



Biodiversity Development Assessment Report

YANCO SOLAR FARM BDAR



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ACRONYMS AND ABBREVIATIONS

BAM	Biodiversity Assessment Methodology
BC Act	Biodiversity Conservation Act 2016 (NSW)
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
CEMP	Construction environmental management plan
Cwth	Commonwealth
DBH	Diameter at breast height
DoE	Department of the Environment (Cwth), now Department of the Environment and Energy
DPE	Department of Planning and Environment (NSW)
DPI	Department of Primary Industries (NSW)
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
ESCP	Erosion and Sediment Control Plan
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
GHG	Greenhouse gases
GIS	Geographic Information System
ha	Hectares
HBT	Hollow-bearing tree
IBRA	Interim Biogeographic Regionalisation for Australia
Ib Vogt	The proponent
km	kilometres
kV	Kilovolts
LEP	Local Environment Plan
LLS Act	<i>Local Land Services Act 2013</i> (NSW)
LRET	Large-scale Renewable Energy Target
m	Metres
mm	Millimetres

MIA	Murrumbidgee Irrigation Area
MNES	Matters of National environmental significance under the EPBC Act (c.f.)
MW	Megawatts
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PCT	Plant Community Type
PV	Photovoltaic
REAP	Renewable Energy Action Plan
SAIL	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEED mapping	Sharing and Enabling Environmental Data Portal
SEPP	State Environmental Planning Policy (NSW)
SIS	Species Impact Statement
sp/spp	Species/multiple species
SSD	State Significant Development
The proposal	Yanco Solar Farm
VIS	Vegetation Information System

EXECUTIVE SUMMARY

ib vogt GmbH (ib vogt) is planning for the construction and operation of a 60 megawatt (AC) / 72 Megawatt (DC) photovoltaic solar farm at Yanco, in the Leeton Local Government Area, NSW. The proposal would develop approximately 183 ha of the 187 ha subject land. This Biodiversity Development Assessment Report (BDAR) has been prepared by NGH Environmental on behalf of the proponent, ib vogt.

The aim of this BDAR is to address the biodiversity matters raised in the Secretary's Environmental Assessment Requirements (SEARs) and to address the requirements of the Biodiversity Conservation Act 2016. This BDAR forms part of an Environmental Impact Statement (EIS) for the State Significant Development (SSD), prepared under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Biodiversity Assessment Methodology (BAM) is the required assessment methodology for SSDs that trigger the NSW Biodiversity Offsets Scheme, under the NSW *Biodiversity Conservation Act 2016*. This report follows the field work methodologies and assessment format required by the BAM.

Comprehensive mapping and field surveys were completed in accordance with the requirements of the BAM. The development site has been selected to avoid impacts to native vegetation and threatened species. The majority of the development site (190 ha) is comprised of exotic vegetation in the form of orange orchards and vineyards. 0.49 ha of forb-rich Speargrass - Windmill Grass – White Top Grassland of the Riverina Bioregion and 0.05 ha of Weeping Myall Woodland would be cleared for the construction of the transmission line from the solar farm to the substation. Clearing of this native vegetation results in the generation of 11 ecosystem credits.

Two fauna species credit species, the Superb Parrot (*Polytelis swainsonii*) and White-bellied Sea Eagle were observed within the development site during the site surveys. No breeding habitat is present for these species within the development site and no species credits are generated. Impacts to these two species are considered within the ecosystem credits.

One flora species credit species, the Small Scurf Pea (*Cullen parvum*) was unable to be surveyed for during the appropriate survey period and was assumed to be present on site. 11 species credits were generated for this species.

Targeted surveys were undertaken for 14 other species credits species. These threatened species were not detected within the development footprint and no offsets are required for these species.

Impacts to federally listed species that have the potential to occur in the development site have been assessed. Potential impacts have been assessed in accordance with the EPBC guidelines and are considered unlikely to be significant. No referral is considered necessary to the Federal Department of Environment and Energy.

Consideration has been given to avoiding and minimising impacts to biodiversity throughout each phase of the proposal to date. Site selection options have been assessed against key environmental, social and economic criteria. Mitigation and management measures will be put in place to adequately address impacts associated with the proposal, both direct and indirect.

The retirement of the credits generated will be carried out in accordance with the NSW Biodiversity Offsets Policy under the *Biodiversity Conservation Act 2016*. With the retirement of credits and effective implementation of the mitigation measures, the proposal is consistent with the requirements of the BAM.

1 INTRODUCTION

The proposed Yanco Solar Farm is classified as State Significant Development (SSD) under the State and Regional Development State Environmental Planning Policy (SEPP) and therefore a 'major project'. This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the proposed Yanco Solar Farm (the proposal) according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal.

The following terms are used in this document:

- **Development footprint:** the area of land that is directly impacted by the proposal. Includes solar array design, perimeter fence, access roads, transmission line footprint, and ancillary facilities and stockpiles. The development footprint is around 183 hectares (ha).
- **Development site:** the area of land that is subject to a proposed development. The development site is around 210 hectares (ha). The development site is the area surveyed for this assessment.
- **Subject land:** all land within the affected lot boundaries.
- **Buffer area:** all land within 1500 metres (m) of the outside edge of the boundary of the development footprint.

1.1 THE PROPOSAL

Yanco Solar Farm would comprise the installation of a solar plant with a capacity of around 60 megawatts (MW) (AC) / 72 Megawatt (DC) that would supply electricity to the national electricity grid. ib vogt proposes to develop around 183ha of the 210ha development site, retaining existing viable native vegetation remnants that occur on the array site.

The proposal would include the following elements:

- Single axis tracker photovoltaic solar panels mounted on steel frames over most of the site.
- Battery storage to store energy on site;
- Inverter/transformer units;
- Electrical cables and conduits;
- Control room and switchgear to connect the solar farm to a new underground powerline, including synchronous condenser, other associated structures, lightening protection masts, control and protection equipment;
- Communications tower (20m high), adjacent to the control room;
- Site office, vehicle parking areas, access tracks and perimeter fencing;
- Operations and maintenance buildings with associated car parking;
- Vegetative screening;
- An overhead or underground 33kv electrical transmission line to connect the proposal to the Yanco Substation and minor electrical infrastructure works within the substation;
- Widening access routes along Research Road and Toorak Road and intersection upgrades at Toorak Road and Canal Street, Irrigation Way and Canal Street, Toorak Road and Research Road and all associated access points and channel crossings into the proposed solar farm;
- Internal access tracks; and
- Lighting, CCTV system, security fencing.

In total, the construction phase of the proposal is expected to take 10 months. The proposal would be expected to operate for around 30 years. After the initial operating period, the solar farm would either be decommissioned, removing all above ground infrastructure and returning the site to its existing land capability, or upgraded with new photovoltaic (PV) equipment.

1.2 THE DEVELOPMENT SITE

1.2.1 Site location

The proposed location of Yanco Solar Farm is in the Leeton Local Government Area, bordering the township of Leeton around 21 kilometres (km) north-west of Narrandera. The subject land includes the following lots, which are owned by private landholders:

- Lot 142 DP 751745
- Lots 145-152 DP 751745
- Lot 1700 DP 1181161
- Lot 6650 DP 1197165

1.2.2 Site description

The development area is bound by Amato Road, Toorak Road, Hume Road, River Road, Yale Road and the Gogeldrie Branch Canal, and intersected by Research Road, Ronfeldt Road, Houghton Road and the June – Hay railway line. Proposed transmission lines would connect to an existing TransGrid substation adjacent to the proposal area, around 1km to the south-east (Figure 1-1).

The proposed development footprint of the Yanco Solar Farm comprises around 183ha of freehold land. The majority of the development site is primarily irrigated cropping, used as grape and orange orchards. The paddocks have been deep ripped and cultivated in past management practices and most of the native vegetation has been removed. Some planted vegetation occurs along fence lines as windbreaks.

Several irrigation canals are present in the development site. Gogeldrie Branch Canal borders the development site.

Several farm buildings and dwellings also occur in the development site.

