Dinawan Wind Farm

Biodiversity Development Assessment Report

Response to Submissions – Amended BDAR

FINAL REPORT

Prepared for EMM

13 August 2025

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Glossary

Term	Definition
Assessment Area	All land within a 1500 m buffer zone of the subject land.
BAM	NSW Biodiversity Assessment Method
BAM-C	BAM Calculator
BC Act	*Biodiversity Conservation Act 2016*
BCS	Biodiversity Conservation and Science
BDAR	Biodiversity Development Assessment Report
BMP	Biodiversity Management Plan
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
CHM	Canopy Height Model
CoC	Conditions of Consent
DA	Development Application
Cth DCCEEW	Commonwealth Government Department of Climate Change, Energy, the Environment and Water
DBH	Diameter at Breast Height
DCDB	Digital cadastral database
DEM	Digital Elevation Model
Development corridor	The land within the development site where project components may be placed, providing the necessary flexibility for component placement during detailed design (i.e. micro-siting).
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

Term	Definition
	surveys. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.
EMS	Environmental Management Strategy
EEC	Endangered Ecological Community
EP&A Act	NSW E*nvironmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
Ha	Hectare
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
NPW Act	*National Parks and Wildlife Act 1974*
NSW DCCEEW	NSW Government Department of Climate Change, Energy, the Environment and Water
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
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 Applicant may elect to assume the species is present for development/clearing projects only.
SSD	State Significant Development
Subject land	Land subject to development to which the BAM has been applied. Derived based on a minimum 500 metre buffer on the development corridor and includes areas of potential prescribed impacts
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
WM Act	*NSW Water Management Act 2000*
WHS	Work Health and Safety

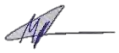
Certification and Declarations

I certify that this report has been prepared based on 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: 14/08/2025

BAM Assessor Accreditation Number: Mitch Palmer 170501

Summary

Overview

Biosis Pty Ltd (Biosis) was commissioned by EMM Consulting (EMM) on behalf of Spark Renewables to undertake a biodiversity assessment for the Dinawan Wind Farm, known herein as the project. The project includes the construction, operation and decommissioning of a wind farm and associated infrastructure with a targeted electricity generation capacity of 1.2 gigawatts (GW). The project forms part of the Dinawan Energy Hub, which includes the Dinawan Solar Farm, assessed under a separate development application.

The project will include the installation of up to approximately 200 Wind Turbine Generators (WTGs), positioned to balance maximisation of electricity generation from the available wind resource, with minimisation of environmental impacts. As is typical of projects of this scale, the construction of the project will likely be staged, and consist of three main areas, enabling works, stage 1 and stage 2. However, the assessment of the project has been undertaken across all possible impacts resulting from the entire development footprint, with staging components only to facilitate the retiring of associated credit obligations.

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 amended Biodiversity Development Assessment Report (BDAR) has been prepared by Mitchell Palmer, an Accredited BAM Assessor (BAAS17051), to accompany the Amendment Report (AR).

Section 1 details the project description, infrastructure components and staging requirements.

The 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 June 2024 with a request for a Response to Submission Letter (RTS) and associated agency responses issued on the 9 August 2024 and 20 August 2024 respectively.

Since the public exhibition of the Dinawan Wind Farm EIS (EMM 2024), the development footprint has been reduced by approximately 18%, down to 1,098 hectares. This includes the removal and relocation of wind turbines, down from 267 to 200 wind turbines, and other infrastructure, reducing potential impacts to BC Act and *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened ecological communities (TECs) and entities. These refinements are described in detail in the 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/increase
PCT 10_moderate	0.33	0.19	-41
PCT 13_moderate	4.83	3.56	-26
PCT 13_thinned	9.14	7.88	-14
PCT 15_moderate	6.20	2.54	-59

Vegetation zone	Area (ha) - EIS lodgement	Area (ha) - amended project	% reduction/increase
PCT 15_thinned	1.61	1.10	-31
PCT 17_mod_good	1.84	0.76	-59
PCT 17_moderate	1.09	1.27	+17
PCT 24_moderate	0.23	-	-100
PCT 26_DNG	395.93	342.38	-14
PCT 26_intact	133.14	116.79	-12
PCT 26_sparse	416.60	341.38	-18
PCT 28_low	54.00	47.46	-12
PCT 28_moderate	0.98	1.11	-13
PCT 45_mod_good	8.83	2.24	-75
PCT 45_Intersection	-	0.83	+100
PCT 46_moderate	105.59	73.44	-30
PCT 46_ Intersection	-	0.34	+100
PCT 160_mod_good	4.07	4.97	+22
PCT 160_moderate	0.84	-	-100

Landscape

The subject land primarily occurs within the Riverina Interim Biogeographic Regionalisation of Australia (IBRA) bioregion and the Murrumbidgee IBRA subregion. A small area for road upgrades along Sturt Highway and Eunony Bridge Road, Olympic Highway/Sturt Highway and Byrnes Road/West Bomen Road, all in the Wagga Wagga locality, are within the South Western Slopes IBRA and Inland Slopes Subregions. No native vegetation will be impacted within this region.

The project's subject land is defined as an area of 31,445 hectares in total, and is the area to which the BAM has been applied in principle, derived based on a minimum 500 metre buffer on the development corridor. The development corridor comprises an area of approximately 6,385 hectares in total and is defined as the land within which the development footprint is located and encompasses the area subject to vegetation integrity and targeted candidate species surveys. The development corridor is also the area within which micro-siting can occur. The project's development footprint comprises an area of approximately 1,098 hectares, being the area of land directly impacted by the project. The development footprint may be subject to alterations at the detailed design stage as a result of micro-siting of infrastructure. Of the 1,098 hectares development footprint, 948.56 hectares consists of native vegetation, 78.95 of non-native/Category 1 exempt land and 70.49 hectares of cleared land such as existing public and formed roads.

The subject land is predominantly located west of Kidman Way, between the township of Coleambally and Jerilderie, adjacent to rural roads such as Liddles Lane and Jerrys Lane to the South, Mclennons Bore Road and Goolgumbla Road centrally and Carrathool Road and Four Corners Road to the west and north respectively. Minor road upgrades are also included at Olympic Highway/Sturt Highway, Byrnes Road/West Bomen Road, Sturt Highway/ Eunony Bridge Road intersections in Wagga Wagga, and Newell Highway and Kidman Way intersection in Bundure. The current land use within the main section of the subject land is sheep and cattle grazing, in conjunction with areas of irrigated and dryland cropping, with the Coleambally outfall drain and other artificial perennial and ephemeral channels occurring.

Section 2 details the overview and descriptions of the broader landscape to which the project is sited.

Vegetation

The majority of the development corridor is covered with native vegetation, predominantly in the form of Derived Native Grasslands (DNG) and sparse Weeping Myall Woodlands, with (precautionarily identified) dynamic natural grasslands, intact Weeping Myall woodland, ephemeral Black Box dominated riparian woodland and wetlands (Lignum or sedge-dominated wetlands) and White Cypress Pine dominated sandhills and paleochannels also present. The following Plant Community types (PCTs) were assessed as present within the development corridor:

- PCT 10 River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic 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).
- 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 28 White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone.
- 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.
- PCT 160 Nitre Goosefoot shrubland wetland on clays of the inland floodplains.

Vegetation within the development corridor was found to represent two Threatened Ecological Communities (TECs) listed under the NSW BC Act, and two TECs listed under the Commonwealth EPBC Act. These include

- *Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions* (Weeping Myall Woodland) - Endangered under the BC Act.
- *Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions* (Sandhill Pine Woodland) - Endangered under the BC Act.
- *Weeping Myall Woodlands* – Endangered under the EPBC Act.
- *Natural Grasslands of the Murray Valley Plains* – Critically Endangered under the EPBC Act.

Vegetation within the subject land was mapped to PCT and vegetation class to inform broader landscape connectivity whilst vegetation within the development corridor was assessed and stratified, based on PCT and broad condition state, into vegetation zones. This resulted in 17 vegetation zones identified within the development footprint and development corridor. Within the subject land, 140 BAM plots have been completed as part of the assessment of vegetation integrity, with 81 used during the assessment as a result of changing designs and representative to vegetation being impacted.

A total of 30 scattered paddock trees have been assessed , with 16 assessed as likely to be impacted under Streamlined assessment module – Scattered trees assessment (Appendix B of the BAM), and were entered

into the scattered tree assessment module of the BAM-C. This is a 47% reduction in impacts to scattered paddock trees.

Section 3 describes in detail the native vegetation, PCTs, TECs and vegetation zones located within the subject land and development corridor.

Threatened flora species

Extensive targeted survey of potential threatened flora species was undertaken between February 2022 and November 2024, as well as July 2025. Targeted threatened flora surveys were undertaken across the development corridor, focussing on the areas of the development footprint that support potential threatened flora habitat. Areas excluded from survey included areas where the understorey was substantially depauperate due to being subject to significant ongoing grazing, areas with significantly high weed species ingress, and areas disturbed by tracks, dams, erosions, farm infrastructure and other associated vectors substantially impacting upon the soil profile.

Surveys were primarily undertaken via implementing a grid-based systematic approach based on the approach prescribed for in *Surveying threatened plants and their habitats* (DPIE 2020b), with parallel field traverses also utilised between grid survey points, and in areas where habitats and potential impacts were more linear or localised in nature. Two threatened flora species have been recorded within the subject land, *Swainsona sericea* (estimated 1,324 individuals) and *Swainsona murrayana (*estimated 1,332 individuals*)*, which included those recorded within the adjacent solar farm area. Not all of these individuals would be directly impacted.

As a result of design changes (predominantly due to efficiencies in road design and transmission requirements), extensive flooding events in spring 2022 which impeded access, and also as a result of survey results and ongoing application of the avoid and minimise principles (based on biodiversity survey findings and other environmental constraints), spatial gaps occur in survey coverage. This has resulted in the application of assumed presence for several threatened flora species, until further survey can be completed in spring 2025.

Section 4 describes in detail the methods undertaken and results for all threatened flora surveys.

Threatened fauna species and Bird and Bat utilisation surveys (BBUS)

Extensive targeted survey of potential threatened and at risk fauna species was undertaken between February 2022 and October 2024. Fauna habitat assessments and targeted survey were undertaken to determine whether the vegetation present within the development corridor contained microhabitats suitable to support the candidate fauna species credit species.

Seasonal bird and bat utilisation surveys (BBUS) across a 24 month period, including eight seasons, were undertaken from August 2022 to July 2024 to inform collision risk modelling (CRM) and qualitative risk assessments, and therefore potential prescribed impacts, including the risk of collision with turbine blades. A total of 26 fixed survey sites were established, including 16 impact sites and 10 control sites, consisting of 720 replicates in total. Of the total 26 points, all 16 impact sites and four of the control sites, totalling 574 replicates across all seasons, were utilised in the CRM. The survey locations were selected to represent likely turbine positions identified early in the project design and to obtain data at potential impact locations. They were distributed in different vegetation formations as a surrogate for habitat types. Large stick nest and hollow bearing tree surveys were also conducted.

A total of 139 bird species were recorded within the subject land, including 111 species recorded during BUS and 31 additional bird species recorded as incidental observations, outside of BUS. The number of species

varied across seasons for bird utilisation and incidental surveys with the highest diversity in spring (104 species recorded), closely followed by summer (98 species recorded) and autumn (89 species recorded), with the lowest diversity in winter (71 species recorded).

Superb Parrots were recorded regularly during BUS surveys, particularly foraging within PCT 26 intact vegetation, more frequently along roadside corridors of McLennons Bore Road and Carrathool Road, but also sporadically within the development corridor. 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 generally tend to remain within or near their 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.

Wedge-tailed Eagles and other more common raptors, were a common sighting, and numerous medium to large, active and non-active stick nests were observed, predominantly in White Cypress Pine and Black Box vegetation, but also on existing large transmission line towers. Numerous ecosystem credit species were also recorded. These included Southern Whiteface, White-fronted Chat, Grey-crowned Babblers, Painted Honeyeaters, Spotted Harrier and Black Falcon. The Black Falcon and Grey-crowned Babblers were observed to be nesting within the subject land, and other species presumed to be as well.

Avoiding areas of NSW DCCEEW Mapped Important Areas of habitat for the Plains Wanderer, and minimising impacts to buffers surrounding mapped important areas was a key focus during project design and assessment, however some impacts do occur primarily as a result of site access and cabling infrastructure, including adjacent to an existing public road (Goolgumbla Road). Additional surveys for Plains Wanderer focused on identifying grasslands outside of NSW DCCEEW Mapped Important Areas that nonetheless contained similar structural characteristics to these areas. One Plains Wanderer individual was incidentally recorded in October 2024 within derived PCT 26 and PCT 46. This resulted in the relocation of all infrastructure within 300 meters of this record.

Microbat surveys were undertaken across the subject land as part of BBUS. Survey effort and results have been combined between those collected within and outside the subject land, such as impact and control sites, to allow for an assessment of the microbat fauna that may utilise the habitats across the site. Fourteen species were positively identified (Almost Certain or Probable) of the 18 species that are known or predicted to occur within the locality (Australasian Bat Society 2022). Up to four additional species may also have been recorded however reliable identification to species level was not possible due to similarity of call characteristics between species.

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 March 2023 and targeted surveys in January 2024. Suitable habitat included seasonally inundated wet areas, farm dams, drainage lines and overflows where grasses, sedges and rushes were present amongst shallow, still water, as well as areas surrounding irrigated cropping areas.

Section 4 describes in detail the methods undertaken and results for all threatened fauna surveys.

Collision risk modelling and collision risk assessments

Biosis undertook CRM and bird and bat risk assessments to inform the overall turbine collision and barrier effect impact assessment for the project. This assessment identified species or groups of birds and bats considered at potential risk of collision with turbines, and the potential impact on bird and bats subject to disturbance and/or barrier effects posed by constructed wind turbines. The outcome of these assessments enables the targeted assessment of key species to be considered in the preparation of the impact

assessment for the wind farm. In addition to direct loss of habitat from the construction of a wind farm, indirect impacts on birds and bats can arise from three potential pathways, including:

- Turbine strike (and possibly barotrauma) with towers and/or operating wind turbine blades at rotor swept area (RSA) heights.
- Loss of habitat connectivity (barrier effects) between essential resources, such as foraging and roosting areas.
- Avoidance of areas of habitat due to air disturbance surrounding operational turbines (habitat sterilisation).

As well as the assessment of threatened and at risk species, individual turbines risk assessments were undertaken. Turbines present with the highest risk of potential collisions to allow for targeted mitigation to be applied to reduce the potential risk and consequences of strikes that may occur. This assessment considered the likelihood of each turbine resulting in potential strikes, largely dependent on surrounding habitat types and proximity to operational turbines, and the potential consequence on species utilising those habitats if they were to collide with a turbine, which is largely driven by the 'at-risk' and conservation status of those species.

Section 6 describes in detail the methods and results of CRM, species and turbine risk assessments.

Avoid and minimise

Avoidance of direct and indirect impacts to these species has been a key consideration in design refinement and has led to reduced impacts. The project has implemented design changes prior to and since preliminary biodiversity assessments were completed in summer 2022.

The development corridor and development footprint 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. Residual impacts to native vegetation, threatened species habitat and TECs will occur, as complete avoidance of impacts was not 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 biodiversity areas.

Measure implemented to reduce impacts include, but are not limited too;

- Project design workshops held on multiple occasions between Biosis ecologists, project designers/engineers and environmental approvals specialists to work through opportunities and constraints relating to how impacts to biodiversity values could be avoided and minimised through project design and the location of infrastructure.
- Removal of infrastructure on landholdings adjacent to Oolambeyan National Park.
- Avoidance of impacts throughout the broader study area, and an overall reduction in loss of higher quality habitats from multiple design revisions.
- Use of existing tracks, public roads and fencelines to delineate sections of the project and used preferentially for locating access tracks and linear infrastructure.
- Relocating and combining footprints and micro-siting corridors to contain as much infrastructure as possible (e.g. co-locating access tracks with electrical cabling and/or transmission line infrastructure), making a more efficient design and keeping impacts to the minimum extent necessary.

- Large scale avoidance of Plains Wanderer important mapped habitat areas, which is common within the subject land.
- Avoidance of, and minimisation of impacts to associated buffers, of a known Plains Wanderer location.
- Minimising the removal of habitat trees that may provide habitat for species such as Superb Parrot and Corbens long-eared Bat.
- Siting turbine mast locations at least 200 m away from PCT 13, PCT 15, PCT 10 and PCT 28 as far as practicable, allows increased buffers from blade tip to edge of canopy.
- Removing and/or relocating turbines away from active and non-active large nests observed during the surveys.
- Removing and/or relocating WTG out of PCT 26 intact areas where vulnerable listed Painted Honeyeaters were recorded and vulnerable listed Grey-crowned Babblers were nesting.
- Avoidance and minimisation of impacts to large patches of *Swainsona murrayana* and *Swainsona sericea.*
- Removal of all WTG considered to be a very high collision risk, and a reduction in high risk turbines, that maybe of increased concern to at risk bird and bat species.

Following turbine layout revisions, the preliminary layout was reduced from 294 turbines to 267, with 214 of the original 294 turbines relocated to some degree based on biodiversity impacts, as well as other environmental constraints. Following the exhibition of the EIS, further review of the design has been completed to refine and optimise the project layout (including the removal of 67 potential WTG locations and an 18% reduction to the development footprint). The reduction has facilitated further avoidance of impacts in the amended design. Amendments to the project layout and development footprint have also been made in response to feedback from key stakeholders, including Transgrid (as proponents for the proposed Victoria to NSW Interconnector (VNI) West) and Origin Energy Power Limited (Origin) (as proponents for the approved Yanco Delta Wind Farm).

Section 7 describes in detail the measures implemented to avoid and minimise impacts to biodiversity.

Impacts and proposed offsets

For impacts that are unavoidable, the following biodiversity credits are required for the project, in accordance with Section 10 of the BAM. Section 8 below, states in detail the direct, indirect and prescribed impacts and assesses the outcomes of the project on biodiversity. Section 10 summaries the residual impacts that occur as a result of the project.

Summary of direct impacts to vegetation

Vegetation zone	Impact (ha)	VI score	TEC	HBTs	Credit requirement
PCT 10_moderate	0.19	29.2	No	Yes	2
PCT 13_moderate	3.6	70.6	No	Yes	110
PCT 13_thinned	7.9	69.2	No	Yes	238
PCT 15_moderate	2.5	75.7	No	Yes	84
PCT 15_thinned	1.1	67.1	No	Yes	32

Vegetation zone	Impact (ha)	VI score	TEC	HBTs	Credit requirement
PCT 17_mod_good	0.76	84.2	No	No	28
PCT 17_moderate	1.3	83.5	No	No	46
PCT 26_DNG	342.38	20.3	No	No	3475
PCT 26_intact	116.8	67.1	Weeping Myall Woodland	No	3917
PCT 26_sparse	341.38	46.2	Weeping Myall Woodland	No	7890
PCT 28_low	47.8	57.1	Sandhill Pine woodland	Yes	1364
PCT 28_moderate	1.1	73.8	Sandhill Pine woodland	Yes	41
PCT 45_mod_good	2.24	65.1	Natural grasslands of Murray Valley Plains (EPBC Only)	No	91
PCT 45_Intersection	0.83	100	Natural grasslands of Murray Valley Plains (EPBC Only)	No	52
PCT 46_moderate	73.4	90.6	Natural grasslands of Murray Valley Plains (EPBC Only)	No	4158
PCT 46_Intersection	0.34	100	Natural grasslands of Murray Valley Plains (EPBC Only)	No	21
PCT 160_mod_good	5	79	No	No	147
					21,696

Summary of direct impacts species credit habitat or individuals

Species	Impact	Vegetation zone	Area (ha)	Biodiversity risk weighting	Credit requirement
Swainsona murrayana	Direct Assumed	PCT 15 moderate PCT 15 thinned PCT 26 DNG PCT 26 intact PCT 26 sparse PCT 28 low PCT 28 moderate PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection	2.60 Known 391.37 Assumed	2	9,121
Swainsona sericea	Direct Assumed	PCT 15 moderate PCT 15 thinned	2.60 Known	2	9,121

Species	Impact	Vegetation zone	Area (ha)	Biodiversity risk weighting	Credit requirement
		PCT 26 DNG PCT 26 intact PCT 26 sparse PCT 28 low PCT 28 moderate PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection	391.37 Assumed		
Austrostipa wakoolica	Assumed	PCT 17_Mod_Good PCT 17_Moderate PCT 26 DNG PCT 26 intact PCT 26 sparse	16.41	2	322
Brachyscome muelleroides	Assumed	PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection	35.62	3	2,428
Brachyscome papillosa	Assumed	PCT 13 moderate PCT 13 thinned PCT 15 moderate PCT 15 thinned PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection	44.42	2	1,930
Lepidium monoplocoides	Assumed	PCT 10 moderate PCT 13 moderate PCT 13 thinned PCT 15 moderate- PCT 15 thinned PCT 26 DNG PCT 26 Intact PCT 26 sparse	212.44	2	3,985
Leptorhynchos orientalis	Assumed	PCT 26 DNG PCT 26 Intact PCT 26 sparse PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection	205.52	2	5,285

Species	Impact	Vegetation zone	Area (ha)	Biodiversity risk weighting	Credit requirement
Maireana cheelii	Assumed	PCT 26 DNG PCT 26 Intact PCT 26 sparse PCT 46 moderate PCT 46 Intersection	238.04	2	5,241
Pilularia novae-hollandiae	Assumed	PCT 13 moderate PCT 13 thinned PCT 15 moderate PCT 15 thinned PCT 26 DNG PCT 26 Intact PCT 26 sparse PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection	71.99	3	2,772
Sclerolaena napiformis	Assumed	PCT 26 DNG PCT 26 Intact PCT 26 sparse PCT 45 mod_good PCT 46 moderate PCT 46 Intersection	238.97	2	5,241
Swainsona plagiotropis	Assumed	PCT 26 DNG PCT 26 Intact PCT 26 sparse PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection	358.47	2	8,054
Grey Snake	Assumed	PCT 10 moderate PCT 13 moderate PCT 13 thinned PCT 15 moderate PCT 15 thinned PCT 17 mod_good PCT 17 moderate PCT 160 mod_good	22.35	2	815
Plains Wanderer	Direct/ Prescribed	Important mapped area	2.38	3	125
Superb Parrot	Direct/ Prescribed	100m buffer of associated PCTs that contain suitable hollows	35.96	2	988

Species	Impact	Vegetation zone	Area (ha)	Biodiversity risk weighting	Credit requirement
		PCT 10 moderate PCT 13 moderate PCT 13 thinned PCT 15 moderate PCT 15 thinned PCT 17 moderate PCT 26 DNG PCT 26 sparse PCT 26 intact PCT 28 low PCT 28 moderate PCT 45 mod_good PCT 46 moderate PCT 160 mod_good			
Southern Bell Frog	Direct/ Prescribed	200m buffer of habitat and associated PCTs in accordance with relevant guidelines. PCT 13 moderate PCT 13 thinned PCT 15 thinned PCT 17 mod_good PCT 26 DNG PCT 26 sparse PCT 26 intact PCT 28 low PCT 45 mod_good PCT 45 Intersection PCT 46 moderate PCT 46 Intersection PCT 160 mod_good	82.88	2	1,946
Southern Myotis	Direct/ Prescribed	PCT 13 moderate PCT 13 thinned	2.41	2	83

Additional surveys will be conducted in Spring 2025 to complete survey requirements and lead to the likely significant reduction of flora species credits and assumed SAII species.

Summary of direct impacts to scattered trees

PCT	Class	Contains hollows	No. of trees	Credit required
PCT 13 Black Box - Lignum woodland wetland	3	Yes	3	3

PCT	Class	Contains hollows	No. of trees	Credit required
PCT 26 Weeping Myall open woodland	2	No	13	7
TOTAL				**10**

All direct, indirect and prescribed impacts have been assessed in the development of this BDAR, and a range of mitigation measures are proposed to ensure the ongoing implementation of the principles of avoidance and minimisation of impacts. This includes measures to minimise impacts during the construction, operational and decommissioning phases of the project, and includes the development of a draft Bird and Bat Adaptive Management Plan (BBAMP), to minimise impacts to aerial fauna during the operational life of the wind farm. Mitigation measures are described in detail in Section 9, with a detailed framework for the BBAMP is provided in Section 9.1.2 and Appendix 9.

The project is considered to result in a significant impact to species or communities listed under the EPBC Act. The project was deemed a controlled action on the 12 July 2023. Following this, supplementary SEARs were issued 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. Significant impacts to Weeping Myall TEC, Natural Grasslands TEC, Plains Wanderer, and Superb Parrot are considered possible despite detailed avoidance during the design process. Section 12.1 details the specific impacts on Matters of National Significance (MNES), with assessments addressing the EPBC ACT Significant Impact Criteria provided in Appendix 6.

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 required 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. Section 11 details the proposed offset strategy and associated staging requirements.

STAGE 1 – BIODIVERSITY ASSESSMENT

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 Wind Farm, known herein as the project. The project includes the construction, operation and decommissioning of a wind farm and associated infrastructure with a targeted electricity generation capacity of 1.2 gigawatts (GW). The project forms part of the Dinawan Energy Hub, which includes the Dinawan Solar Farm, assessed under a separate development application.

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 entirety of the subject land falls within the South West Renewable Energy Zone (REZ).

The project is considered a State Significant Development (SSD) and therefore the NSW Biodiversity Offset Scheme (BOS) applies in accordance with Section 7.9 of the NSW *Biodiversity Conservation Act 2016* (BC Act). A Biodiversity Development Assessment Report (BDAR) is required to be prepared by an Accredited Assessor in accordance with the NSW Biodiversity Assessment Method (BAM) (DPIE 2020a). This report supports an SSD Development Consent application under Part 4, Division 4.7 of the NSW *Environmental Planning and Assessment Act 1979* (SSD-50725708), as an appendix to the Environmental Impact Statement (EIS) for the project. 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 BC Act, including the BAM, and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Environmental Impact Statement (EIS) (EMM 2023) was lodged in June 2024 with Response to Submission Letter (RTS) and associated agency responses issued on the 9 August and 20 August respectively. Since the public exhibition of the Dinawan Wind Farm EIS (EMM 2024), the development footprint has been reduced by approximately 18%, down to 1,098 hectares. This reduction was the result of a review of the design, which was completed to refine and optimise the project layout (including the removal of 67 potential WTG locations). Overall, this further reduced potential impact to BC Act and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed threatened ecological communities (TECs) and entities. These refinements are described in detail in the project's Amendment Report (AR) and subject to assessment in this amended BDAR.

An EPBC Act referral was lodged and the project was deemed a Controlled Action (EPBC 2023/09537) on the 12 July 2023 with listed threatened species and ecological communities as the relevant controlling provisions. Following this, supplementary SEARs were issued by Department of Planning, Housing and Infrastructure (DPHI), formally Department of Planning and Environment, on the 22 August 2023. All EPBC Act requirements will be addressed and assessed in this BDAR in accordance with the NSW Assessment Bilateral Agreement.

1.1. Project description

The project will have a generation capacity of up to 1.2 GW, with construction anticipated to commence in 2025, and expected to be completed over approximately 60 months in total. It is anticipated that the project will be constructed in three stages as stated below in Section 1.1.2. It is expected the project would be in operation for between 25 to 35 years.

The project will include the installation of up to approximately 200 Wind Turbine Generators (WTGs), positioned to balance maximisation of electricity generation from the available wind resource, with

minimisation of environmental impacts. The WTGs will be installed in the Stage 1 and Stage 2 wind areas, as shown on Figure 1. For the purposes of retiring the project's offset credit liability, three stages have been considered:

- an enabling works stage, which includes public road upgrades, site access and construction compound and accommodation facility establishment in Stage 1 (eastern area).
- Stage 1, which includes construction of 54 WTGs and associated infrastructure in Stage 1 (eastern area).
- Stage 2, which includes construction of 146 WTGs and associated infrastructure in Stage 1 (eastern area) and Stage 2 (western area).

All WTGs and associated infrastructure has been included within the entire assessment process for the purposes of this BDAR, with staging only related to the retiring of credits associated for the construction of each stage.

Site access points will be on Kidman Way, McLennons Bore Road, Fernbank Road and Goolgumbla Road within the Mabins Wells/Argoon locality, with WTG and infrastructure components most likely to be transported from Port of Newcastle. Minor road upgrades are required at the Newell Highway/Kidman Way intersection, as well as the Olympic Highway/Sturt Highway, Byrnes Road/West Bomen Road, Sturt Highway/ Eunony Bridge Road intersections in Wagga Wagga.

1.1.1. Infrastructure components

A full project description is provided in Chapter 3 of the AR, however the key infrastructure components are summarised below

- Up to 200 WTGs with the following parameters
    - Average hub height of 150m, may have slight nominal (+/- 2% or 3m) variations on a case by case basis. If required, further amendments to hub height (i.e. up to 164 m) will require an additional collision risk model prior to construction.
    - Maximum blade length of 86m.
    - Worse case upper tip height of 239m, lower tip height of 61m and worse case 180m Rotor Swept Area (RSA), pending variations in the hub height, but RSA will be the same regardless. Further amendments to maximum tip height (i.e. up to 250 m) will require an additional collision risk model prior to construction.
    - Hardstands and foundations.
- Electrical collection system, collector substations and control rooms.
- Electricity transmission line infrastructure (above ground and underground).
- Electricity transmission line infrastructure connecting the collector substations to the Dinawan Substation.
- Operations and maintenance (O&M) infrastructure.
- Temporary construction facilities including but not limited to
    - Worker accommodation facilities.
    - Construction compounds.
    - Site offices and amenities.

- Concrete batching plants.
- Construction materials storage (including stockpiles).
- Laydown areas.
- Temporary meteorological monitoring masts.
- Water tanks.
- Water and sediment management infrastructure.
- Storage and parking areas.
- Borrow pits.

- Other permanent infrastructure including but not limited to
  - Permanent meteorological masts.
  - Hardstands.
  - Water tanks.
  - New access tracks.
  - Upgrades to existing access tracks.
  - Access points from the public road network.

1.1.2. Potential staging

As is typical of projects of this scale, the construction of the project may be staged. The decision to construct the project in stages will depend on a number of factors, including but not limited to:

- Access arrangements for the South West REZ.
- Availability of offtake and other energy market considerations.
- Financing arrangements and other commercial considerations.

Enabling works

Enabling works would be focussed on site access and construction compound and accommodation facility establishment and would include public road upgrades along Mclennons Bore Road, Kidman Way, Newell Highway, Sturt Highway (Wagga Wagga) and associated intersection upgrades.

Table 1 Enabling works potential infrastructure components

Component	Quantity
Development footprint	Up to 69.09 ha (29.47 ha native vegetation)
Wind turbine generator (WTG)	N/A
Collector substation	N/A
O&M facility including carpark	1
Meteorological masts	N/A
Temporary Facilities - Accommodation	1
Transmission line	N/A

Laydown areas	1
Construction compound	1

Stage 1

Stage 1 would be construction within the eastern wind area, including WTGs and grid connection infrastructure. Stage 1 is within the Murrumbidgee LGA.

The final configuration for Stage 1 will depend on the WTG model selected and the outcome of detailed grid studies and technical design, amongst others. However, initial studies indicate that Stage 1 would comprise up to 54 WTGs. Infrastructure proposed to be included within Stage 1 is detailed below within Table 2.

Table 2 Stage 1 potential infrastructure components

Component	Quantity
Development footprint	Up to 281.61 ha (248.58 ha native vegetation)
Wind turbine generator (WTG)	Up to 54
Collector substation	1
O&M facility including carpark	N/A
Meteorological masts	5
Temporary Facilities - Accommodation	N/A
Transmission line	1
Laydown areas	1
Construction compound	1

Stage 2

The second stage would be construction within remainder of the eastern area and the western area, including associated WTGs, grid connection infrastructure and workforce accommodation facility. Stage 2 is within both the Murrumbidgee LGA and Edward River LGA. Infrastructure proposed to be included within Stage 2 is detailed below within Table 3.

Table 3 Stage 2 potential infrastructure components

Component	Quantity
Development footprint	Up to 746.32 hectares (670 ha native vegetation)
Wind turbine generator (WTG)	Up to 146
Collector substation	Up to 3
O&M facility including carpark	1
Meteorological masts	Up to 3
Temporary Facilities - Accommodation	1
Transmission line	2
Laydown areas	1
Construction compound	1

Micro-siting

The proposed layout included in this assessment has undergone numerous design iterations with input from a range of specialists, however it remains indicative and subject to detailed design, which will incorporate detailed geotechnical, and other specialist investigations and selection of the final WTG model.

In order to facilitate refinement of the layout during the detailed design process, an allowance for micro-siting of WTGs no greater than 100-metre radius from the locations identified in the EIS (and this BDAR) is being sought. Other project infrastructure components, including substations, switchyard, grid support, O&M buildings, temporary facilities, cabling and access tracks, etc., may also be micro-sited within the assessed development corridor. Any future micro-sting will ensure that it does not result in greater impacts to biodiversity values, and resultant offsets, than is assessed in this BDAR and the EIS. The micro-siting will also need to comply with all conditions imposed on any development consent granted for the project.

Any micro-siting would ensure that there is no increase in impact to biodiversity values detailed in Table 89, Table 90 or Table 91 of this BDAR. If micro-siting results in an increase in impacts of biodiversity values outlined in the above mentioned tables, consideration of additional impacts and implications in relation to the project prior will be required prior to impacts occurring.

1.2. Purpose of this assessment

This BDAR will:

- Address the BAM (DPIE 2020a) and the BOS.
- Address SEARs issues under section 4.12(8) of the EP&A Act and Part 8 of the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation).
- Identify how the Applicant has avoided and minimised impacts to biodiversity.
- Identify any potential impact that could be characterised as serious and irreversible.
- Describe the offset obligations required to compensate for any unavoidable biodiversity impacts resulting from the proposed development.
- Consider and assess the project in accordance with other relevant legislation such as the Commonwealth EPBC Act.

All biodiversity assessments have been undertaken in accordance with the BAM, and this BDAR has been prepared and certified by BAM Accredited Assessor Mitch Palmer (BAAS17051) and reviewed by BAM Accredited Assessor Callan Wharfe (BAAS18138).

This BDAR describes the outcome of the BAM Credit Calculator (BAM-C) development assessment cases conducted consistent with the BAM as follows

- Main assessment - 00034895/BAAS17051/24/00055370 (Rev5).
- Wind Farm enabling works - 00034895/BAAS17051/24/00055727 (Rev4).
- Wind Farm Stage 1 - 00034895/BAAS17051/24/00046668 (Rev8).
- Wind Farm Stage 2 - 00034895/BAAS17051/24/00055369 (Rev4).
- Scattered tree module stage 1 - 00034895/BAAS17051/24/47205 (Rev5)
- Scattered tree module stage 2 - 00034895/BAAS17051/24/55371 (Rev2).

1.3. Response to submissions

Following submission of the EIS and the accompanying BDAR, NSW Biodiversity Conservation and Science Directorate (BCS), now known as Regional Delivery, Conservation Programs, Heritage and Regulation Group (CPHR) requested further information on 20 August 2024. A summary of the responses to BDAR specific comments is provided in Table 4.

Table 4 Response to submissions

Reference	Summary	Concern	Biosis response
BCS			
1.1 – 2.2	*The BDAR needs to be updated to allow BCS to determine if serious and irreversible impacts (SAII) are likely*	• Provide further evidence-based justification that the proposal will not contribute to SAII Principle 3 for Austral Pillwort and Claypan Daisy. • Provide justification for the impact to Plains-wanderer important habitat mapping including where mapping incorporates existing access tracks • Relocate the permanent meteorological mast DINW02E to an area outside mapped Plain-wanderer habitat. Include access to DINW20E in the assessment, ensuring that proposed access tracks avoid Plains-wanderer habitat.	• Austral Pillwort is no longer an SAII species, therefore, and in addition to its unlikely presence in the development corridor, this assessment has been removed. SAII assessment for Claypan Daisy has been updated in Appendix 5. • Direct impact to Plains Wanderer habitat has been reduced from 4.02 ha to 2.38 ha. These impacts result from areas where the important mapped polygons overlap an existing public road (Goolgumbla Road) as well as existing formed farm tracks that will require minor upgrades. • Further avoidance has been undertaken during design updates and the meteorological mast DINW02E has been relocated outside of Plains Wanderer important mapped area.
3.1 – 6.2	*The candidate lists of threatened species, survey effort, suitable habitat and species polygons need to be revised to ensure they are prepared in accordance with the BAM*	• Provide further justification for excluding candidate fauna species in Section 4.3 and Table 110. If further justification cannot be provided in accordance with the BAM, Section 5.2.2 (3) should be applied, and the species assessed further. • Provide additional information to confirm threatened species surveys were conducted in accordance with relevant guidelines and the TBDC. If additional surveys cannot be completed, assume presence or provide an expert report. • Review threatened flora survey effort data to ensure the spread of survey effort covers all associated PCT grid points in the correct survey months.	• Further justification has been added to Section 4.3 in regard to species excluded from the assessment, particularly Koala and Southern Myotis. • Biosis and the BAM assessor disagree that bird utilisation surveys are not appropriate to use as targeted survey. These surveys are extensive, completed across two years, eight seasons, and supplemented by additional survey for large nests and hollow bearing trees, in accordance with the TBDC. Additional surveys have been completed for forest owls, Bush-stone Curlew, Raptors and Australian Bustard. • Additional targeted flora survey has been undertaken in September 2024, November 2024 and July 2025. Extensive survey has now been undertaken in appropriate seasons across 3 years. However due to the large size of the development corridor, and fluid nature of changing designs as a result of constraints, this has meant

Reference	Summary	Concern	Biosis response
		• Where survey effort including walking transects and grid points have not been completed in the correct survey month, remove this effort from the effort calculations in Table 30. • Remove any driving transects from survey effort calculations and maps then reevaluate additional survey effort for each species. • Complete additional flora surveys in the correct survey month for each flora species to meet the minimum survey requirements set out in the BAM 'Surveying threatened plants and their habitats' guide or seek agreement from BCS to use a different approach for this project. If additional surveys cannot be undertaken, assume presence or provide an expert report. • Prepare species polygons in accordance with Box 2 of the BAM for each species credit species, in consultation with BCS. • Present the species polygons for fauna species on maps in the BDAR.	that extensive areas surveyed are no longer within the development corridor, and gaps still occur. Presence has been assumed in accordance with the BAM where these gaps occur, and will be subject to further survey in September and November 2025. • Species polygons have been updated accordingly.
7.1 - 11..2	*The proponent needs to demonstrate the efforts to avoid and minimise*	• Use the outcomes of turbine risk assessment and collision risk modelling to further avoid and minimise project impacts and identify the 200 turbines that have the lowest impacts on biodiversity including birds and bats. • Use the outcomes of the species surveys, State and Commonwealth TEC mapping and prescribed impact assessment to further to further avoid and minimise project impacts for the proposed 200 turbines. • Prepare an additional (third) BAM-C child case in the parent case to include those turbines	• The project has been refined to include 200 turbines. All turbine risk assessments and collision risk modelling has been updated to reflect this change. • Avoid and minimise assessment and calculations have been amended in Section 7. • All very high risk turbines have been removed or relocated. • Further justification for remaining high risk turbines has now been included. This includes locating turbines within areas considered lower biodiversity value from an native habitat sense, but have a high collision risk due to flocking waterbirds that reside at certain times due to irrigated channels and paddocks.

Reference	Summary	Concern	Biosis response
		and ancillary facilities above the maximum of 200 turbines that are the least likely to be developed. *Table 70 of the BDAR summaries the turbine risk assessment. Of the 267 turbines, four have a very high risk, 59 are high risk and 114 are moderate risk. There is no evidence in the avoid and minimise measures of the BDAR that the proponent has used the results of the turbine risk assessment to further reduce impacts. Given the project only intends to construct 200 of the 267 turbines, the very high and high risk turbines (totalling 63) should be removed. Where the proponent proposes retaining any very high or high risk turbines, BCS requests they provide a detailed justification for doing so*. • Remove or relocate all very high-risk turbines. • Remove or relocate all high-risk turbines, or where this is not possible, provide a detailed justification for retaining them. • Revise Section 7 to detail how changes to the development corridor has reduced biodiversity impacts, in accordance with BAM section 7.1.2. • Include maps of the alternative and selected development options with key biodiversity constraints including (but not limited to) Plains-wanderer important habitat mapping, no-go zones, and areas of high biodiversity value. • After completing additional survey identified in issues 5 and 6, and updating the avoid and minimise assessment as per issues 7, 8 and 9, revise Table 74 to demonstrate the application of avoid and minimise in accordance with the BAM.	• Additionally, some low and moderate risk turbines from a collision risk perspective have also been removed or relocated due to varying constraints such as EPBC listed TECs, Plains Wanderer sighting and recorded threatened flora species.

