Simon,

Dinawan Solar Farm: Results of the threatened flora survey method September 2023

Project no. 37263

Thank you for your email correspondence on 8 September 2023 regarding our proposed deviation from the required survey methods for threatened flora for Dinawan Solar Farm. We understand that BCD reviewed the proposed method and does not support the approach that was put forward initially. We have taken your feedback on board and adjusted our methods to achieve a higher level of survey. This letter summarises the results of the surveys conducted between 11 and 15 September 2023. These surveys are the second season of spring surveys conducted within the development footprint.

Results – September 2023

Field surveys have been undertaken in accordance with relevant guidelines as far as practicable as well as the BAM (DPIE 2020a). Field surveys have been conducted across multiple seasons and across multiple years, including:

- February 2022 – rapid assessment and vegetation mapping.
- August 2022 – rapid assessment, vegetation and hollow bearing tree mapping and targeted fauna surveys.
- September 2022 – targeted flora and fauna surveys.
- November 2022, January 2023, February 2023 – BAM Plots and targeted flora and fauna surveys.
- April 2023 – targeted fauna surveys.
- July 2023 – BAM plots, vegetation mapping of additional areas.
- September 2023 – targeted flora and fauna surveys.

Due to the size of some vegetation zones within the subject land, scale-based variations to field survey methods have been subject to a variation request.

Survey techniques applied to date have included each ecologist undertaking surveys searching via two phase systematic grid searches in areas of habitat >50 hectares, along with a grid of parallel traverses 10 m apart across areas of suitable habitat for each target threatened plant species. Slow driving transects have also been conducted where appropriate.

To date, only two threatened flora species have been recorded, *Swainsona sericea* and *Swainsona murrayana.* Additional clusters of these two species were recorded adjacent to areas where they were found in 2022.

Additional refinement of the development footprint (i.e. area of direct impact) has been undertaken to avoid these species to the extent practicable.

In summary, these species were found to co-occur in small patches and isolated individuals in PCT 26 DNG, east of Kidman Way (Figure1). Although the Weeping Myall communities, both woodland and DNG, are largely homogeneous through the broader region and subject land (i.e. similar species composition), small areas of microrelief do occur on occasion that form small mosaic alterations with the introduction of some additional species, more consistent with other vegetation types, and the overall structure. The two main examples of this are an increase in Lignum *Duma florulenta* and Nitre Goosefoot *Chenopodium nitrariaceum* in areas still dominated by Weeping Myall, or that have evidence of previous woody Weeping Myall vegetation and occurs on the more gilgai grey soils within the PCT 26 Intact and sparse zones, but also slight changes occur on the red loam soils where an increase in forb richness occurs in PCT 26 DNG. The latter does contain some relevance to *PCT 44 Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion*; however, as previously stated, the vegetation has been mapped as derived version of PCT 26, due to evidence of woody debris, scattered recruitment and nearby roadside vegetation. Detailed justification of this will be provided in the BDAR.

Typically, the two threatened *Swainsona* species have been found in areas of derived grassland with an open structure, herb-rich inter-tussock spaces and presence of cryptogamic crust, and in the absence of *Walwhalleya proluta*, Plains Grass *Austrostipa aristiglumis* and *Enteropogon acicularis* as the dominant species. *Swainsona* habitat has also been observed to have a lower cover of grazing-tolerant robust chenopods and less dense grass sward. The populations of the two threatened *Swainsona* species were included as a key constraint during the design process and direct impact to species have largely been avoided to date.

Due to the timing of the advice received from BCS, Biosis proceeded with the 300 m x 300 m grid survey earlier this month; however, more detailed walking transects and slow driving transects in more open areas, were also conducted between the points, in line with suggestions from BCD.