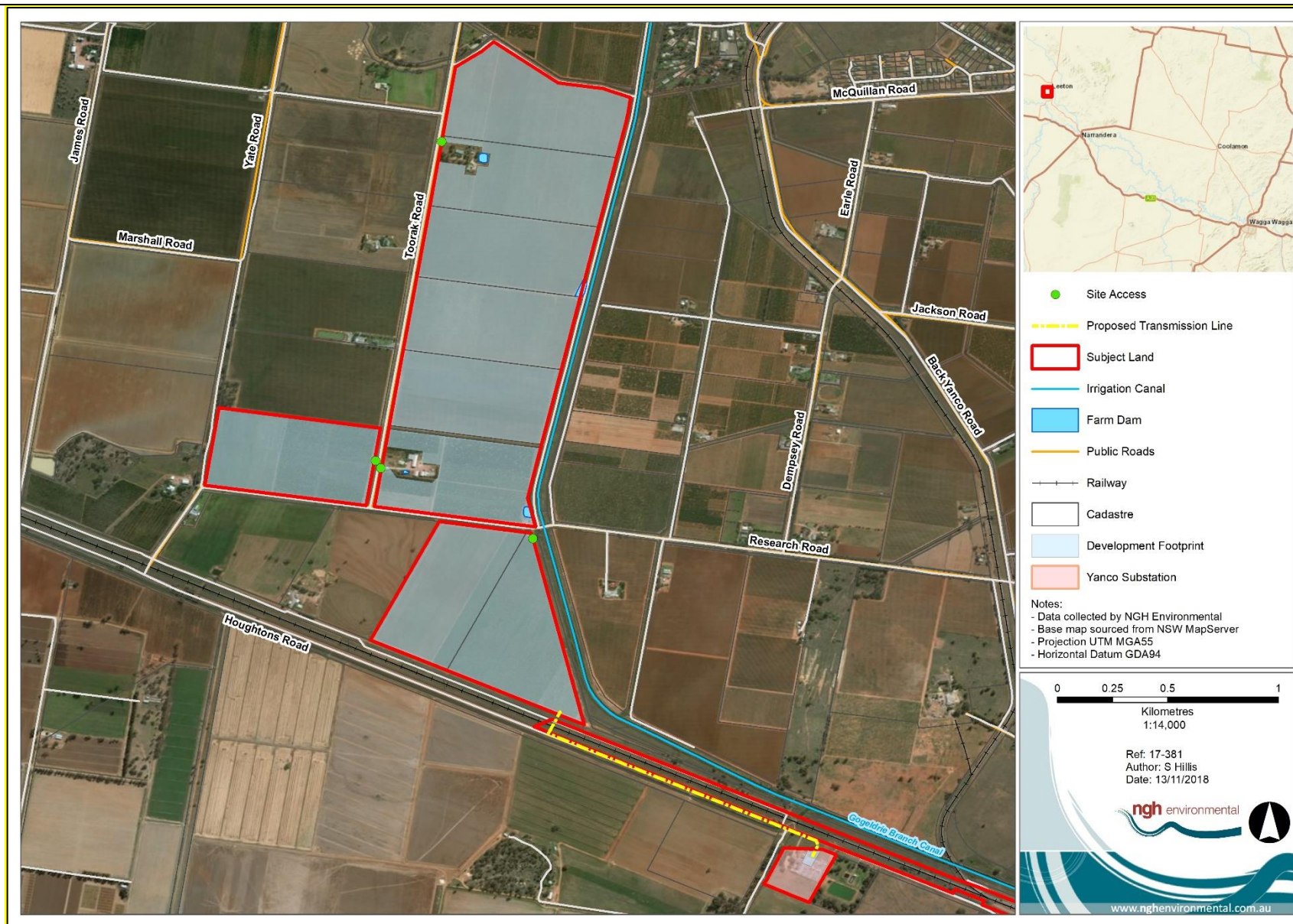


Figure 1-1 Site Map

1.3 STUDY AIMS

This BDAR has been prepared by NGH Environmental on behalf of ib vogt.

The aim of this BDAR is to address the requirements of the BAM, as required in the SEARs and summarised below.

Biodiversity – including an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW) the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless OEH and DPE determine that the proposed development is not likely to have any significant impacts on biodiversity values;

The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM;

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.

No additional specific considerations for any threatened species, populations or communities were specified in the SEARs or by the NSW Office of Environment and Heritage (OEH) for consideration.

This BDAR also addresses the assessment requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.4 SOURCE OF INFORMATION USED IN THE ASSESSMENT

The following information sources were used in this BDAR:

- Proposal layers, construction methods and concept designs provided by ib vogt.
- Australian Government's Species Profiles and Threats (SPRAT) database, accessed at <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>
- NSW OEH's Threatened Species Profiles, accessed at <http://www.environment.nsw.gov.au/threatenedspeciesapp/>
- DPI profiles of threatened species, population, and ecological communities
- Commonwealth Department of Environment and Energy Protected Matters Search Tool (PMST), accessed at <http://environment.gov.au/epbc/protected-matters-search-tool>
- Australia's IBRA Bioregions and sub-bioregions, accessed at <http://environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps>
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 2
- NSW OEH's Biodiversity Assessment Method (BAM) calculator, accessed at <http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx>
- NSW OEH's BioNet threatened biodiversity database, accessed online via login at <http://www.bionet.nsw.gov.au/>
- NSW OEH Threatened Species Profiles, accessed at <http://www.environment.nsw.gov.au/threatenedSpeciesApp/> and www.environment.nsw.gov.au/AtlasApp/UI_Modules/

- OEH BioNet Vegetation Classification Database (OEH 2017), accessed via login at <http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx>
- OEH VIS Mapping, accessed at <http://www.environment.nsw.gov.au/research/VISmap.htm>
- Office of Environment and Heritage (OEH) (2017). Biodiversity Assessment Method.
- NSW Government SEED Mapping, accessed at https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU
- NSW Biodiversity Values Map, accessed at <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap>

2 LANDSCAPE FEATURES

2.1 IBRA BIOREGIONS AND SUBREGIONS

Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features, and flora and fauna communities. The development site is located in the Riverina bioregion, in the Murrumbidgee subregion. The bioregion is characterised by a dry semi-arid climate with hot summers and cool winters. The geology is dominated by Quaternary alluvial sediments, with characteristic landforms of complex alluvial fans with numerous distributary channels and floodplains, depression plains, abandoned lake beds with lunettes, and limited source-bordering dunes. The pre-European vegetation type is dominated by:

- Black Box and River Red Gum on channels
- Black Box, Lignum and Cane Grass in swamps
- Saltbush and Bluebush with Old Man Saltbush, Cottonbush, Myall and Grasses on plains
- White Cypress Pine on sandhills

The dominant IBRA subregion impacted by the proposal would be the Murrumbidgee subregion. This was entered into the BAM calculator for the proposal.

2.2 NSW LANDSCAPE REGIONS AND AREA

The development site is in the Murrumbidgee Scalded Plains Mitchell Landscape. This was entered into the BAM calculator for the proposal.

2.3 NATIVE VEGETATION

As determined by GIS mapping from aerial imagery, around 114.3ha of native vegetation occurs in the 1500m buffer area. This native vegetation in the landscape surrounding the development is predominantly Yellow Box – River Red Gum tall grassy riverine woodland (26ha), Black Box Grassy Open Woodland Wetland of rarely flooded depressions (10ha) and Riverine Plain Grassland (51ha).

2.4 CLEARED AREAS

Within the 1500 m buffer area around the development site, approximately 2316 ha occurs as cleared areas. This is comprised of around 2131 ha of primarily irrigated, levelled agricultural land and 185ha of cleared residential areas.

Within the development site, around 184 ha occurs as agricultural land, which includes 82 ha of orange orchards (Figure 2-2) and 102.3 ha of grape vines (Figure 2-2). These areas provide limited foraging habitat for native species including disturbance-tolerant fauna and introduced species such as foxes and rabbits.



Figure 2-1 Example of orange orchard in the development site.



Figure 2-2 Example of vineyard in the development site.

2.5 RIVER AND STREAMS

There are no prescribed streams within the development site.

The development site contains four farm dams (Figure 2-3).

The proposal site is located in the Murrumbidgee Irrigation Area (MIA), and several irrigation channels run throughout the development site (Figure 2-3). These irrigation channels are involved in existing agricultural activities on the subject land. Irrigators in the MIA have licences which allow them to use a prescribed amount of water each year. The natural hydrology of the site has been largely replaced by irrigation and drainage channels, and storage dams. There would be no removal of irrigation channels throughout the development site.



Figure 2-3 Example of irrigation channel (top left) and storage dams (top right; bottom left and bottom right) in the development site.

2.6 WETLANDS

No wetlands occur in or adjacent to the development site. The nearest important wetlands listed under the EPBC Act are the Fivebough and Tuckerbil Swamps, which are located 5km north-west of the development site.

2.7 CONNECTIVITY FEATURES

There are no significant connectivity features in or adjacent to the development site. The remnant and

planted vegetation and orchard/vineyard plantings provide some habitat connectivity for more disturbance-tolerant and mobile species to travel across the landscape. The irrigation channels provide some aquatic connectivity.

2.8 AREAS OF GEOLOGICAL SIGNIFICANCE

No karsts, caves, crevices or cliffs or other areas of geological significance occur in or adjacent to the development site.

2.9 AREAS OF OUTSTANDING BIODIVERSITY VALUE

No areas of Outstanding Biodiversity Value occur within the development site (NSW Biodiversity Values Map, Figure 2-4).

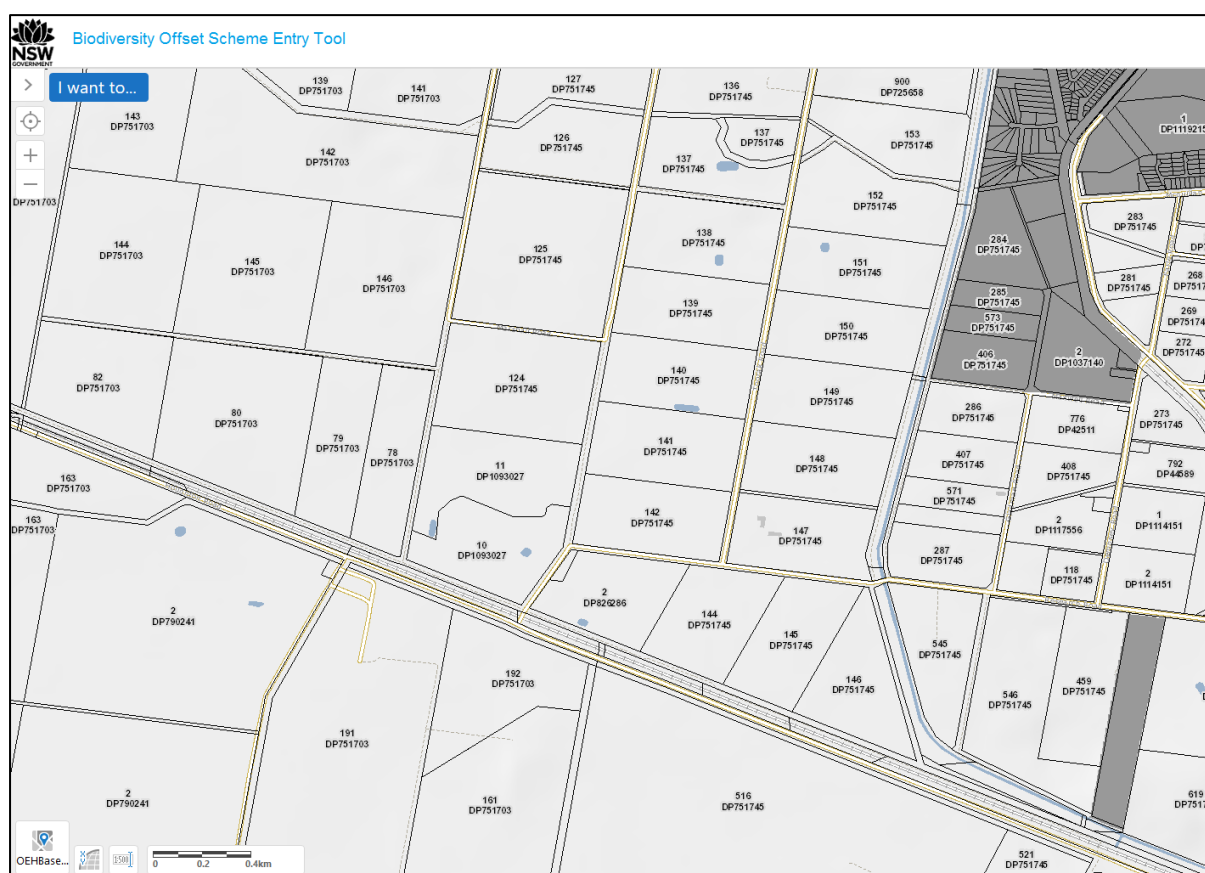


Figure 2-4 Biodiversity Value Map, showing no areas of high biodiversity value in the development site.