Reference	Summary	Concern	Biosis response
		• If the required survey is not completed, the BDAR must include: *a statement in Table 74 about survey limitations and clearly identifying that high biodiversity values may not all have been identified and avoided* and *mapping in section 7.1 and 7.4 of the BDAR for unsurveyed areas for threatened flora and fauna species where the avoid and minimise principle could not be applied based on the outcomes of survey results*. • Justify the location of the development footprint for each large hollow-bearing tree proposed to be removed. • Amend the scattered tree spatial data to include tree identifiers and proposed impact (removed or retained) as per Table 73 of the BDAR.	
12.1 – 15.1	*PCT, TEC, and vegetation zone identification and mapping need to be revised and the biodiversity credit calculation updated*	• Provide maps showing the distribution and extent of the PCTs identified on the subject land and described in BDAR s.3.2.3, as required by BAM s.4.2. • Update the BDAR and calculations of impacts to NSW Weeping Myall TEC to include derived native grassland condition. • Update each BAM-C child case for each stage to only include VI plots collected for that stage. • Where VI plots from another stage are required to make up for a shortfall in the required VI plots, provide justification within the BDAR for each plot on why it is suitable to use in the vegetation zone. • Collect additional VI plots where plots are not within the vegetation zone for each stage of the development footprint.	• Child cases of each of the project stages have been updated. • Due the extensive size of the original project area, detailed mapping to PCTs was only determined with confidence to the development corridor, and mapping to vegetation class provided more broadly to assist within consideration of connectivity and prescribed impacts. This however has now been expanded with mapping of PCTS completed more broadly, however with a lower confidence in some areas, and identified as field verified and desktop only. • Additional plots have been undertaken and incorporated into the assessment. • A revision of the BAM C cases has included a review of all plot data used in the assessment. As a result, some plots are now no longer included. • Further consultation was undertaken in regard to staging and plot location. It should be noted that the staging of the project is solely related to anticipated construction staging and associated credit obligation retirement, however the entire development corridor has been assessed. Therefore, vegetation zones and plot allocation is

Reference	Summary	Concern	Biosis response
			representative to what is observed within the entire development corridor, and not by staging. The BAM operational manual states that where multiple discontinuous areas of vegetation form a vegetation zone, plots must be evenly distributed across these areas if size permits, and is a requirement for linear development proposals. Biosis considers this is as being implemented for zones across the development corridor, but not a requirement for staging construction of a development. The staging areas have changed from originally proposed, and following collection of plots, but although some plots occur more in stage 2 than stage 1 for example, all locations are representative of the homogeneous nature of zones as a whole. Having extra plots, or dummy plots in the case of plot shortfalls across stages, would end up with a situation where a zone would have a different VI score for the same zone within stage 1, then stage 2, which would be inaccurate. In addition, numerous other plots to quantify vegetation zones were completed, but due to change designs, have been excluded from being used in the BAM-C as they are located in areas now considered to be a distance to great from the development footprint, however are still used to map and confirm vegetation zones. • Extensive discussion and justification on TECs is provided in Section 3.2.4. Similar to the adjacent Dinawan Solar farm where the justification for excluding Weeping Myall DNG areas was accepted, PCT 26 typically occurs on fertile red top brown clay soils and sometimes moderate to extensive gilgai that are subject to seasonal waterlogging. For areas of Weeping Myall DNG, 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

Reference	Summary	Concern	Biosis response
			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. Recruitment of *Acacia pendula* rarely occurs in the DNG zone, which helped assign this zone to PCT 26, and no other grassland communities, but cover is generally <1%.
16.1 - 19.7	*The impact assessment requires revision, and mitigation measures need to include more specific detail to be effective in managing impacts.*	• Assess all areas where native vegetation will be impacted by the project, including where there will be clearing for ancillary infrastructure, and to construct or upgrade access and transport routes. • Clarify the location and number of accommodation camps included in the assessment. • Amend Section 8.2 of the BDAR to provide evidence to justify the predicted impacts and discuss any limitations to the data and assumptions made. Revise Table 80 to detail specific measures to mitigate indirect impacts, including details required by BAM s.8.4. • Further assess the impacts wood collection and exotic plant invasion into adjacent vegetation, including Plains-wanderer habitat. • Provide feasible measures to minimise or mitigate any identified impacts from exotic plant invasion or wood collection. • Include measures to minimise or mitigate impacts of sedimentation on threatened entities, including Plains-wanderer habitat, and specify monitoring requirements to ensure controls are effective. • Update Section 9 of the BDAR (including Table 83) to include mitigation measures that follow the SMART principles and address the identified impacts.	• Tracks impacting native vegetation have been added to all met masts where they veer from existing farm tracks. • Updates to project descriptions and component has been undertaken . • Assessment of indirect impacts has been updated in Section 8.2. • Improvements and changing of wording has been undertaken for mitigation measures in Section 9.

Reference	Summary	Concern	Biosis response
		• Ensure that the language in Table 83 sets out clear commitments. • Revise Table 83 to detail auditable mitigation and management measures to be implemented through post-approval plans. Amend Table 83 to include residual impacts and risk of failure. • Provide details in measure B2 to specify the criteria for micro-siting and pre-clearing survey requirements. • Detail how injured and uninjured animals will be treated, particularly with respect to relocation to nearby habitat. The BDAR should discuss what the potential impacts of any relocations/translocations of displaced fauna (particularly threatened species) may be on adjoining habitat and what measures (e.g. monitoring) will be used to minimise any detrimental effects on existing faunal populations that use such areas. • Remove requirements for handling and relocating Southern Bell Frog from Action B2, Table 83. • Document the mitigation priorities and strategies proposed to reduce impacts of predators on Plains-wanderer as indicated in Table 80.	
20.1 - 21.3	*The prescribed impact assessment needs to include all prescribed impacts and further assess the impacts to individual entities*	• Revise Section 8.3 of the BDAR to assess the prescribed impacts that the proposal will, or is likely to have, on threatened entities and their habitat in accordance with Section 8.3 of the BAM. The BDAR should include information on how each prescribed impact is likely to impact each specific species or guild. • Revise the BDAR to include figures displaying corridors for	• Prescribed impacts have been updated for the noted species in Section 8.3.

Reference	Summary	Concern	Biosis response
		different guilds (arboreal, terrestrial, aquatic, etc) to demonstrate that movement will not be impaired. • Assess the impact of the new network of access tracks on habitat connectivity for threatened entities. • Assess the risk of sedimentation (from clearing, construction and operation) on threatened species habitat for individual species during and after high rainfall events when water is moving through the landscape. • Include Southern Myotis and Corben's Long-eared Bat in the assessment of fauna that may use the site as a flyway or migration route • Include all threatened fauna in the vehicle strike assessment and provide mitigation measures to address all impacted species. • Assess vehicle strike impacts for all roads and tracks constructed or used for the project. • Detail the nature and extent of night vehicle movements and revise the assessment to include all additional species at risk of vehicle strike.	
22.1 - 26.3	*The Bird and Bat Adaptive Management Plan (BBAMP) and collision risk model need to be revised*	• Confirm the proposed lower tip height and update Figure ES1 in the EIS to match the assessed RSA or revise the assessment to address the additional impact of a lower tip height of 50 metres. • Update all results in the draft Bird and Bat Management Adaptive Plan (BBAMP), including Bird and Bat Use Survey results and collision risk modelling) if the lower tip height is 50 metres. • Review the list of birds recorded at the subject land in Table A.5 and correct any potential misidentifications.	• A draft BBAMP has been included in Appendix 9. • Updates to turbine risk assessment, species risk assessments and collision risk modelling have occurred following new turbine specifications and reduced turbine numbers. • Fauna tables have been updated following some data entry coding errors from the field data sheets. Australian King Parrot for example was incorrectly included when it should have been Australian Ringneck (as a result of a data entry error following field work). All species were correctly identified in the field.

Reference	Summary	Concern	Biosis response
		• Update all results in the draft BBAMP after revising the species list. • Revise the collision risk assessment in Tables 62 and 63 to include a column for 'Likelihood and nature of collision impacts'. • Include Painted Honeyeater and White-fronted Chat in the collision risk assessment. • Update triggers for Tier 1 and 2 non threatened 'at risk' species in consultation with BCS. • In consultation with BCS review the turbine layout and, where appropriate, group turbines where they are in proximity to a landscape feature and treat them as a single turbine for the purpose of impact triggers. • Revise the draft BBAMP framework in Section 9.1.2 in consultation with BCS, and ensure outcomes based on the results of the BBUS data are fully justified with supporting information and literature. • Prepare a standalone BBAMP that is appended to the BDAR. • Ensure the measures in the BBAMP follow the SMART principles and set out clear and specific commitments.	• Painted Honeyeater and White-fronted Chats are now included in the risk assessment tables. • Triggers have been reviewed and updated were appropriate, noting still however this is a draft BBAMP and will be revised following further consultation with CHPR, and finalised once a final design is approved. • Recommendations for turbine clusters have been incorporated into the draft BBAMP.
27.1	*Potential Biodiversity Stewardship*	• Discuss any potential stewardship sites that may be within turbines area of influence with BCS	• Following submission of the amendment report, consultation with CHPR and BCT will be undertaken.

Reference	Summary	Concern	Biosis response
28.1 - 28.5	*The assessment of Matters of National Environmental Significance requires review.*	• Amend Table 98 of the BDAR to include further justification to support excluding MNES species from further assessment. • Amend section 12 of the BDAR and specifically address each of the bilateral assessment requirements as detailed in Attachment C to this response. • Amend s12.1.7 of the BDAR to address MNES offset requirements covered by the bilateral agreement as per s6 in Attachment C of this response. • After additional surveys for threatened flora are completed, review the significance assessments in Appendix 6 of the BDAR to ensure the validity of outcomes. • Provide specific information around the proposed additional offsets outlined in s12.1.7 of the BDAR for MNES.	• Further information has been provided on EPBC Act-listed species and updated assessments are provided in Section 12 and Appendix 8, respectively.
29.1 - 29.3	*BAM and BOAMS administration*	• Add a new child case within the parent case in BOAMs for stage 2 of the development. • Add a new child case within the parent case to split the scattered trees by stage. • Revise Table 77 to present the scattered tree impact summary for Stage 1 and Stage • Revise Table 91 to present the scattered tree credit liability for each stage.	• Child cases of each of the project stages have been updated.

1.4. Project terminology

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

- The **development corridor** comprises an area of 6,385 hectares and is defined as the land within which the development footprint is located, and which encompasses the area subject to detailed PCT vegetation mapping, vegetation integrity and targeted candidate species surveys. This development

corridor generally comprises a 100 metre to 200-metre-wide area centred on the development footprint.

The development corridor has been defined and assessed to allow for more detailed assessment of potential indirect impacts and to provide flexibility and micro siting during the detailed design phase (Figure 1).

- The **subject land** is defined as an area of approximately 31,445 hectares and is the area to which the BAM has been applied in general. The subject land has been derived based on a minimum 500 metre buffer on the development corridor, and includes vegetation mapping to PCT and vegetation class at a minimum (i.e. subject to rapid ground validation), and is sufficiently broad to capture potential flight paths as well as habitats potentially indirectly impacted and/or fragmented as a result of the project (Figure 1).
- The **development footprint** comprises an area of 1,098 hectares and is the area of land directly impacted by the project, including all infrastructure for construction and operations. Of the 1,098 hectares, 948.56 hectares consists of native vegetation, 78.95 of non-native/Category 1 exempt land and 70.49 hectares of cleared land such as existing public and formed roads. The development footprint may be subject to alterations at the detailed design stage as a result of micro-siting of infrastructure (Figure 1).
- The **assessment area** includes the subject land and the area of land within the 1,500 metre buffer zone surrounding the subject land as defined by the BAM as site based development.
- The **development site** comprises the landholdings upon which the project is located (it is synonymous with the **project area** defined in the EIS) and is approximately 34,512 hectares. The development site is located off Kidman Way, approximately 29 km south from Coleambally, 30 km north from Jerilderie and approximately 160 km west of Wagga Wagga in south-western NSW. The development site is located within the Edward River and Murrumbidgee LGAs, and the Murray Local Land Services (LLS) Region, and is zoned as RU1 Primary Production. A small area that may require road upgrades occurs within the City of Wagga Wagga LGA.

1.5. Sources of information

Sources of information used in the assessment include 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 50 kilometres of the edge of the development site (the locality) were collated and reviewed from the following databases or spatial datasets:

- 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, the 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 2023).
- Native vegetation regulatory map.
- BAM Important Areas maps (DPE 2022b).

- 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 PCTs, as held within the BioNet Vegetation Classification database (NSW DCCEEW 2024a).
- Relevant vegetation mapping, such as (Riverina Region Version v1.2 – VIS_ID 4469 (DPIE 2016)).

The following reports were also reviewed and relied on to provide additional information, particularly in relation to birds and bat utilisation of the subject land and potential risks to those species recorded / predicted to occur:

- Dinawan Energy Hub Biodiversity Constraints and Opportunities Assessment (Biosis 2021).
- Preliminary field assessments of biodiversity values and impacts, Dinawan Energy Hub (Biosis, 2022)
- Dinawan Wind Farm Scoping Report (EMM 2022).
- Dinawan Wind Farm Planning Secretary's Environmental Assessment Requirements SSD-50725708 (DPE 2022).
- Dinawan Wind Farm Planning Supplementary SEARs SSD-50725708 (DPE 2022).
- Dinawan Solar Farm Biodiversity Development Assessment Report (Biosis, 2023).

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 additional 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).
- Spatial data associated with NSW State Vegetation Type Map (DPE 2023), Riverina Regional Native Vegetation Map v1.2 VIS_ID 4469 (DPIE 2016).
- NSW Soil and Land Information System (SALIS).
- 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).
- Digital Elevation Model (DEM) and Canopy Height Model (CHM).

1.6. 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.*
- *Local Land Services Amendment Act 2016.*

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

Table 5 SEARs summary

Biodiversity requirements	Relevant section
SEARS	
An assessment of the biodiversity values and the likely biodiversity impacts of the project, including impacts associated with transport route road upgrades in accordance the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR), including a detailed description of the proposed regime for avoiding, minimising, managing and reporting on the biodiversity impacts (including on grasslands) of the development over time, and a strategy to offset any residual impacts of the development in accordance with the BC Act.	The BDAR has been prepared in accordance with the BC Act and BAM, and the template is based on that provided on the BAM Assessor Resources web page. Avoid and minimise is discussed throughout and is a key focus for the project, discussed in detail within Section 7 Biodiversity values to be impacted are discussed throughout and assessed in Section 8.
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 Coleambally Outfall Drain, Delta Creek and Yanco Creek;	The BDAR has discussed potential impacts to aquatic environments in Section 2, Section 8.3.3 and Section 12.2.
An assessment of the impacts of the development on birds and bats, including blade strike, low air pressure zones at the blade tips (barotrauma), alteration to movement patterns, and cumulative impacts of other wind farms in the vicinity	The BDAR has assessed impacts to birds and bats in Section 6 and Section 8.3.4.
A cumulative impact assessment of biodiversity values in the region from nearby developments	The BDAR has discussed cumulative impacts in Section 8.6.
If an offset is required, details of the measures proposed to address the offset obligations.	A strategy to secure offsets required for residual unavoidable impacts is provided in Section 11 and Section 13.
Supplementary SEARs	
Project description and relevant regulations	The BDAR includes a detailed project description Section 1.1 and a summary of relevant EPBC regulations in relation to biodiversity in Section 1.6 and Section 12.1.
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 4, Section 8, Section 12.1 and Appendix 6.

Biodiversity requirements	Relevant section
Avoid and minimise - *For each of the relevant matters protected that are likely to be significantly impacted by the action, the EIS must provide information on proposed avoidance and mitigation measures to manage the relevant impacts of the action*	Avoid and minimise is discussed throughout and is a key focus for the project, discussed in detail within Section 7 and Section 12.1.4
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 12.1 and Appendix 6.

1.7. Consultation

Consultation was carried out with NSW Biodiversity Conservation and Science (BCS) and 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 6.

Table 6 Consultation

Date	Consultation	Purpose	Key outcomes
15/09/2022	BCS, Spark Renewables, EMM and Biosis	Project overview and introductions Initial discussions around varying flora surveys	General consensus on approach Feedback provided on how to potentially vary flora survey methods
15/11/2022	Cth DCCEEW, EMM, Spark Renewables and Biosis	Pre-referral meeting and project overview	General consensus on approach
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.	General consensus on approach
03/04/2023	Cth DCCEEW and Biosis	Site visit attended by DCCEEW assessing officers and Biosis ecologists Considerations of referral requirements	Positive feedback on general approach General consensus on justification of PCT and condition allocation
25/05/2023	BCS and Biosis	Updates regarding relevant guidelines	Updates and information provided by BCS relating to guidelines in development
20/06/2023	BCS and Biosis	Site visit attended by BCS assessing officers and Biosis ecologists	Positive feedback on general approach General consensus on justification of PCT and condition allocation

Date	Consultation	Purpose	Key outcomes
			Feedback provided on any variation to targeted flora methods
17/04/2024	BCS, Spark Renewables, EMM and Biosis	Project overview and EIS/BDAR Pre lodgement meeting	General consensus on results presented Feedback on targeted flora gaps. Advice provided on MNES significant impact approach Positive feedback on approach to BBUS and CRM Concerns on Black Falcon
25/02/2025	BCS, Spark Renewables, EMM and Biosis	Project updates and clarification on several matters raised in the RTS	General project update and overview of amendments undertaken TEC discussion and DNG implications around justification Discussion on BAM staging and BAM-C Discussion on CRM updates and precautionary assessment of worst case scenario
16/03/2025 and 28/04/2025	BCS, EMM and Biosis	Memo and supporting spatial data regarding vegetation mapping and plot data	General endorsement of plot location and representation for the project being sufficient however, there is still disagreement between BCS and Biosis relating to requirements for staging. Discussed further in Section 1.3 and Section 3.3.

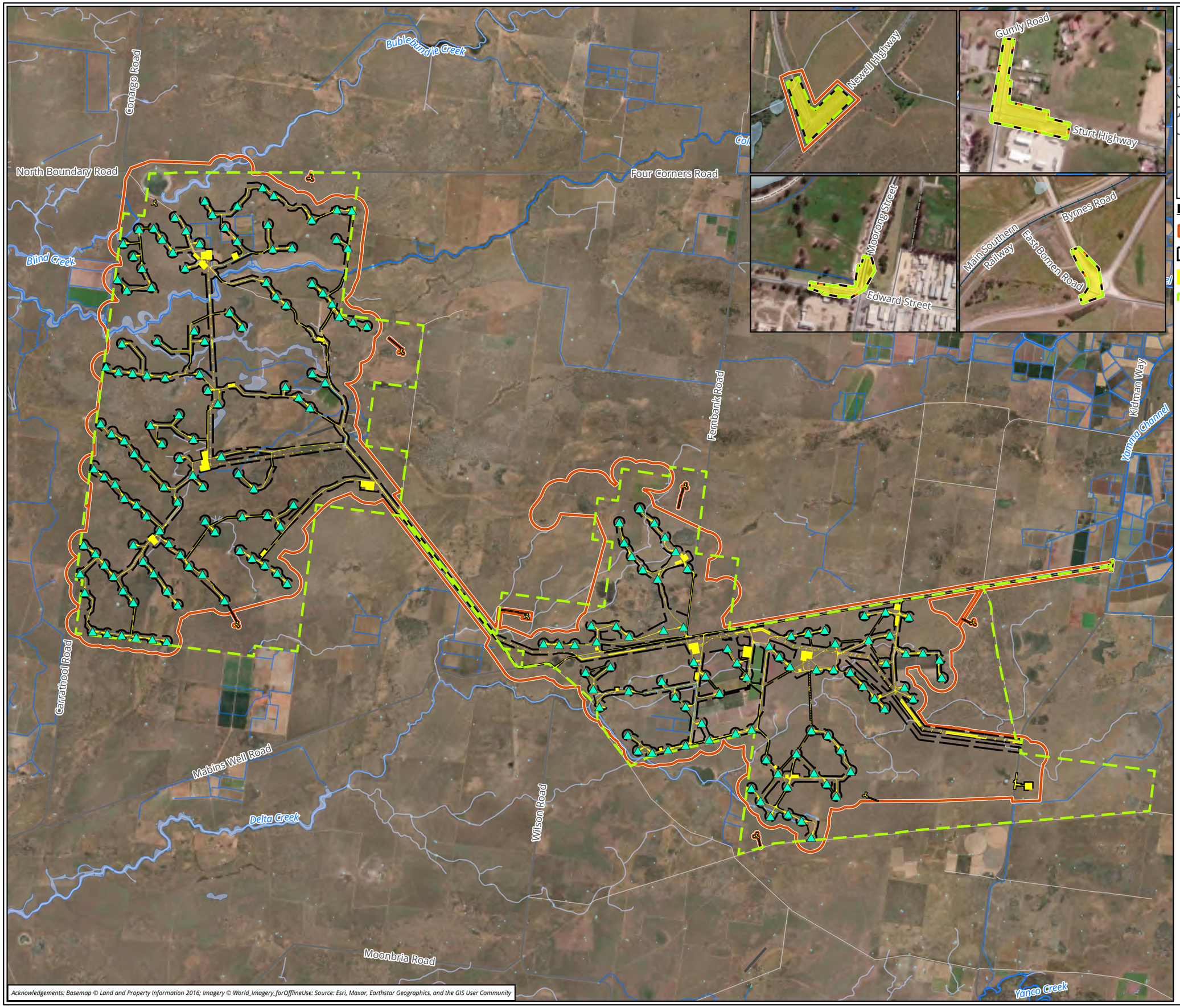


Figure 1 Subject land

Matter: 37263, Date: 07 May 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F1-3.aprx
Layout: 37263_Wind_F1_SubjectLand

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 1,500 metre buffer assessment area, as required by the BAM (DPIE 2020a). Figure 3 shows the location of the subject land and landscape features within the 1500 metre assessment area.

2.1. Subject land description

The subject land is located west of Kidman Way, between the township of Coleambally and Jerilderie, and off other rural roads such as Liddles Lane and Jerrys Lane to the South, Mclennons Bore Road and Goolgumbla Road centrally and Carrathool Road and Four Corners Road to the west and north respectively. The current land use is sheep and cattle grazing, in conjunction with areas of irrigated and dryland cropping, with the Coleambally outfall drain and other artificial perennial channels running through the north-western section of the subject land. The subject land is characterised by low-lying flood prone terrain, with multiple unnamed ephemeral waterways that dissect the subject land and development corridor, with the Delta Creek, Blind Creek and Bublebundie Creeks the most significant natural waterways located within the subject land (Figure 2 and Figure 3). Three small areas also occur for road upgrades at the intersection of Olympic Highway/Sturt Highway, Byrnes Road/West Bomen Road, Sturt Highway/ Eunony Bridge Road intersections in Wagga Wagga. No remnant native vegetation will be impacted at this location in Wagga Wagga.

The subject land covers 31,445 hectares, the majority of which is privately owned and predominantly comprised of farmland, with several residences within the vicinity. Vegetation within the subject land is dominated by native vegetation in varying conditions due to historical overstorey removal, livestock grazing and cropping, resulting in large tracts of derived native grasslands, areas of natural grasslands, fragmented and regenerating woodlands and includes 23 water courses. Soils vary from aeolian sandy soils on stabilised dunes/sandhills of slightly higher elevations to clay loam soils on lower elevation areas and depressions subject to inundation.

Vegetation within the subject land at the intersection of Olympic Highway/Sturt Highway, Byrnes Road/West Bomen Road, Sturt Highway/ Eunony Bridge Road intersections in Wagga Wagga contains predominantly non-native vegetation and scattered native roadside plantings.

2.1.1. Native vegetation cover

Vegetation within the assessment area (1500 metre buffer of the subject land) was assessed using aerial photographic interpretation, Digital Elevation Model (DEM) and Canopy Height Model (CHM), field survey results and existing vegetation mapping. Vegetation communities mapped within the assessment area are detailed within Table 7, which provides the list of PCTs identified from existing vegetation mapping, and the current assessment, as occurring within the assessment area. Conservation status of the communities is also provided.

The total area of the 1500 metre buffer around the subject land is 56,849 hectares, with the area of native vegetation mapped within the buffer being 50,856 hectares (Figure 5). This is a native vegetation cover of 89% (>70% class) as defined in Section 3.2.3 of the BAM (DPIE 2020a)) and this value was entered into the BAM calculator.

Cleared/all remaining areas within the assessment area include approximately 5,992 hectares.

Table 7 PCTs mapped within the assessment area (DPE 2023)

PCT	Associated Threatened Ecological Communities (TECs)	BC Act Status	EPBC Act Status
PCT 8 River Red Gum - Warrego Grass - Couch Grass riparian tall woodland wetland of the semi-arid (warm) climate zone (Riverina Bioregion and Murray Darling Depression Bioregion)	No associated TECs.	N/A	N/A
PCT 9 River Red Gum - wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion	No associated TECs.	N/A	N/A
PCT 10 River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	No associated TECs.	N/A	N/A
PCT 11 River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	No associated TECs.	N/A	N/A
PCT 12 Shallow marsh wetland of regularly flooded depressions on floodplains mainly in the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	No associated TECs.	N/A	N/A
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).	No associated TECs.	N/A	N/A
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).	No associated TECs.	N/A	N/A
PCT 16 Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).	No associated TECs.	N/A	N/A
PCT 17 Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion).	No associated TECs.	N/A	N/A
PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the	No associated TECs.	N/A	N/A

PCT	Associated Threatened Ecological Communities (TECs)	BC Act Status	EPBC Act Status
outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).			
PCT 19 Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplains.	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions.	Endangered	Not listed
PCT 21 Slender Cypress Pine - Sugarwood - Western Rosewood open woodland on sandy rises mainly in the Riverina Bioregion and Murray Darling Depression Bioregion	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions.	Endangered	Not listed
PCT 24 Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains	No associated TECs.	N/A	N/A
PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Weeping Myall Woodlands	Endangered	Endangered
PCT 28 White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone.	Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions.	Endangered	Not listed
PCT 44 Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	Natural Grasslands of the Murray Valley Plains	Not listed	Critically Endangered
PCT 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	Not listed	Critically Endangered
PCT 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	Not listed	Critically Endangered
PCT 47 Swamp grassland wetland of the Riverine Plain	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Not listed	Critically Endangered
PCT 160 Nitre Goosefoot shrubland wetland on clays of the inland floodplains	No associated TECs.	N/A	N/A
PCT 164 Cotton Bush open shrubland of the semi-arid (warm) zone.	No associated TECs.	N/A	N/A

PCT	Associated Threatened Ecological Communities (TECs)	BC Act Status	EPBC Act Status
PCT 165 Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone.	No associated TECs.	N/A	N/A
PCT 216 Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion.	No associated TECs.	N/A	N/A

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

There are three small areas required for road upgrades at the intersection of Olympic Highway/Sturt Highway, Byrnes Road/West Bomen Road, Sturt Highway/ Eunony Bridge Road intersections in Wagga Wagga, and within the south western slopes IBRA and Inland Slopes Subregions. These areas contain non-native vegetation and native roadside plantings within these portions of the subject land, and as such, no further assessment, with exception of consideration for prescribed impacts and planted tree modules, have been undertaken.

2.1.3. NSW (Mitchell) Landscape

Three Mitchell landscapes are recorded within the main subject land, with the Murrumbidgee Scalded Plains the most dominant, and hence, this landscape was entered into the BAM-C.

Murrumbidgee Scalded Plains

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).

Murrumbidgee Source-bordering Dunes

The Murrumbidgee Source-bordering Dunes landscape comprises sandy rises adjacent to river channels and along prior streambeds, deep red and brown sands and loams with a relief between three and 12 metres. This landscape is often heavily grazed and subject to wind erosion. Vegetation within this landscape includes White Cypress Pine *Callitris glaucophylla*, Needlewood *Hakea leucoptera*, Hooked Needlewood *Hakea tephrosperma*, Wilga *Geijera parviflora*, Bull Oak *Allocasuarina luehmannii*, Emu Bush *Eremophila longifolia,* Miljee *Acacia oswaldii*, Yarran *Acacia homalophylla*, Native Quince *Petalostigma pubescens*, Thorny Saltbush *Atriplex semibaccata*, Western Pittosporum *Pittosporum phylliraeoides*, Belah *Casuarina cristata* with sparse grasses. Black Bluebush *Maireana pyramidata* occurs in the shrub layer in western areas (Mitchell 2002).

Murrumbidgee Depression Plains

The Murrumbidgee Depression Plains landscape consists of Quaternary alluvial plains that contain several circular depressions, interpreted as high floodplains or low terraces situated beyond the reach of typical floodwaters. This landscape has a relief of up to 10 metres and consists of grey to brown clays and clay loams with linear patterns of sandy prior streams. This landscape now forms extensive grasslands which are heavily grazed and often invaded by exotic species. This landscape is reported to have originally comprised of Weeping Myall *Acacia pendula*, Old Man Saltbush *Atriplex nummularia* and Bladder Saltbush *Atriplex vesicaria* (Mitchell 2002).

2.1.4. 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 subject land. The subject land is characterised by low-lying flood prone terrain, with multiple unnamed ephemeral waterways that cross the subject land and development corridor, with Delta Creek, Blind Creek and Bublebundie Creeks the most significant natural waterways within the subject land. The Coleambally Outfall Drain and other artificial perennial channels run through the northwestern sections of the subject land. In total, there are 17 first order, five second order and one third order watercourse within the subject land.

Blind Creek is a minor ephemeral waterway (Strahler 1) which drains in a south-westerly direction during significant rainfall and flooding events, and eventually joining Coleambally Creek and Coleambally Outfall Drain.

Bublebundie Creek is a minor, ephemeral waterway (Strahler 2) which drains in a south-westerly direction during significant rainfall and flooded events and terminates just north of the subject land within minor ephemeral unmade chenopod and lignum dominated wetland. During large flooding events, this wetland then spills and connects to Blind Creek to the west.

Delta Creek is a minor, discontinuous ephemeral waterway (Strahler 3) which drains in a south-westerly direction during significant rainfall, although does not connect to any downstream major channel unless the area is significantly flooded.

Coleambally Creek and Coleambally Outfall Drain is generally a modified artificial tributary that flows east to west and is the only waterway that regularly contains water supply within the subject land year round, with water supplied for irrigation and environmental purposes.

An unnamed minor ephemeral waterway (Strahler 1) occurs adjacent to the road upgrade works at the Kidman Way and Newell Highway intersection. This waterway drains eight kilometres in a south-westerly direction during significant rainfall eventually merging with Turn Back Jimmy Creek.

Predicted habitat for threatened aquatic species such as the Flathead Galaxias or Silver Perch is mapped on the Department of Primary Industries (DPI) spatial data portal within the subject land and within sections of the Coleambally Outfall Drain. These species are also identified as part of Delta Creek, however this creek will not be directly impacted. The Coleambally Outfall Drain are identified as Poor Freshwater Fish Community habitat within the subject land on the NSW DPI Freshwater Fish Community map (DPI 2023). This is discussed further in Section 12.2.

2.1.5. Wetlands

The subject land is largely flat with some minor drainage depressions that temporarily hold water during and following rainfall. 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 2), however none of these wetlands are included in the Directory of Important Wetlands (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.

Numerous small depressional areas occur and are mapped as a 'floodplain water body', which is described in the Wetlands of NSW dataset as river and creek channels and adjacent inundated vegetation, including swamps, waterholes and shallow depressions (DPE 2023). Within the subject land, ephemeral wetlands occur as predominantly sporadic areas of PCT 17 Lignum swamps or PCT 160 Nitre Goosefoot dominated ephemeral wetlands, in conjunction with 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 Outfall Drain and associated irrigation channels dissect portions of the subject land, and act as a conduit of irrigation water for grazing and irrigation cropping. Coleambally Outfall Drain is a perennial channel, however generally in low condition with limited fringing vegetation present before transitioning into linear areas and small patches of Black box dominated woodland (Photo 1).

The subject land is not mapped as a Ramsar Wetland, and none occur within the locality.

Photo 1 General condition of Coleambally Outfall Drain within Stage 2 of the subject land

2.1.6. Hydrology

The topography of the subject land and surrounds is characterised as relatively flat terrain. Natural ground elevations within the project area are on average 108 metres Australian Height Datum (AHD) and there is very little variation with a maximum elevation of 115 metres AHD and an aspect from east to west (EMM,2024).

The subject land is affected by two primary flooding mechanisms, local catchment flooding as a result of heavy rainfall in the vicinity of the subject land and/or mainstream flooding sourced from the Murrumbidgee River to the north of the project area. This may occur as a result of heavy rainfall far upstream in the catchment or along river tributaries and not necessarily local to the project area (EMM, 2024). Flood extents within the subject land generally follow the alignment of watercourses, irrigation canals and minor depressions for events up to 0.5% annual exceedance probability (AEP). For the probable maximum flood (PMF) event, more extensive inundation occurs over much of the landscape. The latter was evident in the November 2022 flood event.

The development site is mapped as partially 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.

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

A total of 226 registered groundwater bores are within a 5 km buffer of the development site. Thirteen of these are within the development corridor. Groundwater levels from registered bores range from 15 to 35 metres below ground level (EMM, 2024).

A range of terrestrial groundwater dependent ecosystems (GDEs) are mapped within the subject land based on the Groundwater Dependent Ecosystems Atlas (BoM 2020). These comprise low to moderate potential for groundwater interactions. Associated plant community types include Lignum and Nitre Goosefoot wetlands wetland, Weeping Myall open woodland, Curly Windmill Grass, River Red gum and Black Box woodlands. A review of the High-Ecological Value Aquatic Ecosystems (HEVAE) dataset indicates that GDEs with medium to high value have been mapped within the development site; however, only a small number intersect the development corridor. The mapped GDEs intersecting the development corridor are typically associated with River Red Gum and Lignum and Canegrass wetland vegetation communities.

2.1.7. Connectivity

Much of the subject land consists of derived native grassland (DNG) or sparse modified Weeping Myall woodland, having been historically modified due to cattle and sheep grazing, and installation of cropping bays. However, large tracts of natural grassland and woodland occur within the subject land, with smaller sporadic wetlands/depressions scattered throughout. These wetlands and associated vegetation in flood prone areas may provide movement and dispersal areas for waterbirds and semi-terrestrial species, such as frogs, which was evident during the spring 2022 flooding event. In addition, although highly ephemeral, waterways 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.

Roadside vegetation corridors contain intact remnant vegetation, predominately Weeping Myall and occasional Black Box patches, that act as a conduit to larger intact patches throughout the broader landscape.

Woodland, primarily Black Box dominated riparian areas, Weeping Myall woodlands and White Cypress Pine dominated sandhills and paleochannels, 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 north-east and north-west of the subject land respectively. These connectivity features provide breeding, foraging and dispersal resources for terrestrial and arboreal mammals, flying mammals, and avifauna.

These habitats together form an important network of corridors and refugia for fauna species and movement for flora genetic material in a fragmented landscape.

2.1.8. 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). Prior streams and paleochannels occur scattered through the subject land that are no longer regularly active within existing fluvial systems, interspersed between a mosaic of woodland, inland riverine forest and derived grasslands on alluvial clay plain as well as scaled red soils.

Sandhills also occur, formed over millions of years by the natural weathering of the hills to the east of the subject land, with the deposition and subsequent windblown accumulation of sand adjacent to current and former river, streams and channels.

There were no recorded karst, caves, crevices, cliffs or other areas of geological significance within the development site or within the assessment area.

2.1.9. 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 subject land, or broader assessment area.

2.1.10. Important mapped areas

Plains-wanderer *Pedionomus torquatus* (EPBC Act Critically Endangered, BC Act Endangered) Mapped Important Areas of habitat (NSW DCCEEW 2023) are present within the subject land. During preliminary assessments, these areas have largely been avoided, however some impacts do occur primarily as a result of site access and where the mapped polygons overlap existing formed public roads (Goolgumbla Road) and existing farm tracks. It must be noted that Goolgumbla Road follows an existing road corridor, which includes important mapped areas. Other infrastructure such as cabling infrastructure and any new roads within the development corridor have now been removed from impacting Plains wanderer mapped areas. This is discussed further in Section 4.1.2. It is important to note that Plains-wanderer is also a species potentially subject to Serious and Irreversible impacts (SAII), if direct (and potentially indirect) impacts occur to Mapped Important Areas of habitat, which is discussed further in Section 10.2 and Appendix 5.

2.1.11. Additional landscape features

There are no additional landscape features within the subject land identified or covered in the development's SEARS.

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 DPHI 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

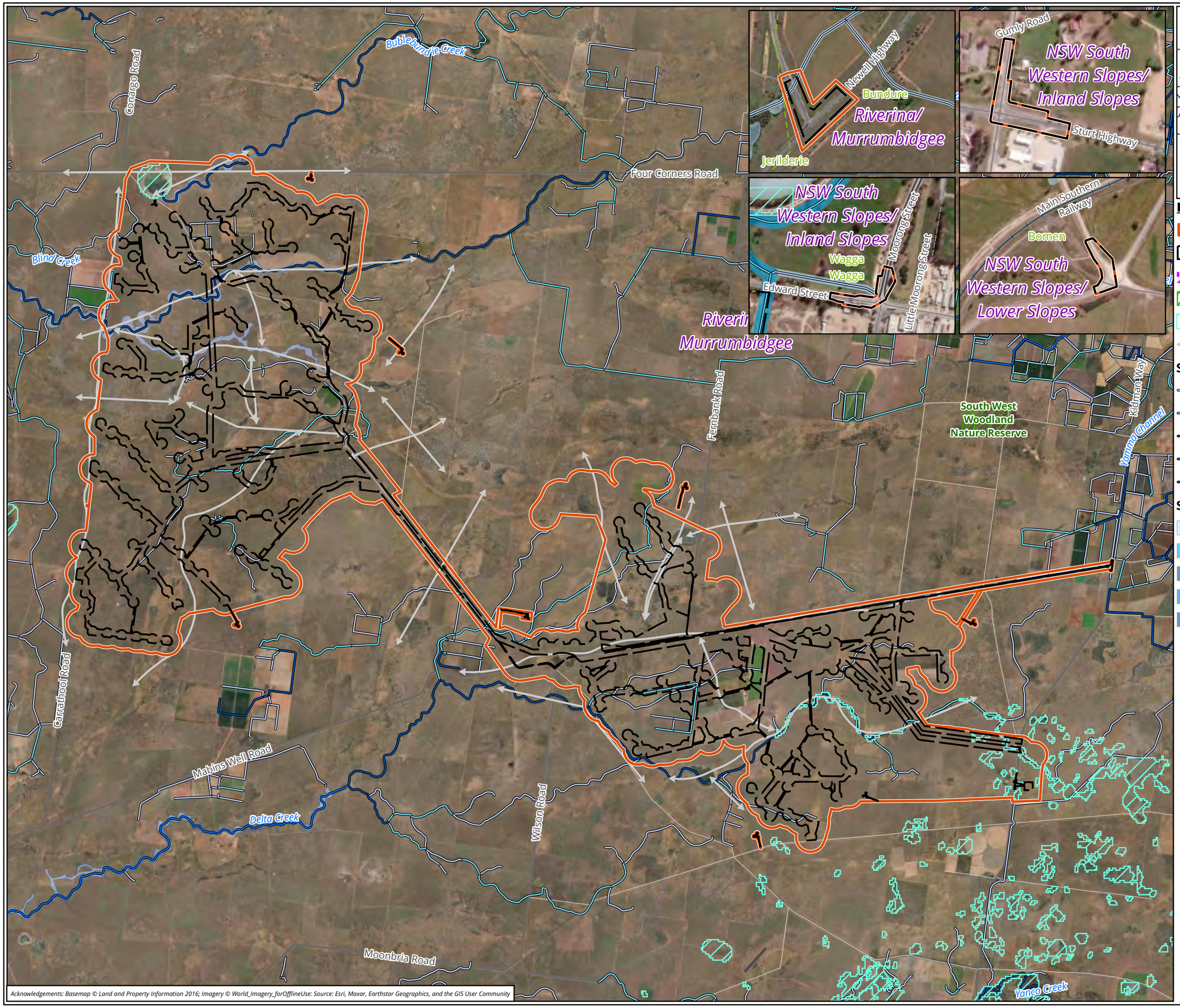
- Vulnerable and sensitive regulated land.
- Land not cleared of native vegetation before 1 January 1990 or unlawfully cleared of native vegetation after 1 January 1990.
- Land containing native vegetation grown or preserved using public funds.
- Land subject to an expired remedial action to restore 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 on Category 1-exempt land that are required to be re-categorised as Category 2-regulated land within the subject land.

Consultation was undertaken with the regulator (DPHI) to obtain a copy of the draft NVR mapping for the subject land on 6 July 2022. This data was analysed and used as the primary determinant, in conjunction with DEM and CHM and alongside the features listed above in order to complete the Land Category Assessment for the project.

Areas identified as non-native vegetation or Category 1-exempt land are shown on Figure 4. These predominantly include:

- Areas of current and previous cropping.
- Significant farm tracks and major fencelines.
- Significant dams.
- Rural infrastructure and residences.
- Airstrip.