The intention was to achieve a level of survey that responds to the scale of the development footprint, reflects the relatively uniform and repeated vegetation patterns, including the slight mosaic variation that occurs on occasion, as well as the land use history, whilst remaining scientifically robust. The varied method is summarised below and the results shown in Table 1 and Figure 10.2 (attached):

- The method has been applied to two zones only, being PCT 26 DNG and PCT 26 Sparse (all other zones have been completed following the guidelines grid intersect survey density and are not subject to the variation).
- The grid intersect density was changed from searching at 100 m x 100 m grid intersects to searching at 300 m x 300 m grid intersects. Search effort still used the 40 m diameter area systematic search as per the guidelines.
- Two ecologists conducted transects between the grid points. These were conducted by both walking and slow driving, the latter only where vegetation was more open and species, or similar species, clearly visible when in flower, and if observed, warranted more detailed investigation.
- If target species were identified during the lower density grid intersects then survey effort was increased accordingly across the relevant vegetation zones.

Calculations have been based on a 40 m buffer of each grid point (0.13 ha) and transects have been buffered by 10 m either side (20 m in total) as two ecologists were undertaking the surveys.

Table 1 Overview of vegetation zones and survey completed in September 2023

Veg Zone	Area (ha)	100 x 100 m Required*		300 x 300 m Completed**		Transects between points (completed)	Total area			
		Survey points	Area (ha)	Survey points	Area (ha)	Area (ha)	Total area of PCT completed (ha)	Difference between required and completed (ha)	Difference between required and completed (%)	Overall diff (%)
PCT 26 Sparse	1,550.8	1,569	204	168	21.8	195.3	217.1	+13.1	106%	14
PCT 26 DNG	887.3	884	114	98	12.7	127.1	139.8	+25.8	122%	16
TOTAL	**2,438.1**	**2,453**	**318**	**266**	**34.6**	**322.4**	**356.9**	**+38.9**	**-**	**15**

*according to the Guidelines **proposed Biosis variation

Note: Table 1 does not include:

- the survey effort undertaken in Spring 2022 (an additional 23 ha and 181 grid points), that was hindered by access issues and flooding events
- areas within the subject land where 100 m x 100 m grids were applied (PCT 45 and PCT46) and other areas <50 ha where transects where solely undertaken.

The additional surveys in September 2023 resulted in the identification of *Swainsona sericea* and *Swainsona murrayana* populations in similar locations to where these species were identified in September 2022. Two additional patches of these species have been avoided (approximately 620 individuals) through further design refinement.

In summary, the survey effort achieved accounts for approximately 15% of the total area of the vegetation zones. The survey effort is on average 2% higher than the required amount of the 100 m x 100 m grids alone stated by the guidelines (approx. 13%). The survey effort has been achieved by a combination of both grid searches and transects (in line with BCD's suggestion).