2.10 SITE CONTEXT COMPONENTS

Method applied

The proposal conforms to the definition of a *site-based development* under the Biodiversity Assessment Methodology. The site-based development assessment methodology has been used in this BAM assessment.

Percent Native Vegetation Cover

The Percent Native Vegetation Cover within the 1500m buffer area surrounding the development site prior to the development was calculated to be 4.70%. This was entered into the BAM calculator for the proposal.

The total area of the 1500m² buffer area is 2430ha. The area of native vegetation in the 1500m buffer area is 114.3ha (Figure 2-5).

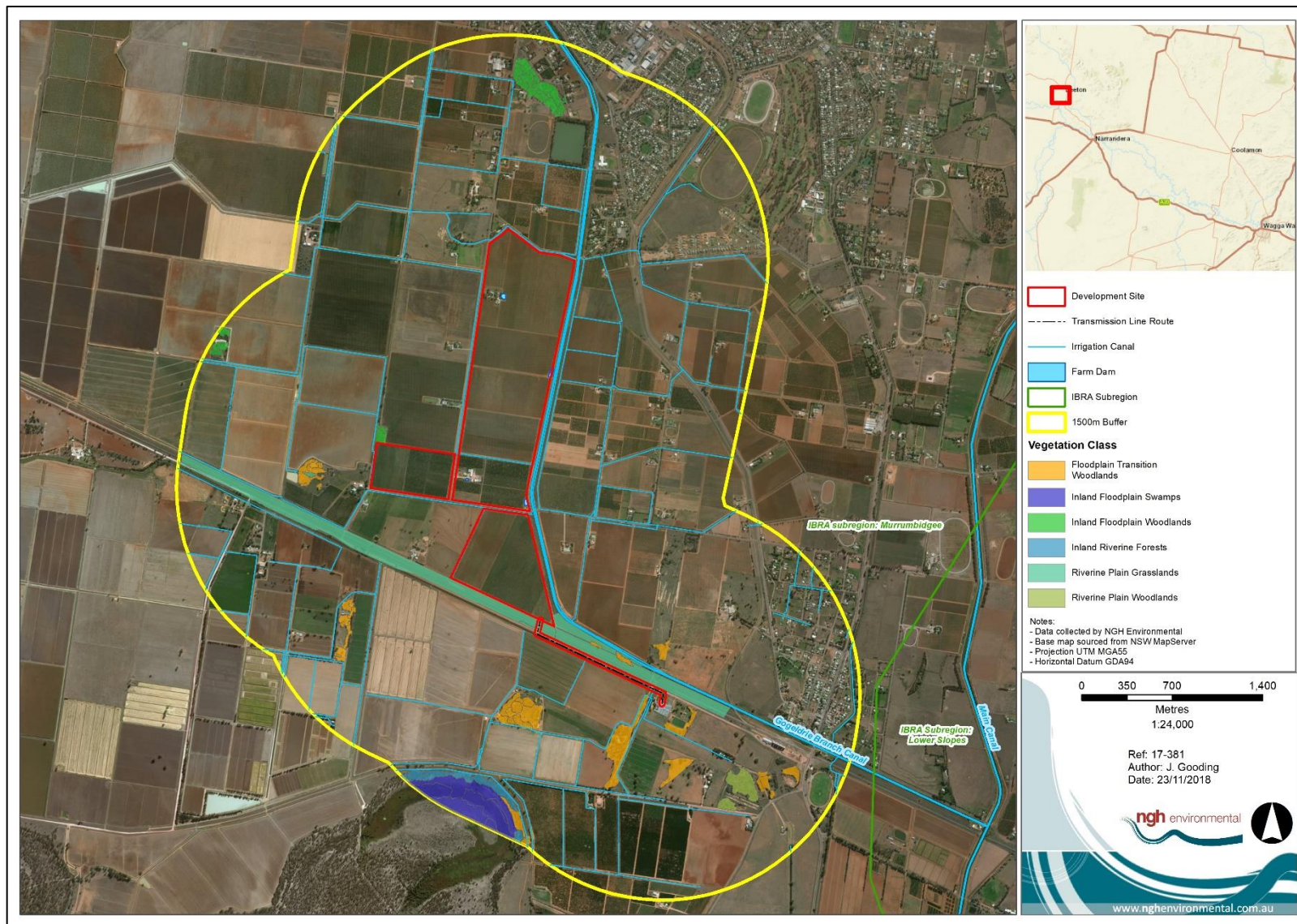


Figure 2-5 Location map showing native vegetation in the development site and in the 1500 m buffer area.

3 NATIVE VEGETATION

3.1 NATIVE VEGETATION EXTENT

Around 26.6ha of native vegetation occurs within the development site (Figure 3-1). This is comprised of:

- 0.68ha of remnant River Red Gum – Yellow Box Woodland,
- <0.1ha of remnant of Weeping Myall Woodland,
- 3.15ha of planted native vegetation, and
- 22.70ha of Riverine Plain Grassland.

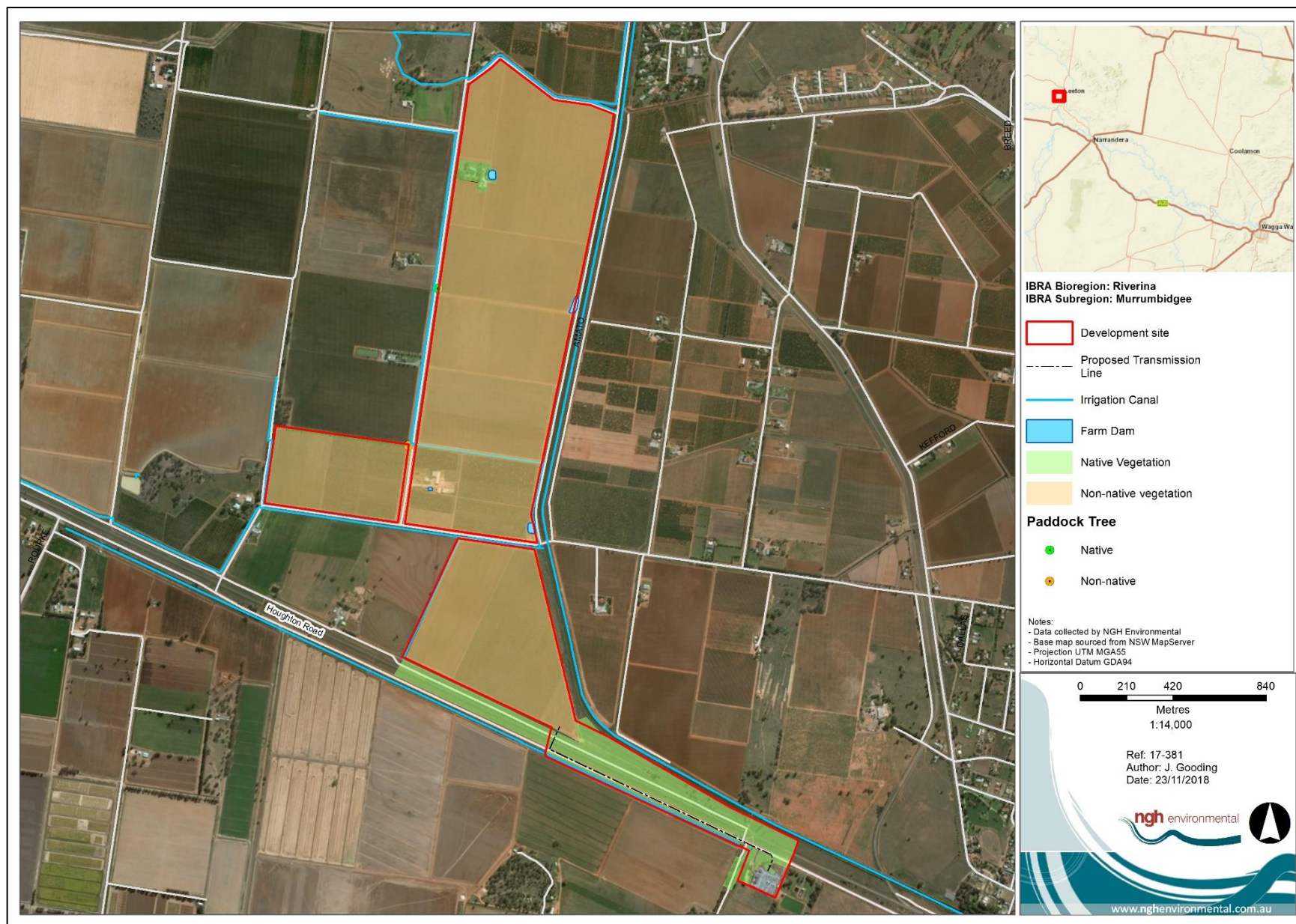


Figure 3-1 Vegetation extent within the development site.