Legend

- Subject land
- Development corridor
- IBRA Region/Sub-region
- National Park/Reserve
- Local wetlands
- Connectivity

Strahler stream order

- 1
- 2
- 3
- 4
- 5

Strahler stream order buffers

- 1
- 2
- 3
- 4
- 5

Figure 2 Site map

0 1 2 3 4 5

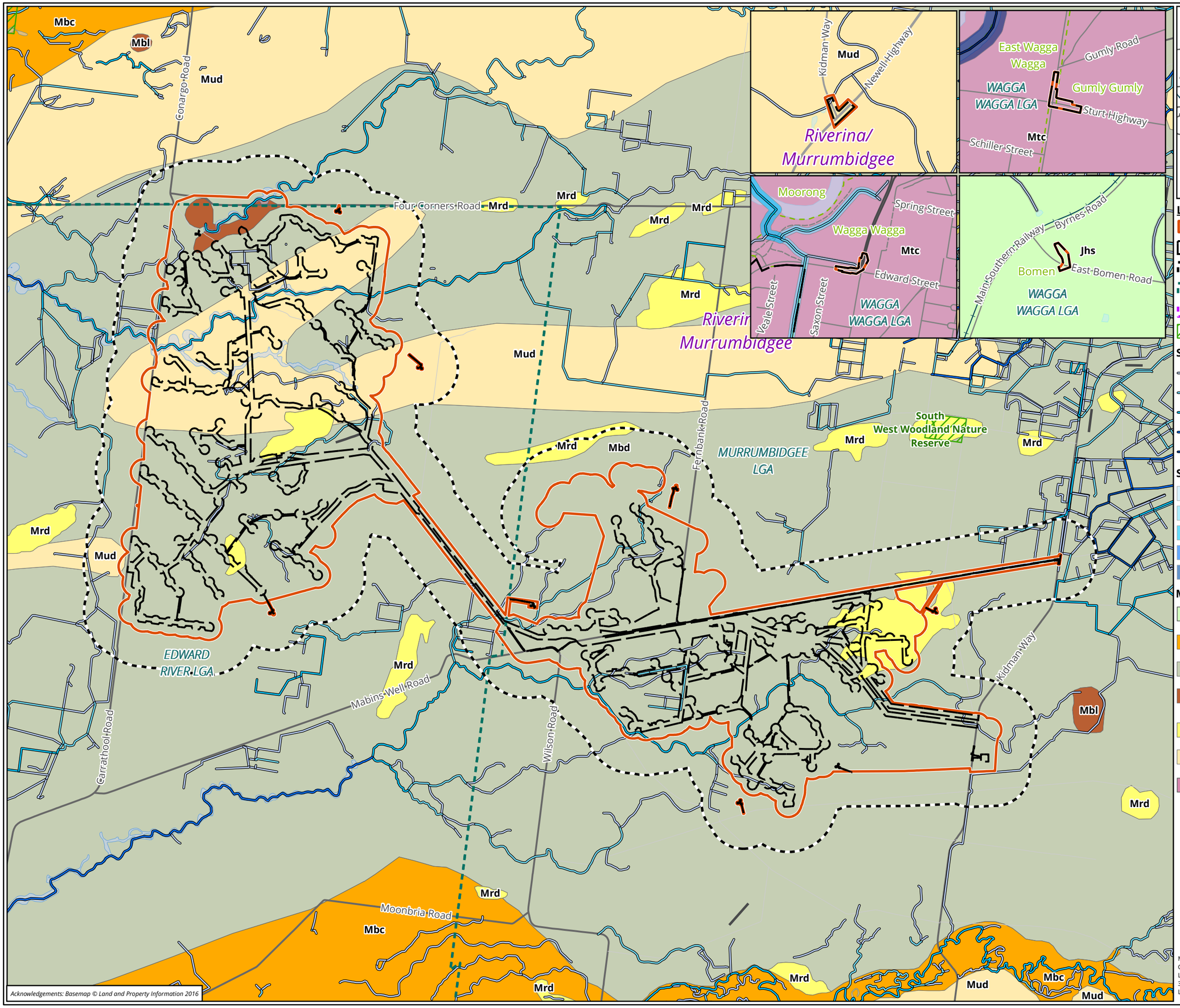
Kilometers
Scale: 1:135,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 07 May 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F1-3.aprx
Layout: 37263_Wind_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
- Development corridor
- Assessment area
- Local Government Area
- IBRA Region/Sub-region
- National Park/Reserve

Strahler stream order

- 1
- 2
- 3
- 4
- 5

Strahler stream order buffers

- 1
- 2
- 3
- 4
- 5

Mitchell landscapes

- Jhs,Junee Hills and Slopes
- Mbc,Murrumbidgee Channels and Floodplains
- Mbd,Murrumbidgee Scalded Plains
- Mbl,Murrumbidgee Lakes, Swamps and Lunettes
- Mrd,Murrumbidgee Source-bordering Dunes
- Mud,Murrumbidgee Depression Plains
- Mtc,Murrumbidgee - Tarcutta Channels and Floodplains

Figure 3 Location map

0 1 2 3 4 5 6

Kilometers
Scale: 1:150,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 07 May 2025
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
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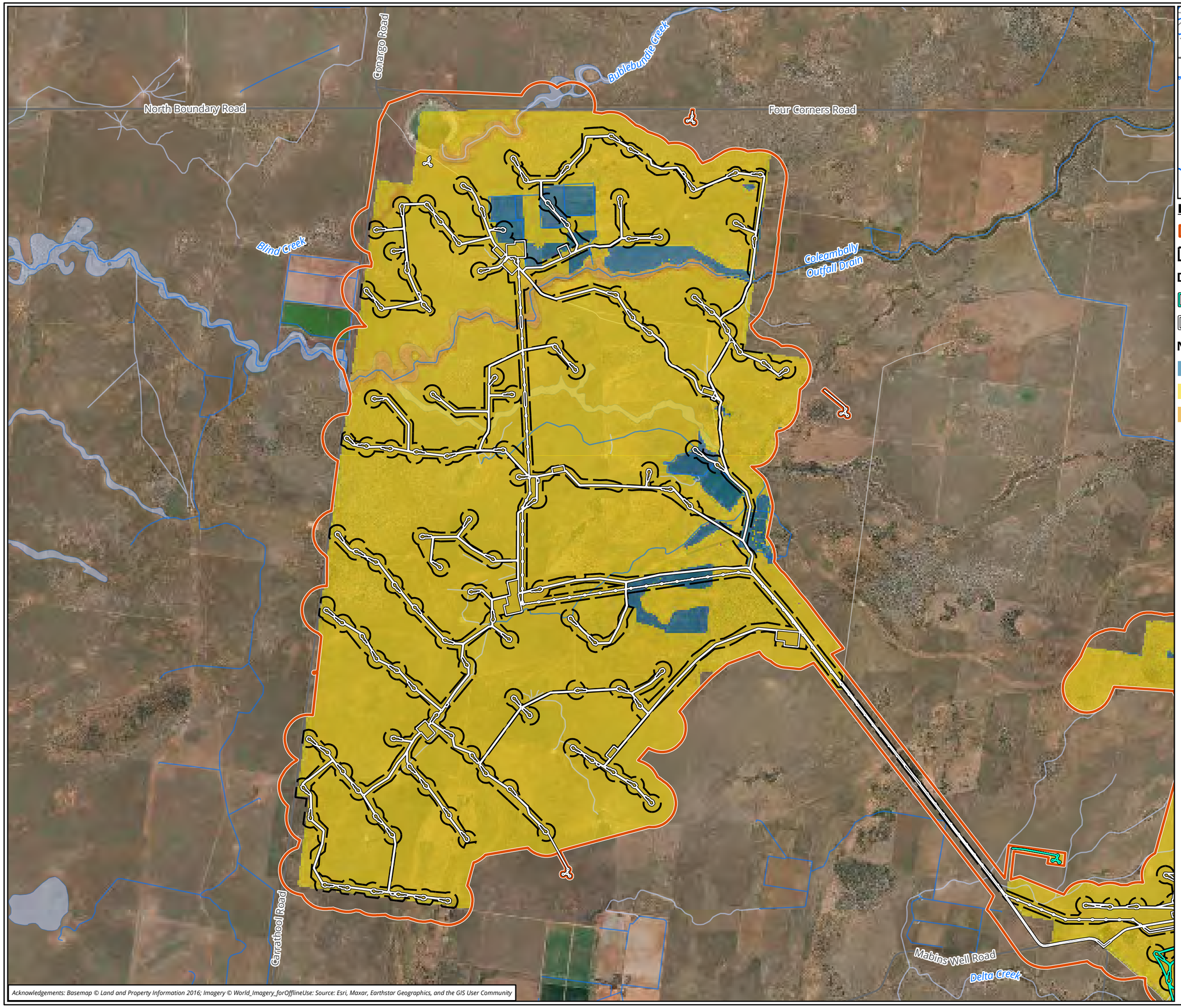


Legend

- Subject land
- Development corridor

Development footprint

- Stage 1
- Stage 2

NSW Land categorisation

- Cat 1 - Exempt land
- Cat 2 - Regulated land
- Cat 2 - Regulated land - Vulnerable

Figure 4 Land category - Western area

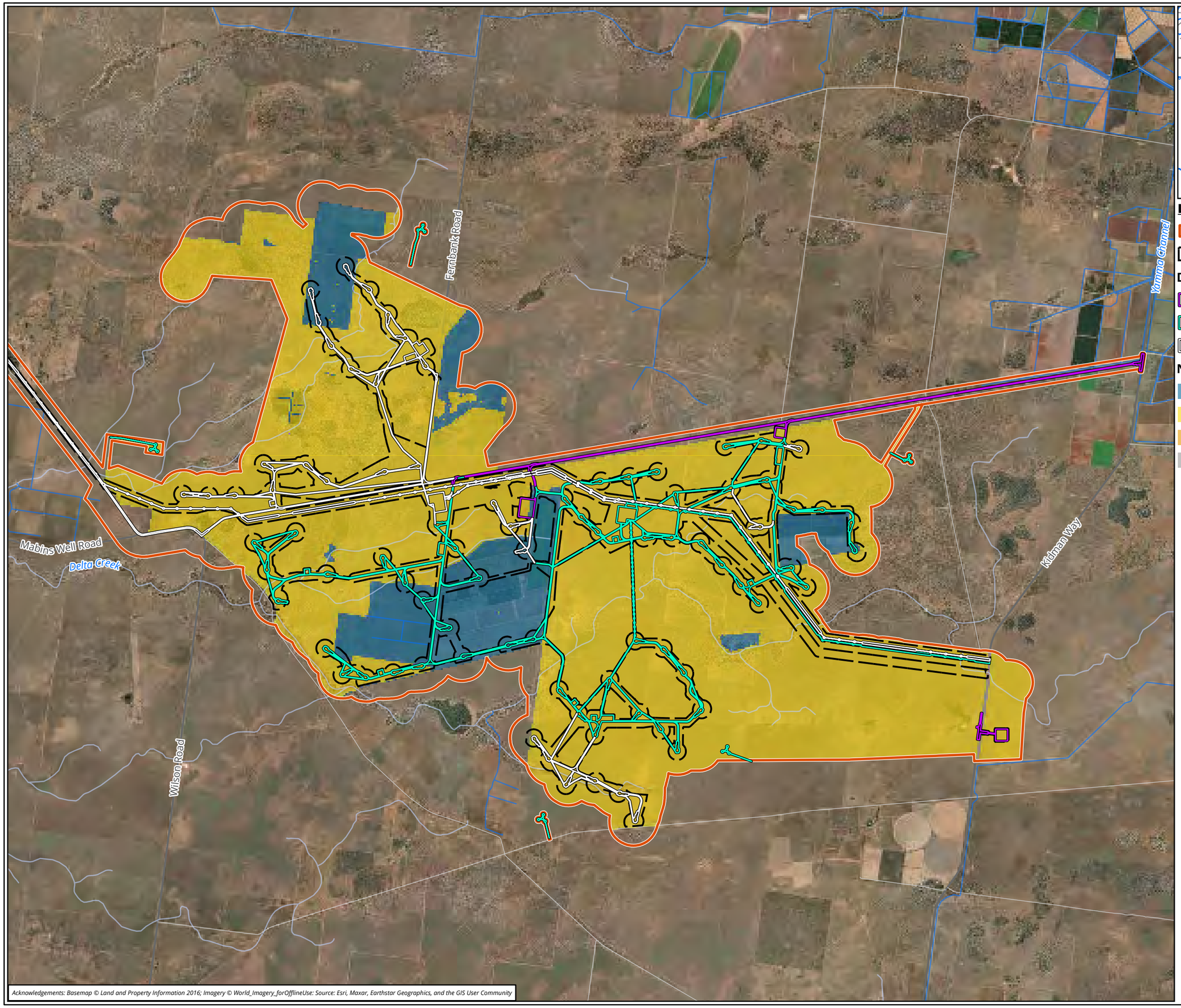
0 1 2 3

Kilometers
Scale: 1:80,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 08 April 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F4_LandCat



Legend

- Subject land
- Development corridor

Development footprint

- Early Works
- Stage 1
- Stage 2

NSW Land categorisation

- Cat 1 - Exempt land
- Cat 2 - Regulated land
- Cat 2 - Regulated land - Vulnerable
- Excluded land

Figure 4 Land category - Eastern area

0 1 2 3

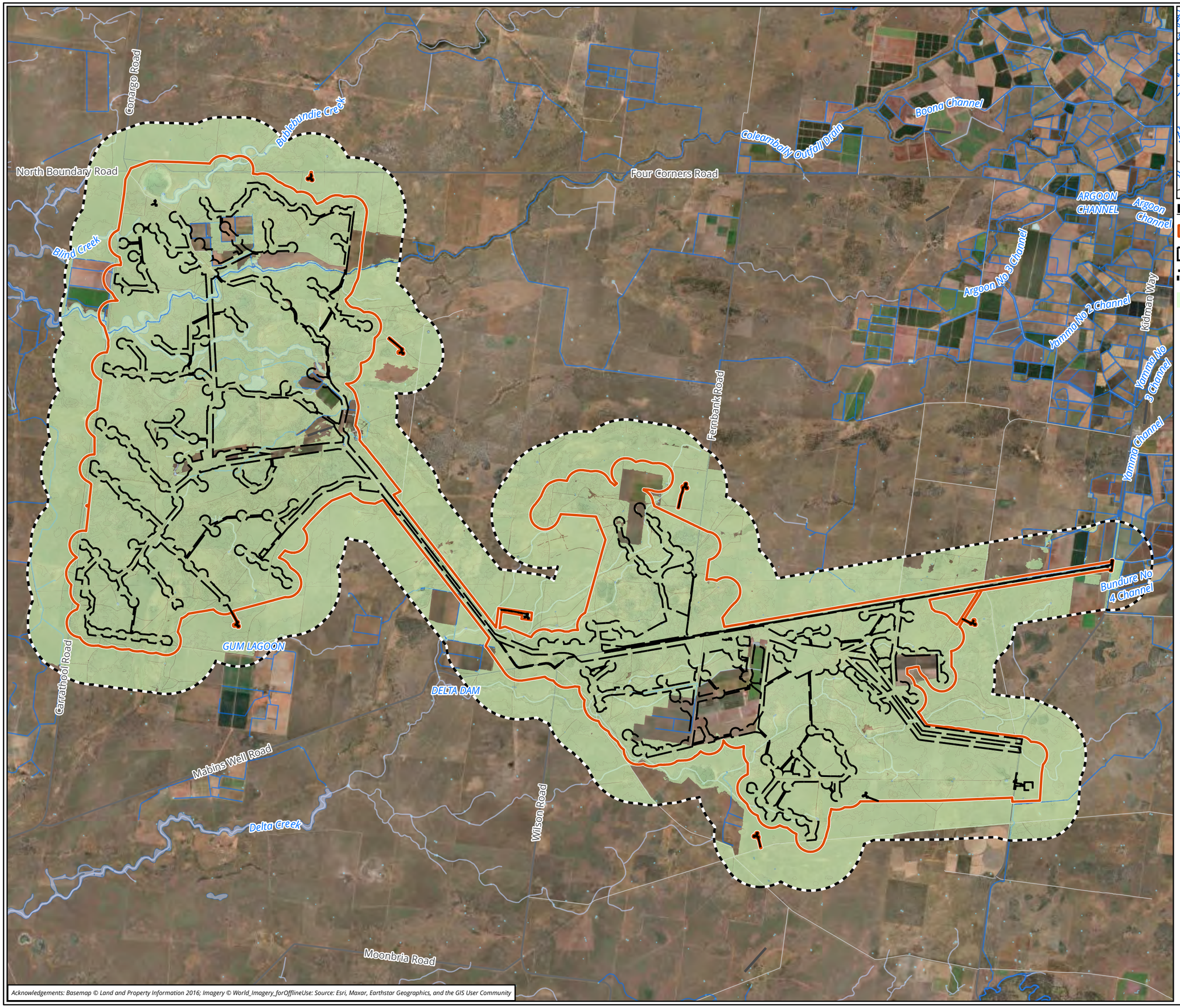
Kilometers
Scale: 1:80,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 08 April 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F4_LandCat

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



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

Figure 5 Native vegetation cover

Matter: 37263, Date: 08 April 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F5_NVC

3. Native vegetation

The subject land and development corridor support 28,626 hectares and 5,774 hectares of native vegetation respectively with varying levels of disturbance, however predominantly in moderate condition on the whole. The majority of the vegetation within the subject land is comprised of DNG and sparse Weeping Myall woodland. More intact patches of woodland are restricted to moderate sized patches of intact Weeping Myall on red soils, as well as Inland floodplain Black Box dominated woodland along riparian areas and Riverine Sandhill White Cypress Pine communities on the slightly elevated sandhills or slightly lower depressional paleochannels. Mosaic patches of Lignum or Nitre Goosefoot, and occasionally Canegrass dominated swamps occur adjacent to the more natural grasslands on the grey loam soils. Minor areas of native vegetation, including around dams, near gates and cattle camps, occurs in a modified condition due to historic clearing of overstorey woodland species and grazing by cattle and sheep. Native vegetation comprises the majority of the subject land within and surrounding grazed land with weed cover varying from very low to moderate. Native vegetation type, composition and cover relative to weeds is variable throughout the subject land and is driven by factors including but not limited to grazing pressure/palatability, water availability/inundation frequency, soils, past agricultural soil disturbance and clearing.

3.1. Native vegetation methods

3.1.1. Native vegetation extent

The extent of native vegetation, TECs, and vegetation integrity within the subject land was determined using the results of site investigations, previous studies undertaken at the site by Biosis (Biosis 2021) and EMM (EMM 2022) as well as Section 4 of the BAM (DPIE 2020a).

Figure 5 provides a map of the native vegetation cover recorded within the subject land and development corridor. 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 5, are either cleared / Category 1 – exempt land or non-native vegetation (also on Figure 4), and are addressed further below.

Details of the PCTs and TECs present within the development corridor, and vegetation class within the subject land, are provided in the sections 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).
- Review of current and historic satellite imagery.
- DEM and CHM data provided by LIDAR.
- Dinawan Energy Hub Biodiversity Constraints and Opportunities Assessment (Biosis 2021).
- Dinawan Solar Farm Scoping Report (EMM 2022).

- Dinawan Wind 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.

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 project 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 – BAM plots, targeted flora and fauna surveys.
- January 2024 - Targeted flora and fauna surveys.
- July 2024 - Targeted fauna surveys for Owls and Bush Stone Curlew and additional microbat (BBUS) surveys at height.
- September 2024 - Targeted flora and fauna surveys.
- October 2024 – Additional targeted fauna surveys for raptor nests, hollow bearing trees and supplementary targeted Pink Cockatoo surveys and Australian Bustard surveys.
- November 2024 - Targeted flora and fauna surveys.
- December 2025 – Additional BAM plots
- March 2025 – Additional BAM plots
- July 2025 - Targeted flora surveys.

Bird and Bat Utilisations Surveys (BBUS) were conducted across eight seasons across a 24 month (two year) period commencing from August 2022, through to July 2024. Dates surveyed include

- Winter – August 2022, July 2023 and July 2024 (Bats only for the latter)
- Spring – November 2022 and October 2023.
- Summer – February 2023 and January 2024.

- Autumn – May 2023 and March 2024.

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 30 June 2026). Fauna survey was conducted under approval CSB 17/892 from the NSW Animal Care and Ethics Committee (expiry date 31 January 2026).

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

- 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 based on *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.
- 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.

Field delineated boundaries were validated by desktop assessment of existing aerial imagery, as well as high definition LiDAR data captured specifically for the project. Changes in soil types and vegetation colour were assessed using the aerial imagery to help confirm PCT boundaries as well as area. LiDAR data was used to create a digital DEM as well as CHM, so vegetation types associated with changes in topography, such as the presence of sandhills and paleochannels versus Black Box in depressions, and wooded vegetation within varying Weeping Myall zones, could be assessed. LiDAR was also used determine the percentage cover of low

shrubs and wooded vegetation in open areas where complex boundaries occurred between areas potentially considered potentially natural or derived grasslands

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 9.

Further details of targeted survey for threatened species are provided in Section 4 below.

3.1.4. Local 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.

Gaps in flora survey do occur due to the size of the development corridor overall, as well as changing designs due to avoid and minimise principles for biodiversity and other environmental disciplines (heritage for example), as well overall design efficiencies to reduce environmental impacts, meaning some areas surveyed are now no longer within the development corridor, whilst other parts of the development corridor are yet to be surveyed. Additionally, due to the large size of the development corridor and implications of significant flooding events in spring 2022, application of the *Surveying Threatened Plants and Their Habitats* (DPIE 2020b) guidelines to their fullest intent was not practical or considered achievable. 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. Some of these limitations were rectified and supplemented in spring 2023 in more favourable conditions. Therefore, some species have been assumed present in areas not sufficiently surveyed and until further surveys can be undertaken in Spring 2025.

Whilst gaps occur, surveys are considered appropriate at this stage of assessment to understand the potential impacts to threatened flora and fauna, based on the survey effort conducted for both Dinawan Solar Farm and Dinawan Wind Farm, the largely consistent landscape features and the largely homogenous nature of vegetation/habitats present.

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 Energy Connect BAM assessment (WSP, 2022) and Pottinger BDAR (Biosis, 2024) and the findings with regards to new threatened flora records, methods 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.

3.2. Native vegetation results

3.2.1. Non-native vegetation

Considerable proportions of the subject land, of which minor amounts occur within the development corridor and development footprint, has been assessed as supporting non-native vegetation, and comprises areas of existing (and ongoing) agricultural practices and disturbance such as farm tracks, dams and areas of irrigated and dryland cropping (refer Photo 2). Areas not shown as native vegetation cover are indicated on Figure 5 and Figure 6. Areas of non-native vegetation that do support habitat for threatened species have been considered throughout this assessment.

Non native groundcover also occurs at intersection upgrade areas within the Wagga Wagga locality, where vegetation adjacent to highly utilised roads are highly managed via slashing and pesticide use. This is particularly the case at the Byrnes Road/West Bomen Road and

The total area of non-native vegetation and/or cleared areas within the subject land is 2,721 hectares, 609.61 hectares within the development corridor (9.6%) and 149.44 hectares within the development footprint (13.6%).

Photo 2 Irrigated cropping areas within the subject land

3.2.2. Planted native vegetation

Within the main subject land, planted native vegetation occurs in the form of occasional planted wind breaks and around rural residences and infrastructure. However, this planted vegetation will not be impacted by the project, and is not assessed further within the BDAR.

Small areas of intersection upgrades with the Wagga Wagga locality contain native and non native roadside plantings above a highly managed lawn and exotic groundcover, and it may be required that a small number of planted trees require trimming or removal to allows trucks transporting wind turbine blades to manoeuvre

at the Olympic Highway/Sturt Highway location. No other trees, native or non native, will be impacted at the other intersection upgrade locations.

Where only part of the subject land contains planted native vegetation, the streamlined assessment module provided in Appendix D of the BAM may be used to assess that part of the development, activity, clearing or biodiversity certification proposal. Planted native vegetation at the intersection of Olympic Highway/Sturt Highway in Wagga Wagga contains roadside native and non native vegetation, with a few occasional remnant and much larger River Red Gums. The later will not be impacted, with potential impacts restricted to trimming of, or the removal of, non-native plantings, and two planted Yellow Box *Eucalyptus melliodora* individuals, one tea tree *Melaleuca bracteata* and one Ribbon Gum *Eucalyptus viminalis* individual.

Following implementation of D.1 – Decision-making key, an assessment (Table 8) of the habitat values this vegetation provides to threatened species was undertaken in accordance with D.2 – Assessment of planted native vegetation for threatened species habitat.

Table 8 Planted native vegetation – streamlined assessment, Olympic Highway/Sturt Highway in Wagga Wagga

Decision Key		Response
1. Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?		No. The planted native and non-native vegetation are part of a linear strip of roadside plantings and industrial estate screening. PCT 74 and PCT 5 are located in the broader locality where remnant River Red Gums and Yellow Box occur, primarily as patches to the north west (river) and south west, and scattered paddock trees to the north, however, these individuals or patches will not be impacted by the intersection upgrades. The age and structure of the trees indicate they are planted and are readily differentiated from large remnant individuals in the broader study area, and cannot be reasonably assigned to PCT 74 or PCT 5, or other. Go to question 2
2. Is the planted native vegetation:	a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and	No
	b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	No – Go to 3

Decision Key	Response
3. Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following: • **a. a species recovery project** • **b. Saving our Species project** • **c. other types of government funded restoration project** • **d. condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat** • **e. legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act)** • **f. ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan, or** • **g. approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000)?**	Not that the applicant is aware of – Go to 4
4. Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	No - As far as known, the plantings are likely associated with roadside plantings and screening from previous road upgrades and/or industrial estate complexes being established.
5. Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or tea tree farms?	Yes – As far as known, the plantings were for roadside plantings and screening from previous road upgrades and/or industrial estate complexes being established. The vegetation must be assessed in accordance with D2- Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied).
6. Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)?	N/a

In accordance with Section D.2 (of Appendix D of the BAM), the assessor must assess the suitability of the planted native vegetation for use by threatened species and record any incidental sightings or evidence (e.g. scats, stick nests) of threatened species credit species using, inhabiting or being part of the planted native vegetation. Planted trees and shrubs were generally immature individuals with no evidence of nests, however

small fissures and small non fully formed hollows do occur where damage has occurred to limbs. No evidence of current use, nor any evidence of use by species credit species was observed during site evaluation, and the likelihood of use outside of transient purposes for common and highly disturbance tolerant native species (Magpies, Ravens, Galahs for example) is very low. Mitigation measures will be implemented to minimise any potential direct and indirect impacts resulting from the removal of planted vegetation at this intersection. .

3.2.3. Plant community types

The development corridor is effectively entirely covered with native vegetation in the form of predominantly DNG and sparse Weeping Myall Woodlands, precautionarily identified natural grasslands, intact Weeping Myall woodland, ephemeral Black Box dominated riparian woodland and wetlands (Lignum or sedge-dominated wetlands) and White Cypress Pine dominated sandhills and paleochannels.

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 DEM, 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 corridor, 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 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 development corridor and subject land:

- PCT 10 River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic 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).
- 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 28 White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone.
- 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.
- PCT 160 Nitre Goosefoot shrubland wetland on clays of the inland floodplains.

Table 9 PCT 10 River Red Gum - Black Box woodland wetland

PCT 10 River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
Common name	River Red Gum - Black Box woodland wetland
Vegetation formation	Forested Wetlands
Vegetation class	Inland Riverine Forests
Extent within development corridor and development footprint	Development corridor • 4.25 ha in moderate condition. Development footprint • 0.19 ha in moderate condition
Condition	This community was recorded in moderate condition.
Description	PCT 10 within the development corridor and subject land occurs as a tall to mid-high woodland composed of River Red Gum *Eucalyptus camaldulensis* and Black Box *Eucalyptus largiflorens,* as well as in conjunction with White Cypress Pine *Callitris glaucophylla* along paleochannels and prior streams that are ecotonal with PCT 28. This PCT geographically occurs at the junction of River Red Gum and Black Box zones. The understorey contains dense stands of Nitre Goosefoot *Chenopodium nitrariaceum* and occasional Lignum *Duma florulenta.* The ground layer is sparse and includes grass species such as *Enteropogon acicularis*, *Chloris truncata* and *Sporobolus caroli* and forb species such as *Centipeda cunninghamii*, *Einadia nutans* and *Euphorbia drummondii*. Weeds are common and include *Trifolium spp.*, *Hordeum spp., Lolium spp. Vulpia spp* and Bathurst Burr *Xanthium spinosum*. This community occurs on grey to brown loam to medium clays in drainage depressions, prior streams, swamps on alluvial plains and floodplains of rivers.
Survey effort	Two plots were collected over the course of the field assessment
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. River Red Gum - Black Box woodland wetland within the development corridor 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 and vegetation cover – Overstorey dominated by River Red Gum, understorey of Nitre Goosefoot with sparse ground cover including *Chloris truncata* and *Sporobolus caroli* and forb species such as *Centipeda cunninghamii, Einadia nutans* and *Euphorbia drummondii*. Other PCTs considered were PCT 2, PCT 5, PCT 7, PCT 8, PCT 9 and PCT 11, however mid and understorey species that comprise these PCTs were absent within the subject land and are mostly absent within the broader landscape.
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)	43% (DPE 2023c).

PCT 10 River Red Gum - Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
PCT 10 – Moderate condition	

Table 10 PCT 13 Black Box – Lignum wetland

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 within development corridor and development footprint	Development corridor • 16.61 ha in moderate condition • 29.78 ha in thinned condition Development footprint • 3.56 ha in moderate condition • 7.88 ha in thinned condition
Condition	This community at the subject land was recorded in moderate and thinned condition states.
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 development corridor, moderate condition Black-Box – Lignum woodland contains sporadic Black Box and consisted of understorey species including shrub and forb species such as Creeping Saltbush *Atriplex semibaccata*, Black Rolypoly *Sclerolaena 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. The condition state within the thinned condition zone has similar floristic structure but impacted by clearing and evidence of thinning of smaller regenerating Black Box.
Survey effort	Seven plots collected in total • Three plots were collected over the course of the field assessment within PCT 13_moderate • Four plots were collected over the course of the field assessment within PCT 13_thinned
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 (NSW DCCEEW 2024a) 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 abundance of Nardoo and was present on more consistent gilgaied grey loam/clay soil that is more frequently inundated considered PCT 13 the best

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)	
	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% (NSW DCCEEW 2024a).
PCT 13 – moderate	
PCT 13 – thinned	

Table 11 PCT 15 Black Box open woodland wetland

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 within development corridor and development footprint	Development corridor • 33.13 ha in moderate condition • 6.39 ha in thinned condition Development footprint • 2.54 ha in moderate condition • 1.10 ha in thinned condition
Condition	This community at the subject land was recorded in moderate and thinned condition states.
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 development corridor, 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	Seven plots collected in total • Four plots were collected over the course of the field assessment within PCT 15_moderate • Three plots were collected over the course of the field assessment within PCT 15_thinned
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 (NSW DCCEEW 2024a) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on clays and sandy-loams. • Landform – occurs on floodplains. • 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, a lower cover of Lignum and

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)	
	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% (NSW DCCEEW 2024a).
PCT 15 – moderate	
PCT 15 – thinned	

Table 12 PCT 17 Lignum shrubland wetland

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 within development corridor and development footprint	Development corridor • 23.90 ha in mod_good condition • 11.16 ha in moderate condition Development footprint • 0.76 ha in mod_good condition • 1.27 ha in moderate condition
Condition	This community at the subject land was recorded in a moderate to good (mod_good) condition as well as in moderate condition. 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 proluta* 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 development corridor, 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	Seven plots collected in total • Four plots were collected over the course of the field assessment within PCT 17_mod_good • Three plots were collected over the course of the field assessment within PCT 17_moderate
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 (NSW DCCEEW 2024a) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on clays.

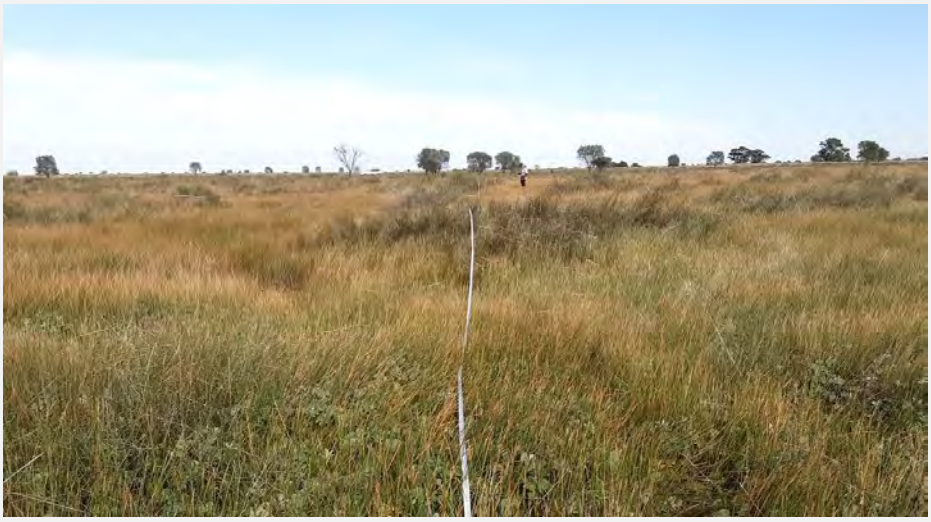
PCT 17: Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	
	• Landform – occurs on flood plains. • Dominant species – Lignum, Creeping Saltbush, Black Rolypoly, Common Nardoo, and a mix of grasses and forbs including Curly Windmill 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% (NSW DCCEEW 2024a).
PCT 17 – mod_good	
PCT 17 – moderate	

Table 13 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 within development corridor and development footprint	Development corridor • 2,177.64 ha in DNG condition. • 1,961.78 ha in sparse condition. • 795.43 ha in intact condition. Development footprint • 342.38 ha in DNG condition. • 341.38 ha in sparse condition. • 116.79 ha in intact condition.
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 open 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.

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 • Intact – 11 plots were collected over the course of the field assessment in the Intact condition class. • Sparse – Nine plots were collected over the course of the field assessment in the Sparse condition class. • DNG - 10 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 (NSW DCCEEW 2024a) 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, but was not found to occur within the subject land. 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 3.2.4. **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 5% of all sparse condition areas) 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 the 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 7.
Estimate of percent cleared value of PCT (BioNet)	90% (NSW DCCEEW 2024a).
PCT 26 – DNG (non-TEC)	

PCT 26 Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	
PCT 26 – sparse **(TEC BC Act only)**	
PCT 26 – intact **(TEC BC Act and EPBC Act)**	

Table 14 PCT 28 White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone

PCT 28 White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	
Common name	White Cypress Pine open woodland.
Vegetation formation	Semi-arid Woodlands (Shrubby sub-formation).
Vegetation class	Riverine Sandhill Woodlands.
Extent within the development corridor and development footprint	Development corridor • 240.65 ha in low condition. • 22.54 ha in moderate condition. Development footprint • 47.76 ha in low condition. • 1.11 ha in moderate condition
Condition	This community is recorded in low and moderate condition.
Description	PCT 28 generally occurs as an open woodland or with scattered trees up to 15 m high dominated by White Cypress Pine *Callitris glaucophylla*. Associated small trees or tall shrubs include Western Rosewood *Alectryon oleifolius* and *Acacia* oswaldii. Common chenopod species include *Rhagodia spinescens, Sclerolaena muricata, Enchylaena tomentosa, Salsola tragus, Atriplex semibaccata, Sclerolaena diacantha* and *Sclerolaena divaricata*. Forb species include *Zaleya galericulata, Boerhavia dominii* and *Sida corrugata*. Many stands contain a very sparse shrub understorey that has been grazed out with the ground being dominated by native and exotic grasses and forbs. Introduced grass Barley grass *Hordeum leporinum* is common. Native grass species include *Austrostipa scabra, Enteropogon acicularis* and *Tripogon loliiformis*. Occurs on sandy loam soils on prior streams, source bordering sand dunes and sand plains in south-western NSW. Few sites are in good condition due to grazing and clearing and impacts from rabbits. Many sites are highly degraded and eroded with a few trees remaining, little regeneration and a depleted understorey. Within the development corridor, moderate condition White Cypress Pine woodland contains White Cypress Pine, in conjunction with Needlewood *Hakea leucoptera* and occasional Bulloak *Allocasuarina luehmannii*. Understorey species including shrub and forb species such as Curly Windmill Grass, *Sida corrugata*, Spear grass *Austrostipa scabra*, *Paspalidium constrictum*, *Eragrostis setifolia* and moderate cover of *Trifolium spp.,* Barley Grass and Annual Rye Grass *Lolium rigidum.* Low condition areas had a similar floristic composition, however native cover is lower and sporadic individuals of White Cypress Pine only, with higher cover of weed species such as Barley Grass and Annual Rye Grass
Survey effort	10 plots collected in total • Six plots were collected over the course of the field assessment within PCT 28_low • Four plots were collected over the course of the field assessment within PCT 28_moderate
Justification of PCT	White Cypress Pine 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 sandy loam soils, prior streams, paleochannels and sandy ridges • Dominant species and structure – dominant open canopy cover of White Cypress Pine with Needlewood and Bulloak, with grassy cover of Spear grass, Curley Windmill Grass and *Sida corrugata.*

PCT 28 White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	
	This PCT differs from similar PCT 19 Cypress Pine woodland due to having a more open canopy structure with the canopy comprising White Cypress Pine and (to a lesser extent) Needlewood, grassy structure and minimal shrub layer. This PCT differs from similar PCT 21 Slender Cypress Pine – Sugarwood – Western Rosewood open woodland primarily due to being dominated by White Cypress Pine and not Slender Cypress Pine *Callitris gracilis* subsp. *murrayensis*.
TEC Status	**NSW BC Act:** This community is associated with but does not meet the requirements for the BC Act listed *Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions.* However, this community is associated with and meets the requirements for the BC Act listed *Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions.* The vegetation in this community supports flora species characteristic of the BC Act listed *Sandhill Pine Woodland* TEC and occurs in the correct geographic location. **Commonwealth EPBC Act:** This community is not associated with a TEC listed under the EPBC Act.
Estimate of percent cleared value of CT (BioNet)	73% (DPE 2023a).
PCT 28 – Low condition	

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

Table 15 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	Development corridor • 20.41 ha in moderate to good condition. Development footprint • 2.24 ha in moderate to good condition. • 0.83 due to intersection upgrades
Condition	This community within the development corridor was recorded in moderate to good condition. This community is highly dynamic across the subject land but mostly occurring within lower lying depressions of alluvial grey clays and clay loams, and near riparian areas.
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 development corridor, mod_good condition Plains Grass grassland is dominated by dense *Walwhalleya proluta or* Plains Grass, along with Curly Windmill Grass, Yanganbil *Austrostipa bigeniculata*, 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	Four plots were collected over the course of the field assessment within the development corridor.
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. Riverine Plain Grasslands within the development corridor meets the PCT description (NSW DCCEEW 2024a) via the following: • IBRA region and subregion – Riverina region and Murrumbidgee subregion. • Soil - occurs on clays and grey soils. • 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 does intergrade and becomes ecotonal with PCT 26 DNG and PCT 46, with similar floristic composition, albeit changes in dominance, however there is generally a discernible change in soil type. PCT 26 DNG was found to occur on the more red/brown sandy alluvial and clay soils with occasional Weeping Myall or *Acacia oswaldii* recruitment, and PCT 46 and PCT 45 occurring on more of the grey loam to cracking clay soils in slight depressions or drainage lines. 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,*

PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	
	with Yanganbil also common, as well numerous other spear grasses and *Rytidosperma* spp. and forbs on the grey loam to cracking clay soils. PCT 46 is generally <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 3.2.4 and Section 12.1 Commonwealth TECs within the development corridor are mapped on Figure 7
Estimate of percent cleared value of PCT (BioNet)	60% (NSW DCCEEW 2024a).
PCT 45 – Mod_good	

Table 16 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	Development corridor • 400 ha in moderate condition. Development footprint • 73.79 ha in moderate condition. • 0.34 due to intersection upgrades
Condition	This community within the development corridor 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 *Rytidosperma* 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 development corridor, 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	Ten plots were collected over the course of the field assessment within the development corridor
Justification of PCT	An analysis was undertaken for this community using the BioNet Vegetation Classification PCT filter. Curly Windmill Grassland within the development corridor meets the PCT description (NSW DCCEEW 2024a) 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 does intergrade and becomes ecotonal with PCT 26 DNG and PCT 45, with similar floristic composition, albeit changes in dominance, however there is generally a discernible change in soil type. PCT 26 DNG was found to occur on the more red/brown sandy alluvial and clay soils with occasional Weeping Myall or *Acacia oswaldii* recruitment, and PCT 46 and PCT 45 occurring on more of the grey loam to cracking clay soils in slight depressions or drainage lines. 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.

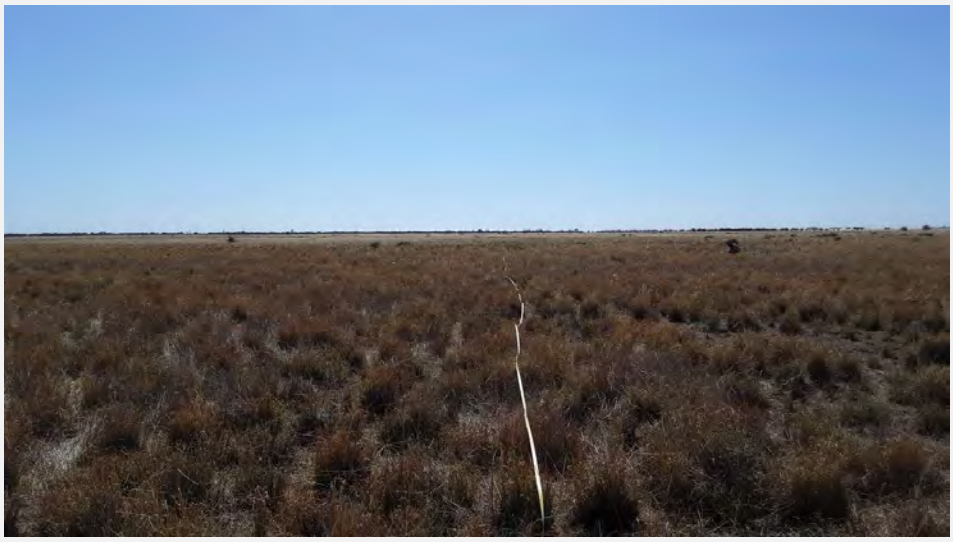
PCT 46: Curly Windmill Grass - speargrass - wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	
TEC Status	**NSW BC Act:** This community is not associated with a TEC listed under the BC Act. **Commonwealth EPBC Act:** As a precautionary measure, the PCT and condition 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 3.2.4 and Section 12.1 Commonwealth TECs within the development corridor are mapped on Figure 7
Estimate of percent cleared value of PCT (BioNet)	50% (NSW DCCEEW 2024a).
PCT 46 – Moderate condition *Walwhalleya* and *Enteropogon* dominated grassland	

Table 17 PCT 160 Nitre Goosefoot shrubland wetland on clays of the inland floodplains

PCT 160 Nitre Goosefoot shrubland wetland on clays of the inland floodplains	
Common name	Nitre Goosefoot shrubland wetland.
Vegetation formation	Freshwater Wetlands.
Vegetation class	Inland Floodplain Shrublands.
Extent within the development corridor and development footprint	Development corridor • 27.70 ha in mod_good condition. Development footprint • 4.97 ha in mod_good condition.
Condition	This community was recorded in moderate to good condition.
Description	PCT 160 within the development corridor occurs as tall shrubland to two metres high, dominated by Nitre Goosefoot *Chenopodium nitrariaceum* often with Lignum, *Sclerolaena muricata, Sclerolaena divaricata* and *Maireana aphylla.* Low shrubs include *Sclerolaena stelligera,* Common Nardoo and *Atriplex semibaccata*. Forb species include *Vittadinia cuneata, Centipeda cunninghamii* and *Oxalis perennans*. Exotic species may be common including the grasses *Hordeum leporinum* and *Lolium Rigidum.* Occurs on cracking clay or sandy clay soils in lake beds, low lying plains, drainage depressions and alluvial plains subject to flooding. Grades into Lignum communities in wetter areas of the development corridor where drainage more impeded.
Survey effort	Four plots collected in total
Justification of PCT	Nitre Goosefoot shrubland 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 cracking clay or sandy clay soils. • Dominant species – dominant cover of Nitre Goosefoot. This PCT differs from similar PCT 17 Lignum wetland by being dominated by Nitre Goosefoot and differs from similar PCT 164 Cotton Bush open shrubland by being dominated by Nitre Goosefoot and not Cotton Bush and containing a different floristic assemblage.
TEC Status	**NSW BC Act:** This community is associated with BC Act listed *Artesian Springs Ecological Community in the Great Artesian Basin.* It does not meet the requirements for this TEC due to being geographically distant from the known TEC location, having no association with natural springs/discharge areas and observed dominant species (i.e., Nitre Goosefoot, *Vittadinia cuneata, Centipeda cunninghamii* and *Oxalis perennans*). **Commonwealth EPBC Act:** This community is not associated with a TEC listed under the EPBC Act.
Estimate of percent cleared value of PCT (BioNet)	28% (DPE 2023a).

PCT 160 Nitre Goosefoot shrubland wetland on clays of the inland floodplains	
PCT 160 – moderate condition	
PCT 160 – mod_good	

3.2.4. Threatened ecological communities

Vegetation within the development corridor was found to represent two TECs listed under the NSW BC Act, and two TECs listed under the Commonwealth EPBC Act, as outlined in Table 18 and Table 19 below and illustrated on Figure 7. A considerable effort has been made to avoid and minimise impacts to the highest value areas of these TECs through the assessment process, however impacts do occur and are generally linear in nature. Further assessment and descriptions are provided below.