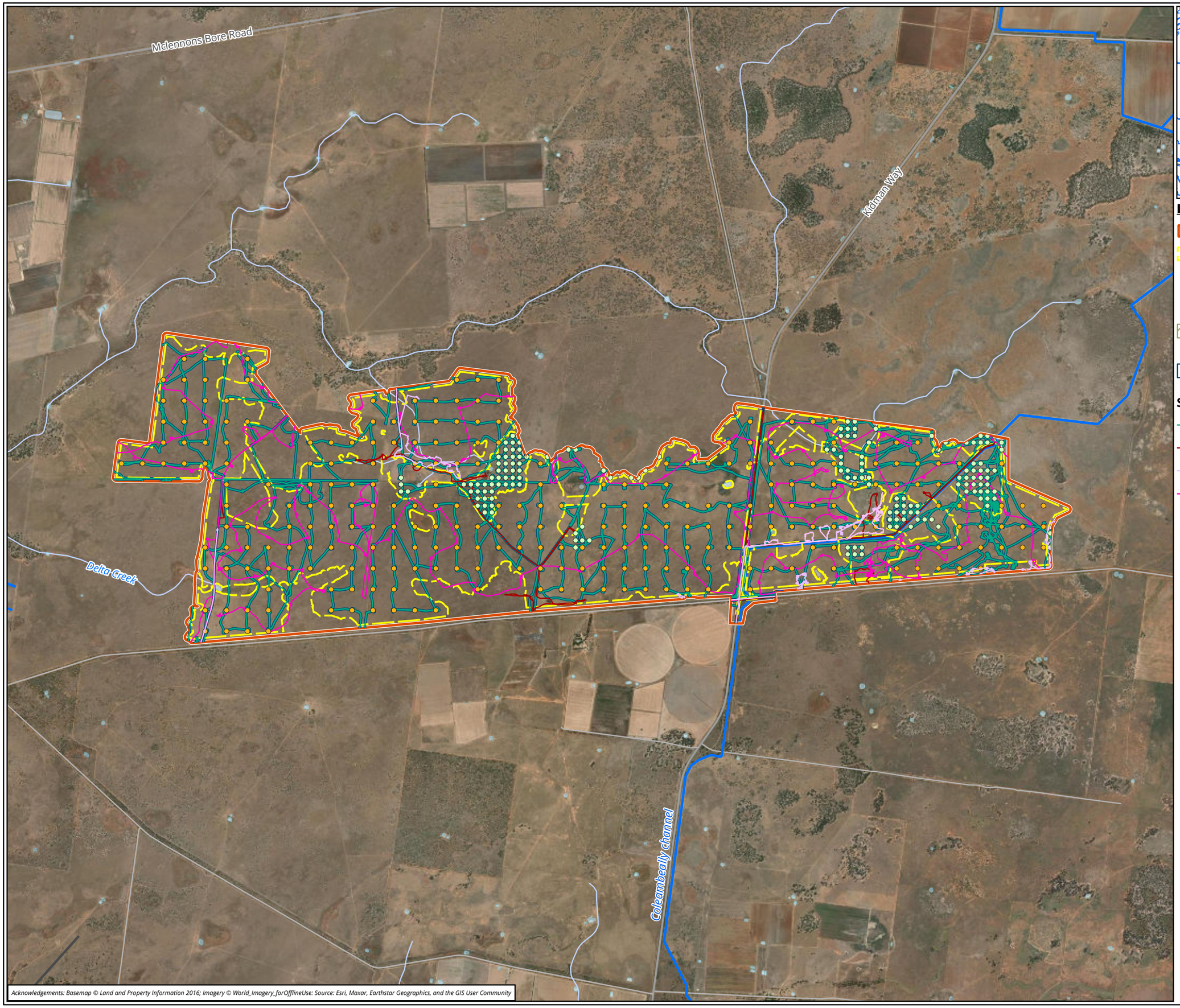
The adopted survey approach and outcomes will be described in detail in the BDAR that will accompany the EIS for the project. We would welcome the opportunity to meet with BCD to discuss the project further once the BDAR has been reviewed.

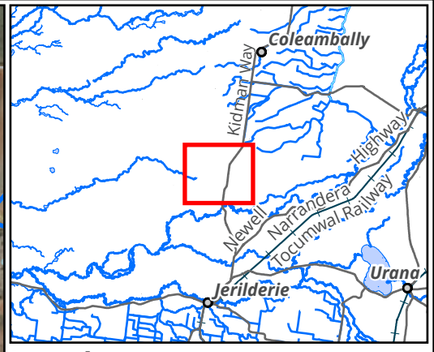
Regards

Mitch Palmer

Manager – Ecology and GIS (NSW)

Appendix A. Figures





Legend

- Subject land
- Development footprint
- Grid points (300m x 300m)
- Grid points (100m x 100m)
- Grid points (100m x100m - buffer 40m)
- Survey tracks (September 2023 - buffer 20m)

Survey tracks

- September 2023
- January/February 2023
- November 2022
- September 2022

Figure 10.2 Targeted flora survey

0 1 2

Kilometers
Scale: 1:50,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 21 September 2023,
Prepared by: JB, Prepared for: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_F5-10.aprx
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