3.2 PLANT COMMUNITY TYPES (PCTS)

3.2.1 Methods to assess PCTS

Review of existing information

A search was undertaken of OEH Vegetation Information System (VIS) database and NSW SEED mapping to access existing vegetation mapping information within the development site. Two relevant existing vegetation maps were assessed.

- **SEED Mapping – Sharing and Enabling Environmental Data (2017).** One PCT (*PCT 44: Forb-rich Speargrass – Windmill grass – White top grassland of the Riverina Bioregion*) was mapped occurring along Houghton Road. No other vegetation communities were mapped within the development site. Small patches of native vegetation occurring in the surrounding areas were *PCT 74: Yellow Box – River Red Gum tall grassy riverine woodland of NSW South Western Slopes and Riverina Bioregion* to the south and *PCT 16: Black Box grassy open woodland of rarely flooded depressions in South Western NSW* to the north.
- **Riverina Regional Native Vegetation Map _VIS_ID 4469.** No vegetation communities were mapped within the development site. Six PCTs were mapped in the 1500m buffer area with the dominant communities being *PCT 74, PCT 16 and PCT 10: River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion.*

Floristic survey

A site overview was undertaken on 7 September 2017. The entire subject land was surveyed by car and on foot by an ecologist with NGH Environmental. The aim of this survey was to determine the extent of native vegetation present in the development site, its condition and vegetation type. Random meander searches were conducted in areas of native vegetation to determine the plant species present. PCTs were identified from the native species present, landforms and physiography and location in the IBRA subregion using the BioNet Vegetation Classification Database. The subject land was then stratified into areas of similar condition class to determine vegetation zones for each PCT.

Detailed floristic surveys of vegetation plots were undertaken on 9 August, 24 August and 26 November 2018. The surveys were undertaken using the methodology presented in the BAM (2017). The required number of vegetation integrity plots of 20m by 50m was established in each vegetation zone. Data was collected on the composition, structure and function of the vegetation. Personnel undertaking the field work have been trained in the BAM and were directed by persons accredited under the BAM (Appendix H).

3.2.2 PCTs identified on the development site

Three PCTs were identified during the floristic surveys;

- 44 - Forb-rich Speargrass – Windmill Grass – White Top Grassland of the Riverina Bioregion
- 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- 74 – Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion

A description of PCT 44 is provided in Table 3-1 belowTable 3-1 Description of PCT 44 in development site.

Forb-rich Speargrass – Windmill Grass – White Top Grassland of the Riverina Bioregion		
Vegetation formation	Grassland	
Vegetation class	Riverine Plain Grasslands	
Vegetation type	PCT ID	PCT 44
	Common Community Name	Speargrass-Windmill Grass-White Top Grassland
Approximate extent within the development site	22.7ha	
Species relied upon for PCT identification	Species name	Relative abundance
	<i>Maireana excavata</i>	<1%
	<i>Chloris truncata</i>	<1%
	<i>Austrostipa scabra</i>	<1%
	<i>Rytidosperma caespitosa</i>	0-5%
	<i>Sida corrugata</i>	<1%
Justification of evidence used to identify the PCT	<p>The grassland is heavily disturbed through past construction of roadside, irrigation canals, railway line and powerline easement. It is dominated by exotic species such as silver leaf nightshade (<i>*Solanum elaeagnifolium</i>), Wild Oats (<i>*Avena fatua</i>) and Vervain (<i>*Salvia verbenaca</i>). However, disturbance tolerant native species are still present in the grassland. Five plots were undertaken in this PCT.</p> <p>Three PCTS were considered that occur as grasslands in the Riverina Bioregion. These are PCT 44, 45 and 46.</p> <p>PCT 44 is considered to be the most appropriate PCT based on the following criteria present in the community:</p> <ul style="list-style-type: none"> • SEED mapping of the area shows the area as PCT 44 • Understorey highly degraded but species that were present are characteristic of the PCT (listed above) • Location within the Murrumbidgee IBRA subregion • Occurs on floodplains and alluvial plains • Grey clay soils 	
TEC Status	<p>This community can be associated with the EEC: <i>Natural Grasslands of the Murray Valley Plains</i> listed under the EPBC Act. The grassland is not considered part of the EEC based on the following factors:</p> <ul style="list-style-type: none"> • Falls outside the indicative distribution map (DSEWPac, 2012) • Based on wooded areas in the close vicinity, is more likely to be a derived grassland from PCT 26 or PCT 74. 	

Forb-rich Speargrass – Windmill Grass – White Top Grassland of the Riverina Bioregion

- Only one species occurring that is listed as frequent in natural grasslands of the Murray Valley Plains (DSEWPaC, 2012)
- No past records of diagnostic indicator fauna species such as plains wanderer.

Estimate of percent cleared

73%

Examples



Figure 3-2 PCT 44 along Houghton Road.



Figure 3-3 PCT 44 along Houghton Road.

Table 3-2 Description of PCT 26 in development site.

Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion		
Vegetation formation	Semi-arid Woodland (Grassy Sub-formation)	
Vegetation class	Riverine Plain Woodland	
Vegetation type	PCT ID	PCT 26
	Common Community Name	Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
Approximate extent within the development site	0.05ha	
Species relied upon for PCT identification	Species name	Relative abundance
	Weeping Myall (<i>Acacia pendula</i>)	25%
	Creeping Saltbush (<i>Atriplex seminbaccata</i>)	5%
	Ruby Saltbush (<i>Enchylaena tomentosa</i>)	10%
	Climbing Saltbush (<i>Einadia nutans</i>)	8%
	Small Flowered Wallaby Grass (<i>Rytidosperma setaceum</i>)	5%
	Spear Grass (<i>Austrostipa scabra</i>)	0.1%
Justification of evidence used to identify the PCT	<p>Weeping Myall Open Woodland is characteristically dominated by the overstorey dominated by <i>Acacia pendula</i>.</p> <p>There are four Weeping Myall Woodland PCTs in NSW. These are PCT 26, 27, 116 and 1766.</p> <p>PCT 26 is considered to be the most appropriate PCT based on the following criteria that are present in the community;</p> <ul style="list-style-type: none"> • The only one of the PCTS listed above that occurs in the Riverina bioregion. • Dominated by an overstorey of <i>Acacia pendula</i> • Species present are characteristic of the PCT (listed above) • Located within the lower slopes IBRA subregion • Occurs on alluvial plains • Clay Soils 	
TEC Status	Forms part of the TEC: <i>Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray Darling Depressions, Riverina and NSW South Western Slopes bioregion</i> listed under the BC Act.	
Estimate of percent cleared	90%	

Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

Examples



Figure 3-4 Example of PCT26: Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion along Houghton Rd.




Figure 3-5 Example of PCT26: Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion along Houghton Rd.

Table 3-3 Description of PCT 74 in development site.

Yellow Box – River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion.		
Vegetation formation	Grassy Woodlands	
Vegetation class	Floodplain Transition Woodlands	
Vegetation type	PCT ID	PCT 74
	Common Name Community	Yellow Box – River Red Gum tall grassy riverine woodland
Approximate extent within the development site	0.67ha	
Species relied upon for PCT identification	Species name	Relative abundance
	Yellow Box (<i>Eucalyptus melliodora</i>)	0 -10%
	River Red Gum (<i>Eucalyptus camaldulensis</i>)	0-25%
	Bimble Box (<i>Eucalyptus populnea</i>)	0-12%
	Deane's Wattle (<i>Acacia deanei</i>)	<1%
	Climbing Saltbush (<i>Einadia nutans</i>)	0-5%
	<i>Oxalis perennans</i>	<1%
	Curly Windmill Grass (<i>Enteropogon acicularis</i>)	3-15%
Justification of evidence used to identify the PCT	<p>The community is highly fragmented and disturbed comprising two small patches of only 0.67ha.</p> <p>The overstorey is dominated by a mixture of Bimble Box, River Red Gum and Yellow Box. The eastern patch is comprised of entirely semi mature Bimble Box. PCTs containing Bimble Box in the Riverina Bioregion were considered. These were PCT 72, 82, 103, 105 and 207, however none of these PCTS matched with the other plant species present on site, soil types or landforms.</p> <p>PCT 74 was considered to be the most appropriate PCT based on the following criteria that are present in the community:</p> <ul style="list-style-type: none"> • All three overstorey species are present in this community • Understorey species present are characteristic of the PCT (listed above) • It occurs in the Murrumbidgee IBRA subregion. 	

Yellow Box – River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion.

	<ul style="list-style-type: none"> • Occurs on floodplains and flats • Clay soils
TEC Status	Forms part of the TEC: <i>White Box-Yellow Box-Blakely's Red Gum Woodland</i> listed as Endangered under the BC Act.
Estimate of percent cleared	73%
Examples	 <p>Figure 3-6 Example of PCT 74: Yellow Box - River Red Gum tall grassy riverine woodland.</p>