Table 18 Summary of BC Act TECs within the subject land

BC Act TEC	Listing status	Potential TEC within subject land (Ha)	Development corridor (Ha)	Development footprint (Ha) Total	Development footprint (Ha) EW/Stage 1	Development footprint (Ha) Stage 2
Myall Woodland in the Darling Riverine Plains, Brigalow	Endangered	7,535.70	2,757.21	**458.17 (6% of subject land total)**	144.67 (2% of subject land total)	313.50 (4% of subject land total)

BC Act TEC	Listing status	Potential TEC within subject land (Ha)	Development corridor (Ha)	Development footprint (Ha) Total	Development footprint (Ha) EW/Stage 1	Development footprint (Ha) Stage 2
Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions						
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Endangered	1,418.29	263.19	**48.87 (4% of subject land total)**	-	48.87 (4% of subject land total)

Table 19 Summary of EPBC Act TECs within the development corridor

EPBC Act TEC	Listing status	Development corridor (Ha)	Development footprint (Ha) Total	Development footprint (Ha) EW/Stage 1	Development footprint (Ha) Stage 2
Weeping Myall Woodlands	Endangered	873.53	**128.73 (15% within development corridor)**	31.05 (4% within development corridor)	97.63 (11% within development corridor)
Natural Grasslands of the Murray Valley Plains	Critically Endangered	423.62	**76.87 (18% within development corridor)**	4.76 (1% within development corridor)	72.11 (17% within development corridor)

*Note, estimates of percentage of impacts for EPBC Act listed communities is compared to the detailed mapping undertaken within the development corridor, as confirmation of all areas potentially meeting the MNES criteria for these communities across the broader subject land has not been undertaken.

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 occurs patchily with sparse canopy woodlands (represented by PCT 26) more dominantly occurring 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, continuation of and future grazing regimes and maintenance of the wind farm requirements within the DNG areas would also inhibit the natural recovery of a woodland community, but not beyond that which would occur under the current agricultural regimes. Occasional recruitment of Weeping Myall and *Acacia oswaldii* was noted in some DNG areas, which supported the selected PCT alignment, and not a more natural grassland, however woody vegetative cover is primarily <1%.

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 20.

Table 20 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 zones does not contain structure consistent with that of a woodland. Some recruitment and fallen timber occurs, <1%cover, but highly sporadic across the zone. This has been the case across these zones since 1958 as evident by historic imagery.
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 21 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). Yes for DNG. Minor recruitment only.	• Weeping Myall treed patches are scattered throughout the subject land. • 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). • In areas of sparse woodland, majority of canopy cover is between 1-5% or contains less than 25 trees per hectare. • 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 defoliated Weeping Myall trees?	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). • 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	Yes for treed areas (intact and sparse). No for DNG.	• Treed patches (intact) have multiple regeneration cohorts recorded during floristic sampling and general observations. • DNG and sparse generally have a very scattered single cohort of regenerating Weeping Myall (i.e. grazed individuals).

Decision steps (from TSSC 2009b & CoA 2009)	Response	Justification
Myall present?		
EPBC Act listed Myall Woodlands	• Treed (intact) patches – Yes • Sparse woodland - Partial • DNG patches - No	As above.

Sandhill Pine Woodland

Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South-Western Slopes bioregion (Sandhill Pine Woodland) is an EEC listed under the BC Act. The community profile for this TEC indicates the subject land is in an area where this TEC is predicted to occur (OEH 2018b).

In the Riverina bioregion and the far south-western portion of the NSW South Western Slopes bioregion, this community is typically associated with prior streams and aeolian source-bordering dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. These soil and landscape types occur within the subject land (DPE 2021).

Characteristics of the Sandhill Pine Woodland TEC include (DPE 2021):

- Occurs in the Riverina, Murray-Darling Depression and NSW South Western Slopes Bioregions.
- Characterised by an open tree stratum, which may be reduced to isolated individuals or may be absent as a result of past clearing. The tree layer is dominated by White Cypress Pine Callitris glaucophylla, either in pure stands or with a range of other less abundant trees or tall shrubs.
- Can occur as remnant stands or small fragmented patches forming a disturbed mosaic.
- Community structure variable with grazed remnants typically occurring with a simplified community structure.

Within the subject land, PCT 28 occurs in paleochannels and sand hills associated with prior streams and sandplains. White Cypress Pine trees occurred throughout this area in small to large patches and moderate to low condition depending on disturbance history, providing evidence the lower condition areas were once dominated by this species. All areas of low and moderate condition zones are considered to meet the condition thresholds for listing of this TEC under the BC Act.

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 generally 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 TEC to the EPBC Act listed 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 or development corridor (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 development corridor with the key diagnostics and condition thresholds for the Murray Valley Plains Natural Grassland TEC in Table 22.

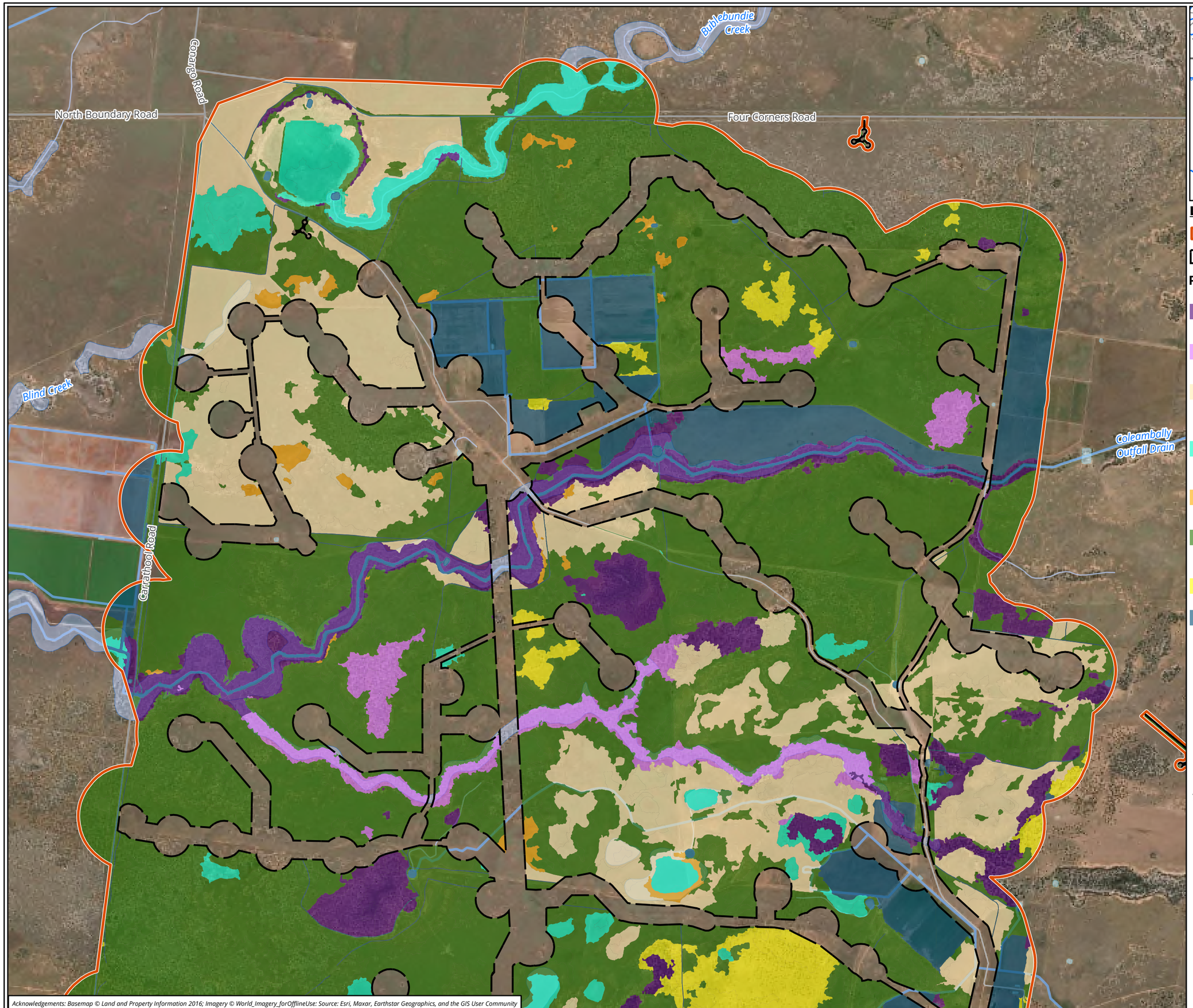
Table 22 Comparison of site observations, key diagnostic characteristics and condition thresholds for the EPBC Act listed Murray Valley Plains Natural Grassland TEC (TSSC 2012a)

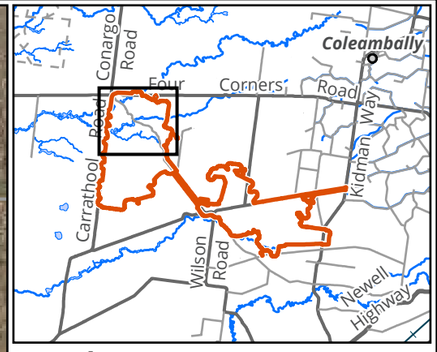
Feature/threshold	Site observations and notes
Key diagnostic characteristics	
Distribution is primarily in the Riverina Bioregion and the Wimmera plains of the Murray Darling Depression Bioregion. Other outlying occurrences are also in the Murray Darling Depression Bioregion and the NSW South Western 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 development corridor occurs in the IBRA Riverina Bioregion and Murrumbidgee sub-region. • The development corridor 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 development corridor 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

Feature/threshold	Site observations and notes
	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 plains-wanderer, striped legless lizard, hooded scaly-foot or curl snake.	• 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
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 (PCT 45 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 for 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: o *Asperula conferta* o *Calotis scabiosifolia var. scabiosifolia* o *Cheilanthes spp.* o *Chenopodium desertorum* o *Goodenia gracilis* o *Goodenia pusilliflora* o *Leiocarpa panaetioides* o *Maireana excavata* o *Maireana pentagona* o *Swainsona procumbens*. o *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:	• PCT 45 and PCT 46 meet Category A condition state.

Feature/threshold	Site observations and notes
• **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).**	

Overall, it has been precautionarily determined that's areas classified as PCT 45 and PCT 46 on grey soils and subject to slight microrelief are consistent with the EPBC listing criteria for the Murray Valley Plains Natural Grassland TEC.





Legend

- Subject land
- Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Black Box open woodland wetland with chenopod
- Curly Windmill Grass - speargrass - wallaby grass grassland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Nitre Goosefoot Shrubland
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- White Cypress Pine open woodland
- Category 1 - Exempt land

Figure 6A Plant community types within the subject land Page 1

0 1,000

Meters
Scale: 1:38,000 @ A3
Coordinate System: GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 09 April 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
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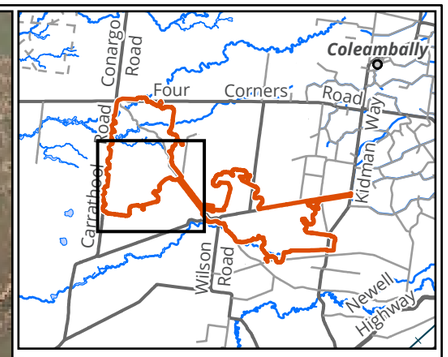

Legend

Subject land

Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Black Box open woodland wetland with chenopod
- Curly Windmill Grass - speargrass - wallaby grass grassland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Nitre Goosefoot Shrubland
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- White Cypress Pine open woodland
- Category 1 - Exempt land

Delta Creek

Figure 6A Plant community types within the subject land Page 2

0 1,000

Meters

Scale: 1:52,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 09 April 2025,
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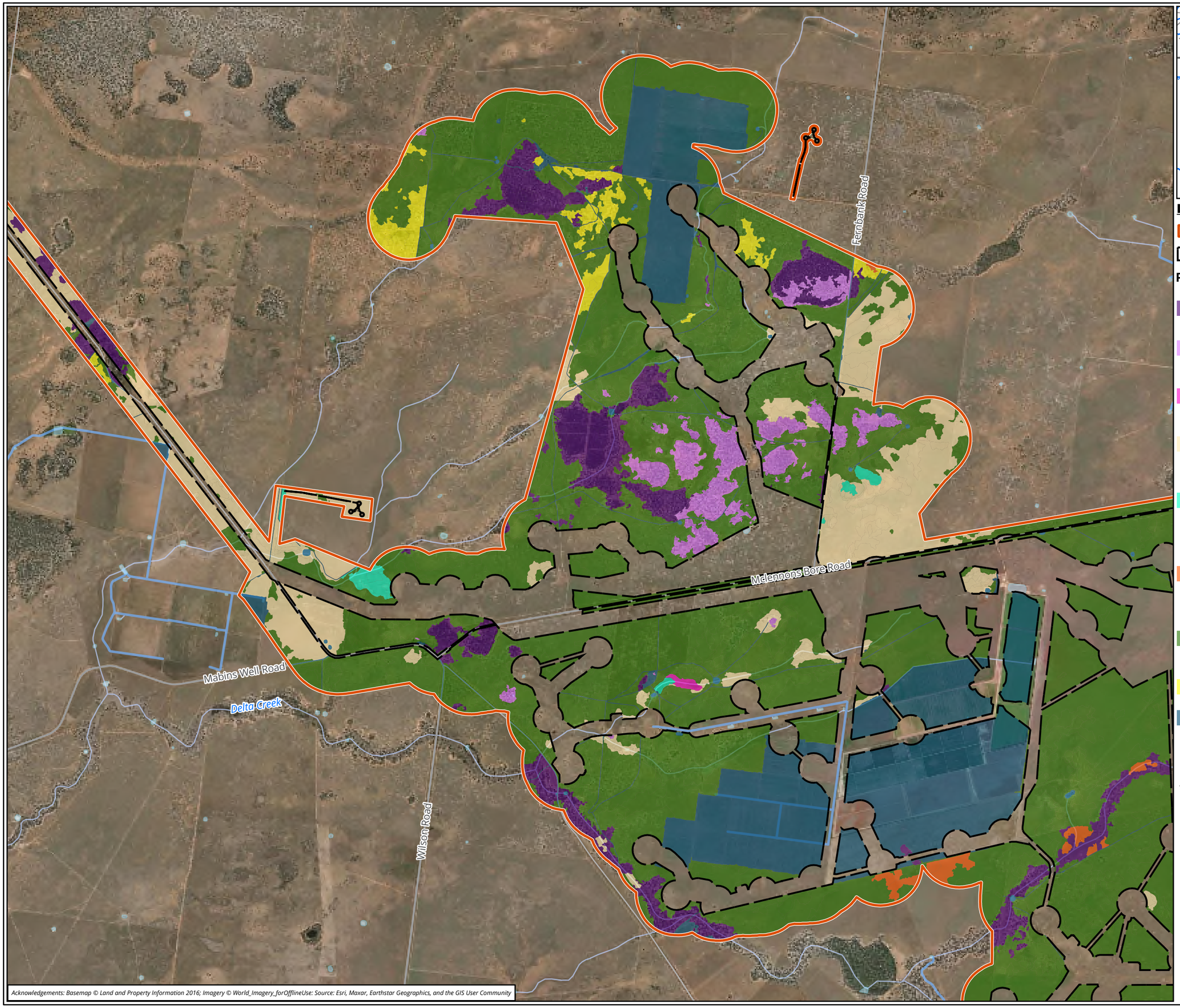

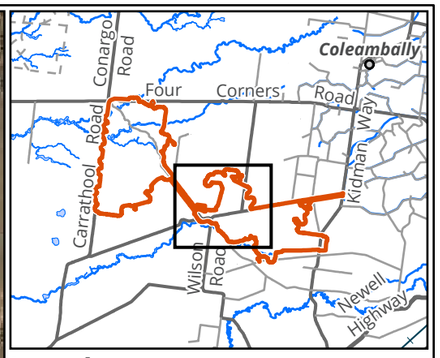

Legend

- Subject land
- Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Black Box open woodland wetland with chenopod
- Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains
- Curly Windmill Grass - speargrass - wallaby grass grassland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- White Cypress Pine open woodland
- Category 1 - Exempt land

Figure 6A Plant community types within the subject land Page 3

0 1,000

Meters
Scale: 1:47,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 09 April 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
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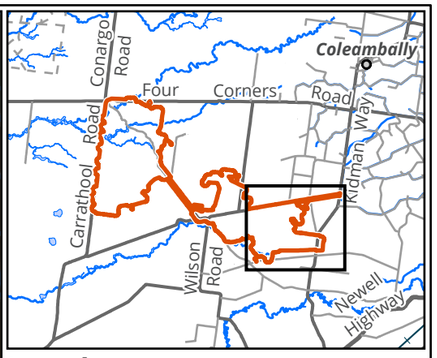

Legend

- Subject land
- Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Black Box open woodland wetland with chenopod
- Curly Windmill Grass - speargrass - wallaby grass grassland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- White Cypress Pine open woodland
- Category 1 - Exempt land

Figure 6A Plant community types within the subject land Page 4

0 1,000

Meters
Scale: 1:48,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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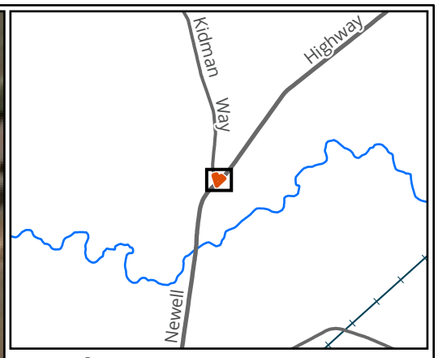

Legend

- Subject land
- Development corridor

Plant community types

- Curly Windmill Grass - speargrass - wallaby grass grassland
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- River Red Gum - Black Box woodland
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- UNE - Non Native

Figure 6A Vegetation class within the subject land
Page 5

0 80

Meters
Scale: 1:2,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 09 April 2025,
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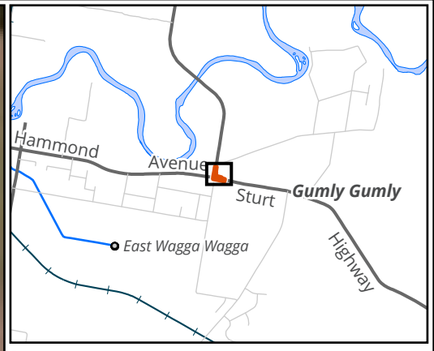

Legend

Subject land

Development corridor

Plant community types

UNE - Non Native

Figure 6A Vegetation class within the subject land
Page 6

0 40

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

N

biosis

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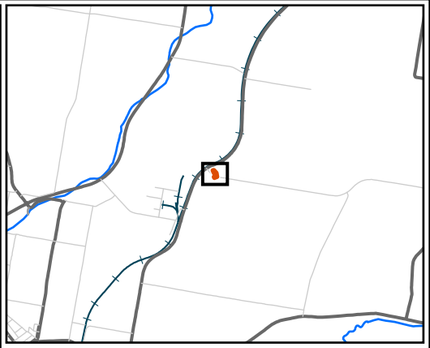

Legend

Subject land

Development corridor

Plant community types

UNE - Non Native

Figure 6A Vegetation class within the subject land
Page 7

0 50

Meters
Scale: 1:1,500 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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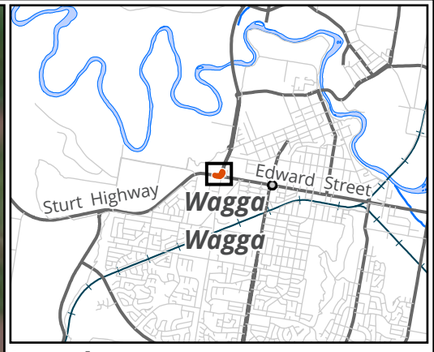

Legend

- Subject land
- Development corridor

Plant community types

- UNE - Non Native/Planted

Figure 6A Vegetation class within the subject land
Page 8

0 50

Meters
Scale: 1:1,500 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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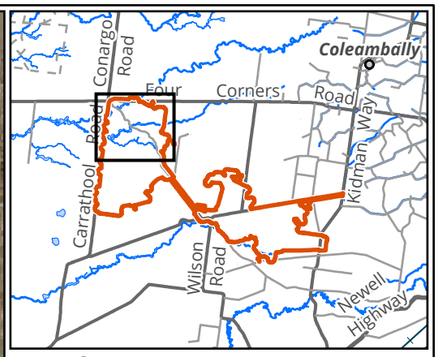

Legend

- Subject land
- Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Black Box open woodland wetland with chenopod
- Curly Windmill Grass - speargrass - wallaby grass grassland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Nitre Goosefoot Shrubland
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- White Cypress Pine open woodland
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (Derived Native Grassland)
- Category 1 - Exempt Land

Figure 6B Plant community types within the development corridor
Page 1

0 1,000
Meters
Scale: 1:38,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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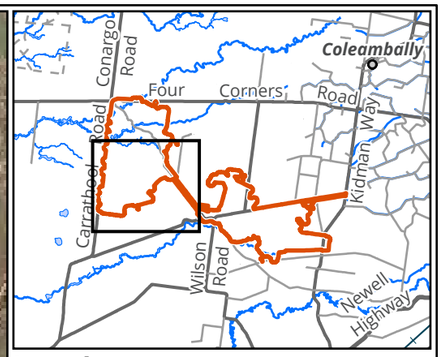

Legend

Subject land

Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Black Box open woodland wetland with chenopod
- Curly Windmill Grass - speargrass - wallaby grass grassland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Nitre Goosefoot Shrubland
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- River Red Gum - Black Box woodland
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- White Cypress Pine open woodland
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (Derived Native Grassland)
- Category 1 - Exempt Land

Figure 6B Plant community types within the development corridor
Page 2

0 1,000
Meters
Scale: 1:52,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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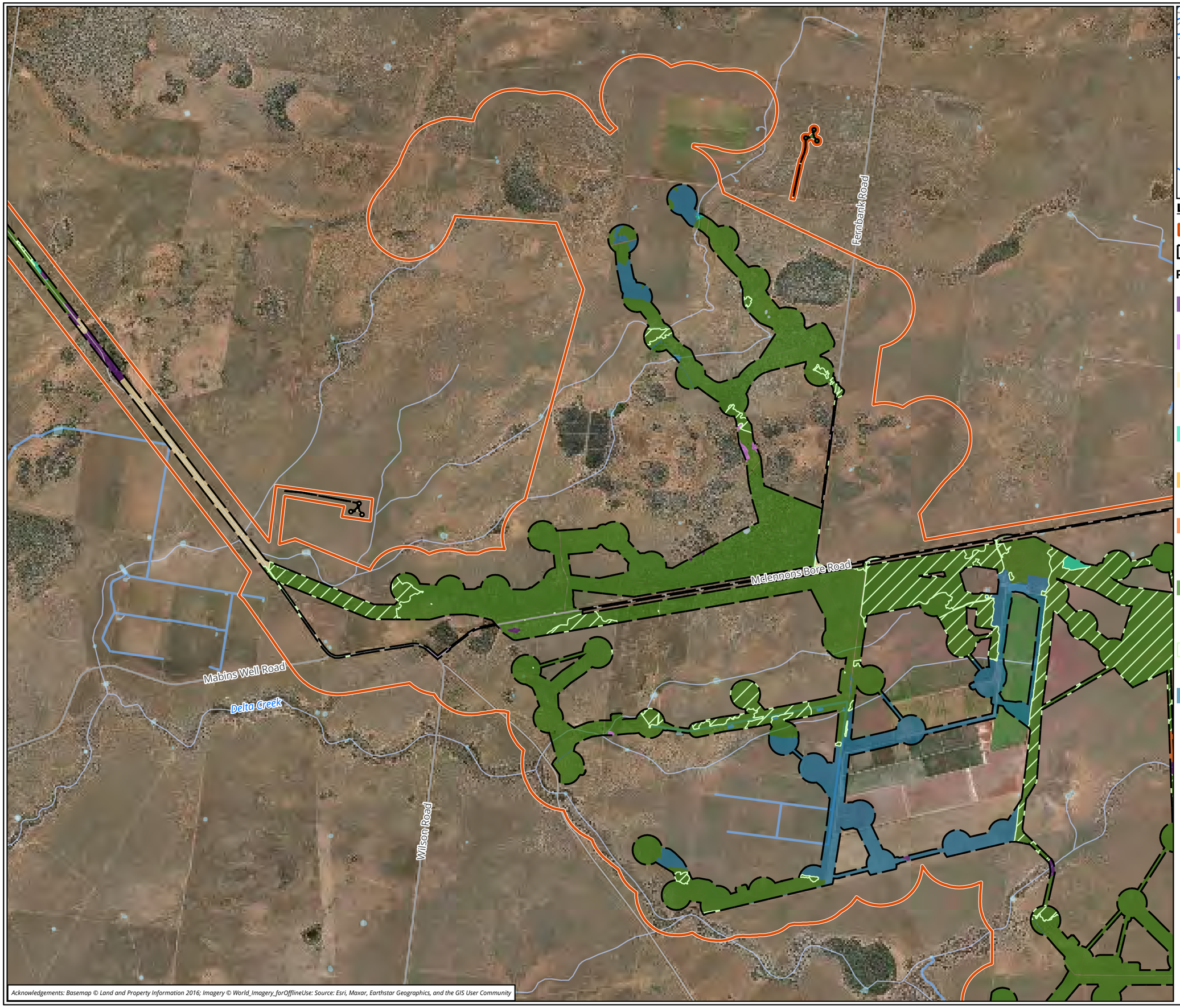
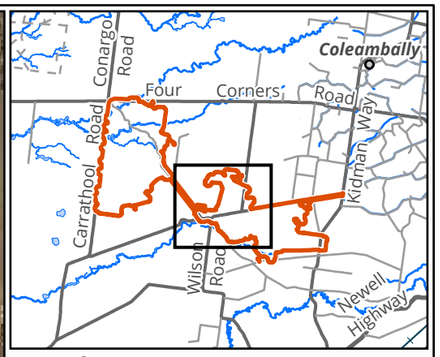
Delta Creek





Legend

- Subject land
- Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Black Box open woodland wetland with chenopod
- Curly Windmill Grass - speargrass - wallaby grass grassland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Nitre Goosefoot Shrubland
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (Derived Native Grassland)
- Category 1 - Exempt Land

Figure 6B Plant community types within the development corridor
Page 3

0 1,000
Meters
Scale: 1:47,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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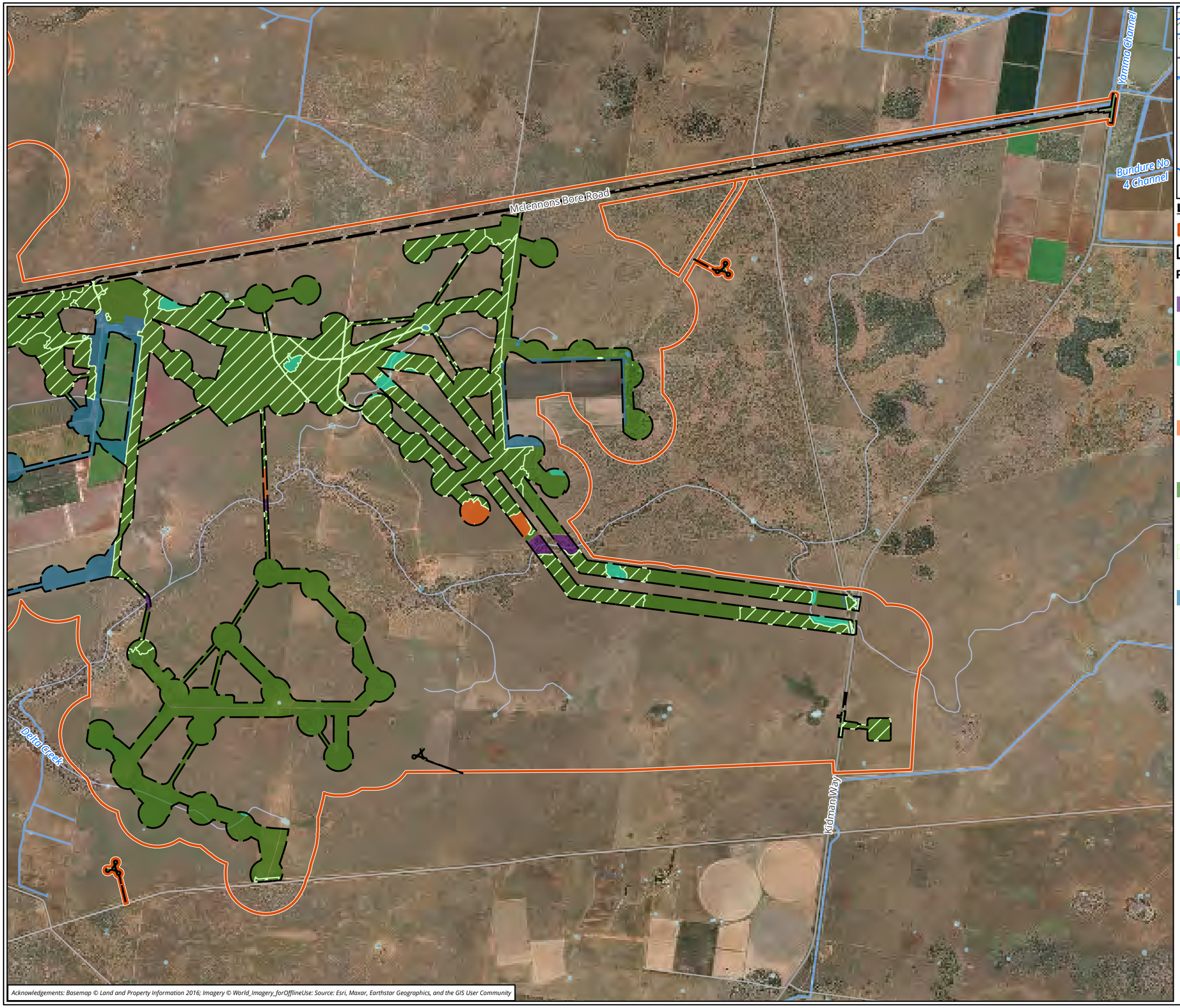

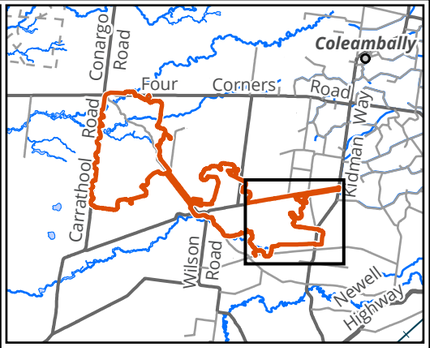

Legend

- Subject land
- Development corridor

Plant community types

- Black Box - Lignum woodland wetland
- Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (Derived Native Grassland)
- Category 1 - Exempt Land

Figure 6B Plant community types within the development corridor
Page 4

0 1,000
Meters
Scale: 1:48,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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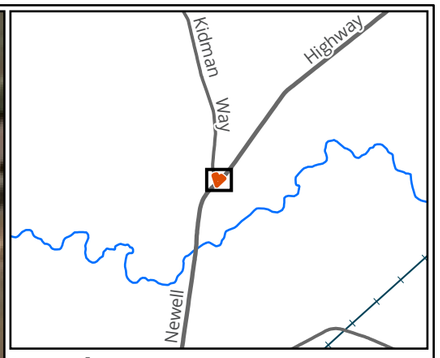

Legend

- Subject land
- Development corridor

Plant community types

- Curly Windmill Grass - speargrass - wallaby grass grassland
- Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- UNE - Non Native

Figure 6B Plant community types within the development corridor
Page 5

0 80

Meters
Scale: 1:2,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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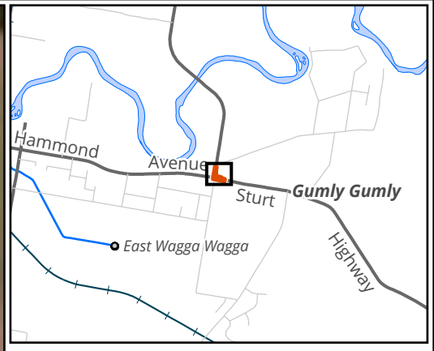

Legend

- Subject land
- Development corridor

Plant community types

- UNE - Non Native
- Excluded Land - UNE - Non Native

Figure 6B Plant community types within the development corridor
Page 6

0 40

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

N

biosis

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Legend

Subject land

Development corridor

Plant community types

UNE - Non Native

Figure 6B Plant community types within the development corridor
Page 7

0 60

Meters
Scale: 1:1,500 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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Layout: 37263_Wind_F6B_PCTs_DC_P7-8

Legend

- Subject land
- Development corridor

Plant community types

- UNE - Non Native/Planted

Figure 6B Plant community types within the development corridor
Page 8

0 60

Meters
Scale: 1:1,500 @ A3
Coordinate System: GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 17 April 2025,
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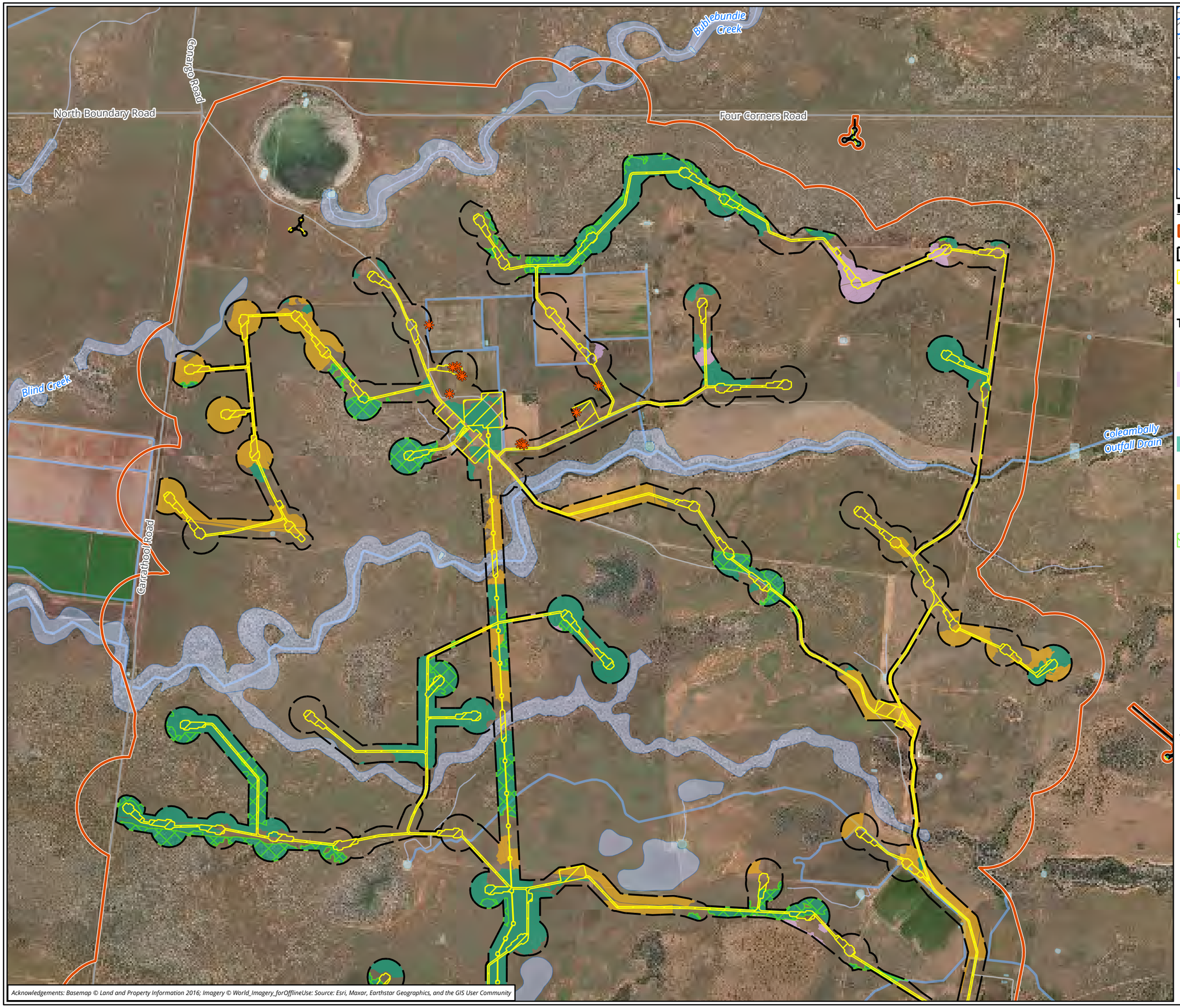

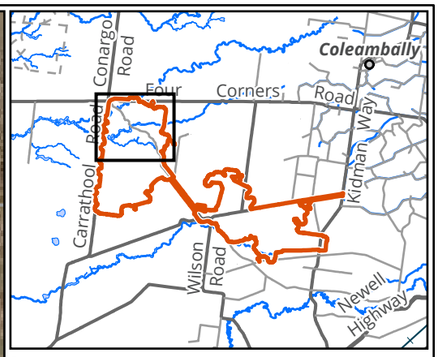

Legend

- Subject land
- Development corridor
- Development footprint
- Paddock tree

Threatened ecological communities

- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions (EEC, BC Act)
- Weeping Myall Woodlands (EEC, BC Act)
- Natural Grasslands of the Murray Valley Plains (potential) (CEEC, EPBC Act)
- Weeping Myall Woodlands (EEC, EPBC Act)

Figure 7.1 Threatened ecological communities within the subject land

0 1,000

Meters
Scale: 1:38,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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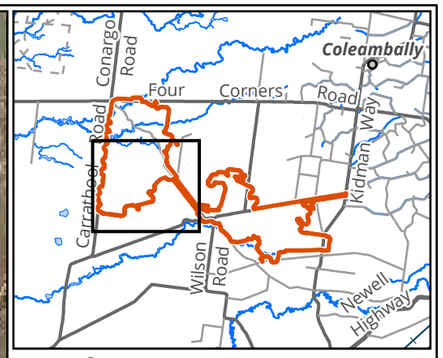
Acknowledgements: Basemap © Land and Property Information 2016; Imagery © World_Imagery_forOfflineUse: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



Legend

- Subject land
- Development corridor
- Development footprint
- Paddock tree

Threatened ecological communities

- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions (EEC, BC Act)
- Weeping Myall Woodlands (EEC, BC Act)
- Natural Grasslands of the Murray Valley Plains (potential) (CEEC, EPBC Act)
- Weeping Myall Woodlands (EEC, EPBC Act)

Delta Creek

Figure 7.2 Threatened ecological communities within the subject land

0 1,000

Meters
Scale: 1:52,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 19 March 2025,
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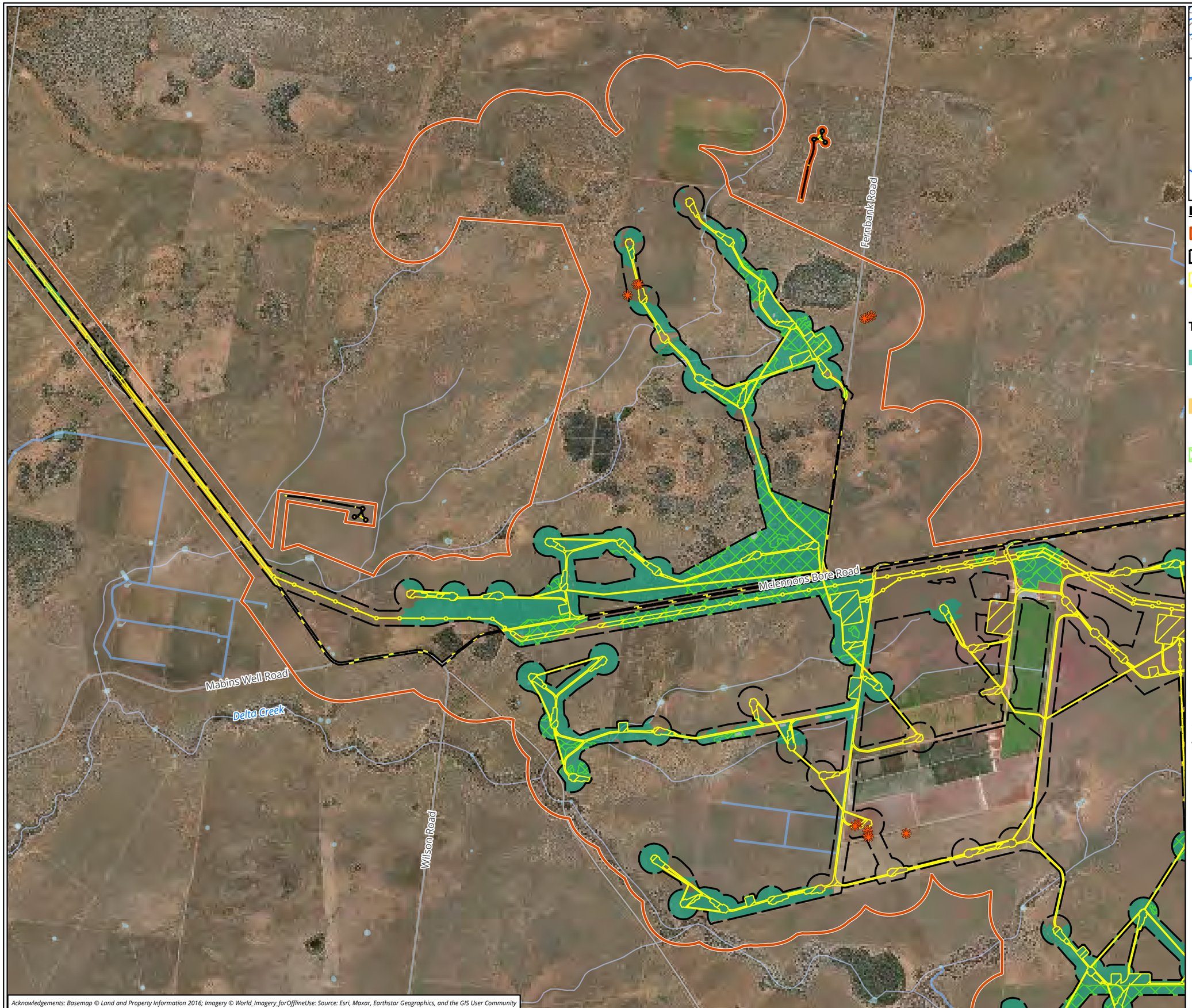

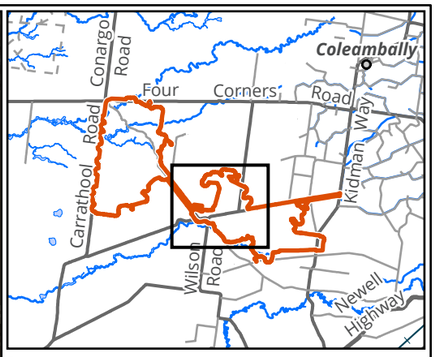

Legend

- Subject land
- Development corridor
- Development footprint
- Paddock tree

Threatened ecological communities

- Weeping Myall Woodlands (EEC, BC Act)
- Natural Grasslands of the Murray Valley Plains (potential) (CEEC, EPBC Act)
- Weeping Myall Woodlands (EEC, EPBC Act)

Figure 7.3 Threatened ecological communities within the subject land

0 1,000

Meters
Scale: 1:47,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 19 March 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
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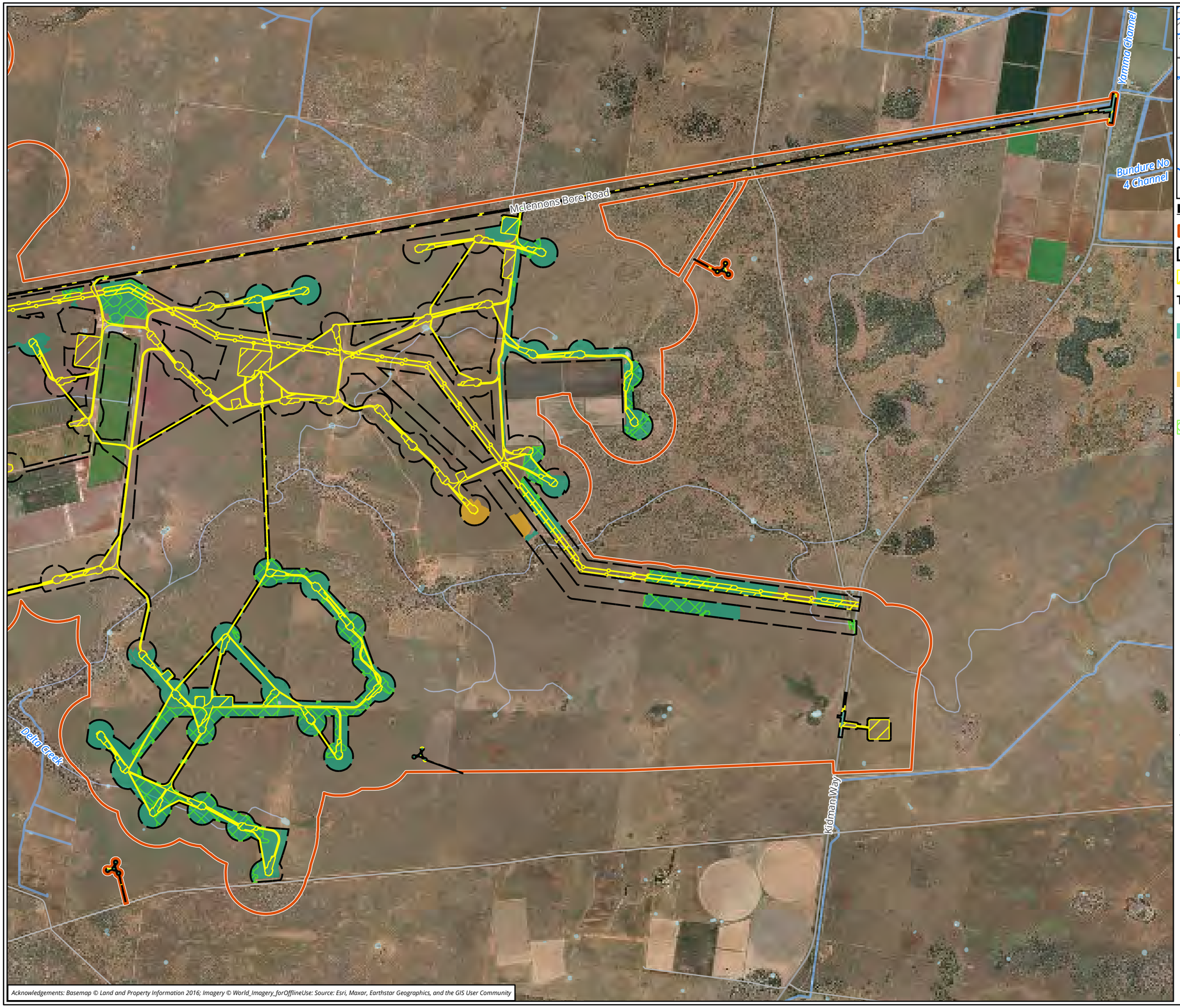
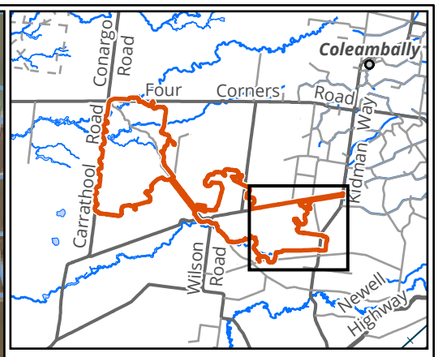
Layout: 37263_Wind_F7_TECs





Legend

- Subject land
- Development corridor
- Development footprint

Threatened ecological communities

- Weeping Myall Woodlands (EEC, BC Act)
- Natural Grasslands of the Murray Valley Plains (potential) (CEEC, EPBC Act)
- Weeping Myall Woodlands (EEC, EPBC Act)

Figure 7.4 Threatened ecological communities within the subject land

0 1,000

Meters

Scale: 1:48,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 19 March 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
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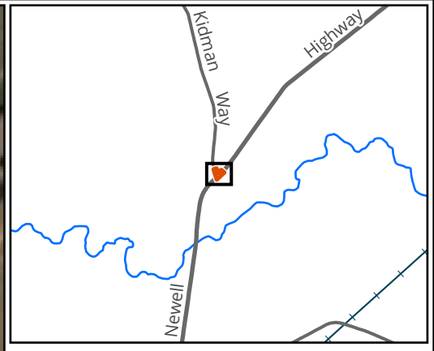

Legend

- Subject land
- Development corridor
- Development footprint

Figure 7.5 Threatened ecological communities within the subject land

0 80

Meters
Scale: 1:2,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 14 March 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
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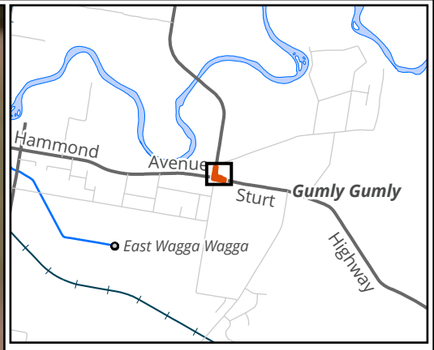

Legend

- Subject land
- Development corridor
- Development footprint

Figure 7.6 Threatened ecological communities within the subject land

0 40

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

N

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Matter: 37263, Date: 14 March 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F7_TECs_P5

3.3. Vegetation integrity assessment

3.3.1. Vegetation zones and patch size class

Vegetation within the development corridor and development footprint was assessed and stratified, based on PCT and broad condition state, into vegetation zones in accordance with Section 4.3 of the BAM, and as described in Table 9 to Table 17 above. This resulted in 17 vegetation zones identified within the development footprint. Table 23 details each of the zones, and provides details on the numbers of BAM floristic plots undertaken in each. Broader vegetation within the subject land was mapped to PCT and vegetation class only, predominantly to inform avifauna movement at a broader landscape level.

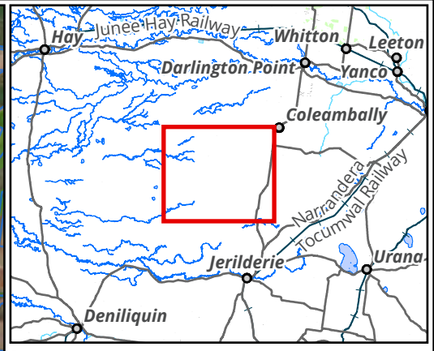
Patch size classes for each vegetation zone present within the subject land were assessed as per Section 4.3.2 of the BAM (DPIE 2020a) using a selection process in ArcGIS. All native vegetation with a gap of less than 100 metres from the next area of woody native vegetation, or ≤30 metres for non-woody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

Patch size classes for each vegetation zone are also outlined in Table 23 below, and illustrated on Figure 8.

Table 23 Vegetation zones within the development corridor and total development footprint

Vegetation zone	Plant Community Type	Condition	BAM plots completed	Development footprint (ha)	Development corridor (ha)	Max. patch size (ha)
1	PCT 10 River Red Gum - Black Box woodland wetland	Moderate	2	0.19	4.25	>100
2	PCT 13 Black Box - Lignum woodland	Moderate	3	3.56	16.61	>100
3		Thinned	4	7.88	29.78	>100
4	PCT 15 Black Box open woodland wetland	Moderate	4	2.54	33.13	>100
5		Thinned	3	1.1	6.39	>100
6	PCT 17 Lignum shrubland wetland	Mod_good	4	0.76	23.90	>100
7		Moderate	3	1.27	11.16	>100
8	PCT 26 Weeping Myall woodland	DNG	10	342.38	2,177.64	>100
9		Intact	11	116.79	795.43	>100
10		Sparse	9	341.38	1,961.78	>100
11	PCT 28 White Cypress Pine Woodland	Low	6	47.76	240.65	>100
12		Moderate	4	1.11	22.54	>100
13	PCT 45 Plains Grass grassland	Mod_good	4	2.24	22.79	>100
16		Intersection	0	0.83	0.83	>100
14	PCT 46 Curly Windmill Grass - speargrass -	Moderate	10	73.44	399.65	>100
17		Intersection	0	0.34	0.34	>100

Vegetation zone	Plant Community Type	Condition	BAM plots completed	Development footprint (ha)	Development corridor (ha)	Max. patch size (ha)
	wallaby grass grassland					
18	PCT 160 Nitre Goosefoot shrubland wetland	Mod_good	4	4.97	27.70	>100



Legend

- Subject land
- Development corridor
- Assessment area
- Patch size ≥100ha

Figure 8 Patch size location

0 1 2 3 4 5

Kilometers
Scale: 1:135,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 19 March 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F8_PatchSize

3.3.2. Vegetation integrity

Due to the size of the subject land, highly detailed vegetation mapping was not completed across its entirety and vegetation integrity was assessed using data obtained from BAM plots to determine appropriate vegetation condition and zones within the development corridor only. However, higher-level and broad PCT and vegetation class mapping was ground-truthed and extrapolated across the subject land and broader landscape as far as practicable. All PCTs within the subject land were entered into the BAM-C to determine threatened species lists for further assessment.

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) based on the area impacted within the development footprint. In total, 140 BAM plots have been completed across the wind farm and adjacent solar farm subject land, with 81plots determined as being justified for inclusion, and considered representative of the biodiversity values within the wind farm development footprint. A number of the BAM plots included in this assessment are no longer located within the development footprint as a result of design refinements over the course of the project. These refinements include changes due to avoidance and minimisation of impacts to higher condition vegetation and/or to minimise the impacts of turbine collisions risk, or to ensure the vegetation (and condition) was suitably sampled and not influenced by existing disturbed areas such as tracks and dams. Where justifiable, many of these plots have been retained for use in the assessment as they are representative of the vegetation present within the development footprint, given the uniformity of the landscape and condition states across the development footprint, development corridor and the subject land more broadly. Details are provided in Table 24, with locations shown on Figure 9. It is also noted that there are only two landholders across the subject land and the land management practices of these two landholders also contribute to the uniformity of the condition of native vegetation (given similarities in terms of weed management, grazing pressure, cropping regimes, etc). The BAM operational manual stage 1 states that where multiple discontinuous areas of vegetation form a vegetation zone, plots must be evenly distributed across these areas if size permits, and is a requirement for linear development proposals. Biosis considers this is as being implemented for zones across the development corridor, and is not a requirement for staging construction of a development.

A number of plots are located within the adjacent Dinawan Solar Farm subject land, however the entire wind farm development corridor and subject land for the solar farm were mapped concurrently, and consistently with the same thresholds and rule sets for determining vegetation type and condition zones applied. Thus the use of plots that do not fall within the amended development footprint does not alter the vegetation integrity assessment, nor the ultimate offset credit obligation.

In summary,

- Vegetation and condition mapping (i.e. to determine vegetation zones) has been undertaken at the site scale, and as such areas within the development corridor, development footprint, and broader subject land were validated and mapped to the same definition with application of the same rule set, based on areas of specific PCTs occurring in the same broad condition states. In areas not subject to or adequately ground-validated (i.e. areas that have never been within the various iterations of the

development corridor, but occur within the subject land), vegetation has been mapped to Vegetation Class based on desktop assessment, and has been noted as such in the relevant spatial data.

- As outlined within the BDAR, the assessment has been undertaken to include the concept of a development corridor to allow for assessment of indirect impacts and to allow for micro-siting flexibility during future detailed design stages. The assessment of vegetation integrity has been designed based on the vegetation zones within or adjacent to the development corridor (rather than the more refined development footprint) to ensure that sufficient data has been collected to allow for accurate description of the biodiversity values across the entire development corridor area.
- Some BAM plots were collected in areas outside of the development corridor (but within subject land as per definition above) that were not within the disturbance footprint to ensure this larger volume of data could be collected across the appropriate (larger) spatial area.
- BAM plots were preferentially located within the development footprint, however numerous layout design iterations have been worked through during the data collection phase of this BDAR. As the development corridor is based on a buffer of the development footprint, design refinements to the footprint to avoid/minimise direct impacts (as outlined above), also have the effect of altering the broader development corridor. This has resulted in some plots that were collected within the development footprint / corridor, during early design iterations, now being located completely outside the final development corridor. However noting the site-sale of the vegetation mapping, the location of the plots remains representative of the impacted vegetation, whether the plot is located within the final development footprint / corridor, or not.

Table 24 BAM plots completed

BAM plot reference	Vegetation zone	BAM plot reference	Vegetation zone
DEH_W_904	PCT 10_moderate	**DEH_RTS_W11**	PCT 26_intact
DEH_W_906	PCT 10_moderate	**DEH_W_04**	PCT 26_sparse
DEH_W_604	PCT 13_moderate	**DEH_W_10**	PCT 26_sparse
DEH_W_606	PCT 13_moderate	**DEH_W_818**	PCT 26_sparse
DEH_RTS_W1	PCT 13_moderate	**DEH_S_16**	PCT 26_sparse
DEH_W_601	PCT 13_thinned	**DEH_W_820**	PCT 26_sparse
DEH_W_608	PCT 13_thinned	**DEH_S_25**	PCT 26_sparse
DEH_W_815	PCT 13_thinned	**DEH_S_35**	PCT 26_sparse
DEH_RTS_505	PCT 13_thinned	**DEH_S_29**	PCT 26_sparse
DEH_W_01	PCT 15_moderate	**DEH_RTS_504**	PCT 26_sparse
DEH_W_500	PCT 15_moderate	**DEH_W_811**	PCT 28_low
DEH_W_504	PCT 15_moderate	**DEH_W_812**	PCT 28_low
DEH_RTS_502	PCT 15_moderate	**DEH_W_903**	PCT 28_low
DEH_W_813	PCT 15_thinned	**DEH_W_905**	PCT 28_low
DEH_W_814	PCT 15_thinned	**DEH_RTS_W15**	PCT 28_low
DEH_RTS_W2	PCT 15_thinned	**DEH_RTS_W13**	PCT 28_low
DEH_RTS_W7	PCT 17_mod_good	**DEH_W_11**	PCT 28_moderate
DEH_S_12	PCT 17_mod_good	**DEH_W_501**	PCT 28_moderate

BAM plot reference	Vegetation zone	BAM plot reference	Vegetation zone
DEH_RTS_W8	PCT 17_mod_good	**DEH_W_502**	PCT 28_moderate
DEH_W_603	PCT 17_mod_good	**DEH_RTS_W14**	PCT 28_moderate
DEH_S_52	PCT 17_moderate	**DEH_W_801**	PCT 45_mod_good
DEH_RTS_W6	PCT 17_moderate	**DEH_RTS_503**	PCT 45_mod_good
DEH_RTS_W5	PCT 17_moderate	**DEH_RTS_500**	PCT 45_mod_good
DEH_W_02	PCT 26_DNG	**DEH_RTS_501**	PCT 45_mod_good
DEH_W_03	PCT 26_DNG	**DEH_W_505**	PCT 46_moderate
DEH_W_07	PCT 26_DNG	**DEH_W_15**	PCT 46_moderate
DEH_W_12	PCT 26_DNG	**DEH_W_612**	PCT 46_moderate
DEH_W_13	PCT 26_DNG	**DEH_W_611**	PCT 46_moderate
DEH_W_14	PCT 26_DNG	**DEH_W_805**	PCT 46_moderate
DEH_W_602	PCT 26_DNG	**DEH_W_806**	PCT 46_moderate
DEH_W_609	PCT 26_DNG	**DEH_W_816**	PCT 46_moderate
DEH_W_614	PCT 26_DNG	**DEH_W_817**	PCT 46_moderate
DEH_W_808	PCT 26_DNG	**DEH_RTS_W9**	PCT 46_moderate
DEH_W_06	PCT 26_intact	**DEH_RTS_W16**	PCT 46_moderate
DEH_W_08	PCT 26_intact	**DEH_W_901**	PCT 160_mod_good
DEH_W_503	PCT 26_intact	**DEH_W_902**	PCT 160_mod_good
DEH_W_610	PCT 26_intact	**DEH_RTS_W4**	PCT 160_mod_good
DEH_W_613	PCT 26_intact	**DEH_RTS_W3**	PCT 160_mod_good
DEH_W_802	PCT 26_intact		
DEH_W_807	PCT 26_intact		
DEH_W_819	PCT 26_intact		
DEH_RTS_W12	PCT 26_intact		
DEH_RTS_W10	PCT 26_intact		

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.

3.3.3. Vegetation integrity score

Plot data was entered into the BAM-C to determine vegetation integrity scores for each vegetation zone. Plot data are provided in Appendix 3.1, with vegetation integrity scores for each vegetation zones provided in Table 25 below.

Table 25 Vegetation zone integrity scores

Vegetation zone	Composition score	Structure score	Function score	VI score*	HBTs present
PCT 10_moderate	53.4	38.7	12.1	29.2	Yes
PCT 13_moderate	71.6	81.5	60.2	70.6	Yes
PCT 13_thinned	75.4	77	57	69.2	Yes
PCT 15_moderate	95.7	85.8	52.7	75.7	Yes
PCT 15_thinned	95.6	98.6	32	67.1	Yes
PCT 17_mod_good	79.9	88.8	-**	84.2	No
PCT 17_moderate	83.1	84	-**	83.5	No
PCT 26_DNG	75.3	38.1	2.9	20.3	No
PCT 26_intact	92.3	81	40.4	67.1	No
PCT 26_sparse	72.2	37.2	36.8	46.2	No
PCT 28_low	98.6	94.3	20	57.1	Yes
PCT 28_moderate	86.5	93.5	49.2	73.8	Yes
PCT 45_mod_good	52.7	80.3	-**	65.1	No
PCT 45_Intersection*	100	100	-**	100*	No
PCT 46_moderate	90.8	90.4	-**	90.6	No
PCT 46_Intersection*	100	100	-**	100*	No
PCT 160_mod_good	71.2	87.8	-**	79.0	No

***Benchmark (pristine) condition vegetation would receive a VI score of 100.**

****** Shrubland / grassland PCTs do not get a function score within the BAM-C.**

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

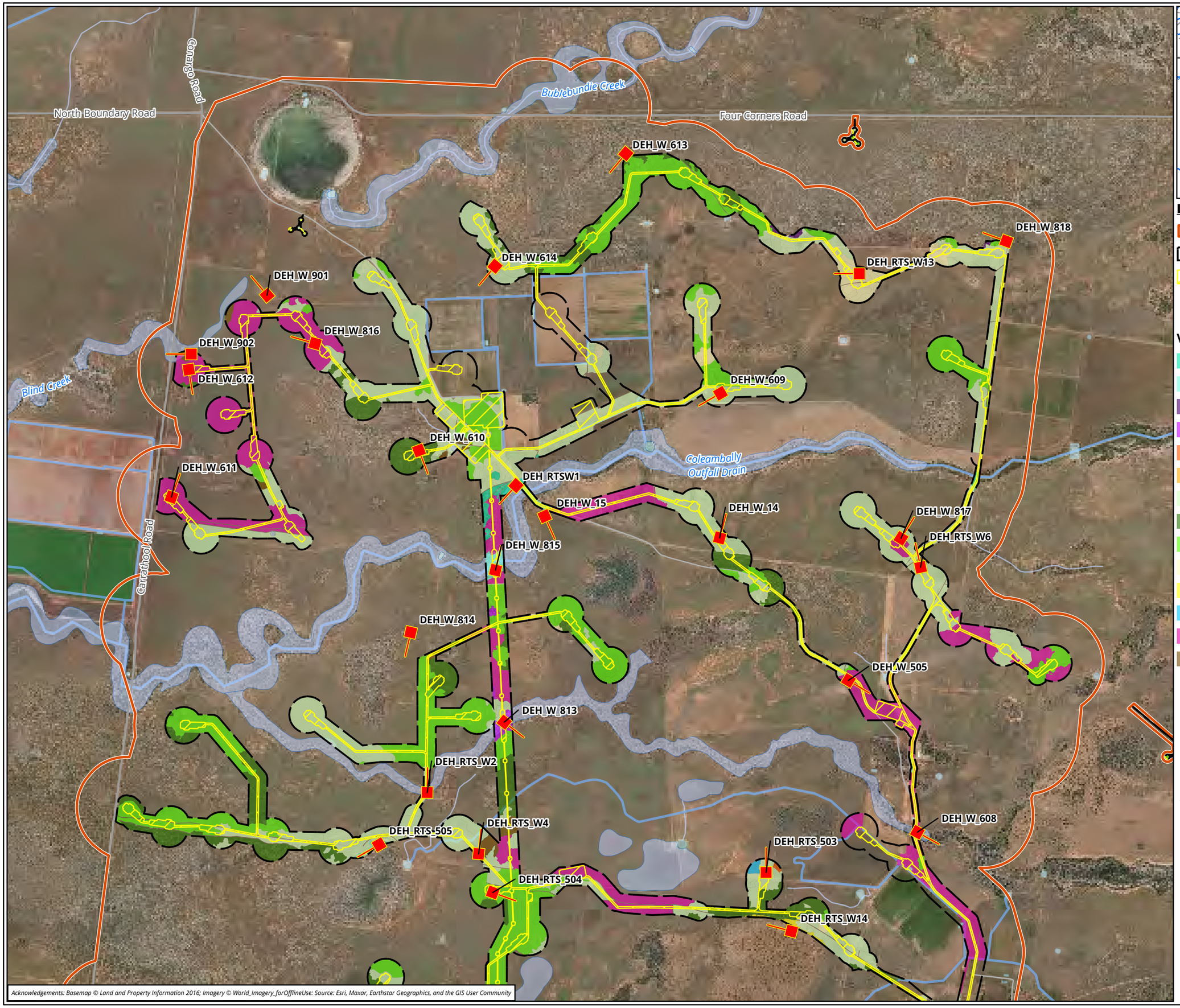
A total of 30 scattered paddock trees were recorded within the development corridor, of which 16 will or may be impacted, and have been assessed under Streamlined assessment module – Scattered trees assessment (Appendix B of the BAM) and were entered into the scattered tree assessment module of the BAM-C. Scattered paddock tree were determined to have:

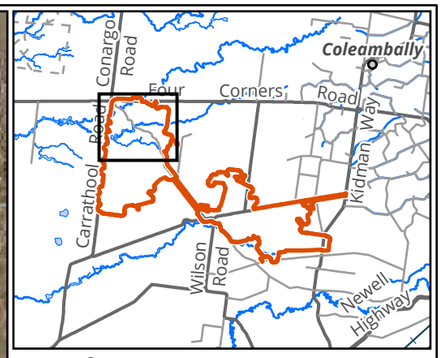
- Three or fewer trees that have a DBH of greater than or equal to 5 cm and are within a distance of 50 m of each other, that in turn, are greater than 50 m away from the nearest living tree that is greater

than or equal to 5 cm DBH, and are completely separated by 100% exotic vegetation, human-made surfaces or bare ground.

The Streamlined assessment module – Scattered trees assessment was used only to assess the part of the subject land that contained scattered trees. Any proposed clearing of native vegetation that did not meet the definition of scattered trees was assessed in accordance with Section 4 of the BAM (DPIE 2020a).

The assessment of the project's impact to scattered trees is provided as Appendix 6.1 of this BDAR.





Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot

Vegetation zone

- VZ2 - 13_Moderate
- VZ3 - 13_Thinned
- VZ4 - 15_Moderate
- VZ5 - 15_Thinned
- VZ6 - 17_Mod_Good
- VZ7 - 17_Moderate
- VZ8 - 26_DNG
- VZ9 - 26_Intact
- VZ10 - 26_Sparse_Canopy
- VZ11 - 28_Low
- VZ12 - 28_Moderate
- VZ13 - 45_Mod_Good
- VZ15 - 46_Moderate
- VZ17 - 160_Mod_Good

Figure 9.1 Vegetation zones and plot locations

0 1,000

Meters
Scale: 1:38,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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Matter: 37263, Date: 19 March 2025,
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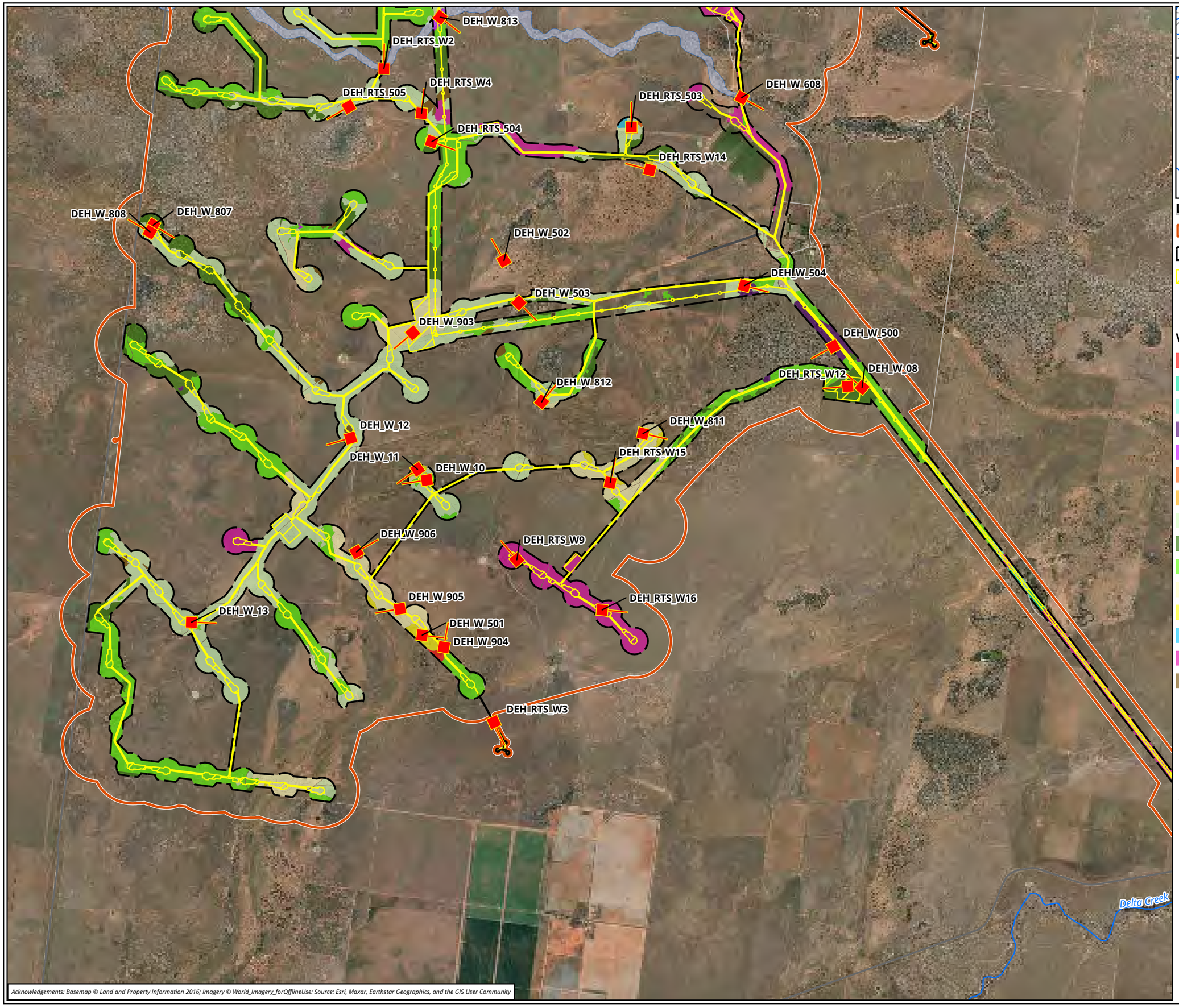

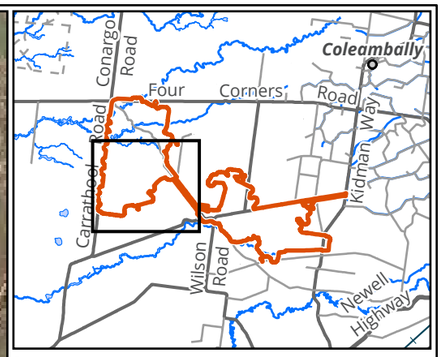

Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot

Vegetation zone

- VZ1 - 10_Moderate
- VZ2 - 13_Moderate
- VZ3 - 13_Thinned
- VZ4 - 15_Moderate
- VZ5 - 15_Thinned
- VZ6 - 17_Mod_Good
- VZ7 - 17_Moderate
- VZ8 - 26_DNG
- VZ9 - 26_Intact
- VZ10 - 26_Sparse_Canopy
- VZ11 - 28_Low
- VZ12 - 28_Moderate
- VZ13 - 45_Mod_Good
- VZ15 - 46_Moderate
- VZ17 - 160_Mod_Good

Figure 9.2 Vegetation zones and plot locations

0 1,000

Meters
Scale: 1:52,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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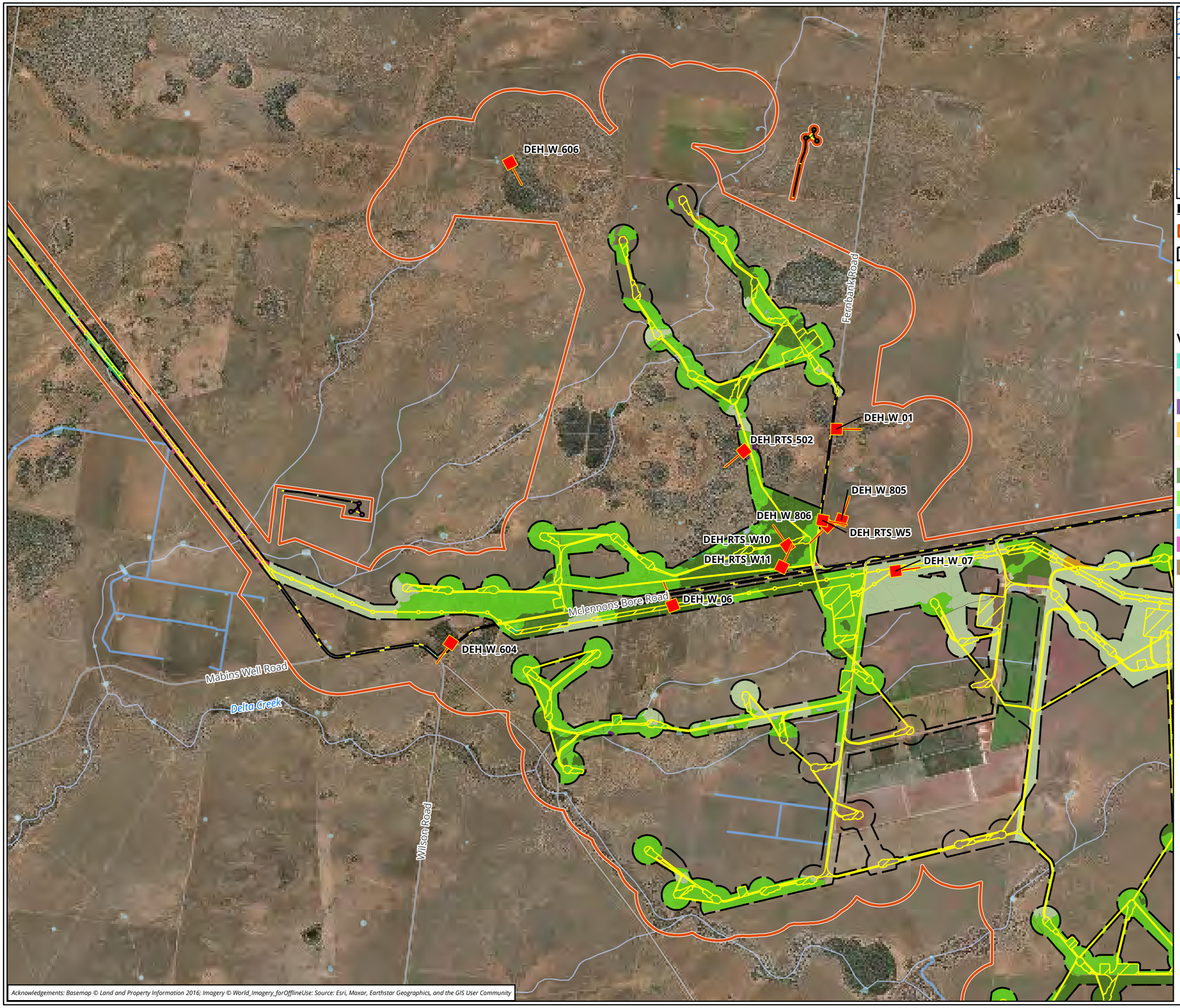

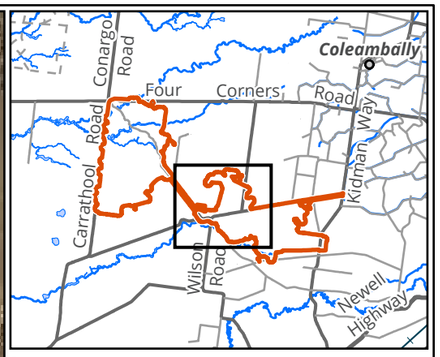

Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot

Vegetation zone

- VZ2 - 13_Moderate
- VZ3 - 13_Thinned
- VZ4 - 15_Moderate
- VZ7 - 17_Moderate
- VZ8 - 26_DNG
- VZ9 - 26_Intact
- VZ10 - 26_Sparse_Canopy
- VZ13 - 45_Mod_Good
- VZ15 - 46_Moderate
- VZ17 - 160_Mod_Good

Figure 9.3 Vegetation zones and plot locations

0 1,000

Meters
Scale: 1:47,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

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GIS: JB, Checked by: MP, Last edited by: jbeckius
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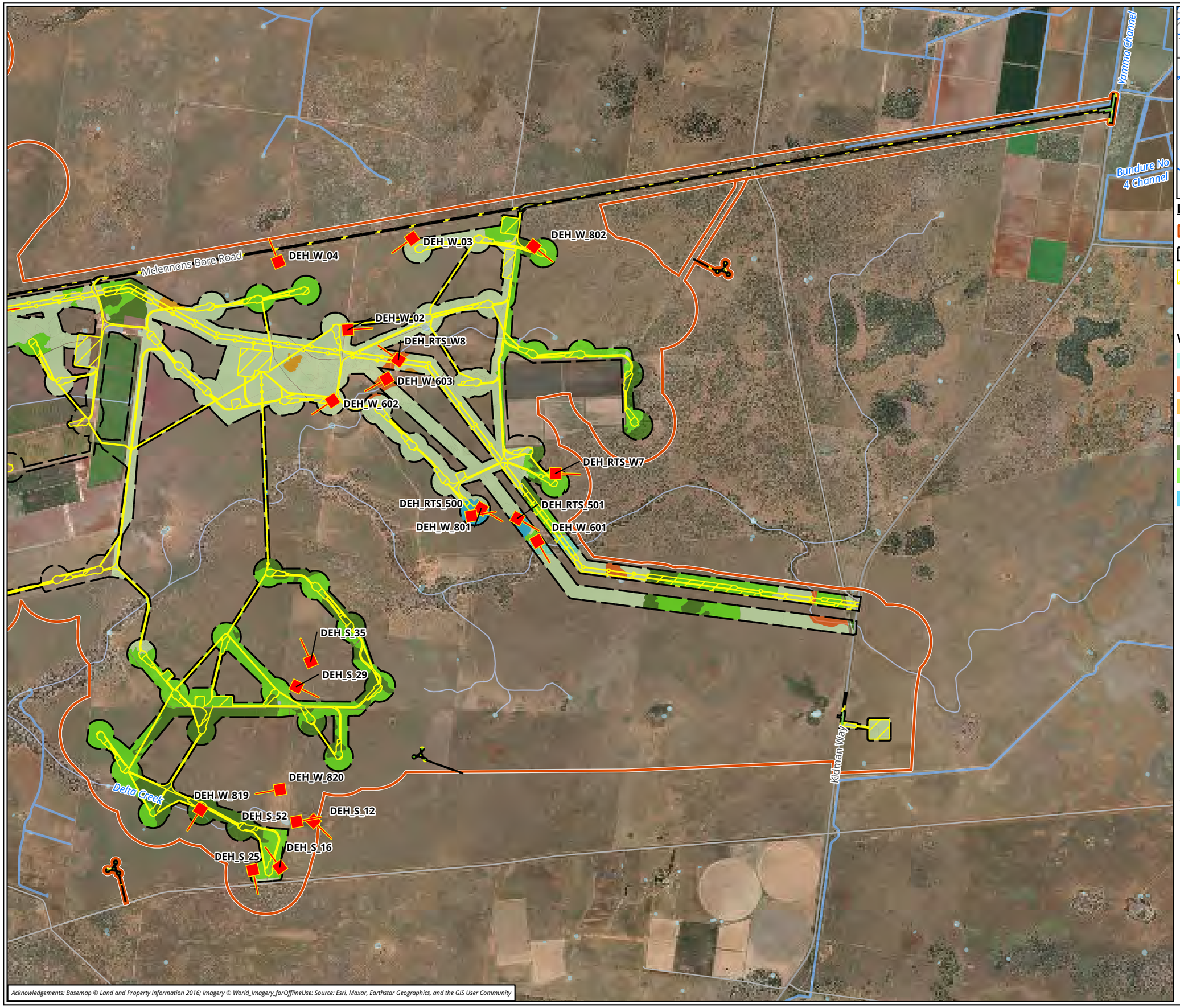

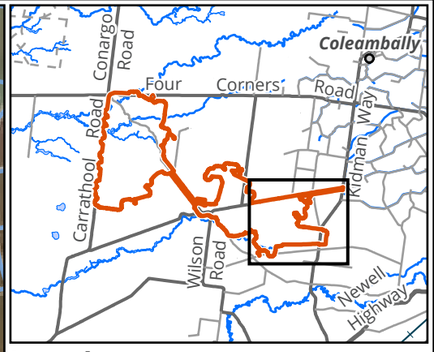

Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot

Vegetation zone

- VZ3 - 13_Thinned
- VZ6 - 17_Mod_Good
- VZ7 - 17_Moderate
- VZ8 - 26_DNG
- VZ9 - 26_Intact
- VZ10 - 26_Sparse_Canopy
- VZ13 - 45_Mod_Good

Figure 9.4 Vegetation zones and plot locations

0 1,000

Meters
Scale: 1:48,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

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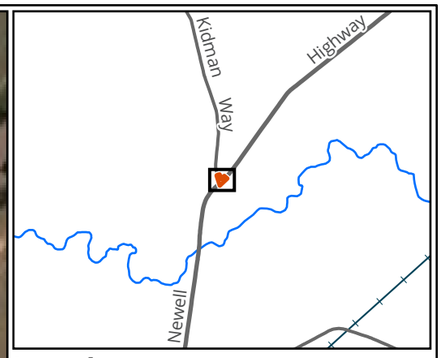

Legend

- Subject land
- Development corridor
- Development footprint

Vegetation zone

- VZ14 - 45_Intersection
- VZ16 - 46_Intersection

Figure 9.5 Vegetation zones and plot locations

0 80

Meters
Scale: 1:2,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 14 March 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
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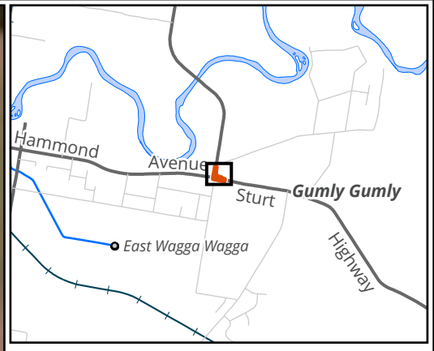
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F9_VegZones_P5-6



Legend

- Subject land
- Development corridor
- Development footprint

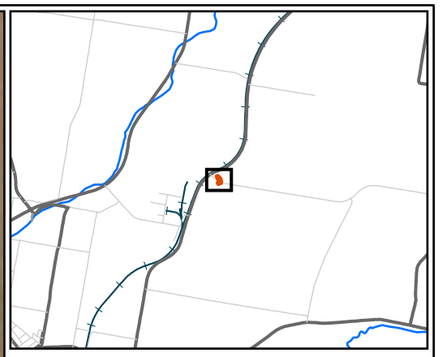
Figure 9.6 Vegetation zones and plot locations

0 40 N

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

biosis

Matter: 37263, Date: 14 March 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F9_VegZones_P5-6



Legend

- Subject land
- Development corridor
- Development footprint

Figure 9.7 Vegetation zones and plot locations

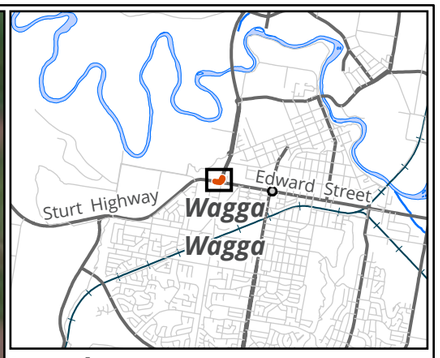
0 50

Meters
Scale: 1:1,500 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 17 April 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F9_VegZones_P7-8