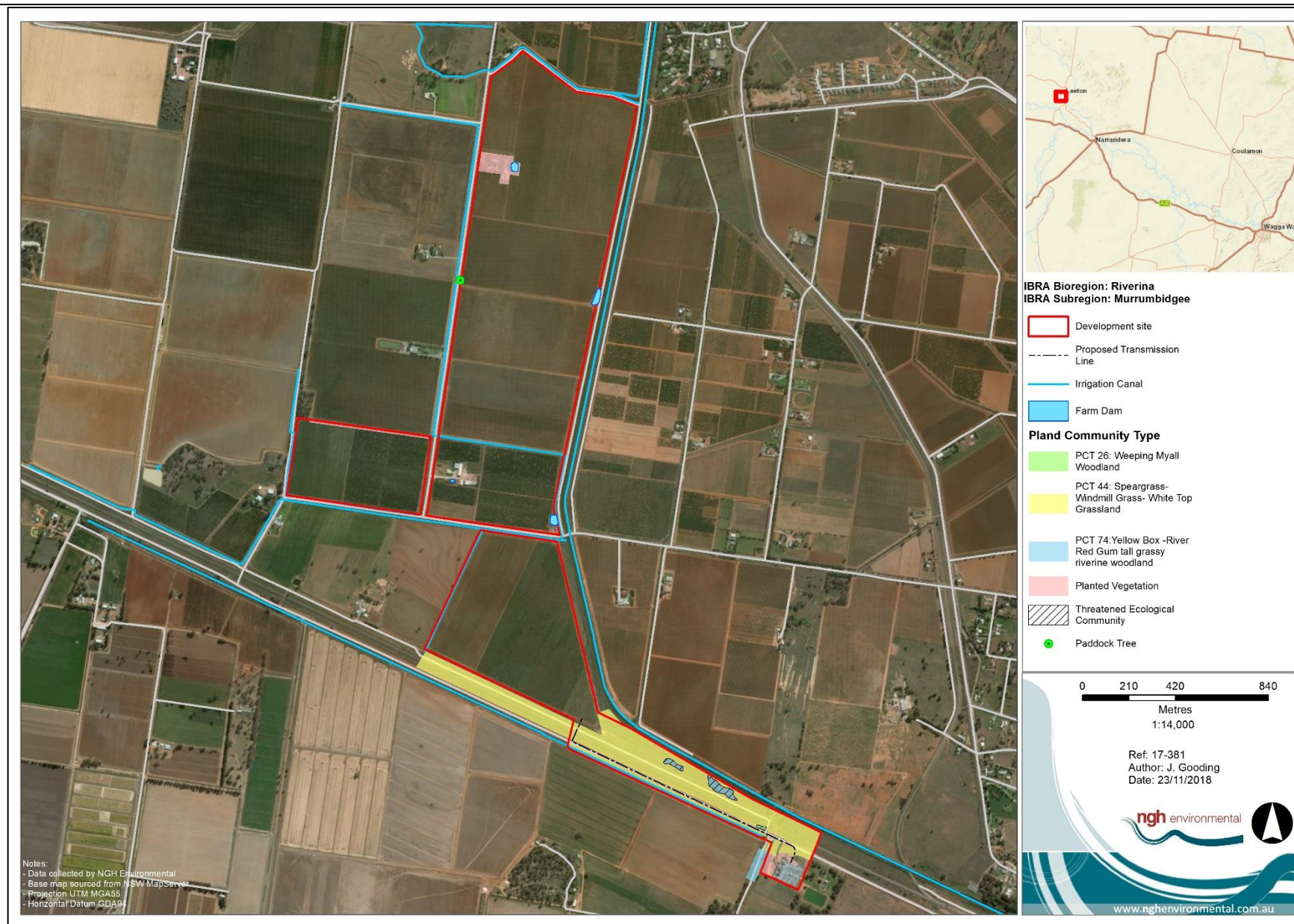


Figure 3-7 Plant Community Types and TECs at the development site.

3.3 VEGETATION INTEGRITY ASSESSMENT

3.3.1 Vegetation zones and survey effort

The random meander, overview inspection and detailed floristic plots have been used to assist the delineation of zones. Three PCTs were identified in the survey area. Each of these PCTs is considered to be in the one condition within the development site and is not broken down into separate zones.

Nine floristic plots were undertaken within the three PCTs. The number of floristic plots undertaken in each zone was in line with the minimum plot requirements per zone area as specified in the BAM (2017).

Table 3-4 Vegetation zones within the development site

Zone ID	PCT ID	Stratification unit / condition	Zone size (ha)	Survey effort (# plots)	Area impacted (ha)
1	44	<p>Low</p> <p>This zone occurs in the roadside vegetation along Houghton Road. The conditions are considered consistent along the length of the roadside surveyed although there is slight variation in the diversity of species present. The grassland is considered in low condition as it is dominated by exotic species such as silver leaf nightshade (<i>*Solanum elaeagnifolium</i>), Wild Oats (<i>*Avena fatua</i>) and Vervain (<i>*Salvia verbenaca</i>) and has been heavily disturbed through construction of roads, powerlines, irrigation canals and a railway line.</p> <p>This community does not form part of an EEC.</p>	22.7	6	0.49
2	26	<p>Moderate</p> <p>A small patch of Weeping Myall occurs in the roadside vegetation along Houghton Rd. The understorey is comprised of a mix of native and exotic grasses and forbs.</p> <p>This community forms part of the EEC: <i>Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray Darling Depression, Riverina and NSW South Western Slopes Bioregion.</i></p>	0.05	1	0.05
3	74	<p>Moderate</p> <p>Two small patches of Yellow Box – River Red Gum Riverine woodland occur in the roadside vegetation along Houghton Rd.</p>	0.67	2	0
4	-	Planted Vegetation	3.15	0	0

Zone ID	PCT ID	Stratification unit / condition	Zone size (ha)	Survey effort (# plots)	Area impacted (ha)
		<p>This zone is comprised of a planted row of <i>Casuarina cunninghamiana</i> in the North West section and a variety of native horticultural plants surrounding the house block in the North of the development site.</p> <p>This vegetation does not represent a plant community type.</p>			

3.3.2 Vegetation integrity assessment results

86 plant species were identified within the nine vegetation integrity survey plots, comprising 42 native species and 44 exotic species. The results of the plot field data can be found in Appendix A and Appendix B.

After a constraints analysis, the areas of PCT 74 were avoided by the proposal. These PCTs were not added into the BAM calculator.

The plot data from the vegetation integrity survey plots for PCT 44 and PCT 26 was entered into the BAM calculator. The results of the vegetation integrity assessment are provided in Table 3-5.

Table 3-5 Table of current vegetation integrity scores for each vegetation zone within the development site.

Zone ID	Plant Community Type (PCT)	Area (Ha)	Composition score	Structure score	Function score	Vegetation Integrity Score
1	PCT 44	0.49	56.7	23.3	n/a	36.4
2	PCT 26	0.05	76.6	100	84.5	86.5

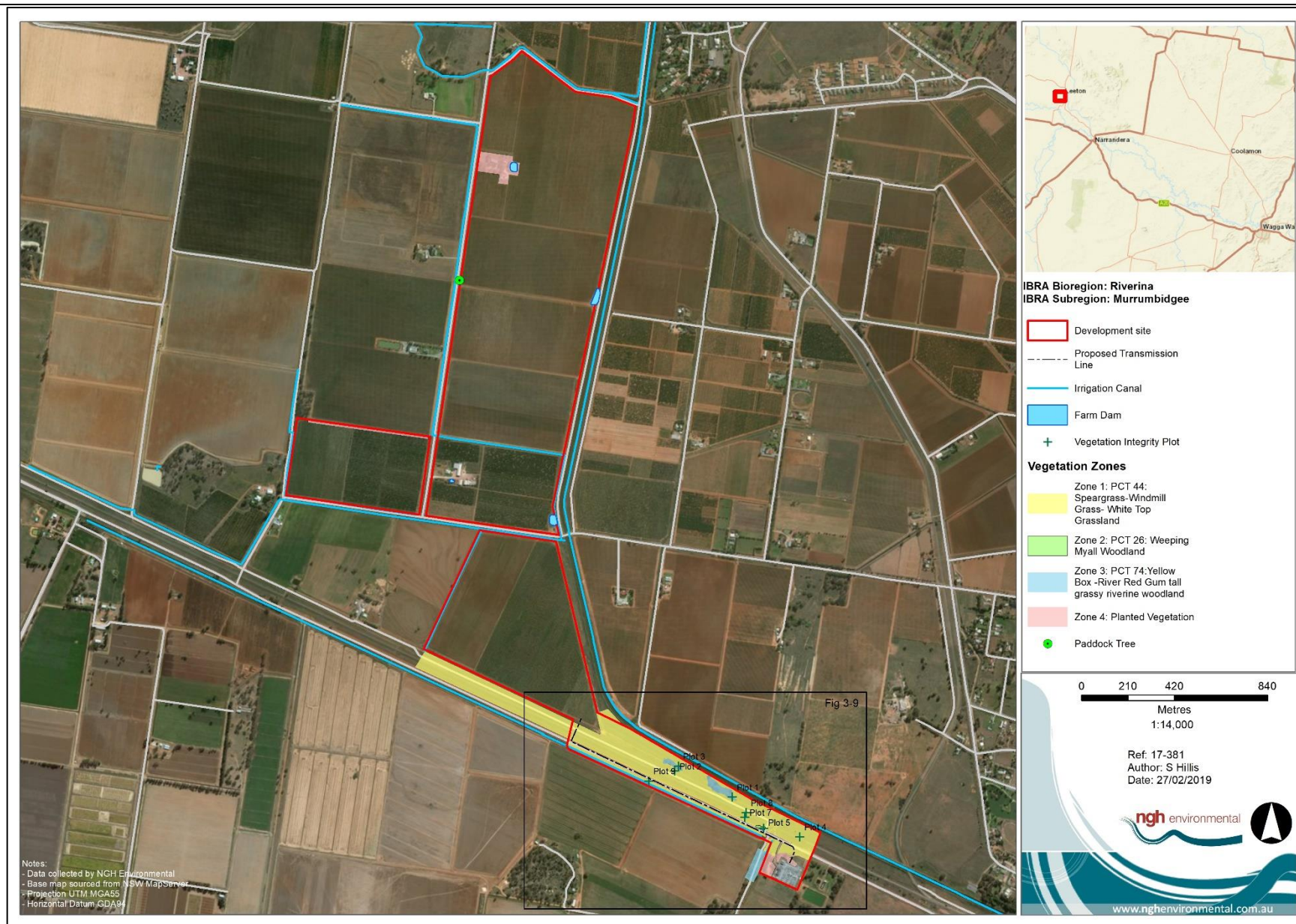


Figure 3-8 Vegetation zones at the development site.