Legend

- Subject land
- Development corridor
- Development footprint

Figure 9.8 Vegetation zones and plot locations

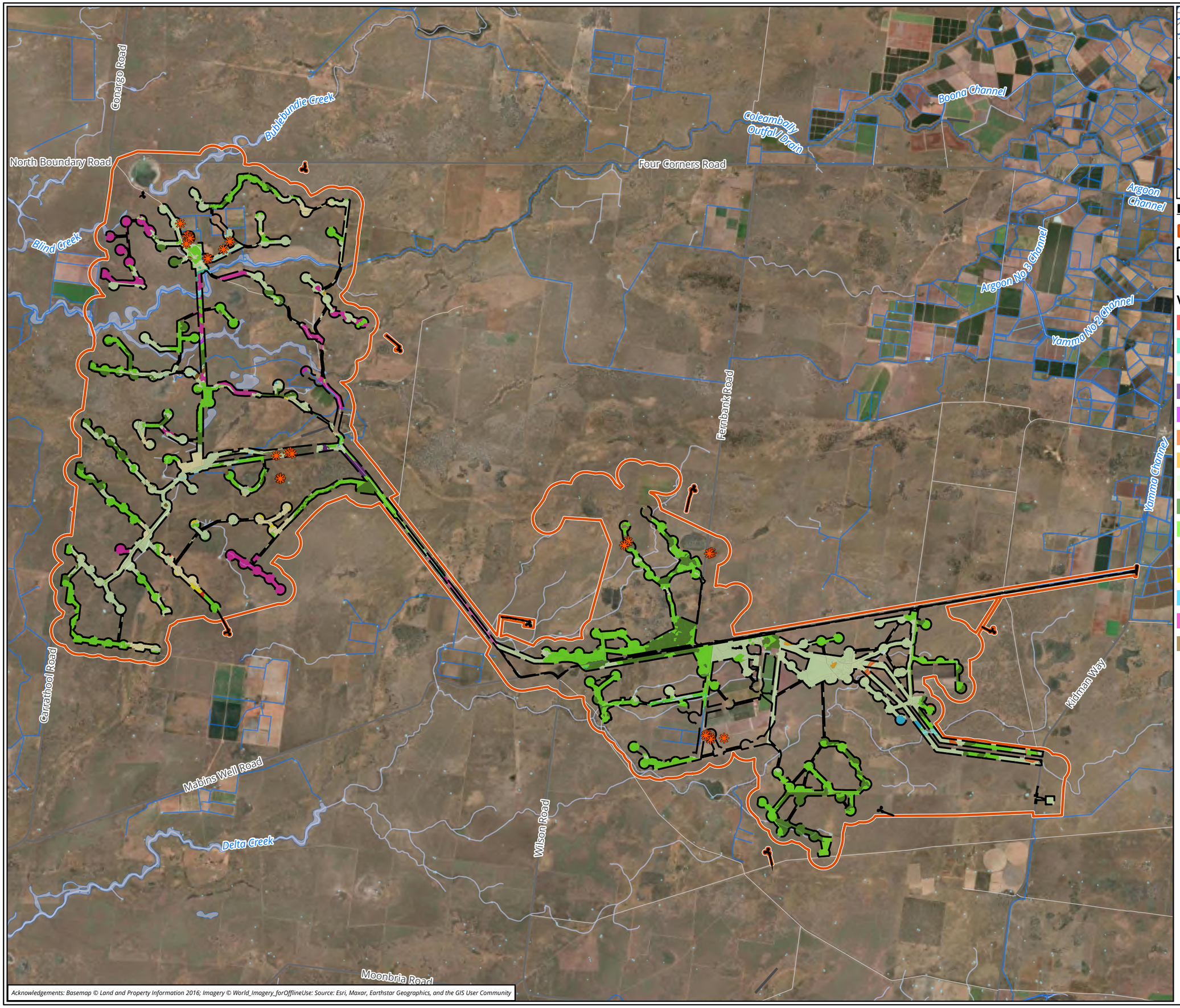
0 50

Meters
Scale: 1:1,500 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: 37263, Date: 17 April 2025,
GIS: JB, Checked by: MP, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F9_VegZones_P7-8



Legend

- Subject land
- Development corridor
- Paddock tree

Vegetation zone

- VZ1 - 10_Moderate
- VZ2 - 13_Moderate
- VZ3 - 13_Thinned
- VZ4 - 15_Moderate
- VZ5 - 15_Thinned
- VZ6 - 17_Mod_Good
- VZ7 - 17_Moderate
- VZ8 - 26_DNG
- VZ9 - 26_Intact
- VZ10 - 26_Sparse_Canopy
- VZ11 - 28_Low
- VZ12 - 28_Moderate
- VZ13 - 45_Mod_Good
- VZ15 - 46_Moderate
- VZ17 - 160_Mod_Good

Figure 10 Scattered paddock trees - Overview

0 1 2 3 4 5

Kilometers

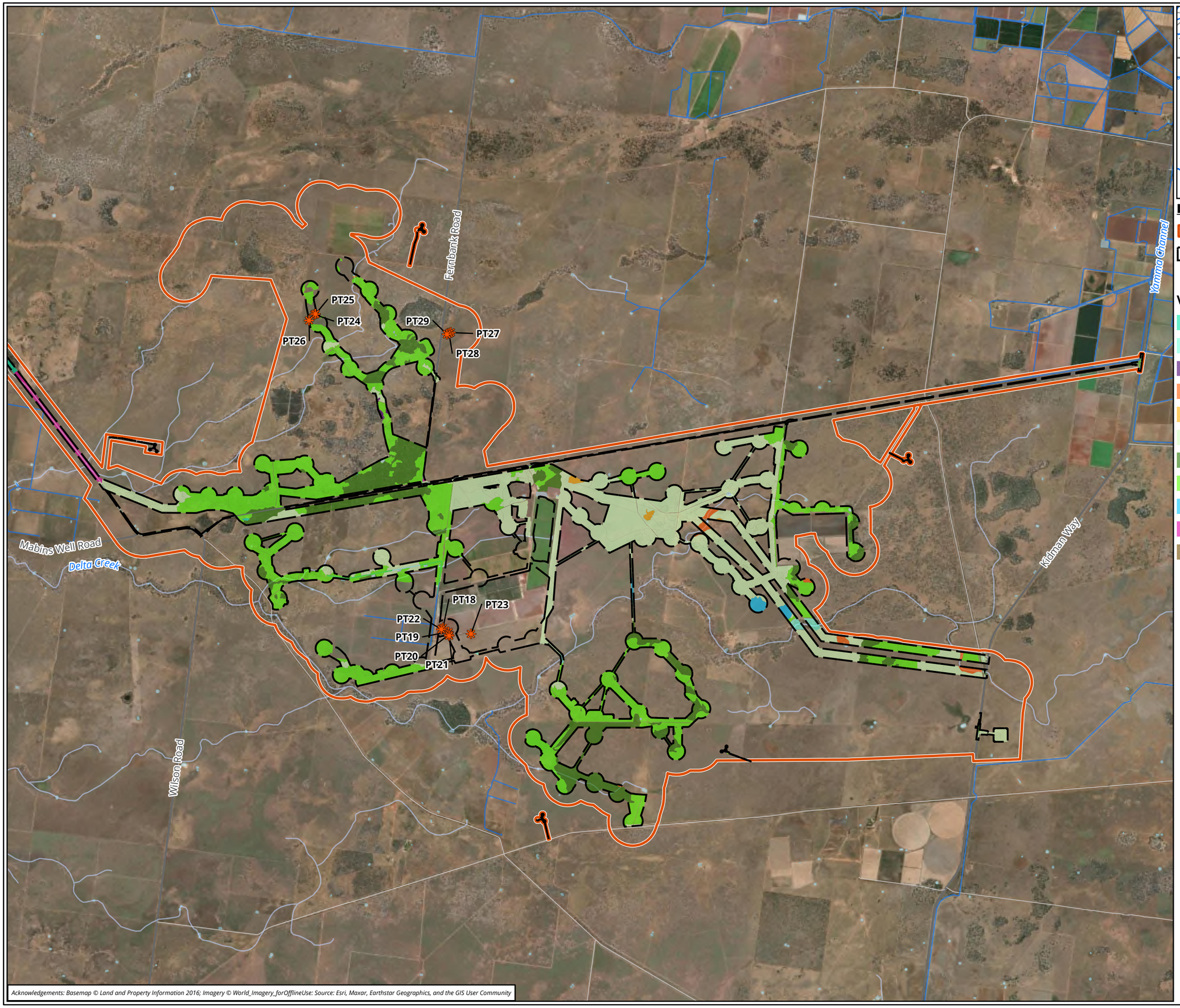
Scale: 1:130,000 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

biosis

Matter: , Date: 08 April 2025,
, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F10_PaddockTrees



Legend

- Subject land
- Development corridor
- Paddock tree

Vegetation zone

- VZ2 - 13_Moderate
- VZ3 - 13_Thinned
- VZ4 - 15_Moderate
- VZ6 - 17_Mod_Good
- VZ7 - 17_Moderate
- VZ8 - 26_DNG
- VZ9 - 26_Intact
- VZ10 - 26_Sparse_Canopy
- VZ13 - 45_Mod_Good
- VZ15 - 46_Moderate
- VZ17 - 160_Mod_Good

Figure 10 Scattered paddock trees - Eastern area

0 1 2 3

Kilometers
Scale: 1:80,000 @ A3
Coordinate System:
GDA2020 MGA Zone 55

N

biosis

Matter: , Date: 08 April 2025,
, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
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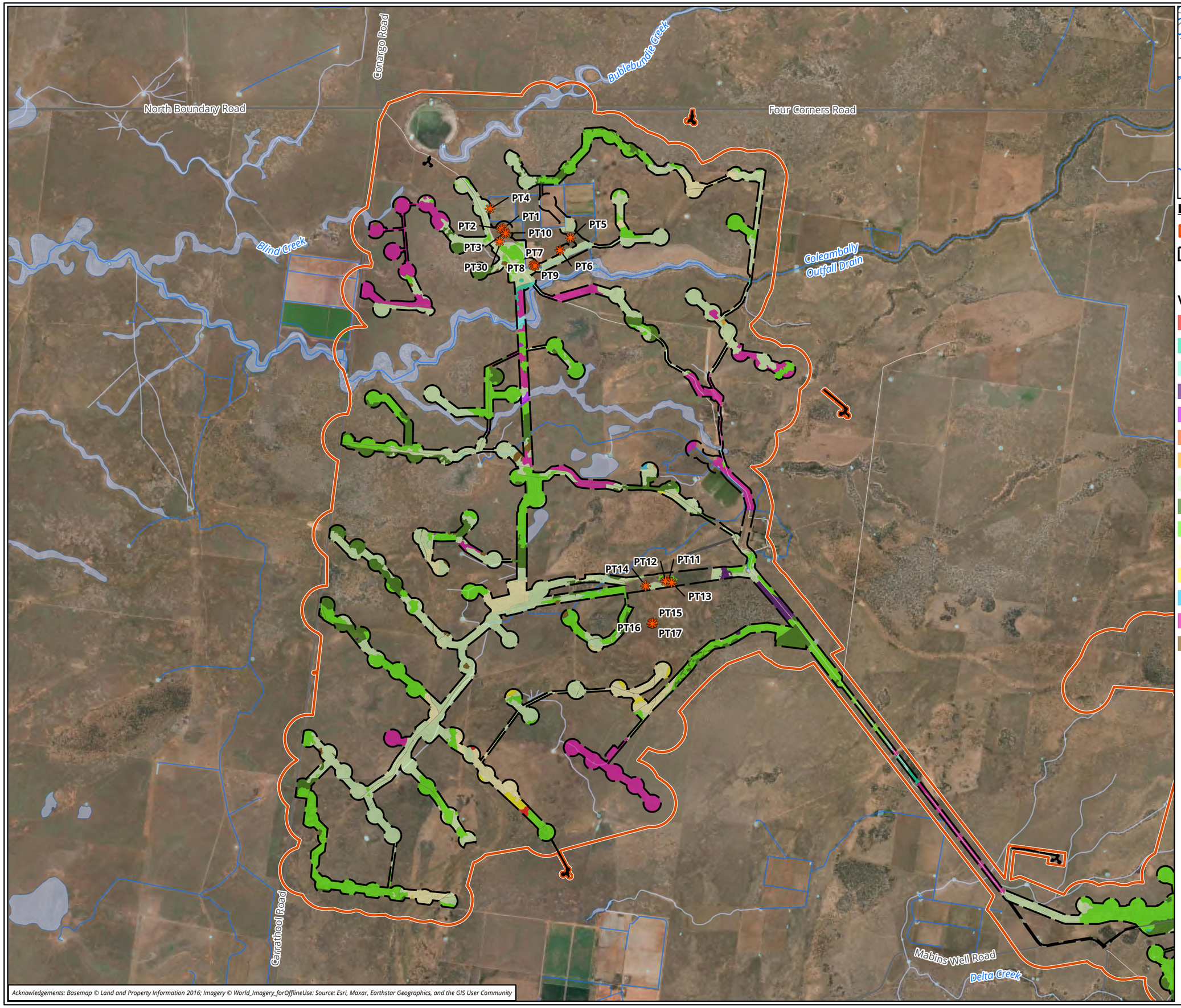


Figure 10 Scattered paddock trees - Western area

Matter: , Date: 08 April 2025,
, Last edited by: jbeckius
Location: P:\37200s\37263\Mapping\
37263_Dinawan_BDAR_Wind_F4-10.aprx
Layout: 37263_Wind_F10_PaddockTrees

4. Threatened species

4.1. General habitat types and features

The subject land is predominantly 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) and White Cypress Pine woodlands. Mapping by NSW DCCEEW (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.

Areas of dryland and irrigated cropping occur within the subject land. Generally, these areas support limited opportunities for biodiversity due to the broadscale historical vegetation removal and regular disturbance to the soil from seasonal agricultural activities (cultivation, fertilising and chemical application). Areas left fallow for a number of seasons are likely to have some natural regeneration of native coloniser species, however the habitat values supported by these areas is also limited. However, during seasonal irrigation in selected areas, water availability does attract common waterbirds, sometimes in large numbers, as well common amphibians, but also threatened species such as Southern Bell Frog *Litoria raniformis*, which was recorded in these areas where more permanent water occurs. Cropping, livestock grazing and historical vegetation removal are the key drivers for habitat condition and the associated potential for threatened flora species to occur. Areas of highest condition vegetation occur in areas where these practices have been generally excluded from grazing or occur at lower intensity. Areas with higher intensity grazing generally support soil types more likely to produce palatable ground-coverage species. Despite historic grazing, cropping and clearing, the subject land supports a diverse array of vegetation communities, often with moderate or higher plant species richness and habitat types.

Black Box dominated woodlands and ephemeral drainage lines, depressions and wetland areas provide foraging, shelter, movement and breeding resources for native fauna such as woodland birds and raptor species, including a number of threatened species recorded across the subject land. Seasonally flooded grassy/sedge drainage lines, wetlands, farm dams and artificial drains and channels in the subject land provide habitat for a range of fauna, including birds, frogs and reptiles.

White Cypress Pine woodlands occur as open areas with varying degrees of density depending on history of clearing. Areas with remnant pine often contain fissures and nests and can support foraging, roosting and breeding habitat for microbat species and range of common fauna, particularly raptor and woodland bird species. Woody vegetation areas support forage opportunities for insectivorous microbat species, that are likely to forage above and below the canopies. Open areas between wooded patches provide flyways, however larger open areas or cropping and grasslands / low chenopod shrublands provide limited opportunities for bats.

Intact Weeping Myall woodland and sparse woodlands (represented by PCT26) occur 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. This community provides a range of habitats for more woodland dependent avifauna such as parrots and honeyeaters that rely on the more widely spaced trees with a relatively open canopy.

As previously mentioned, grasslands within the subject land 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. 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. More natural grasslands are in higher condition generally, so potential for threatened flora in these areas is greater. Grasslands and low open chenopod shrublands generally occur across large expanses away from source bordering features such as creeklines, prior-streams, or sandhills. Habitats provided by these areas are limited to shelter habitat for smaller and ground-dwelling fauna species including reptiles, echidna, and ground-dwelling/foraging bird species and common avian species including quail, Brown Songlark and Australasian Pipit. Grassland and shrubland provide open hunting opportunities for raptors and movement pathways for small bird species. 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 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.

4.1.1. Flora habitat assessments

Flora habitat assessments were undertaken during preliminary assessment and the stratification of vegetation communities and vegetation zones. Habitat assessment was undertaken to determine if PCTs supported the critical habitat components for flora species, or contained degraded habitat that would not support threatened flora species identified as candidate species (species credit species) by the BAM Calculator. An assessment of the potential for candidate flora species was undertaken following completion of initial habitat assessments and the results are outlined in Section 4.3 and Appendix 2.

4.1.2. Fauna habitat assessments

Fauna habitat assessments were undertaken to determine the presence of microhabitats and other critical habitat components (habitat constraints) suitable for all threatened fauna species considered predicted species (ecosystem credit species) or candidate species (species credit species) under the BAM. Habitat assessments focussed on the presence of the features such as those listed below:

- Habitat trees including large and/or hollow-bearing trees, stick nests, availability of flowering shrubs and canopy/understorey feed tree species.
- Condition and type of native vegetation and the presence of exotic species.
- Presence and condition of waterways, lakes, swamps, wetland and watercourses (artificial and natural).
- 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 cropping, grazing, vegetation clearing (thinning), rural land management practices and exotic species infestation.
- Abundance of introduced predators such as cats and foxes, as well as environmental pests such as rabbits.

- Topography and landscape morphology.
- Soil type and presence of rocky areas.
- Habitat connectivity.

Several habitat features with potential to support threatened species credit species were identified during these habitat assessments, including fissures in cypress pine trees, stick nests, woody debris, semi-aquatic habitat, grassland and shrubland and sandy rises. An assessment of the suitability for these features to support the presence of potential candidate species is presented Appendix 2.

Field capture of detailed fauna habitat information allowed for confirmation of presence/absence of habitat features and microhabitats for the range of candidate species across surveyed portions of the subject land. 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. Fauna habitat assessment details were cross-referenced with vegetation assessment, topology, landscape, soil, current and historic imagery data to draw conclusions regarding potential suitability of habitat for threatened species. Fauna habitat assessment details were cross-referenced with vegetation assessment, topology, landscape, soil, current and historic imagery data to draw conclusions regarding potential suitability of habitat for threatened species.

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) based on all PCTs and vegetation class present. Impacts to these species require assessment, however targeted surveys are 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 under the Threatened Biodiversity Data Collection (TBDC). Table 26 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.

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 of prescribed impacts and under the Commonwealth EPBC Act.

One ecosystem credit species, Regent Parrot, has been discounted from potentially occurring within the subject land. This is due to the geographical limitation of not being within 10 kilometres of the junction of the Murray River. All other ecosystem credit species are considered relevant to the project.

Table 26 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
Black Falcon	*Falco subniger*	Yes	Moderate
Blue-billed Duck	*Oxyura australis*	No	Moderate
Brolga	*Grus rubicunda*	No	Moderate

Common name	Species name	Recorded during surveys	Sensitivity to gain class
Curlew Sandpiper	*Calidris ferruginea*	No	High
Diamond Firetail	*Stagonopleura guttata*	Yes	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
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
Painted Honeyeater	*Grantiella picta*	Yes	Moderate
Plains-wanderer	*Pedionomus torquatus*	Yes	High
Pied Honeyeater	*Certhionyx variegatus*	Yes	Moderate
Redthroat	*Pyrrholaemus brunneus*	No	Moderate
Scarlet Robin	*Petroica boodang*	No	Moderate
South-eastern Hooded Robin	*Melanodryas cucullata*	No	Moderate
Southern Whiteface	*Aphelocephala leucopsis*	Yes	Moderate
Spotted Harrier	*Circus assimilis*	Yes	Moderate
Square-tailed Kite	*Lophoictinia isura*	No	Moderate
Superb Parrot	*Polytelis swainsonii*	Yes	Moderate
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

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/absence 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 and EPBC listed species predicted to occur within the subject land based on the IBRA subregion within which the project occurs, the native vegetation cover present within the 1500 metre buffer area, the PCTs present within the development corridor and subject land, and patch sizes listed in within Table 23.

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. Six predicted species credit species have been excluded from occurring within the subject land based on the following

- Menindee Nightshade *Solanum karsense* – The subject land is not west of Maude.
- Sand-hill Spider Orchid *Caladenia arenaria* - The subject land is not 'East of Jerilderie' and microhabitat within the White Cypress Pine communities has groundcover which is degraded.
- Swift Parrot - No important mapped areas.
- Curlew Sandpiper - No important mapped areas.
- Regent Parrot – The subject land is not within 10km of the Murray River.
- 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 rare occasion, River Red Gum *Eucalyptus camaldulensis*, in the development corridor and subject land. Feed tree species present are predominantly secondary feed trees such as Black Box. Black Box (a high use feed tree) is common within the subject land, and occasionally fragmented stands of River Red Gum (a preferred use feed tree) (DPE 2022c) occur within the development corridor, however the subject land is not considered to support habitat for Koala. In the context of the Riverina more broadly, Koala habitat is associated with major rivers, such as the Murrumbidgee, Edward and Murray rivers where large stands of River Red Gum and Black Box trees occur on the regularly inundated inner floodplains along these larger river systems. This is supported by the clear concentration of Koala records along these rivers, the majority of which occur around 70 – 80 km to the north-east, or 80 - 85 km to the south, of the subject land. Records do occur further west, including west of the subject land, however these are again strongly associated with the major river systems. A number of BioNet records occur away from these major rivers, most of which are associated with 'Dan Lunney's Community Wildlife Survey' or WIRES records, however these records all have a high level of uncertainty surrounding the accuracy of the GPS coordinate of the records themselves.

  Habitat connectivity in terms of Koala movement is fragmented between these major river systems and the subject land. It is acknowledged that Koalas traverse treeless landscapes for some distances, however these 'hostile' habitats as noted in the Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE 2022c), are prevalent within the fragmented landscape and riparian corridor along the ephemeral watercourses that provide some level of connectivity through the landscape to the subject land. This is supported by the clear concentration of Koala records along major rivers only, the majority of which occur around 80 km south, or over 80 km northeast, of the subject land.

  The justification of the absence of Koala within the subject land is based on a lack of records in the broad expanse between Hay, Deniliquin, Finley, Corowa, and Coleambally, but more importantly, the naturally sparsely treed to open landscape of this region, and the understanding that regional Koala

populations are restricted to major river systems that support extensive stands of River Red Gum and associated Black box woodlands. The tree cover of the local landscape has also been subject to long-term fragmentation of habitat connectivity through land clearing (across 100 km of 'hostile' habitat [as defined in the BAM Koala guidelines]) between known regional populations along the Murrumbidgee and Edwards Rivers. As seen through aerial imagery it is evident that to the north and south of the subject land the flood runner creek systems that traverse the site have major breaks in tree cover or become very narrow riparian zones with interrupted physical connectivity to the major river systems to the north (Murrumbidgee) and south (Murray). Highly limited connectivity occurs along these degraded, narrow and fragmented riparian corridors to the north and south of the subject land (e.g. Coleambally Outfall Drain and Delta Creek).

The BAM Koala guidelines define fragmented (or discontinuous) habitat as patches of suitable habitat separated by >500 m from other areas of suitable habitat, with suitable habitat defined as PCTs containing Koala feed trees. The landscape surrounding the subject land is dominated by unsuitable grassland/chenopod shrubland habitat, therefore creating discontinuous habitat for 10s to 100s of km surrounding the subject land. To cross these open areas, Koalas would need to spend considerable time on the ground increasing their vulnerability to predation and vehicle strike. It is considered highly unlikely that Koalas occupy the subject land based on the lack of local records or from known populations along the Murrumbidgee River near Hay, a lack of tree cover and very poor connectivity to facilitate their movement from known populations over 80 km to the north-east at Narrandera and south around Tocumwal.

Habitat connectivity is considered a microhabitat (or habitat component) as defined in the BAM for Koala, and the absence of habitat connectivity between the subject land and known regional populations is considered justification for the species absence in accordance with s5.2.3.2.a.ii of the BAM. Furthermore, impacts to habitat connectivity are a known key threat to Koala so it can therefore be inferred that where substantial breaks in connectivity exist, and have existed for a long period of time, the species is highly unlikely to occur in the fragmented and isolated areas such as the subject land.

Although no longer an excluded species, the assessment approach for Southern Myotis has been reviewed with the updated approach outlined below.

- Southern Myotis *Myotis Macropus* – The subject land is at this species most southern and westerly distribution. This species was potentially recorded (only) as part of the 'species complex' via ultrasonic recording (refer Section 4.3.1). Southern Myotis being recorded as part of a species complex does not mean it has been recorded present at the site or incidentally observed, nor does it necessarily mean it should be assumed to be present through application of the precautionary principle.

  Identification of Southern Myotis calls to species level is difficult, and only possible in sequences containing particular features that allow it to be differentiated from other species that produce similar, near vertical, high-bandwidth linear call types where these species overlap in distribution (such as Gould's Long-eared Bat *Nyctophilus gouldii* and Lesser Long-eared Bat *Nyctophilus geoffroyi*). Good quality sequences of Southern Myotis can be differentiated from *Nyctophilus* spp where a feeding buzz is present (a rapid increase in pulse repetition rate, slope, frequency and speed) (Gonsalves & Law 2017). Reinhold et al. (2001) also report that Southern Myotis calls generally have a pulse interval of less than 75 ms, an initial slope of greater than 400 Octaves Per Second (OPS) and that between these values the species cannot be distinguished. No calls containing these distinguishing features were found in the data analysed for the Project that would allow the species to be confirmed as present.

Ultrasonic analysis therefore makes it difficult to identify linear type bat calls to species level. As a result, during the analysis process these types of calls were assigned to a species complex, that for the project, includes Southern Myotis, Gould's Long-eared Bat, Lesser Long-eared Bat and Corben's Long-eared Bat. Assigning a call to the Myotis/Nyctophilus species complex is not confirmation that Southern Myotis is present, rather a reflection of the fact that the call could theoretically belong to either of these species, and it cannot be confirmed which species from the call alone.

This approach is common in bat call analysis and an accepted limitation of the methodology. It is also more conservative than ruling the species out where no calls with distinguishing features are observed despite many sequences being present in the range of values that are indistinguishable. Continuing to include Southern Myotis as possibly present (by assigning it to a species complex) during the call analysis means that additional consideration of the site context and available habitat for the species must be given prior to it being ruled out. The results from the ultrasonic analysis therefore must be viewed in the context of the broader landscape and habitat values within the subject land. This is the approach taken in the BDAR, and the reason the species was assessed in accordance with Section 5.2.2 of the BAM.

Southern Myotis, also known as the "fishing bat", forages in and around dams, streams and waterways with large pools or stretches. The TBDC lists the habitat constraints for the species as "waterbodies with permanent pools/stretches 3 m or wider…", due to the reliance of this species on permanent water for foraging where it scoops prey from the water with its feet (Campbell, 2009). The species also roosts in close proximity to its foraging habitat (within 200 m) utilising both tree hollows or human structures including bridges, culverts, caves and tunnels etc.(Gorecki 2020, Campbell 2009).

The species is primarily coastal, occurring in a narrow coastal band from the Kimberly to North Queensland and along the east coast of Queensland, NSW and Victoria to South Australia. Although its distribution does extend inland, this is predominantly along major inland rivers (such as the Murray River and the Murrumbidgee River), reflecting its close association with water (Gonsalves and Law 2017). Bionet records for Southern Myotis strongly reflect the known habitat preferences for the species, being concentrated on the coast and extending inland via major inland river corridors.

Despite inland rivers representing apparently suitable habitat, the species is still seemingly rare. Law and Anderson (1999) surveyed 18 sites in the State Forests of the Millewa and Koondrook/Perricoota area (about 40 to 50 kilometres south-west of Deniliquin, NSW), targeting Southern Myotis and found it present at only two locations within 7 km of each other, near the Barmah Bridge. This was consistent with previous surveys in the region that recorded the species in a similar location. The authors concluded that the species is "extremely rare" in the study region despite the presence of apparently suitable foraging habitat and abundant roost hollows in River Red Gums. Surveys further downstream on the Victorian side of the border by Lumsden and Bennet (1995) also failed to detect the species.

The most recent data from the vicinity of the project is from the Monitoring, Evaluation and Research program (MER) that has been in place in the Murrumbidgee Catchment area since 2014 overseen by the Commonwealth Environmental Water Office. Surveys from 2021-22 within the Yanco Creek System monitored ten wetlands and recorded Southern Myotis from only one site, known as Sheepwash wetlands located approximately 50 kilometres south-west of Narrandera (approximately 40 km east of the subject land). This more recent study similarly demonstrates the rarity of the species in the region, such that even targeted surveys, in permanent, vegetated waterbodies may fail to detect the species.

A study by Law, Chidel and Towerton (ABS newsletter 2001) found that Southern Myotis 'can persist in some agricultural settings if suitable roosts are present' and that 'rural creeks with intact riparian

vegetation have a good chance of supporting' the species. However, their study was in a vastly different part of the species range, in Northern NSW near Urbenville. Southern Myotis were found roosting beneath an old log bridge on Boomi Creek, well within the coastal distribution of the species and a very typical roost structure. Law, Chidel and Towerton (2001) go on to emphasise that the species is 'clearly uncommon in certain areas, such as along the Murray River' and that 'intensive agricultural practices, such as cropping with irrigation, could be more detrimental to Southern Myotis because of increased fertiliser, herbicide and insecticide run-off".

Maintaining riparian connectivity has previously been observed to be vital for this species in maintaining functional landscape connectivity and facilitating dispersal (Gorecki 2020). It is considered highly improbable that Southern Myotis would be able to exploit these habitats without greater landscape connectivity to core riparian woodland habitat.

Sources of "near-permanent" water within the subject land are restricted to farm dams, and the Coleambally Outfall Drain. Dams are highly isolated, however some fragmented and ephemeral connectivity is likely to be provided along the Coleambally Outfall Drain to areas where the species has been recorded such as the Yanco Creek system. Further connectivity may be possible to areas of presumed areas of core habitat such as the vegetated riparian corridors of the Murrumbidgee / Edward / Murray Rivers.

Seasonal flooding events may increase the area of potential foraging habitat for Southern Myotis on occasion however, this would be on a temporary and transient basis, and their range would presumably retract again as flooding subsides. Given the limited availability of suitable roosting habitat in these vegetation types (such as Nitre-Goosefoot swamp), it is also unlikely that they would provide anything more than additional foraging habitat adjacent to core roosting areas, to be exploited under appropriate seasonal conditions rather than representing an opportunity for the species to expand its range or permanently occupy broader territory. These semi-permanent wetland systems are not consistent with identified habitat constraints in the TBDC of "waterbodies with permanent pools/stretches 3 m or wider" or the species need for breeding and roosting habitat surrounding such waterways. It is recognised that farm dams provide potential habitat for Southern Myotis, however the likelihood of this must be considered in the broader context of the landscape and the known behaviour and distribution of the species.

Calls of the Myotis/Nyctophilus species complex were recorded across the subject land, and as such the species' broader distribution and habitat requirements were assessed to determine the likelihood of calls in the species complex being those of Southern Myotis. It has been concluded that it is unlikely calls represent Southern Myotis being present. However, given the known occurrence of the species approximately 40 km to the east of the subject land within the Yanco Creek system, which could conservatively be considered occasionally connected to the subject land via the Coleambally Outfall Drain, it has been conservatively assessed that there may be a potential impact to the species. This potential for impact is considered to only be associated with the areas most likely to represent the species' habitat within the subject land. Those being the "near-permanent" Coleambally Outfall Drain, and a habitat polygon for the species has been developed in this location, which is further detailed in Section 4.3.3 below.

A complete description and justification for inclusion or exclusion 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 within the development corridor.

All candidate species credit species considered as part of this assessment, and their associated method of assessment, are listed in Table 27 and Table 28.

Threatened flora candidate species

Habitats for threatened flora species within the development corridor occurs across shrubland, woodland, wetland and grassland communities, including areas of DNG. Some areas of the subject land have been subject to a high and moderate degree of management, including cropping, clearing/thinning and grazing and are less likely to provide threatened flora habitat. This includes open areas of irrigated and dryland cropping, 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 ecological condition class and potential habitat for threatened flora.

Table 27 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 27 Candidate flora species credit species

Species name	Common name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Austrostipa wakoolica	A spear-grass	Discreet gilgai and depressions within 17- All zones 26 - All zones 28 - All zones	October – December	Moderate – 2
Brachyscome muelleroides	Claypan Daisy	45_mod_good 46_moderate	September – November	Very High – 3
Brachyscome papillosa	Mossgiel Daisy	13 – All zones 15- All zones 24_moderate (present in previous development corridor only) 45_mod_Good 46_moderate	September – November	High – 2
Convolvulus tedmoorei	Bindweed	General areas of grey soil, gilgai and depressions within 17 – All zones 24_moderate (present in previous development corridor only) 26 – All zones 45_mod_good 46_moderate	June – September	Very High – 3

Species name	Common name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Eucalyptus leucoxylon subsp. Pruinosa	Yellow Gum	13 – All zones 15 – All zones	All Year	High – 2
Leptorhynchos orientalis	Lanky Buttons	24_moderate 26 – All zones 45_mod_good 46_moderate	September – November	High – 2
Lepidium monoplocoides	Winged Peppercress	10_moderate 13 - All zones 24_moderate (present in previous development corridor only) 15 – All zones 26 – All zones	September – December	High – 2
Maireana cheelii	Chariot Wheels	26 – All zones	Maireana cheelii	High – 2
Pilularia novae-hollandiae	Austral Pillwort	Discreet gilgai and depressions within 13 - All zones 15 – All zones 17 – All zones 26 – All zones 45_mod_good 46_moderate	October – December	Very High – 3
Sclerolaena napiformis	Turnip Copperburr	26 – All zones 46_Moderate	September – November	High – 2
Swainsona plagiotropis	Red Darling Pea	26 – All zones 45_Mod_Good 46_Moderate	September	High – 2
Swainsona murrayana	Slender Darling Pea	15- All zones 26 – All zones 28 – All zones 45_mod_good 46_moderate	September	High – 2
Swainsona sericea	Silky Swainsona-pea	15- All zones 26 – All zones 28 – All zones 45_mod_good 46_moderate	September – November	High – 2

Threatened fauna candidate species

Fauna habitat assessments were 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. Table 28 provides a list of candidate fauna species credit species considered in this assessment within the subject land, each species' required survey period and the relevant method of assessment.

Table 28 Candidate fauna species credit species

Common name	Species name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Australian Bustard	*Ardeotis australis*	13 – All zones 15 – All zones 26 – All zones 45_Mod_Good 46_Moderate	All year	High – 2
Barking Owl	*Ninox connivens*	10 – All zones 13 – All zones 15 – All zones 28 – All zones	January – August	High – 2
Bush Stone-curlew	*Burhinus grallarius*	10 – All zones 13 – All zones 15 – All zones 26_Intact 28 – All zones	All year	High – 2
Grey Snake	*Hemiaspis damelii*	10 – All zones 13 – All zones 15 – All zones 17 – All zones	October - February	High – 2
Little Eagle (Breeding)	*Hieraaetus morphnoides*	10 – All zones 13 – All zones 15 – All zones 26 – Intact and sparse 28 – All zones	August – October	Moderate – 1.5
Major Mitchell's Cockatoo (Breeding)	*Lophochroa leadbeateri*	10 – All zones 13 – All zones 15 – All zones 26 – Intact and sparse	September – December	High – 2
Masked Owl	*Tyto novaehollandiae*	10 – All zones 13 – All zones 15 – All zones 28 – All zones	January – August	High – 2

Common name	Species name	PCT/Zone	Survey period	Sensitivity to gain/Biodiversity Risk weighting
Plains Wanderer	*Pedionomus torquatus*	26_DNG 46_Moderate	All year (important mapped areas)	Very High – 3
Southern Bell Frog	*Litoria raniformis*	10 – All zones 13 – All zones 15 – All zones 17 – All zones 26_DNG	October – January	High – 2
Southern Myotis*	*Myotis macropus*	10 – All zones 13 – All zones 15 – All zones	October – March	High – 2
Square-tailed Kite (Breeding)	*Lophoictinia isura*	10 – All zones 13 – All zones 15 – All zones 26 – Intact and sparse 28 – All zones	September – January	Moderate – 1.5
Superb Parrot (Breeding)	*Polytelis swainsonii*	10 – All zones 13 – All zones 15 – All zones 26 – Intact and sparse 28 – All zones	September – November	High – 2
White-bellied Sea-Eagle (Breeding)	*Haliaeetus leucogaster*	10 – All zones 13 – All zones 15 – All zones	July – December	High – 2

4.3.1. Threatened species survey details

Targeted threatened species surveys of the subject land were undertaken by Biosis between August 2022 and November 2024. Weather observations where available for each survey date are shown in Table 29.

Table 29 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	

Survey undertaken	Survey date	Temperature (°C)		Rain (mm)	Rain preceding month (mm)
		Min.	Max.		
BBUS Winter 1					
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 **BBUS Spring 1**	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 **Litoria surveys**	29 January 2023	21.8	24.4	0	72..2
	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	
BAM Plots, targeted flora surveys, hollow bearing trees **BBUS Summer 1**	13 February 2023	10.4	30.2	0	32.6
	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	
BBUS Autumn 1	9 May 2023	4.3	17.8	0.2	8
	10 May 2023	3.9	17.2	0	
	11 May 2023	0.6	19.5	0	

Survey undertaken	Survey date	Temperature (°C)		Rain (mm)	Rain preceding month (mm)
		Min.	Max.		
	12 May 2023	2.0	20.7	0	
	13 May 2023	4.9	21.6	0	
BAM Plots vegetation mapping additional areas	14 June 2023	5.6	14.1	0.8	15.2
BBUS Winter 2	25 July 2023	0.2	15.4	0.2	24.1
	26 July 2023	-0.8.	11.7	0.2	
	27 July 2023	2.2	20.3	0	
	28 July 2023	4.2	20.0	2.4	
	29 July 2023	4.7	19.1	0.4	
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	
BBUS Spring 2	16 October 2023	10.8	18.2	1.0	78.1
	17 October 2023	3.5	20.8	0	
	18 October 2023	6.7	24.1	0	
	19 October 2023	10.8	28.6	0	
	20 October 2023	12.1	30.9	0	
Targeted flora and fauna surveys	19 November 2023	9.1	33.9	0	14.6
	20 November 2023	16.0	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	
Targeted fauna surveys – Litoria	15 January 2024	19	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	
BBUS Summer 2	22 January 2024	11.3	29.5	0	67.3
	23 January 2024	10.5	35.1	0	
	24 January 2024	21.0	35.4	0	
	25 January 2024	23.8	30.8	0	

Survey undertaken	Survey date	Temperature (°C)		Rain (mm)	Rain preceding month (mm)
		Min.	Max.		
BBUS Autum 2	13 March 2024	20.5	33.5	0	0.6
	14 March 2024	18.2	25.4	0	
	15 March 2024	16.6	31.7	0	
	16 March 2024	18.6	28.8	0	
	17 March 2024	15.9	29.4	0	
Owls and Curlew and microbats (BBUS)	22 July 2024	7.1	18.4	0	22
	23 July 2024	5.4	19.2	0	
	24 July 2024	3.6	17.1	0	
	25 July 2024	7.5	15.1	0	
	26 July 2024	2.4	17.0	0.8	
	27 July 2024	5.0	15.8	0.2	
Targeted Flora survey	16 September 2024	-1.4	18.1	0	19
	17 September 2024	1.1	19.7	0	
	18 September 2024	3.8	24.7	0	
	19 September 2024	5.6	20.0	0	
	20 September 2024	50.0	19.0	0	
Targeted fauna surveys – nests, Hollows, Pink Cockatoo and Bustard	28 October 2024	9.7	25.3	0	7.7
	29 October 2024	7.4	27.1	0	
	30 October 2024	7.6	28.7	0	
	31 October 2024	11.0	25.3	0	
Targeted Flora survey	18 November 2024	9.9	25.6	0.2	9.2
	19 November 2024	7.6	27.3	0	
	20 November 2024	7.7	30.5	0	
	21 November 2024	12.9	36.1	0	
	22 November 2024	18.2	37.3	0	
Targeted Flora survey	30 June 2025	1.8	13.3	0	50.6 (79 in preceding 3 months)
	1 July 2025	0.6	14.1	0	
	2 July 2025	4.5	14.9	0	
	3 July 2025	4.6	15.5	0	

Information from the Australia Government Bureau of Meteorology website.

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

Threatened flora

Targeted threatened flora surveys, undertaken by experienced Biosis ecologists (Table 30) on the dates listed in above in Table 29, were completed generally in accordance with the required BAM survey guideline, *Surveying threatened plants and their habitats* (DPIE 2020b). Feedback received from BCS during consultation for both the Dinawan wind and solar projects was also considered and implemented where as much as possible. Targeted threatened flora surveys were undertaken across the development corridor, focussing on the areas of the development footprint that support potential threatened flora habitat as much as possible. Areas excluded from survey included areas where the understorey was substantially depauperate due to being subject to ongoing grazing, areas with significantly high weed species ingress, and areas disturbed by tracks, dams, erosions, farm infrastructure and other associated vectors substantially impacting upon the soil profile.

Surveys were primarily undertaken via implementing a grid-based systematic approach based on the approach prescribed for in *Surveying threatened plants and their habitats* (DPIE 2020b), with parallel field traverses also utilised between grid survey points, and in areas where habitats and potential impacts were more linear or localised in nature and where microhabitats for some species occur.

Furthermore, slow driving vehicle-based transects were employed to target (and successfully record) flowering *Swainsona spp* across the development corridor, however, have been discounted from survey effort.

Survey method and effort

The BAM survey guideline, *Surveying threatened plants and their habitats* (DPIE 2020b) allows for implementation of a grid-based systematic approach when areas of suitable habitat greater than 50 hectares are required to be surveyed. This method requires a 100 square metre grid to be placed over the survey area, and at each grid intersect point, a 40 metre diameter area is surveyed for each target species.

Due to the very large size and the various reiterations of the development footprint and development corridor (approximately 943 hectares of native vegetation and potential habitat within the amended development footprint alone), and thus the area of suitable habitat requiring survey, as well as the consistent and uniform cover of native vegetation and habitats, a variation to the standard BAM method was applied. The intention of the varied survey effort employed was to achieve a level of survey that responds to the scale of the development footprint and suitable habitat requiring survey, reflects the relatively uniform, largely homogenous and repeated vegetation patterns that occur throughout the subject land (including the slight mosaic microrelief variation that occurs on occasion), as well as the land use history, whilst remaining scientifically robust and repeatable. The varied survey method still employed 100 metre grids within the development corridor, however due to the large number required, selected points surveyed were undertaken across as many representative PCT and conditions as possible, within the areas of highest potential for species being present, as well as where known infrastructure would occur at the time of survey, such as WTG locations, injunction with transects in between grids.

Added complexities to targeted flora survey were due to fluid design changes, predominantly due to efficiencies in road design and transmission requirements, and wet weather in spring 2022 which impeded access, but also as a result of survey results and application of the avoid and minimise principles as a result of biodiversity findings, and other environmental constraints (i.e. heritage). This meant that some survey grids and transects conducted in 2022 are now outside of the development corridor. None the less, due to the homogenous nature of the PCT condition types within the development corridor and subject land, the results of these grid searches remain relevant.

Grid-based targeted surveys were implemented as follows:

- A grid spaced at 100 square metres was placed over the development footprint using GIS to locate the survey locations at each grid intersect point, which were accessed by GIS tablet computers in the field.
- Experienced botanist staff members then undertook detailed surveys at each of the survey locations by pacing out 40 m by 40 m square, crossing-over at the grid intersect point.
- This 40 m square was surveyed by walking 5 – 10 m wide parallel transects to ensure a high level of coverage within each survey location.
- When a target threatened species was located, finer scale surveys were used to "locate population extent, to help define the species polygon" in accordance with the two-phase grid-based systematic survey approach for large areas (DPIE 2020b).
- Further 10 m wide transect searches were completed when walking between grid points to increase survey coverage.

Survey progress was captured using handheld GPS units, and ArcGIS Tracker enabled on field staff mobile phones or tablet computers, to geospatially log transects walked throughout the targeted threatened species surveys. Spatial locations of all threatened species recorded were captured by either hand-held GPS units, mobile tablet computers running Collector for ArcGIS (both with accuracy of generally ± 5 metres).

Combining the number of grids undertaken in each corresponding survey month, as well as BAM plots and walking transect, demonstrates that the survey effort of what would be required by implementing grid searches only in the development footprint has been met or exceeded in many instances. Although the systematic grid survey was applied for targeted flora species in conjunction with flora transects in smaller habitats, a high degree of spatial representation across all homogeneous habitats and areas of microhabitats was still achieved, however survey gaps are still present. This meant however that locating areas of assumed presence polygons spatially was challenging. The following methods and results were employed to demonstrate survey gaps and areas of assumed presence, and where further targeted survey will be undertaken in September and November 2025. Where shortfalls occur in survey coverage, species have been assumed present within each relevant zone, with the whole vegetation zone included. A commitment to undertake further surveys in September and November 2025 has been made within areas where presence has been assumed, and gaps in spatial coverage of larger zones apply. This would also allow for further design revision and more accurate development footprint and staging design, reducing survey area and, more importantly, potential impacts. Methods were as follows:

- The development footprint was divided into 100x100m grids.
- All grids points completed in September 2022 to September 2024 (3x survey periods) and November 2022-2024 (3x survey periods) and July 2025, were overlayed within the 100x100m grid area.
- Completed grid points were buffered by 40m.
- Where a completed grid point had been undertaken and the 40m buffer was intersected with areas of impact, this grid square was deemed as surveyed.
- Where no grids or 40m buffer occurred as completed or intersect within a 100x100m grid, then this grid was deemed as not surveyed, and assumed presence was applied across the entire 100x100m grid.

The application of this approach detailed the following results across the development footprint

- A total of 374.83 hectares across all habitats of area for assumed presence.

- A total of 722.19 hectares across all habitats considered surveyed.

Furthermore, the girds were then intersected with the PCT and vegetation zones for the development footprint, in addition to the corresponding offset staging. A summary of species polygons is demonstrated in Table 31.

Two threatened flora species have been recorded, *Swainsona sericea* and *Swainsona murrayana*. These species were found to co-occur in small patches and as isolated individuals in PCT 26 DNG, on the redder soils where forb richness is slightly higher and presence of other native species, such as Bulbine Lily was observed (Photo 3). Scattered individuals were recorded in these areas. *Swainsona sericea* (estimated 1,324 individuals) and *Swainsona murrayana* (estimated 1,332 individuals) were recorded within the subject land, including those recorded within the adjacent solar farm area. Not all of these individuals would be directly impacted. 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 isolated individuals and small patches, totalling approximately 2.60 ha. This was determined by a 50m buffer around scattered individuals of both Swainsona species found (due to their similar habitats and often co-occurrence) as well as mapped extent of known populations, clipped to the development footprint.

Photo 3 (a) PCT 26 DNG with higher grass cover, less forb cover where threatened flora not found, **(b)** lower grass cover, higher forb cover, regenerating myall, where threatened *Swainsona* spp were found and **(c)** depressions and gilgai's targeted for *Pilularia novae-hollandiae* and *Austrostipa wakcoolica*.

Justification of survey method and effort and timing

Targeted flora surveys were varied but aligned to the methods prescribed in the BAM guidelines *Surveying threatened plants and their habitats* (DPIE 2020b) for large sites with >50 hectares of suitable habitat requiring survey. Surveys were completed during the targeted species' survey periods as detailed in BioNet, as well as when species were recorded on site outside these prescribed timeframes. Reference populations and known records in the broader locality were also checked for *Swainsona* species and *Leptorhynchos orientalis*. Other species such as *Maireana cheelii* and *Brachyscome* species were also known to be flowering at the time of survey from other nearby projects.

Survey personnel and relevant experience

Targeted flora surveys were undertaken by the Biosis ecologists listed in Table 30. At all times survey teams consisted of a minimum of one senior botanical specialist staff member, paired on occasion with a botanical specialist with less experience.

Table 30 Targeted flora survey personnel and relevant experience

Staff member	Role	Relevant experience
Mitchell Palmer	Manager – Ecology and GIS (NSW) BAM Accredited Assessor Principal Ecologist	Over 14 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.

Staff member	Role	Relevant experience
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	Three years' experience conducting threatened flora surveys within NSW and the Riverina region.
Kit King	Botanist	Three years' experience conducting threatened flora surveys within NSW.
Elise Keane	Senior Botanist	Eight years' experience conducting threatened flora surveys within NSW, particularly in the Riverina
Dimity Bambrick	Senior Ecologist	Six years' experience conducting threatened flora surveys within NSW, particularly in the Riverina
Dylan Mason	Botanist	Three years' 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 31 provides a summary of the results of the targeted flora surveys completed, survey effort and results are illustrated on Figure 11.

Table 31 Summary of targeted flora survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha or count within development footprint)
Austrostipa wakoolica	A spear-grass	• Within areas of potential habitat, parallel transects in areas <50 ha and grid based searches in areas >50 ha • November 2022 • November 2023 • November 2024	Not recorded during surveys to date.	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 17 mod_good – 0.06 ha • PCT 17 moderate – 1.23 ha • PCT 26 DNG – 6.59 ha • PCT 26 Intact – 0.35 ha • PCT 26 sparse – 8.19 ha
Pilularia novae-hollandiae	Austral Pillwort	• Within areas of potential habitat, parallel transects in areas <50ha and grid based searches in areas >50 ha • November 2022.	Not recorded during surveys to date.	Not detected in surveys undertaken to date Assumed present where survey shortfall occurs • PCT 13 moderate – 3.56 ha • PCT 13 thinned – 4.02 ha • PCT 15 moderate- 1.49 ha

Species name	Common name	Survey method	Survey results	Species Polygon (ha or count within development footprint)
		• November 2023 • November 2024		• PCT 15 thinned – 1.10 ha • PCT 26 DNG – 6.49 ha • PCT 26 Intact – 0.35 ha • PCT 26 sparse- 8.19 ha • PCT 45 mod_good – 0.27 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 45.26 ha • PCT 46 Intersection – 0.34 ha
Maireana cheelii	Chariot Wheels	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023 • September 2024 • November 2024	Not recorded during surveys to date.	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Brachyscome muelleroides	Claypan Daisy	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023 • September 2024 • November 2024	Not recorded during surveys to date.	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 45 mod_good – 0.05 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha

Species name	Common name	Survey method	Survey results	Species Polygon (ha or count within development footprint)
Brachyscome papillosa	Mossgiel Daisy	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023 • September 2024 • November 2024	Not recorded during surveys to date.	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 13 moderate – 2.94 ha • PCT 13 thinned – 3.69 ha • PCT 15 moderate- 1.12 ha • PCT 15 thinned – 1.07 ha • PCT 45 mod_good – 0.05 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Convolvulus tedmoorei	Bindweed	• Within areas of potential habitat, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • September 2023 • September 2024 • July 2025	Not recorded during surveys.	Not detected in surveys undertaken to date.
Leptorhynchos orientalis	Lanky Buttons	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023 • September 2024 • November 2024	Not recorded during surveys to date.	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha • PCT 45 mod_good – 0.05 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Swainsona sericea	Silky Swainsona-pea	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and	Recorded during surveys.	Detected during surveys • PCT 26 DNG – 0.45 ha • PCT 26 intact – 0.02 ha • PCT 26 sparse – 0.05 ha • PCT 46 moderate – 2.08 ha

Species name	Common name	Survey method	Survey results	Species Polygon (ha or count within development footprint)
		grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023 • September 2024 • November 2024		Assumed present where survey shortfall occurs: • PCT 15 moderate- 2.17 ha • PCT 15 thinned – 1.07 ha • PCT 26 DNG – 140.45 ha • PCT 26 Intact – 49.08 ha • PCT 26 sparse- 120.64 ha • PCT 28 low – 29.14 ha • PCT 28 moderate – 0.44 ha • PCT 45 mod_good – 0.10 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate - 47.09 ha PCT 46 Intersection – 0.34 ha
Swainsona murrayana	Slender Darling Pea	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • September 2023 • September 2024	Recorded during surveys.	Detected during surveys • PCT 26 DNG – 0.45 ha • PCT 26 intact – 0.02 ha • PCT 26 sparse – 0.05 ha • PCT 46 moderate – 2.08 ha Assumed present where survey shortfall occurs: • PCT 15 moderate- 2.17 ha • PCT 15 thinned – 1.07 ha • PCT 26 DNG – 140.45 ha • PCT 26 Intact – 49.08 ha • PCT 26 sparse-120.64 ha • PCT 28 low – 29.14 ha • PCT 28 moderate – 0.44 ha • PCT 45 mod_good – 0.10 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 47.09 ha • PCT 46 Intersection – 0.34 ha
Swainsona plagiotropis	Red Darling Pea	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • September 2023 • September 2024	Not recorded during surveys to date.	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 26 DNG – 140.45 ha • PCT 26 Intact – 49.08 ha • PCT 26 sparse- 120.64 ha PCT 45 mod_good – 0.10 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 47.09 ha • PCT 46 Intersection – 0.34 ha
Sclerolaena napiformis	Turnip Copperburr	• Within areas of potential habitat, a combination of	Not recorded during surveys to date.	Not detected in surveys undertaken to date.

Species name	Common name	Survey method	Survey results	Species Polygon (ha or count within development footprint)
		vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023 • September 2024 • November 2024		Assumed present where survey shortfall occurs: • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha PCT 45 mod_good – 0.10 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Lepidium monoplocoides	Winged Peppercress	• Within areas of potential habitat, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • November 2022 • September 2023 • November 2023 • September 2024 • November 2024	Not recorded during surveys to date. Further surveys required in November 2023	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 10 moderate – 0.14 ha • PCT 13 moderate – 2.94 ha • PCT 13 thinned – 3.50 ha • PCT 15 moderate- 1.49 ha • PCT 15 thinned – 1.12 ha • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha
Eucalyptus leucoxylon subsp. Pruinosa	Yellow Gum	• Within areas of potential habitat, a combination of vehicle based driving surveys, parallel transects in areas <50ha and grid based searches in areas >50 ha • September 2022 • February 2023. • September 2023 • September 2024 • November 2024	Not recorded during surveys.	Not detected in surveys undertaken to date.

Threatened fauna

Several habitat features with potential to support threatened species credit species were identified during habitat assessments. These features have been summarised in Table 32.

Table 32 Habitat features with potential to support threatened species credit species

Habitat feature	Presence within the development footprint
Hollow-bearing trees and fissures	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 to limit collision risk 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 threatened raptors species such as Little Eagle, Spotted Harrier and Square-tailed Kite. The subject land contains areas of mapped Important Area for Plains Wanderer, however these have largely 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.

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. A key focus was to map potential owl habitat and hollow bearing trees, and site infrastructure away from these areas as far as practicable. Additional, targeted survey was undertaken for Bush Stone-curlew, Barking Owl and Masked Owl in July 2024, primarily targeting the presence of large woody debris for Bush-stone Curlew, and larger tree hollows potentially suitable for owl breeding activity, which are sparsely located within the development corridor. Woodland patches supporting suitable woody debris and tree hollows were then selected for nocturnal call-playback and spotlighting surveys, with eight survey locations sampled, across 48 replicates.

Call playback and detection in suitable habitat for threatened owls, included a two-minute call playback period, followed by five-minute listening period, and two-minute spotlighting period (conducted twice per species), with an initial ten-minute listening period and two-minute spotlighting period before commencing; plus a final fifteen-minute listening and spotlighting period following the survey, searching within approximately 60 metre radius of the call playback location.

Although considered unlikely to occur in this region, this survey also was undertaken for Bush Stone-curlew. Call playback and detection in suitable habitat for Bush-stone Curlew, including a 30-second call playback, followed by four minutes and 30 seconds of listening (conducted three times per site per evening). The survey guidelines do not specify the number of replicate nights of survey recommended, however in this case, two to four nights of survey were undertaken per site to align with the owl surveys. Spotlighting through suitable habitat, and lushing of vegetation (opportunistically) for Bush Stone-curlew were also completed. Additional spotlight and driving transects were conducted in March and April 2023 across eight nights, with audio

detectors placed out between 29 March and 15 April, across 18 nights. Two Anabat swifts with acoustic microphones, and eight audiomoths were utilised during this period, as well as in November 2022.

No opportunistic records of owls or curlews 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 of habitat, and minimising impacts to buffers surrounding mapped important areas was a key focus, however some impacts do occur primarily as a result of site access, including adjacent to an existing public road (Goolgumbla Road). To supplement this, a combination of spotlighting, driving transects, and audio acoustic detection techniques was undertaken. Additional surveys for Plains Wanderer focused on identifying grasslands outside of NSW DCCEEW Mapped Important Areas that nonetheless contained similar structural characteristics to these areas. At the time of surveys (April 2023), limited areas of the grasslands observed were considered optimal within the development corridor, including the nearby Mapped Important Areas, where minimal areas contained optimal habitat structure as described in the *National Recovery Plan for the Plains-wanderer (Pedionomus torquatus)* (DoE 2016), the *Saving Our Species Plains-wanderer Habitat Management Guide* (DPIE 2020d), or more recent research by Nugent et al. (*2022 Multi-scale habitat selection by a cryptic, critically endangered grassland bird—The Plains-wanderer (Pedionomus torquatus): Implications for habitat management and conservation*. The additional survey focused on traversing areas within the development corridor where a dominant cover of *Rytidosperma caespitosum* tussocks, and perennial tussock grasses such as *Chloris truncata* and *Enteropogon acicularis* occur. Generally, grasslands throughout the development corridor were too dense and tall, likely as a result of above average rainfall conditions in the 12 months prior, dominated by species such *Walwhalleya proluta*. Preferred habitat is generally characterised as containing approximately 50 % bare ground, 10 % fallen litter, and 40 % grasses, herbs, and forbs, usually on hard red-brown loams (DPIE 2020). Grass tussocks are mostly shorter than five centimetres, with some patches of vegetation up to around 30 centimetres important for providing concealment. Inter-tussock space with bare earth and sparse litter is an important habitat component. Plains-wanderers are not likely to use habitat that is too dense with limited space between tussocks, actively avoid areas of dense grass, and their presence is negatively correlated with increased grass height (DoE 2016, DPIE 2020d). Open grassland structure is necessary to allow the birds to forage efficiently and to detect and avoid predators. It is possible though in more average years, density of grass cover will lower and due to the dynamic nature of grasslands in the Riverina, may provide habitat at times in future.

Justification of survey method and effort

The key focus was the implementation of avoidance and minimisation of impacts to suitable owl habitat during project design, by siting infrastructure >200m away from areas containing known or potential for, suitable hollow bearing trees. The survey effort is considered adequate and in line with recommended survey requirements within the TBDC.

Avoidance of important mapped areas for Plains Wanderer, in conjunction with detailed survey of other potential areas of habitat, was undertaken. A 300m No Go buffer was placed around the location of the Plains Wanderer individual.

Timing of survey

Survey was conducted in relation to requirements in the TBDC survey guidance (where relevant).

Survey personnel and relevant experience

Nocturnal bird surveys were undertaken by the Biosis ecologists outlined in Table 33, survey effort is illustrated on Figure 11.

Table 33 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 14 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	Seven years' experience conducting threatened fauna surveys within NSW.
Bret Stewart	Senior Zoologist (Technical Lead)	15 years' experience conducting threatened fauna surveys within NSW.
Rachel Moore	Zoologist	Four years' experience conducting threatened fauna surveys within NSW.
Joel Nicholson	Zoologist	Over five 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)	Three years' experience conducting threatened flora surveys within NSW. (Hollow bearing tree assessment)

Results

Table 34 provides a summary of the results of the nocturnal bird surveys completed. As a result of hollow bearing tree mapping within suitable habitat for threatened owls, numerous hollows were recorded, however due to the large areas and many trees containing hollows, not all were accounted for. However, like many of the hollow bearing trees noted within development corridor, 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 and on the odd occasion where suitable owl sized hollows were encountered, these were occupied by Galahs at the time of survey, and therefore not considered to be in use for any threatened owls.

Now Owls nor Bush Stone Curlew were recorded. One Plains Wanderer individual was incidentally recorded in October 2024 within PCT 26 DNG and PCT 46, and coincidently, in close proximity to important mapped areas.

Avoiding mapped important habitat and identified potential areas of Plains Wanderer habitat was a key focus of the assessment for Plains Wanderer, however some impacts do occur primarily as a result of site access, including adjacent to an existing public road (Goolgumbla Road).

Table 34 Summary of nocturnal bird survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) within development footprint
Tyto novaehollandiae	Masked Owl	• Habitat assessment and hollow bearing tree assessment • Supplementary acoustic detection	No evidence of Owl use within suitable habitat	N/A
Ninox connivens	Barking Owl	• Habitat assessment and hollow bearing tree assessment • Supplementary acoustic detection	No evidence of Owl use within suitable habitat	N/A
Pedionomus torquatus	Plains Wanderer	• Important mapped areas • Habitat mapping • Driving transects / spotlighting • Audio acoustic detection	Important mapped areas identified with some impacts Not recorded	2.38 ha of important mapped habitat
Burhinus grallarius	Bush Stone-curlew	• Driving transects / spotlighting • Audio acoustic detection	Not recorded	N/A

Diurnal birds and active nest/hollow searches

Survey method and effort

Seasonal bird utilisation surveys were undertaken to inform collision risk modelling (CRM) and therefore potential prescribed impacts, including the risk of collision with turbine blades. It was also used to inform the targeted species surveys for candidate species credit species.

Background research and data sources were reviewed to identify all protected bird species records within 50 kilometres of the development corridor. Information from relevant literature and incidental species sightings during other surveys were used to inform surveys. Bird utilisation survey (BUS) replicates were undertaken to focus on key species of concern and record data for all species including:

- All threatened species.
- Species which are rarely recorded.
- Species which exist naturally at relatively low densities.
- Waders.
- Larger birds such as raptors (eagles, hawks, kites) and waterbirds (herons, pelicans).
- Migratory birds.

A total of 26 fixed survey sites were established, including 16 impact sites and 10 control sites, consisting of 720 replicates in total. Of the total 26 points, 16 impact sites and four control sites, totalling 574 replicates across all seasons, were utilised in the CRM. The survey locations were selected to represent likely turbine

positions identified early in the project design and to obtain data at potential impact locations. They were distributed in different vegetation formations as a surrogate for habitat types. As the design developed, some turbine locations moved to avoid other environmental constraints, which resulted in modifications to the BUS design. Methodology and results of the CRM are discussed further in Section 6.

Over a 24 month (or two year) period, BUS was undertaken within the subject land in the seasons and dates outlined in Table 36 below to support the collision risk modelling, and to describe the avian fauna of the subject land.

Table 35 Summary of bird survey method and results

Year	Summer	Autumn	Winter	Spring
2022	-	-	1- 5 August	21- 25 November
2023	6 - 10 February	8 - 12 May	23 -27 July	16 - 20 October
2024	22 - 26 January	13 - 17 March	-	-

Surveys comprised fixed-point surveys, which comprised one observer stationed at each point for 20 minutes. Survey details including the date, start and end times, site location, weather conditions, and habitat features of interest were recorded during each survey. During surveys, all observations within 360 degrees and up to 3500 metres of the observer were recorded, including:

- Species observed taking flights.
- Count of individuals.
- Height of bird above ground when first detected, in 5 metre increments.
- Distance of bird from observer when first detected.
- Species behaviour, if relevant.
- Flight direction.
- Incidental bird observations were also recorded across the subject land.

Each fixed point was surveyed two to four times per survey, ideally a minimum of once each at three different times of day:

- Morning (6:00 AM to 10:59 AM).
- Mid-day (11:00 PM to 13:59 PM).
- Afternoon (2:00 PM to 6:00 PM).

This methodology aimed to capture seasonal and temporal changes, including migration and species behaviour.

The 26 fixed survey impact and control points and replicates obtained equates to a total of 720 replicates and around 14,400 minutes (or a total of 240 hours) of targeted diurnal bird surveys across multiple habitats, including 467 impact replicates and around 9,340 minutes (or nearly 156 hours) of targeted bird surveys.

The following draft height matrix was defined to classify bird height but will be subject to final turbine specifications for lower and upper blade tip height, and allows for nominal variations within the hub height:

- Below Rotor Swept Area (RSA): <61 metres above ground level.
- Within RSA: 61 to 239 metres above ground level.

- Above RSA: >239 metres above ground level.

The following bird guilds were used to categorise species:

- Raptors.
- Grassland, shrubland and ground-dwelling birds.
- Waterbirds, seabirds and other aquatic foragers.
- Woodland birds (including parrots and songbirds).
- Exotic birds (introduced species).

The above guilds were applied to the BUS results to identify birds of concern for future collision risk modelling.

Initial habitat mapping comprising assessment of tree-hollow densities suitable for parrot nest trees and large raptor nests was undertaken across the majority of woodland patches within the development corridor. In addition to BUS, opportunistic and targeted surveys as well as large stick nest and hollow bearing tree surveys were conducted in September 2022, February 2023, March 2023 and September 2023 and October 2024. Surveys consisted of transects, observing hollows for use and other evidence of breeding.

Targeted parrot surveys were then undertaken by a combination of area searches, point transects and slow driving transects, by two ecologists, and included:

- Observations of any signs of breeding, such as begging birds, any occupied nests/hollows and lone birds within the breeding season.
- Twenty-minute searches completed within woodland patches, dependent on vegetation and habitat distribution.
- A vehicle driven slowly with windows down through suitable habitat (woodland), in approximately 50 -100 m wide parallel transects, with denser areas inspected on foot.

When the target species were recorded, they were followed until they were observed at/in a hollow, or were unable to be followed further.

All known large stick nests within or surrounding the development corridor were visited in October 2024 to ascertain use and species occupancy. Whilst visiting known nests, large areas of wooded habitats were being concurrently surveyed for new nests and the general presence of the target species.

Justification of survey method and effort

Survey was undertaken in accordance with methodology outlined in the NSW *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004) and best practice for surveying wind farm developments.

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; or (c) an occupied nest.
- Survey for the presence of nest trees supporting large stick nests.

- 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).

In conjunction with the substantial BUS survey effort across multiple years and seasons, the survey methods and effort completed by Biosis are considered to fulfil this requirement.

Timing of survey

Seasonal replicate surveys across multiple years were completed, including 2022 that had above average rainfall and flooding events, meaning surveys were timed to provide the best opportunity to record all birds present and that may occur on occasion within the subject land. This includes sedentary or resident birds, migratory or nomadic birds, and also provides an opportunity to determine the presence of certain species during BAM/BioNet specified breeding season survey periods. Active nest searches and targeted hollow bearing tree use mapping was undertaken in October 2024.

Survey personnel and relevant experience

Diurnal bird surveys were undertaken by the Biosis ecologists outlined in Table 36.

Table 36 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	Seven 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)	Over 15 years' experience conducting threatened fauna surveys within NSW.
Aleksei Atkin	Principal Ecologist	Over 13 years' experience conducting threatened fauna surveys within NSW.
Rachel Moore	Zoologist	Four years' experience conducting threatened fauna surveys within NSW.
Emma Heath	Zoologist	One years' experience conducting threatened fauna surveys within NSW.
Zalia Payne	Zoologist	Three years' experience conducting threatened fauna surveys within NSW.
Joel Nicholson	Zoologist	Over five years' experience conducting threatened fauna surveys within NSW.

Results

Table 37 below provides a summary of the results of the diurnal bird surveys completed.

A total of 140 bird species were recorded within the subject land, including 110 species recorded during BUS and 30 additional bird species recorded as incidental observations, outside of BUS. The total list of species is provided in Appendix 4. The number of species varied across seasons for bird utilisation and incidental surveys with the highest diversity in spring (104 species recorded), closely followed by summer (98 species recorded) and autumn (88 species recorded), with the lowest diversity in winter (70 species recorded).

The only candidate species credit species recorded were Superb Parrots (Photo 4). Superb Parrots were recorded regularly during BUS surveys, particularly foraging within PCT 26 intact vegetation, more frequently along roadside corridors of McLennons Bore Road and Carrathool Road, but also sporadically within the development corridor. 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 generally tend to remain within or near their 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.

Wedge-tailed Eagles (Photo 4), and other more common raptors, were a common sighting, and numerous medium to large, active and non-active stick nests were observed, predominantly in White Cypress Pine and Black box vegetation, but also on existing large transmission line towers.

Numerous ecosystem credit species were also recorded. These included Southern Whiteface, Dusky Woodswallow, White-fronted Chat, Grey-crowned Babblers, Painted Honeyeaters, Spotted Harrier and Black Falcon. The Black Falcon and Grey-crowned Babblers were observed to be nesting within the subject land, and other species presumed to be as well.

Photo 4 (a) Wedge-tailed Eagle perched on transmission line adjacent to PCT 28, **(b)** Superb Parrot adult male within canopy of PCT 26. Further information on CRM and results of bird utilisation can be found in Section 6.

Table 37 Summary of diurnal bird survey method and results

Species Name	Common name	Survey method	Survey results	Species polygon (ha) within development footprint
Ardeotis australis	Australian Bustard	Surveys throughout the development corridor in September 2022, March and April 2023, October 2024	This species was not observed during multiple surveys.	N/A
Hieraaetus morphnoides	Little Eagle (Breeding)	Targeted nest surveys in September 2022, September 2023, October 2024 Bird utilisation surveys	This species was not observed during multiple surveys across eight seasons across two years. Large nests detected but in use by Wedge-tailed Eagles.	N/A
Lophochroa leadbeateri	Major Mitchell's Cockatoo (Breeding)	Hollow bearing tree surveys in September 2022, September 2023. October 2024 General diurnal bird surveys Bird utilisation surveys Opportunistic surveys	This species was not observed during multiple surveys across eight seasons across two years.	N/A
Lophoictinia isura	Square-tailed Kite (Breeding)	Targeted nest surveys in September 2022, September 2023 and October 2024 Bird utilisation surveys	This species was observed incidentally foraging on one occasion in December 2024. Large nests detected but in use by Wedge-tailed Eagles.	N/A
Polytelis swainsonii	Superb Parrot (Breeding)	Hollow bearing tree surveys in September 2022, September 2023, October 2024 General diurnal bird surveys Bird utilisation surveys Opportunistic surveys	This species was detected throughout BUS surveys across multiple seasons. Although not observed breeding within the development corridor, it must be assumed due to the presence of paired individuals and juveniles, that breeding is occurring within the subject land. This is expected within the Riverina locality where	100m buffer of associated PCTs within the development corridor with potential HBTs PCT 10 moderate – 0.19 ha PCT 13 moderate – 3.56ha PCT 13 thinned – 7.88 ha PCT 15 moderate – 2.54 ha PCT 15 thinned – 1.10 ha

Species Name	Common name	Survey method	Survey results	Species polygon (ha) within development footprint
			suitable habitat for superb parrots breeding occurs, particularly along river corridors and in woodland patches, more so where River Red Gums are prevalent.	PCT 17 moderate – 0.21 ha PCT 26 DNG – 8.39 ha PCT 26 intact – 1.56 ha PCT sparse – 7.54 ha PCT 28 low – 0.10 ha PCT 28 moderate – 0.04 ha PCT 45 mod_good – 0.15 ha PCT 46 moderate – 2.74 ha PCT 160 moderate – 0.01 ha
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	Targeted nest surveys in September 2022, September 2023 and October 2024 Bird utilisation surveys	This species was not observed during multiple surveys across eight seasons across two years. Large nests detected but in use by Wedge-tailed Eagles, and where nests detected, not optimal for use by White-bellied Sea-Eagle.	N/A

Amphibians – Southern Bell Frog

Survey method, effort and timing

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 March 2023 during targeted surveys for other nocturnal species. Suitable habitat included seasonally inundated wet areas, farm dams, drainage lines and overflows where grasses, sedges and rushes were present amongst shallow, still water, as well as areas surrounding irrigated cropping areas. It is likely survey results are an indication of 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.

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 channels and farm dams. Surveys undertaken in January 2024 targeted areas of more permanent water in the subject land such as farm dams, irrigated cropping areas and channels.

Survey personnel and relevant experience

Amphibian surveys were undertaken by the Biosis ecologists outlined in Table 38

Table 38 Amphibian survey personnel and relevant experience

Staff member	Role	Relevant experience
Mitch Palmer	Manager – Ecology and GIS (NSW) BAM Accredited Assessor Principal Ecologist	Over 14 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 14 years' experience conducting threatened fauna surveys within NSW.
Bret Stewart	Senior Zoologist (Technical Lead)	15 years' experience conducting threatened fauna surveys within NSW.
Tara Lillicot	Zoologist	Two years' experience conducting threatened fauna surveys within NSW.

Results

Numerous Southern Bell Frog *Litoria raniformis* were detected within the subject land in April, September and November 2023 and January 2024 (Photo 5). 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.

Photo 5 *Litoria raniformis* adjacent to Coleambally Outfall Drain

Table 39 Summary of amphibian 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 11.	This species was observed throughout the Coleambally outfall drain and farm dams and fringing areas of PCT 26 DNG within the subject land.	200m buffer of habitat and associated PCTs in accordance with relevant guidelines. • PCT 13 moderate – 0.55 ha • PCT 13 thinned – 2.00 ha • PCT 15 thinned – 1.07 ha • PCT 17 mod_good – 0.49 ha • PCT 26 DNG – 28.09 ha • PCT 26 intact – 7.98 ha • PCT 26 sparse – 29.73 ha • PCT 28 Low – 0.77 ha • PCT 45 intersection– 0.64 ha • PCT 46 moderate – 9.54 ha • PCT 46 Intersection – 0.34 • PCT 160 mod_good – 1.48 ha

Reptiles – Grey Snake

Survey method, effort and timing

The project will assume presence of Grey Snake due to the late inclusion of the species as a Species Credit Species, approximately 15 months after the project's SEARS were issued. The Applicant proposes to either produce an Expert Report or progress further surveys to revise and more accurately describe impact to the species as part of post-approval survey.

An Assumed Presence habitat polygon has been developed for Grey Snake, the details of which are provided in Table 40.

Table 40 Summary of reptile survey method and results

Species name	Common name	Survey method	Survey results	Species Polygon (ha) or count
Hemiaspis damelii	Grey Snake	N/A	Assumed present	Associated PCTs in accordance with relevant guidelines. • PCT 10 moderate – 0.19 ha • PCT 13 moderate – 3.56 ha • PCT 13 thinned – 7.88 ha • PCT 15 moderate – 2.54 ha • PCT 15 thinned – 1.10 ha • PCT 17 mod_good – 0.76 ha • PCT 17 moderate – 1.27 ha • PCT 160 mod_good – 4.97ha

Microbats

Survey method, effort and timing

Microbat surveys were undertaken across the subject land as part of BBUS. Survey effort and results have been combined between those collected within and outside the subject land, such as impact and control sites, to allow for an assessment of the microbat fauna that may utilise the habitats across the site.

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.

Units were located 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. The majority of detectors were installed at ground or canopy level. Two Meteorological Masts (Met Masts) were sampled during each survey period commencing from summer 2023. The first Met Mast installed at the eastern side of the site (MME_DIN01), within the stage 1 area, had a detector

mounted to a pulley system approximately 70 metres high in each of summer 2023 and summer 2024, autumn 2023 and 2024, winter 2023 and 2024, and spring 2023 and 2024. In summer, autumn and winter 2024, a unit was also mounted to the second and more recently installed Met Mast (MMW_DIN02) in the site's west, in the stage 2 area. Each Met Mast also had a second detector placed at ground level, for direct comparison with data collected at height (photo 6).

In total across two years and eight seasons, 259 detector nights were undertaken as shown in Table 41.

No reference calls were collected during the survey. Call identification was assisted by the following resources:

- Bat calls of NSW (Pennay, Law, & Reinhold 2004) including sample call files downloaded from https://www.environment.nsw.gov.au/topics/animals-and-plants/surveys-monitoring-and-records/bat-calls-of-nsw
- Key to the bat calls of south-east Queensland and north-east New South Wales (Reinhold et al. 2001)
- Unpublished course materials from the Advanced Bat Call Analysis Workshop (May 2023) – Titley Scientific and Balance! Environmental (Greg Ford and Julie Broken-Brow).

Species nomenclature used in this report follows the Australian Faunal Directory (ABRS 2022) unless otherwise stated. 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).

Table 41 Survey effort per season

Season	Date deployed	Date retrieved	Number of detectors	Detector model	Detector nights
Spring	20-21/11/2022	25/11/2022	10	5 x Anabat Express FS 5 x Anabat Swift	35
Summer	6/2/2023	8-15/2/2023	11	3 x SM4 6 x Anabat Express FS 2 x Anabat Swift	40
Autumn	8/5/2023	10-12/5/2023	10	5 x Anabat Express 4 x Anabat Swift	33
Winter	24/7/2023	28/7/2023	12	4 x Anabat Express 8 x Anabat Swift	43
Spring	15/10/2023	19/10/2023	12	3 x Anabat Express 9 x Anabat Swift	44
Summer	15/1/2024	23/1/2024	4	4 x Anabat Express	19

Season	Date deployed	Date retrieved	Number of detectors	Detector model	Detector nights
Autumn	11/3/2024	16/3/2024	8	7 x Anabat Chorus 1 x Anabat Swift	27
Winter	22/07/2024	27/02/2024	4	4x Anabat Swift	18
TOTAL					**259**

Photo 6 Installed detector on stage 1 Met Mast and example of detector set up within PCT 26 DNG and adjacent PCT 13

Survey personnel and relevant experience

Deployment of detectors was undertaken concurrently with bird utilisation surveys and nocturnal surveys, by Biosis Zoologists with suitable experience in using and deploying ultrasonic bat detectors. Call analysis was undertaken by Felicity Williams. Felicity is experienced in ultrasonic call analysis having used it to complete her Honours thesis titled "*The influence of fire on the foraging activity of insectivorous bats in the Victorian Mallee*" in 2009 under the supervision of Lindy Lumsden (Arthur Rylah Institute for Environmental Research, Victorian Government Department of Land, Environment, Water and Planning). Felicity has over eight years' experience using ultrasonic call detection and analysis for impact assessments on microbats in both Victoria and NSW. A subset of calls for each species identified was sent to an independent bat expert for verification. Positive identifications presented in this assessment were confirmed by Dr Lisa Cawthen.

Table 42 Targeted microbat survey personnel and relevant experience

Staff member	Role	Relevant experience
Felicity Williams	Senior Zoologist – Bat Ecology	Over eight years' experience in bat call data analysis.
Mitch Palmer	Manager – Ecology and GIS (NSW) BAM Accredited Assessor Principal Ecologist	Over 14 years' experience and key expertise in the identification of native flora, vegetation communities and avifauna species throughout NSW, including conducting flora and

Staff member	Role	Relevant experience
		fauna surveys within the Riverina region.
Aleksei Atkin	Senior Zoologist	Over 14 years' experience undertaking diurnal bird surveys in NSW.
Dr Caragh Heenan	Senior Zoologist – Major Projects (Zoology)	Over five years' experience undertaking bat surveys in NSW and 17 years' experience undertaking flora and fauna surveys across South Australia and Northern Territory.
Emma Heath	Zoologist	Over one year of experience undertaking bat surveys in NSW.
Joel Nicholson	Zoologist	Over five years' experience undertaking bat surveys in NSW.

Results

Data was viewed using Anabat Insight (version 2.0.9, licensed), 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 at the site. Species identification was guided by the probability of occurrence at the site based on distribution, database records obtained from NSW BioNet and known habitat values at each detector point and across the site 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 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. 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 recorded 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. Due to variability in the quality of calls and difficulty in distinguishing some species, a conservative approach was taken when analysing calls and assigning an identification. The identification of each call was assigned a confidence rating (Duffy et al. 2000) as summarized in Table 43.

A total of 142,044 files were recorded over 259 detector nights seasonally from spring 2022 to Winter 2024. Of these, 78,861 were discarded by the allbats filter and 5,716 contained less than 5 pulses and were not used in further analysis. This resulted in 56,996 files deemed to be valid bat calls of which 20,798 were manually reviewed during data analysis (equating to 36% of total valid passes).

Fourteen species were positively identified (Almost Certain or Probable) of the 18 species that are known or predicted to occur within the subject land (Australasian Bat Society 2022). Up to four additional species may also have been recorded however reliable identification to species level was not possible due to similarity of call characteristics between species.

Table 43 Call identification confidence ratings

Identification	Description
C – Almost certain	Diagnostic call characteristics present, consistent with descriptions in reference material and / or reference calls.
PR - Probable	Highly likely the call represents a particular species, but call lacks enough detail (e.g. call quality) to be definite or similarities with other species of similar call type or frequency limits identification certainty and/or there is a limited number of sequences to be confident in species presence.
SG – Species Group	Call characteristics (e.g frequency, shape) are indicative of a number of species and call lacks sufficient detail (e.g. call quality, diagnostic features) that would allow identification to species level.
X – Not Detected	Of the data analysed, no calls were attributable to this species.

Table 44 Summary of microbat survey method and results

Species name	Common name	BC Act status	EPBC Act status	Identification
Austronomus australis	White-striped Free-tailed Bat	-	-	C
Chalinolobus gouldii	Gould's Wattled Bat	-	-	C
Chalinolobus morio	Chocolate Wattled Bat	-	-	C
Chalinolobus picatus*	Little Pied bat	V	-	PR
Myotis macropus	Southern Myotis	V	-	SG
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	SG
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	SG
Nyctophilus gouldi	Gould's Long-eared Bat	-	-	SG
Ozimops petersi	Inland Free-tailed Bat	-	-	C
Ozimops planiceps	South-eastern Free-tailed Bat	-	-	C
Ozimops ridei	Ride's Free-tailed Bat	-	-	C
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	C

Species name	Common name	BC Act status	EPBC Act status	Identification
Scotorepens balstoni	Inland Broad-nosed Bat	-	-	C
Scotorepens greyii	Little Broad-nosed Bat	-	-	C
Vespadelus baverstocki*	Inland Forest bat	V	-	PR
Vespadelus darlingtoni	Large Forest Bat	-	-	PR
Vespadelus regulus	Southern Forest Bat	-	-	PR
Vespadelus vulturnus	Little Forest Bat	-	-	C

* The study area occurs at the edge of the current accepted distribution range of these species. A small number of possible calls for each of these species were found during call analysis however, their presence within the study area would need to be confirmed through trapping to be confident calls were attributable to these species

The only threatened species identified to species level with confidence was Yellow-bellied Sheathtail Bat. Reliable identification to species level of a further three species was not possible due to poor data quality, similarity of call characteristics between species and / or uncertainty surrounding distribution. These species include:

- Southern Myotis – Difficult to separate from those of Long-eared bats (Nyctophilus spp) in the absence of diagnostic features. Unlikely to be this species as discussed in Section 4.3.
- Corben's Long-eared bat - Calls of Corben's Long-eared Bat cannot be differentiated from those of Gould's Long-eared Bat or Lesser Long-eared Bat, and the species is therefore assumed to be present in areas where Long-eared Bat calls were recorded.
- Little Pied Bat - A small number of potential Little Pied Bat calls were recorded. Due to the low quality and small number of sequences, it was difficult to confirm the presence of this species through call analysis.

These species were identified as part of a species group and identification to species level cannot be confirmed from the ultrasonic analysis.