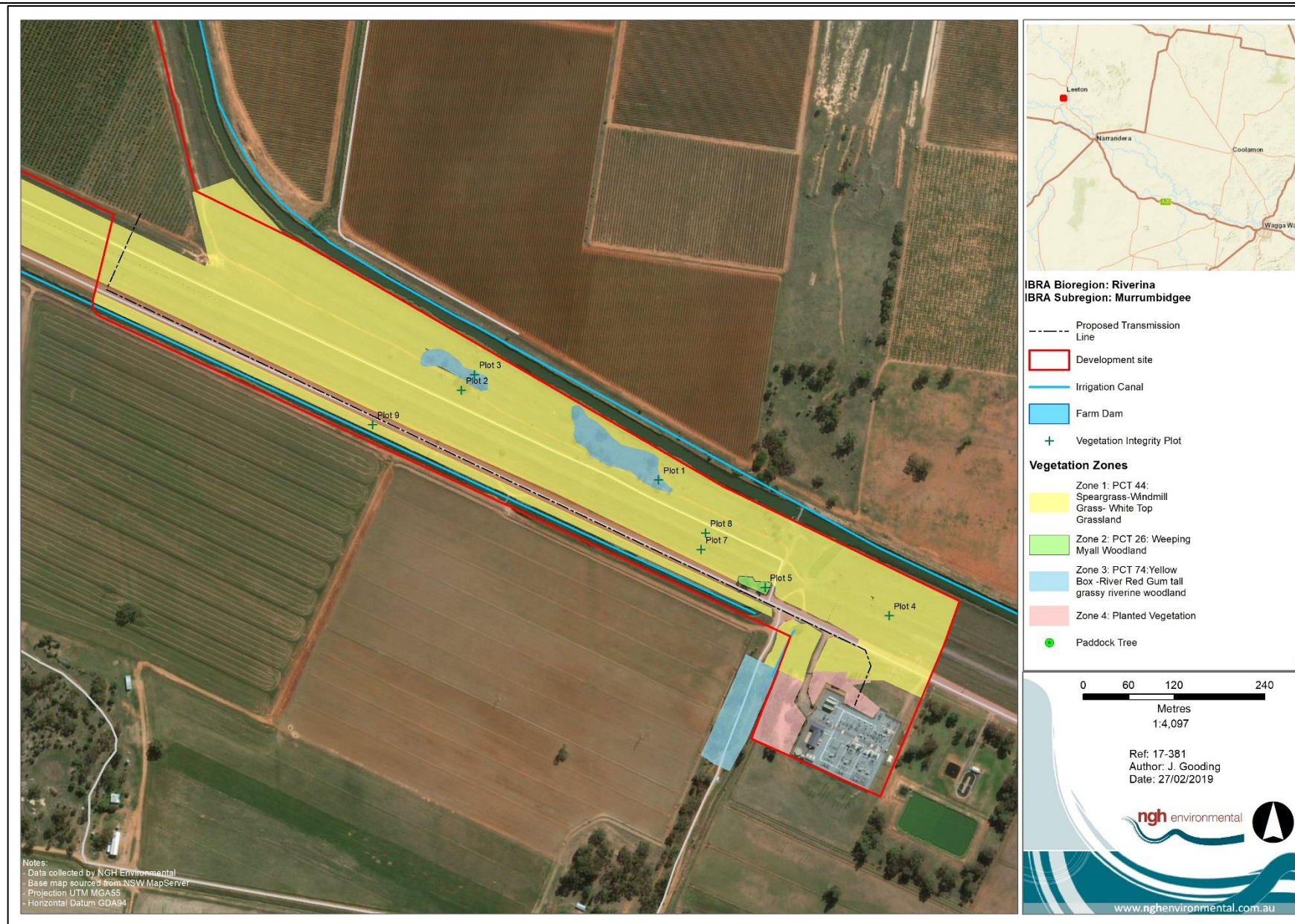


Figure 3-9 Vegetation zones along transmission line route

4 THREATENED SPECIES

4.1 ECOSYSTEM CREDIT SPECIES

The following ecosystem credit species were returned by the calculator as being associated with the PCTs present on the development site. These are assumed to occur and generate credits:

Table 4-1 Ecosystem credit species.

Ecosystem credit species	Vegetation type(s)	NSW Listing Status	National Listing Status
Major Mitchell's Cockatoo <i>Lophochroa leadbeateri</i>	PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Not listed
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	PCT 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Not listed
White-fronted Chat <i>Epthianura albifrons</i>	PCT 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	Vulnerable	Not listed
Grey Falcon <i>Falco hypoleucos</i>	PCT 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Endangered	Not listed
White-bellied Sea-Eagle <i>Haliaeetus leucogaster</i>	PCT 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Not listed
Hooded Robin <i>Melanodryas cucullata cucullata</i>	PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Not listed
Scarlet Robin <i>Petroica boodang</i>	PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Not listed
Superb Parrot <i>Polytelis swainsonii</i>	PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Vulnerable
Grey Crowned Babbler <i>Pomatostomus temporalis temporalis</i>	PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Not listed
Diamond Firetail <i>Stagonopleura guttata</i>	PCT 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion PCT 26 – Weeping Myall Open Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Vulnerable	Not listed

4.1.1 Species excluded from the assessment

No ecosystem credit species were excluded from the assessment; all are assumed to occur and contribute to ecosystem credits.

4.2 SPECIES CREDIT SPECIES

4.2.1 Candidate species to be assessed

The BAM Calculator predicted the following species credit species to occur at the development site.

Table 4-2 Candidate species credit species requiring assessment.

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
FAUNA				
Australian Bustard <i>Ardeotis australis</i>	Tussock and hummock grasslands, low shrublands and low open grassy woodlands; occasionally pastoral and cropping country, golf courses and near dams.	High	Endangered	Not listed
Major Mitchell's Cockatoo <i>Lophochroa leadbeateri</i> (Foraging)	Living or dead tree with hollows greater than 10cm diameter	Moderate	Vulnerable	Not listed
Superb Parrot <i>Polytelis swainsonii</i> (Foraging)	Breeding habitat can be identified by the presence of habitat features and observed nest or two or more birds seen on site.	High	Vulnerable	Vulnerable
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i> (Foraging)	Breeding habitat includes trees up to 30m, rocks and high ground, where trees are not available.	High	Vulnerable	Not listed
Koala <i>Phascolarctos cinereus</i>	Areas identified via survey as important habitat. Important habitat defined by density of koalas and quality of habitat determined by on-site survey	Moderate	Vulnerable	Vulnerable
FLORA				
Mossgiel Daisy <i>Brachyscome papillosa</i>	Clay soils on Bladder Saltbush and Leafless Bluebush plains; also grassland and Inland grey Box – Cypress Pine woodland.	Moderate	Vulnerable	Vulnerable
Claypan Daisy <i>Brachyscome muelleroides</i>	Floodplains on grey-brown or red-brown clays and claypans	Very high	Vulnerable	Vulnerable
Bindweed <i>Convolvulus tedmoorei</i>	Grows on self-mulching grey clay. cl Thrives on soil flooded periodically	High	Endangered	Not listed

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
Small Scurf-pea <i>Cullen parvum</i>	Grassland, River Red Gum woodland or Box-Gum woodland, sometimes on grazed land and usually on table drains or adjacent to drainage lines or watercourses, in areas with rainfall 450 –700mm.	High	Endangered	Not listed
Winged Peppercress <i>Lepidium monoplocoides</i>	Land containing seasonally damp or waterlogged sites	High	Endangered	Endangered
Lanky Buttons <i>Leptorhynchos orientalis</i>	Woodland or grassland, sometimes on margins of swamps. Communities include Bimble Box plain in red-brown soil, dense <i>Acacia pendula</i> woodland with herbaceous understorey on red clay to clay loam, open grassland areas on red soils, and red clay plains at edge of Canegrass Swamp.	High	Endangered	Not listed
Chariot Wheels <i>Maireana cheelii</i>	Heavy grey clay soils and claypans or shallow depressions.	Moderate	Vulnerable	Vulnerable
Austral Pillwort <i>Pilularia novae-hollandiae</i>	Strongly ephemeral - dependent on rain. Only found in drying mud. Presume seedbank based on similar species but unsure; dispersal assumed based on spores but no research to support.	High	Endangered	Not listed
Slender Darling Pea <i>Swainsona murrayana</i>	Clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Bladder Saltbush, Black Box and grassland communities on level plains, floodplains and depressions and often with <i>Maireana</i> species. Remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	High	Vulnerable	Vulnerable
Silky Swainson-pea <i>Swainsona sericea</i>	Natural Temperate Grassland and Snow Gum Woodland on the Monaro; Box-Gum Woodland in the Southern Tablelands and South West Slopes.	High	Vulnerable	Not listed

4.2.2 Inclusions and exclusions based on habitat features

Two species were added to the Credit Calculator based on the presence of suitable habitat and nearby known records (Table 4-3). These species are the Sloane's Froglet and Southern Bell Frog.

Table 4-3 Additional candidate species included for assessment.

Species Credit Species	Habitat components and geographic restrictions	Sensitivity to gain class	NSW listing status	National listing status
Sloane's Froglet <i>Crinia sloanei</i>	Periodically inundated areas in grassland, woodland, and disturbed habitats. Known in subregion.	Moderate	Vulnerable	Not listed
Southern Bell Frog <i>Litoria raniformis</i>	Requires habitat that contains water for at least four months for tadpole development.	Moderate	Endangered	Vulnerable

Three candidate species were excluded from the credit calculator based on the development site being outside their known range (Table 4-4).

Table 4-4 Candidate species excluded for assessment.

Species Credit Species	Habitat components and geographic limitations	Reason for exclusion	Sensitivity to gain class	NSW listing status	National listing status
A Spear-grass <i>Austrostipa wakoolica</i>	South of Murrumbidgee	Development site North of Murrumbidgee River	Moderate	Endangered	Endangered
Turnip Copperburr <i>Sclerolaena napiformis</i>	Hay Plain	Development site not within Hay Plain	Moderate	Endangered	Endangered
Red Darling Pea <i>Swainsona plagiotropis</i>	Hay Plain	Development site not within Hay Plain	High	Vulnerable	Not listed

4.2.3 Exclusions based on habitat quality

No credit species were excluded from the assessment under justification that habitat is of too poor a quality to be suitable.