Limitations

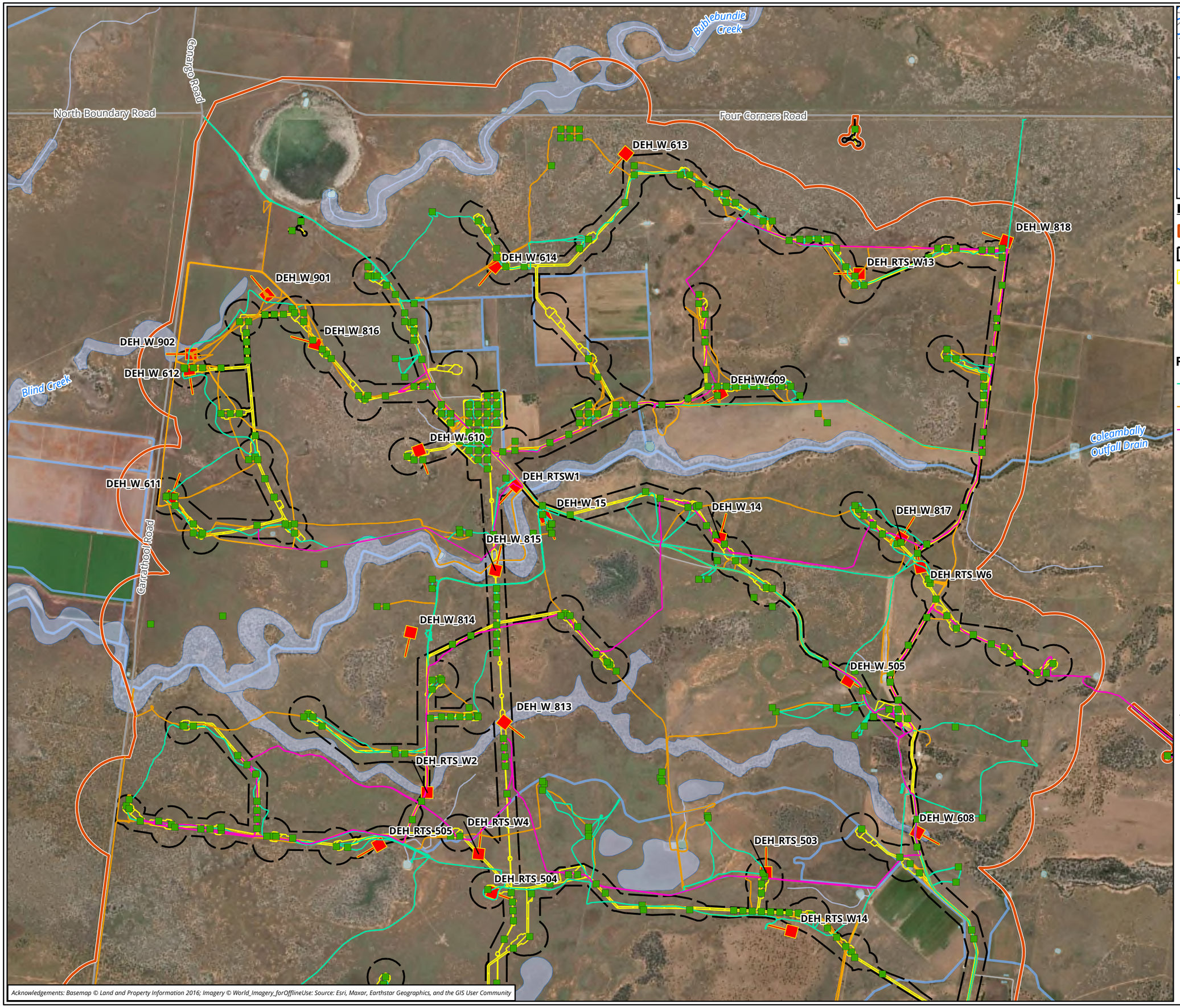
As well as species presence/ absence, bat activity was compared between seasons and habitats as part of site utilisation studies. As described above, not all species were identified to species level. Comparisons of bat activity was based on files assumed to be valid bat calls which included all sequences that passed the allbats filter, and contained more than 5 pulses. It is likely that at least some of these sequences are not actual bat calls (may be insects or noise) and it is also likely that some files that were not included as valid calls (such as containing not enough pulses) were actually bat calls. It is assumed that the error rate is consistent across all units and therefore, valid comparisons of activity can still be made.

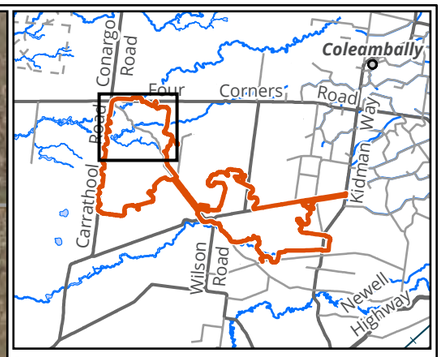
Ultrasonic sampling is associated with a number of limitations. Detectability of bats relates to the intensity of their calls, their flight characteristics and the structure of the surrounding vegetation, all of which influence the distance over which a bat can be detected. Differences in the probability of detection

may result in reduced likelihood of recording and therefore positively identifying some species as present within a site. A recorded call constitutes a measure of relative bat activity, but does not reflect species abundance. The number of calls provides a comparable index of activity to estimate the foraging selectivity of individual species between sampling sites. Manual call analysis is also associated with limitations including the sometimes arbitrary selection of useable calls and subjectivity of the observer. Definitions as to which calls are assigned to each species have been provided to improve the consistency at which calls were attributed to a species.

Wind speed and temperature data was collected at 50 metres and 70 metres at single location points across the subject land. This data may not be representative of actual wind and temperature experienced by bats that are recorded at each detector point, and therefore extrapolations of wind and bat activity across the site are limited.

Bat activity is discussed further in Section 6.





Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot
- Flora grid point

Flora survey tracks

- September
- November
- July

Figure 11A Targeted flora survey
Page 1

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Meters
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Coordinate System:
GDA2020 MGA Zone 55

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biosis

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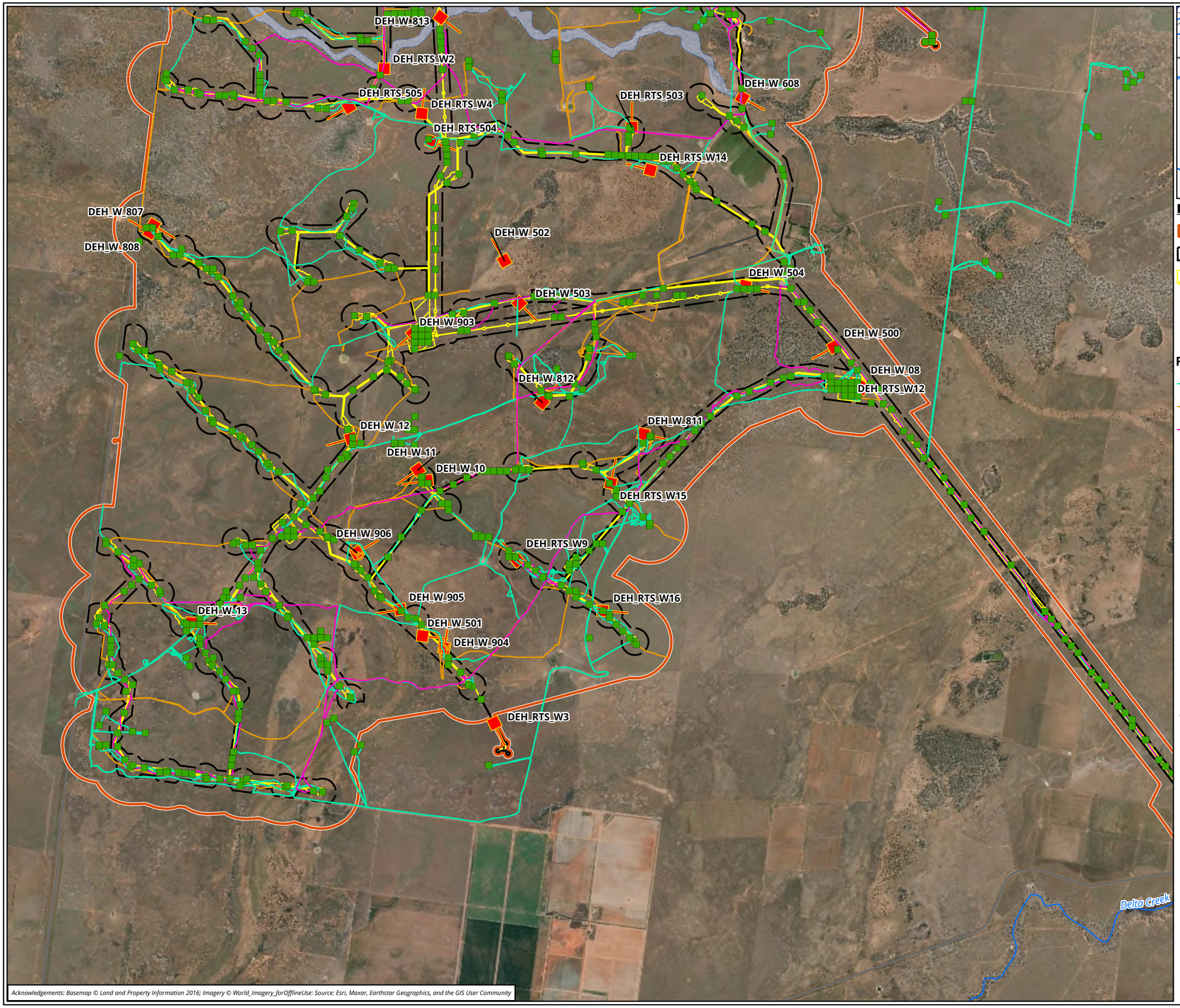

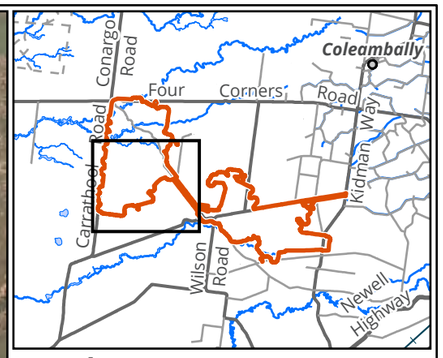

Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot
- Flora grid point

Flora survey tracks

- September
- November
- July

Figure 11A Targeted flora survey
Page 2

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Meters
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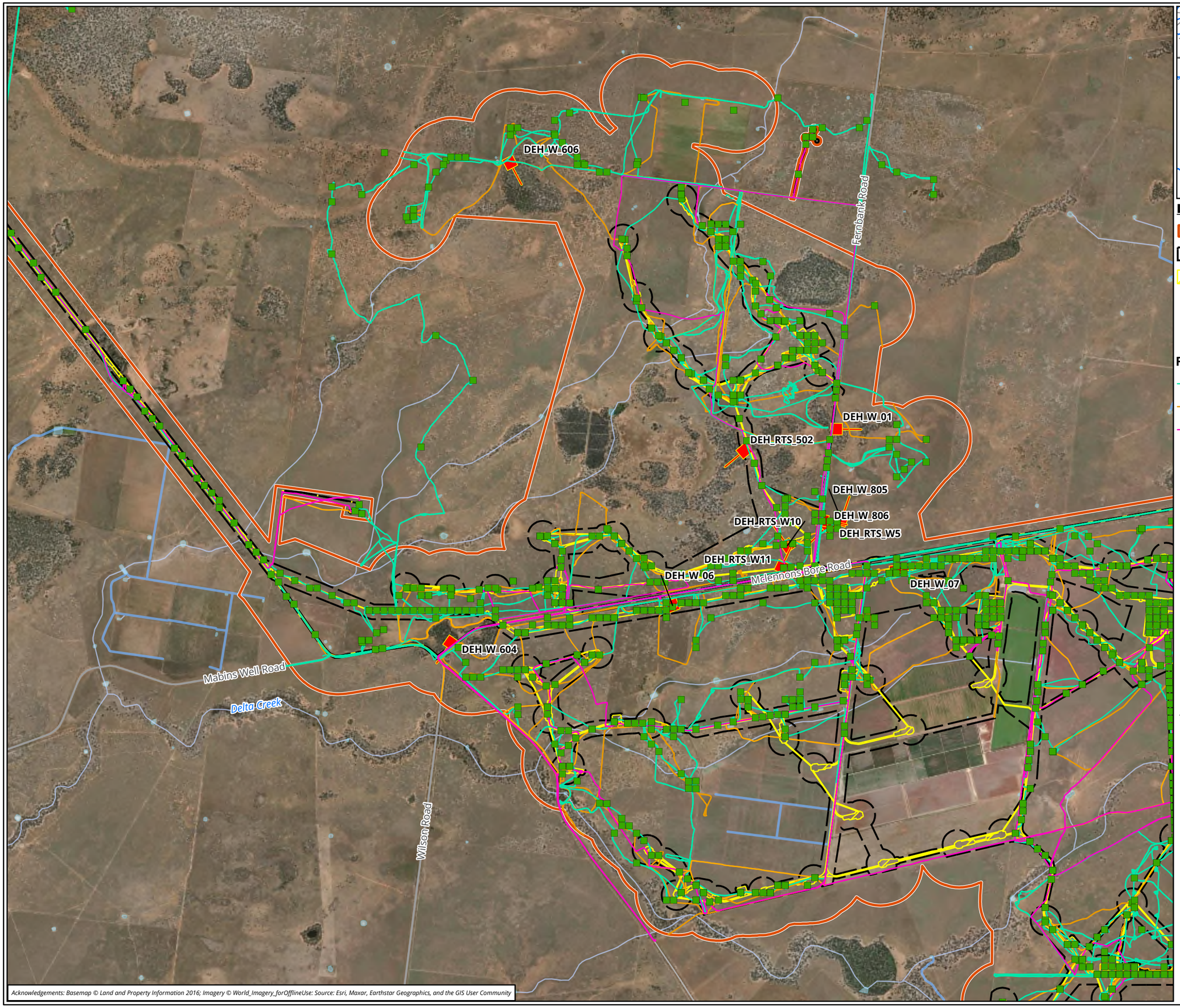

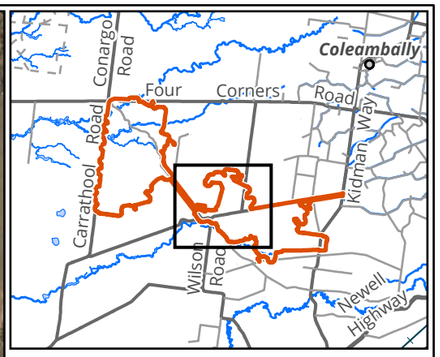

Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot
- Flora grid point

Flora survey tracks

- September
- November
- July

Figure 11A Targeted flora survey
Page 3

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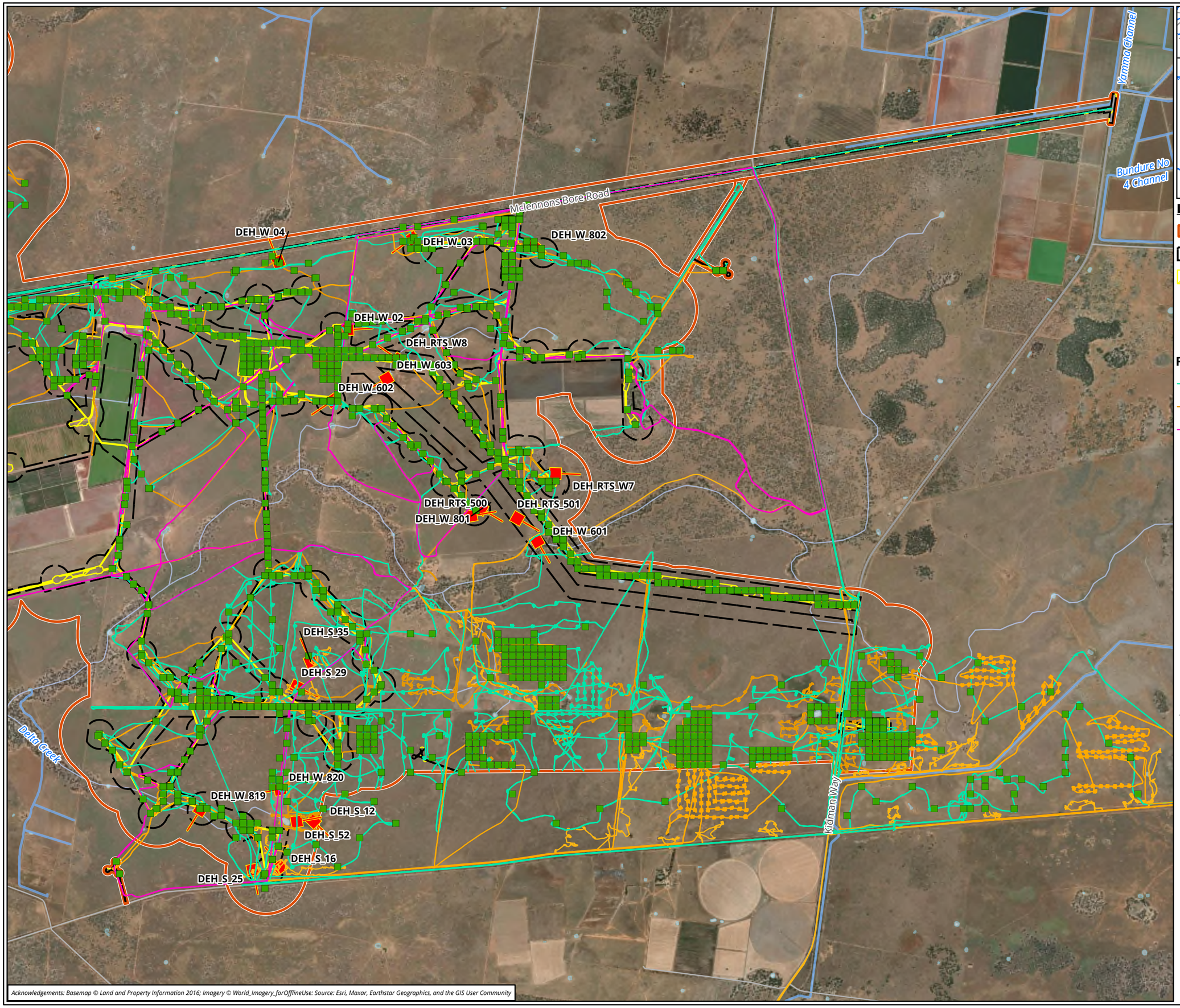

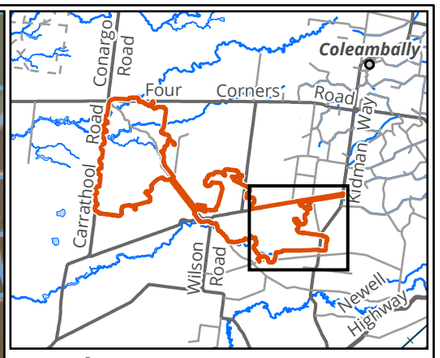

Legend

- Subject land
- Development corridor
- Development footprint
- BAM Plot
- Flora grid point

Flora survey tracks

- September
- November
- July

Figure 11A Targeted flora survey
Page 4

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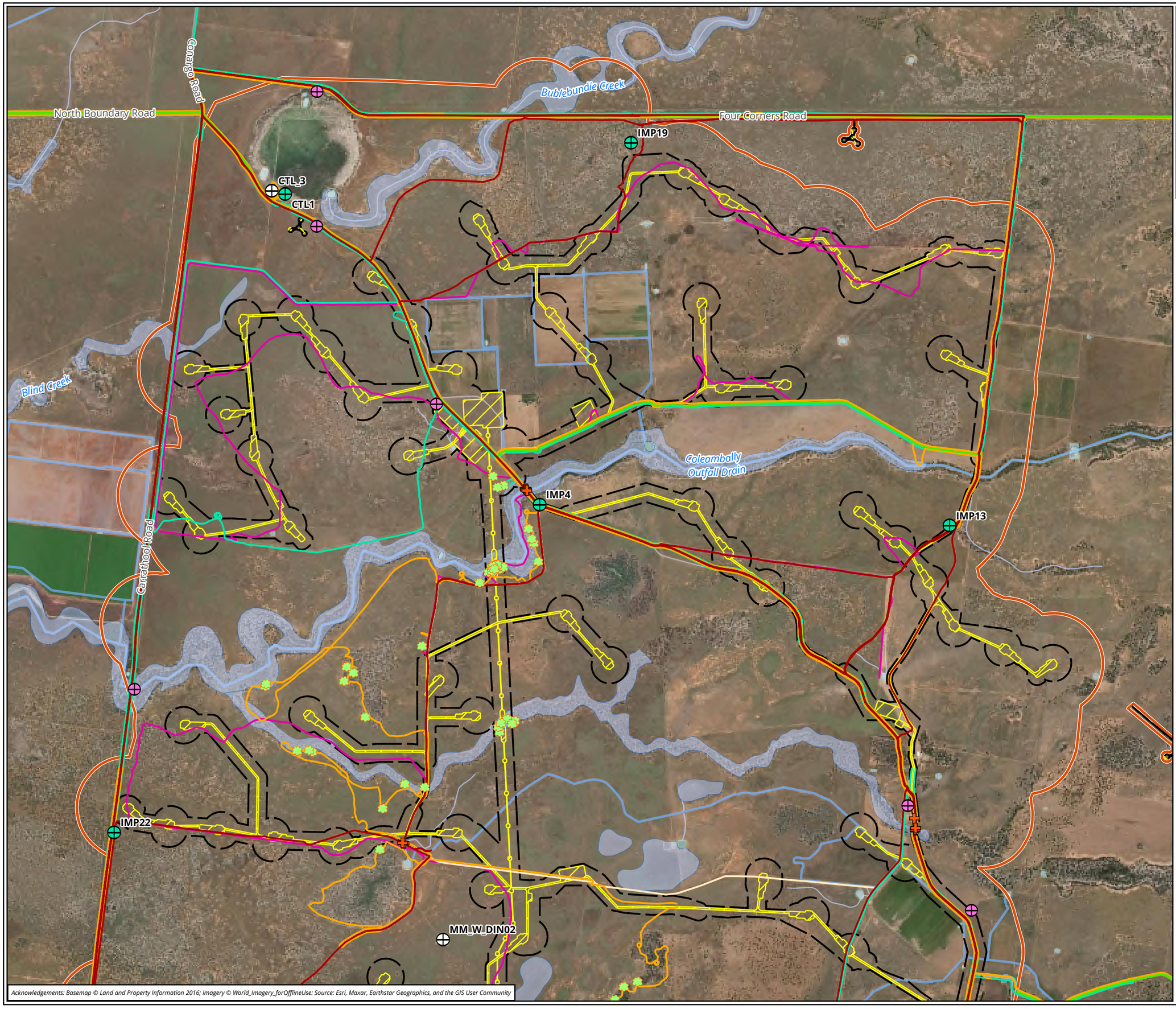

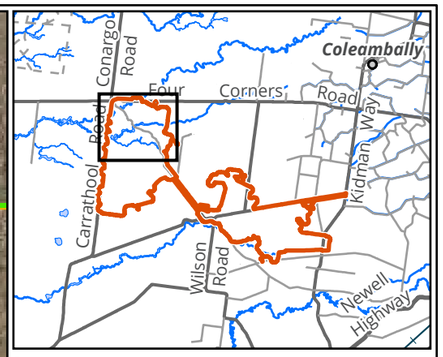

Legend

- Subject land
- Development corridor
- Development footprint
- Hollow-bearing tree
- Call playback
- Audiomoth
- BBUS point - Anabat
- BBUS point - Bird

Fauna survey tracks

- January
- February
- March
- May
- July
- August
- September
- October
- November

Figure 11B Targeted fauna survey Page 1

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Meters
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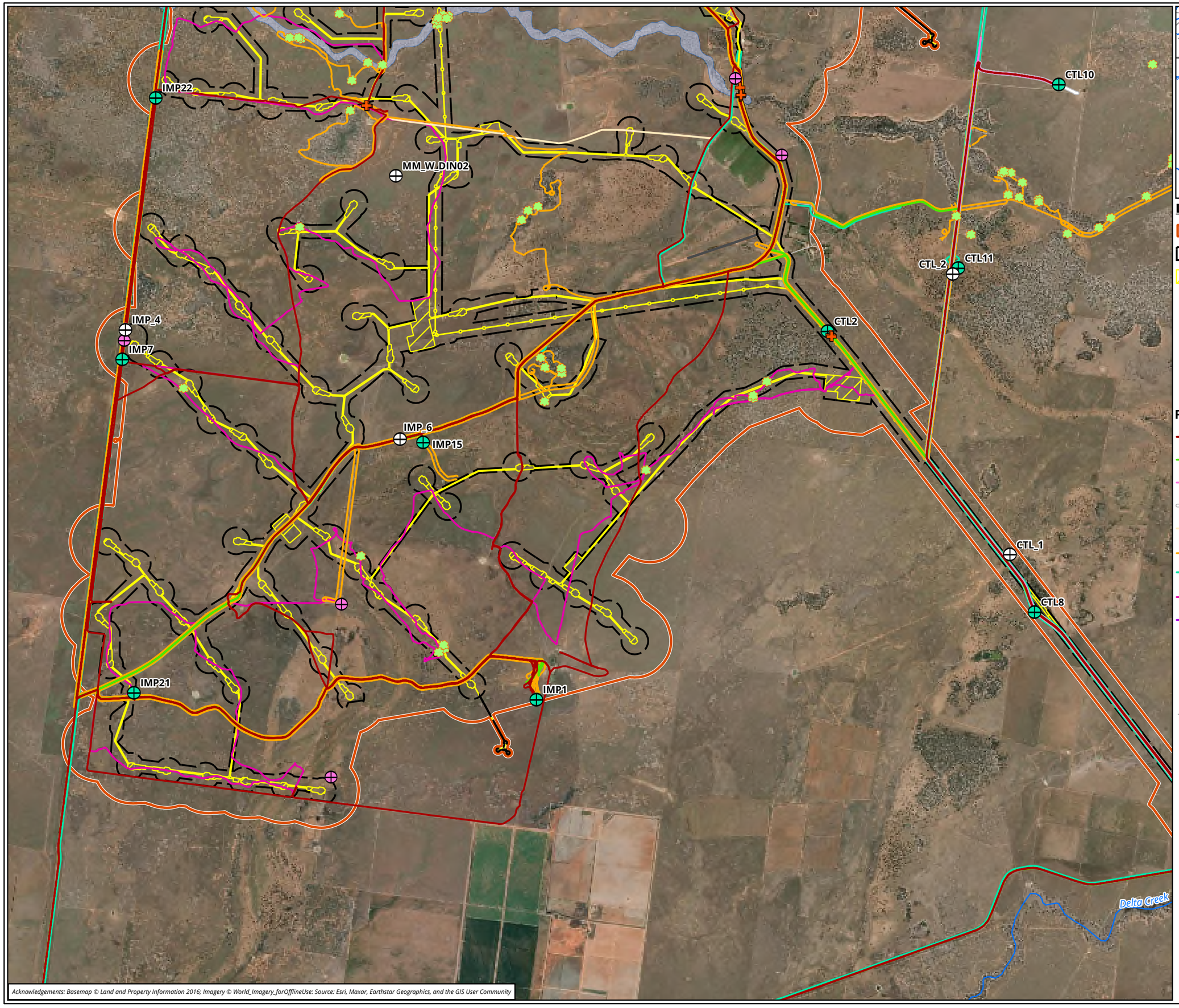

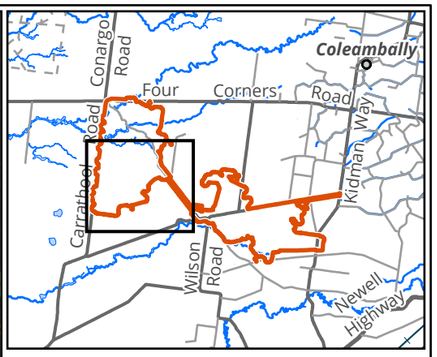

Legend

- Subject land
- Development corridor
- Development footprint
- Hollow-bearing tree
- Call playback
- Audiomoth
- BBUS point - Anabat
- BBUS point - Bird

Fauna survey tracks

- January
- February
- March
- May
- July
- August
- September
- October
- November

Figure 11B Targeted fauna survey
Page 2

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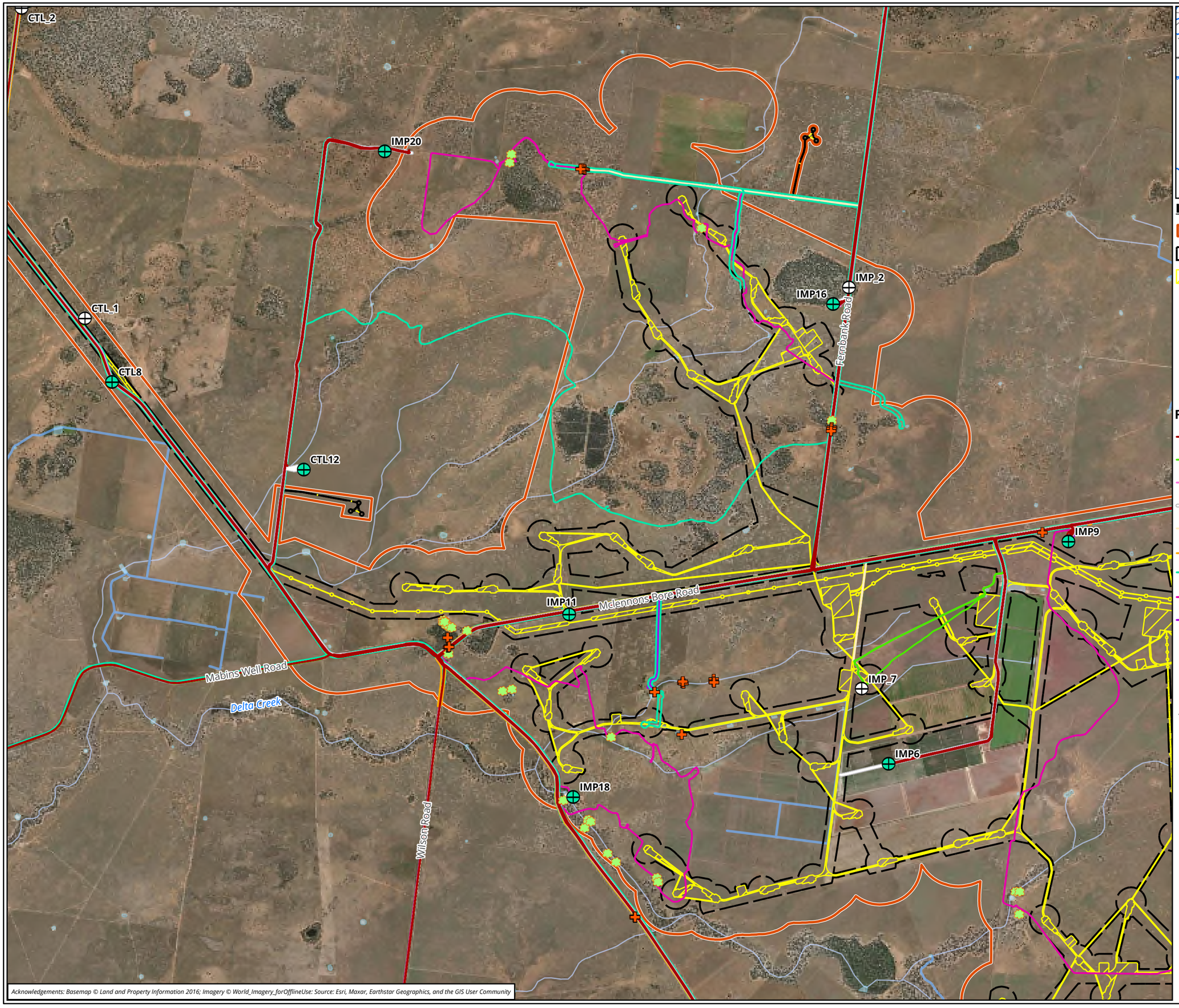

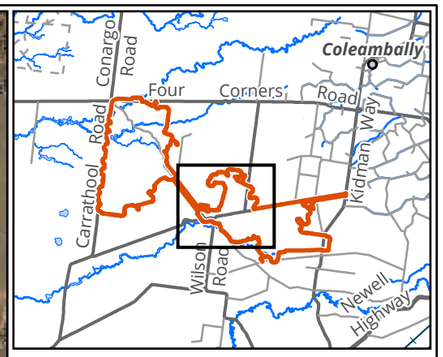

Legend

- Subject land
- Development corridor
- Development footprint
- Hollow-bearing tree
- Call playback
- Audiomoth
- BBUS point - Anabat
- BBUS point - Bird

Fauna survey tracks

- January
- February
- March
- May
- July
- August
- September
- October
- November

Figure 11B Targeted fauna survey Page 3

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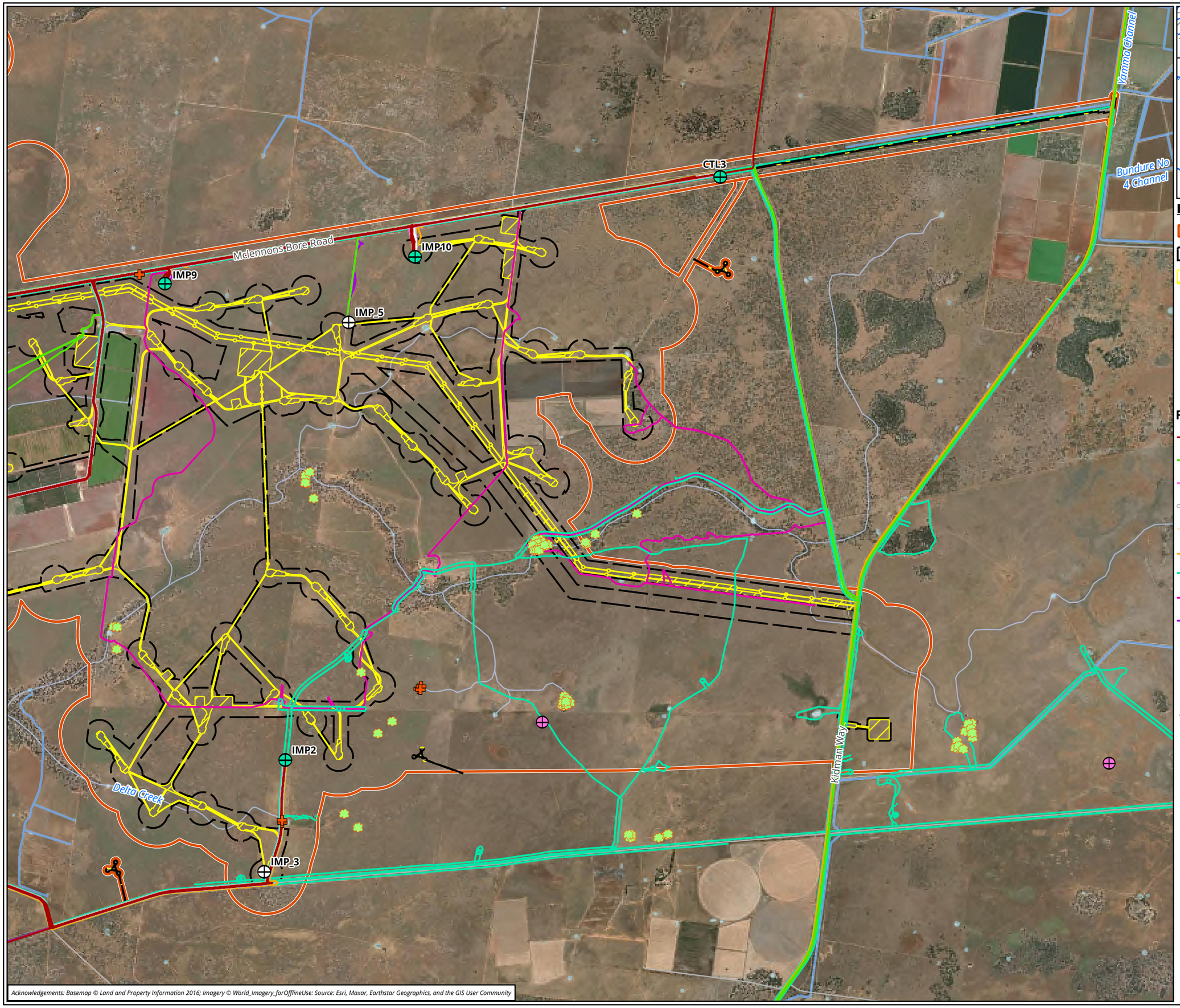

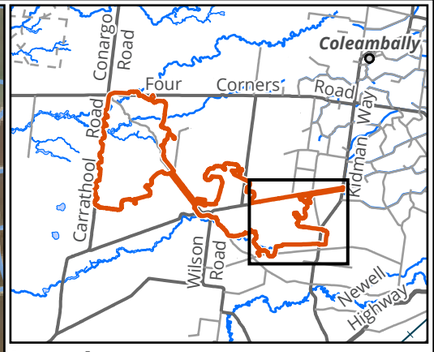

Legend

- Subject land
- Development corridor
- Development footprint
- Hollow-bearing tree
- Call playback
- Audiomoth
- BBUS point - Anabat
- BBUS point - Bird

Fauna survey tracks

- January
- February
- March
- May
- July
- August
- September
- October
- November

Figure 11B Targeted fauna survey
Page 4

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4.3.2. 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.

4.3.3. Threatened species summary and polygons

Table 45 provides details of threatened species with potential to be impacted by the project and outlines the attributes that comprise the threatened species polygons. The presence of threatened species with potential to be impacted by the project is illustrated in Figure 12.

Table 45 Threatened species polygons within the development footprint

Threatened species	Impact (ha / No. indiv.)	Unit of measure	BRW*	Polygon attributes
Flora				
Austrostipa wakoolica	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 17 mod_good – 0.06 ha • PCT 17 moderate – 1.23 ha • PCT 26 DNG – 6.59 ha • PCT 26 Intact – 0.35 ha • PCT 26 sparse – 8.19 ha
Brachyscome muelleroides	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 45 mod_good – 0.05 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Brachyscome papillosa	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 13 moderate – 2.94 ha • PCT 13 thinned – 3.69 ha • PCT 15 moderate- 1.12 ha • PCT 15 thinned – 1.07 ha • PCT 45 mod_good – 0.05 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Lepidium monoplocoides	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 10 moderate – 0.14 ha • PCT 13 moderate – 2.94 ha

Threatened species	Impact (ha / No. indiv.)	Unit of measure	BRW*	Polygon attributes
				• PCT 13 thinned – 3.50 ha • PCT 15 moderate- 1.49 ha • PCT 15 thinned – 1.12 ha • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha
Leptorhynchos orientalis	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha • PCT 45 mod_good – 0.05 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Maireana cheelii	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Pilularia novae-hollandiae	Assumed present in areas of survey shortfall	Area	3	Not detected in surveys undertaken to date Assumed present where survey shortfall occurs • PCT 13 moderate – 3.24 ha • PCT 13 thinned – 4.09 ha • PCT 15 moderate- 1.49 ha • PCT 15 thinned – 1.10 ha • PCT 26 DNG – 6.49 ha • PCT 26 Intact – 0.35 ha • PCT 26 sparse- 8.19 ha • PCT 45 mod_good – 0.27 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 46.12 ha • PCT 46 Intersection – 0.34 ha
Sclerolaena napiformis	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 26 DNG – 98.28 ha • PCT 26 Intact – 23.27 ha • PCT 26 sparse- 81.71 ha • PCT 45 mod_good – 0.10 ha • PCT 46 moderate- 34.41 ha • PCT 46 Intersection – 0.34 ha
Swainsona sericea	Observed	Area	2	Detected during surveys • PCT 26 DNG – 0.45 ha

Threatened species	Impact (ha / No. indiv.)	Unit of measure	BRW*	Polygon attributes
	Assumed present in areas of survey shortfall			• PCT 26 intact – 0.02 ha • PCT 26 sparse – 0.05 ha • PCT 46 moderate – 2.08 ha Assumed present where survey shortfall occurs: • PCT 15 moderate- 2.17 ha • PCT 15 thinned – 1.07 ha • PCT 26 DNG – 140.45 ha • PCT 26 Intact – 49.08 ha • PCT 26 sparse- 120.64 ha • PCT 28 low – 29.14 ha • PCT 28 moderate – 0.44 ha • PCT 45 mod_good – 0.10 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 47.09 ha • PCT 46 Intersection – 0.34 ha
Swainsona murrayana	Observed Assumed present in areas of survey shortfall	Area	2	Detected during surveys • PCT 26 DNG – 0.45 ha • PCT 26 intact – 0.02 ha • PCT 26 sparse – 0.05 ha • PCT 46 moderate – 2.08 ha Assumed present where survey shortfall occurs: • PCT 15 moderate- 2.17 ha • PCT 15 thinned – 1.07 ha • PCT 26 DNG – 140.45 ha • PCT 26 Intact – 49.08 ha • PCT 26 sparse- 120.64 ha • PCT 28 low – 29.14 ha • PCT 28 moderate – 0.44 ha • PCT 45 mod_good – 0.10 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 47.09 ha • PCT 46 Intersection – 0.34 ha
Swainsona plagiotropis	Assumed present in areas of survey shortfall	Area	2	Not detected in surveys undertaken to date. Assumed present where survey shortfall occurs: • PCT 26 DNG – 140.45 ha • PCT 26 Intact – 49.08 ha • PCT 26 sparse- 120.64 ha PCT 45 mod_good – 0.10 ha • PCT 45 Intersection – 0.83 ha • PCT 46 moderate- 47.09 ha PCT 46 Intersection – 0.34 ha
Fauna				
Hemiaspis damelii	Assumed	Area	2	Associated PCTs in accordance with relevant guidelines. • PCT 10 moderate – 0.19 ha • PCT 13 moderate – 3.56 ha

Threatened species	Impact (ha / No. indiv.)	Unit of measure	BRW*	Polygon attributes
				• PCT 13 thinned – 7.88 ha • PCT 15 moderate – 2.54 ha • PCT 15 thinned – 1.10 ha • PCT 17 mod_good – 0.76 ha • PCT 17 moderate – 1.27 ha • PCT 160 mod_good – 4.97ha
Litoria raniformis	Observed	Area	2	The species polygon aligns with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 200 metres radius from the top of bank. • PCT 13 moderate – 0.55 ha • PCT 13 thinned – 2.00 ha • PCT 15 thinned – 1.07 ha • PCT 17 mod_good – 0.49 ha • PCT 26 DNG – 28.09 ha • PCT 26 intact – 7.98 ha • PCT 26 sparse – 29.73 ha • PCT 28 Low – 0.77 ha • PCT 45 intersection– 0.64 ha • PCT 46 moderate – 9.54 ha • PCT 46 Intersection – 0.34 • PCT 160 mod_good – 1.48 ha
Myotis macropus	Assumed	Area	2	200m buffer of semi-permanent water within Coleambally outfall drain and with associated or potential PCT containing suitable microhabitats linked to more suitable • PCT 13 moderate – 0.55 ha • PCT 13 thinned – 1.85 ha
Pedionomus torquatus	Direct impacts upon important mapped habitat	Area	3	Total area impacted of 2.38 ha of important mapped habitat • PCT 13 moderate – 0.01 ha • PCT 13 thinned – 0.10ha • PCT 17 moderate – 0.02 ha • PCT 26 DNG – 0.08 ha • PCT 26 sparse – 0.85 ha • PCT 46 moderate – 1.29 ha
Polytelis swainsonii	Observed	Area	2	100m buffer of associated PCTs within the development corridor with potential hollow bearing trees. • PCT 10 moderate – 0.19 ha • PCT 13 moderate – 3.56ha • PCT 13 thinned – 7.88 ha • PCT 15 moderate – 2.54 ha • PCT 15 thinned – 1.10 ha • PCT 17 moderate – 0.21 ha • PCT 26 DNG – 8.39 ha • PCT 26 intact – 1.56 ha • PCT 26 sparse – 7.54 ha • PCT 28 low – 0.10 ha

Threatened species	Impact (ha / No. indiv.)	Unit of measure	BRW*	Polygon attributes
				• PCT 28 moderate – 0.04 ha • PCT 45 mod_good – 0.15 ha • PCT 46 moderate – 2.74 ha • PCT 160 moderate – 0.01 ha.