4.2.4 Candidate species requiring confirmation of presence or absence

The species listed in Table 4-5 are those that are considered to have habitats present at the development site. Targeted surveys were conducted for most of these species. One species, the Small Scurf-pea (*Cullen parvum*) was not surveyed for during the appropriate survey periods and so was presumed to be present within areas of potential habitat for the purpose of this assessment.

The results from the surveys are summarised below in Table 4-5. Details of the survey methods and results for each surveyed species are provided below. Where relevant, the methods for defining areas of potential habitat are also included. Targeted survey locations are mapped on Figure 4-1.

Table 4-5 Summary of species credit species surveyed at the development site

Species Credit Species	Biodiversity risk weighting	Survey Period	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Fauna					
Australian Bustard <i>Ardeotis australis</i> (Breeding)	2.00	All Year	Surveyed Aug & Oct 2018	No	0
Major Mitchell's Cockatoo <i>Lophochroa leadbeateri</i> (Breeding)	2.00	Sept - Dec	Surveyed Oct 2018	No	0
Superb Parrot <i>Polytelis swainsonii</i> (Breeding)	2.00	Sept - Nov	Surveyed Oct 2018	Yes – however no breeding habitat present on site. Foraging habitat only	0
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i> (Breeding)	2.00	July - Dec	Surveyed Aug & Oct 2018	Yes – however no breeding habitat present on site. Foraging habitat only	0
Koala <i>Phascolarctos cinereus</i> (Breeding)	2.00	All year	Surveyed Aug & Oct 2018	No	0
Sloane's Froglet <i>Crinia sloanei</i>	1.50	July - Aug	Surveyed Aug 2018	No	0
Southern Bell Frog <i>Litoria raniformis</i>	2.00	Oct - Jan	Surveyed Oct 2018	No	0
Flora					
Mossgiel Daisy <i>Brachyscome papillosa</i>	2.00	Sept - Nov	Surveyed Oct & Nov 2018	No	0
Claypan Daisy <i>Brachyscome muelleroides</i>	3.00	Sept - Nov	Surveyed Oct & Nov 2018	No	0
Bindweed <i>Convolvulus tedmoorei</i>	2.00	Aug - Nov	Surveyed Oct & Nov 2018	No	0
Small Scurf-pea <i>Cullen parvum</i>	2.00	Dec - Feb	Not surveyed for during survey period	Assumed Present	0.54 ha
Winged Peppergrass <i>Lepidium monophlooides</i>	2.00	Nov - Feb	Surveyed Oct & Nov 2018	No	0
Lanky Buttons <i>Leptorhynchos orientalis</i>	2.00	Sept - Nov	Surveyed Oct & Nov 2018	No	0

Chariot Wheels <i>Maireana cheelii</i>	2.00	Sept - Feb	Surveyed Oct & Nov 2018	No	0
Austral Pillwort <i>Pilularia novae-hollandiae</i>	3.00	All year	Surveyed Oct & Nov 2018	No	0
Slender Darling Pea <i>Swainsona murrayana</i>	2.00	Sept - Feb	Surveyed Oct & Nov 2018	No	0
Silky Swainson-pea <i>Swainsona sericea</i>	2.00	Sept - Feb	Surveyed Oct & Nov 2018	No	0

4.2.5 Targeted Survey Methods

Australian Bustard

SURVEY EFFORT

Grassland within the development area was surveyed during daytime hours on 24 and 25 October 2018, with an effort investment of 16 person hours, including transects along the entire grassland area at 10m intervals. The same grassland was subject to two spotlight fauna transects at dusk on 10 August 2018 and 25 October. The weather during the survey period was fine and sunny with very little wind. The evening of 25 October was also clear with very little wind and a full moon.

SURVEY RESULTS

No indication of Bustard nesting or activity was observed.

Major Mitchell's Cockatoo

SURVEY EFFORT

A 20-minute targeted survey for this species was undertaken in the area of Yellow Box – River Red Gum Riverine woodland on 25 October 2018. Opportunistic surveys were undertaken over the four days the development site was surveyed. Potential nesting tree hollows were observed at dusk for a 20-minute period on 24 and 25 October 2018 to see if they were utilised by this species or other birds. The weather during the survey period was clear with little wind with a maximum daytime temperature in the mid-20°C.

SURVEY RESULTS

No Major Mitchell's were observed during the four days the development area was surveyed. Only one tree within the development site contains hollows larger than 10cm that are suitable for Major Mitchell's Cockatoo. No activity was observed around this tree. Hollow bearing trees were avoided by the development and no mature trees would be removed by the proposal. Thus, it is unlikely any breeding Major Mitchell's Cockatoo would occur within the development site.

Superb Parrot

SURVEY EFFORT

A 20-minute targeted survey was undertaken in the area of Yellow Box – River Red Gum Riverine woodland on 25 October 2018. Opportunistic surveys were undertaken over the four days the development site was surveyed. Potential nesting tree hollows were observed at dusk for a 20-minute period on 24 and 25 October 2018 to see if they were utilised by this species or other birds. The weather during the survey period was clear with little wind with a maximum daytime temperature in the mid-20°C.

SURVEY RESULTS

A flock of 10 Superb Parrots was observed flying over the development site on 9 August 2018. Only one tree within the development site contains hollows larger than 10cm that are suitable for Superb Parrot. No activity was observed around this tree. This hollow bearing tree is being avoided by the proposal. Thus, it is unlikely any breeding superb parrots would occur within the development site as the development site provides foraging habitat only.

White-bellied Sea-eagle

SURVEY EFFORT

Opportunistic surveys were undertaken over the four days the development site was surveyed. Tall trees within the development area were checked for stick nests on 24 and 25 October 2018. The weather during the survey period was clear with little wind with a maximum daytime temperature in the mid-20°C.

SURVEY RESULTS

Two small stick nests were observed on 25 October 2018 in the Yellow Box – River Red Gum Woodland, one occupied by Australian Ravens (*Corvus coronoides*) and one by Australian Magpies (*Gymnorhina tibicen*). One White-bellied Sea-eagle was observed high in the sky, circling over grassland of the development site, on the 10th August 2018. No large stick nests that could be used by a raptor were observed in the development site. Thus, it is unlikely any breeding White-bellied Sea-eagle occurs within the development site and the development site provides foraging habitat only.

Koala

SURVEY EFFORT

Eucalyptus trees within the development area were surveyed twice on 10 August 2018 and 25 October 2018 by checking around the base of each tree for scats and characteristic scratches. A total of 2 hours was spent surveying around the trees. The weather during the August survey was cold and overcast but fine. Weather during the October survey was clear, with a maximum in the mid-20°C, with very little wind.

SURVEY RESULTS

There was no evidence observed that koalas were or have recently been within the development area.

Sloane's Froglet

SURVEY EFFORT

A survey for Sloane's Froglet was carried out over two mornings on 9 and 10 August 2018 consisting of frog call playback at three dams and four irrigation canals within the development area. Each session lasted 2.5 hours, for a total of 5 hours of survey effort comprising three separate points at each dam and 200m transects along the canal. The weather on both days was sunny with no rain. Surveys were undertaken in accordance with the *Threatened species survey and assessment guidelines: field survey methods for Amphibians* (DECC, 2009) and Bionet Threatened Species Database (OEH, 2018).

SURVEY RESULTS

No Sloane's Froglets responded to the frog call playback at any of the locations surveyed. The Beeping Froglet (*Crinia parinsignifera*) was heard at various survey points and did respond to playback of their respective calls.

Southern Bell Frog

SURVEY EFFORT

A survey for the Southern Bell Frog was carried out over two nights on 24 and 25 October 2018 consisting of frog call playback at two dams (the third was dry) and four irrigation canals within the development area. Each session lasted 3.5 hours, for a total of 7 hours of survey effort comprising two separate points at each dam and 200m transects along the canal. The weather on both nights was clear with no wind and a full moon. Surveys were undertaken in accordance with the *Threatened species survey and assessment guidelines: field survey methods for Amphibians* (DECC, 2009) and Bionet Threatened Species Database (OEH, 2018).

SURVEY RESULTS

No Southern Bell Frogs responded to the frog call playback at any of the locations surveyed. Other frog species such as the Beeping Froglet (*Crinia parinsignifera*), Spotted Marsh Frog (*Limnodynastes tasmaniensis*), Barking Frog (*Limnodynastes fletcheri*) and Peron's Tree Frog (*Litoria peronii*) were heard at various survey points and did respond to playback of their respective calls.

Flora:

Mossgiel Daisy (*Brachyscome papillosa*), Claypan Daisy (*Brachyscome muelleroides*), Bindweed (*Convolvulus tedmoorei*), Winged Peppergrass (*Lepidium monoplacoides*), Lanky Buttons (*Leptorhynchus orientalis*), Chariot Wheels (*Maireana cheelii*) Austral Pillwort (*Pilularia novae-hollandiae*), Slender Darling Pea (*Swainsona murrayana*) & Silky Swainson-pea (*Swainsona sericea*).

SURVEY EFFORT

Suitable habitat for the threatened flora occurs in the Native Grassland (PCT 44) along Houghton Road. This area was surveyed in the form of transects every 10m over the entire grassland area. This is in accordance with the *NSW Guide to Surveying Threatened Plants* (OEH, 2016). Areas of damp depressions were surveyed more intensely for Austral Pillwort. Five biometric plots were also undertaken in this area covering a thorough 20m by 20m area surveyed for flora. The surveys were undertaken over 24 and 25 October 2018, with an additional area on the southern side of Houghton Road surveyed on 26 November 2018.

SURVEY RESULTS

No candidate flora species were recorded during the survey. One convolvulus species was detected in abundance throughout the grassland. It was sent to the herbarium for confirmation and determined that the species was *Convolvulus angustissimus*, which is a common and widespread species with no conservation status.

Flora: Small Scurf Pea (*Cullen parvum*)

SURVEY EFFORT

Suitable habitat for the threatened flora occurred in the Native Grassland (PCT 44) along Houghton Road. The survey was undertaken over 24 and 25 October 2018, with an additional area on the Southern side of Houghton Road surveyed on 26 November 2018. Surveys were not undertaken during the optimal survey time between December and February when the species is flowering.

SURVEY RESULTS

This species was not surveyed during the targeted survey period and as such is assumed to occur on site. The area of impact is determined as the area of native grassland (PCT 44) that would be impacted.

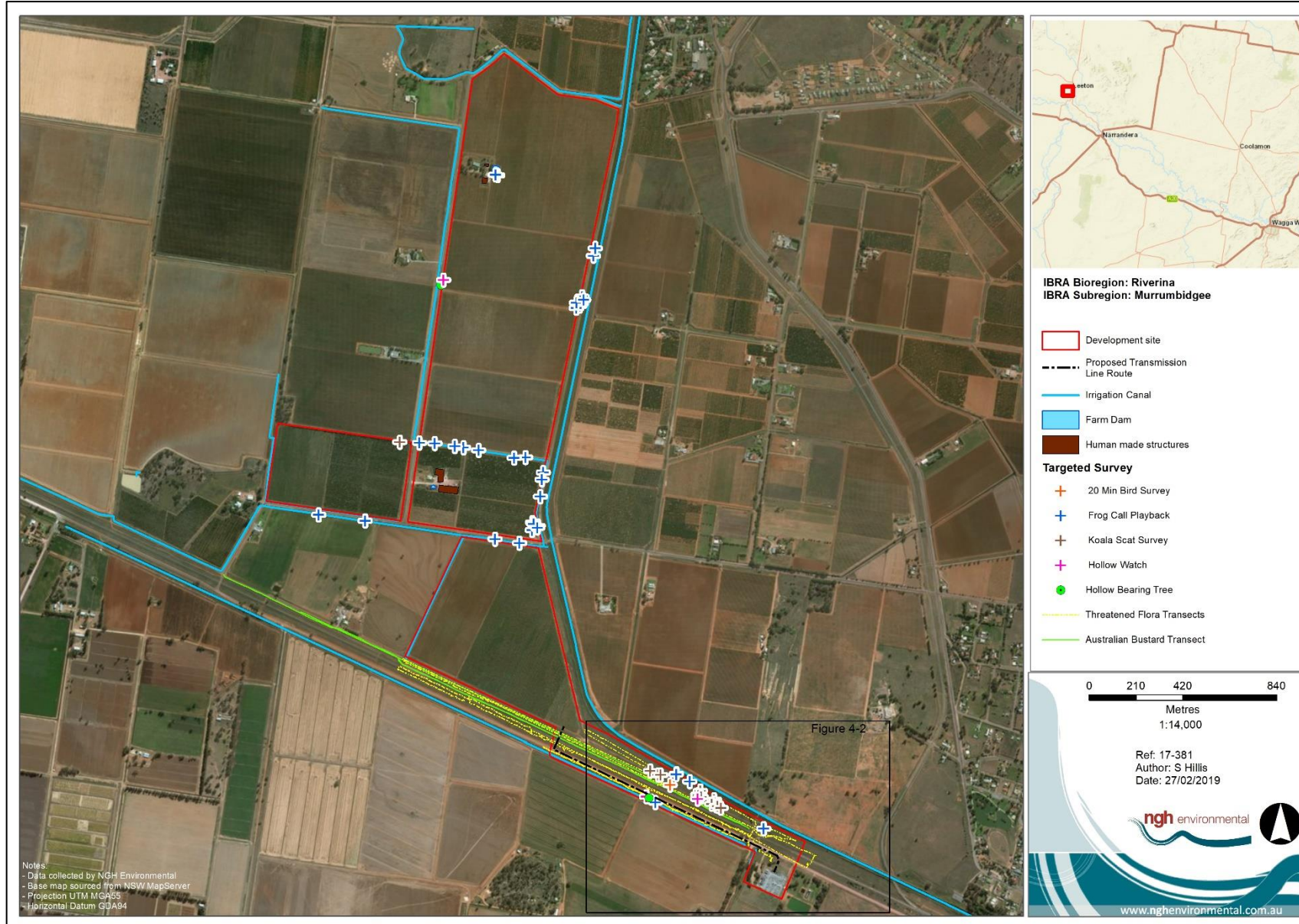


Figure 4-1 Threatened species polygons and targeted survey locations.

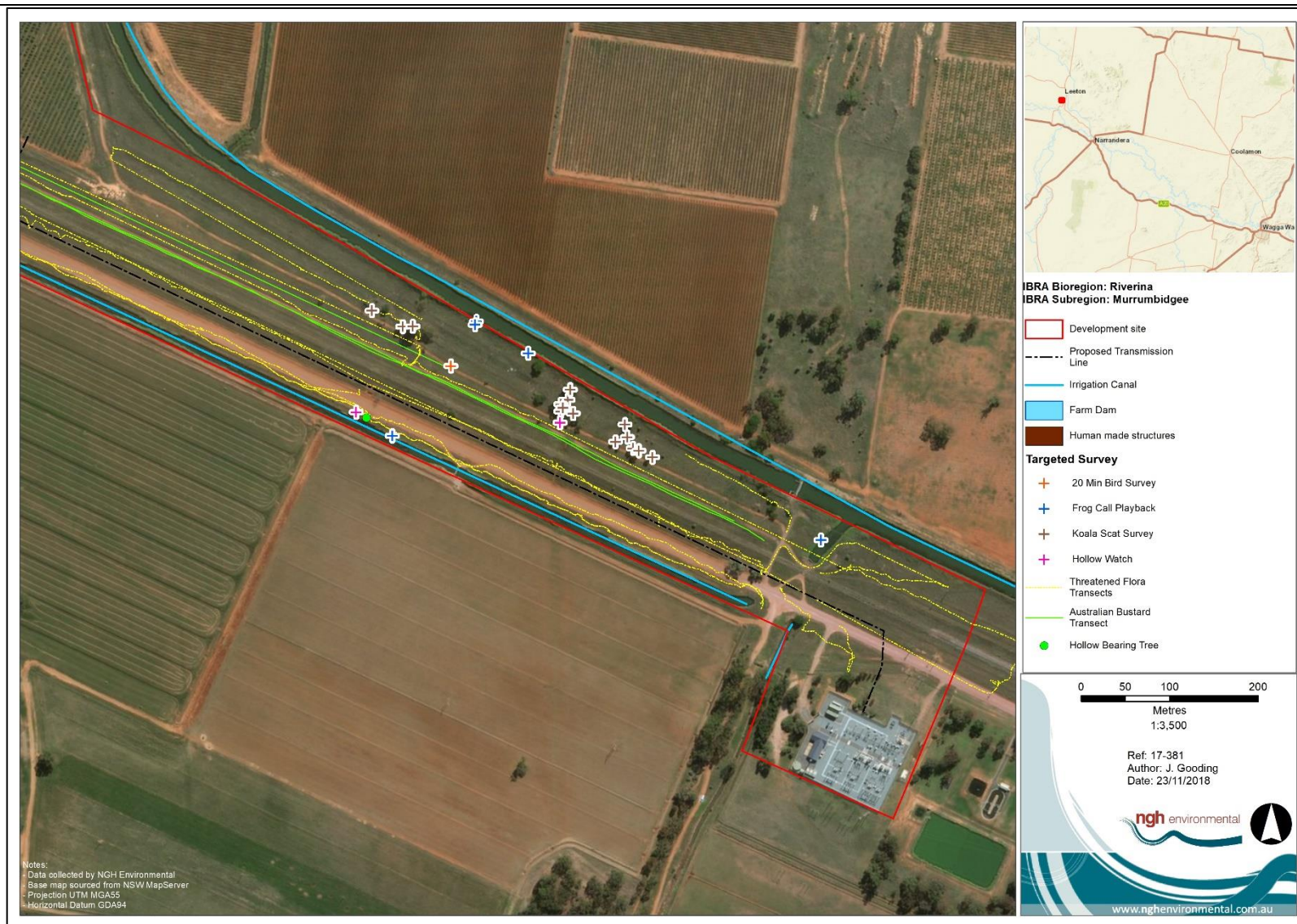


Figure 4-2 Threatened species polygons and targeted survey locations along transmission line route

4.3 ADDITIONAL HABITAT FEATURES RELEVANT TO PRESCRIBED BIODIVERSITY IMPACTS

4.3.1 Occurrences of karst, caves, crevices and cliffs

As verified by the field inspection, there are no occurrences of karst, caves, crevices, or cliffs in the development site.

4.3.2 Occurrences of rock

As verified by the field inspection, there are no occurrences of surface rock in the development site.

4.3.3 Occurrences of human made structures and non-native vegetation

There are several human-made structures on the subject land. There are three farm dams, which provide potential habitat for Sloane's Froglet and Southern Bell Frog. These species were not recorded during targeted surveys. There are two farm buildings, which provide potential roosting habitat for Southern Myotis but will not be removed by the proposed works (Fig 4-1).

Areas of non-native vegetation are planted orange orchards or vineyards. These areas could be utilised by threatened species such as the Grey-headed Flying-fox or raptors such as the White-bellied Sea-eagle as foraging habitat.

4.3.4 Hydrological processes that sustain and interact with the rivers, streams and wetlands

There is a system of irrigation channels and farm dams across the subject land which interact with natural watercourses, including the Murrumbidgee River to the south. Although modified, these features are fringed with native vegetation including sedges. These channels and dams could provide habitat for:

- Sloane's Froglet (*Crinia sloanei*)
- Southern Bell Frog (*Litoria raniformis*)

Neither of these species was detected during targeted site surveys.

No irrigation channels would be removed by the proposed development. Two farm dams would be filled by the proposal. The proposed impacts to these dams are not anticipated to have any broader impacts to environments that sustain and interact with rivers, streams, and wetlands whether on or off-site.

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC Protected Matters Report was generated on 13 September 2018 (with a 10km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (Appendix D). Those relevant to biodiversity include:

- Wetlands of International Importance
- Threatened Ecological Communities
- Threatened species
- Migratory species

The potential for these MNES to occur at the development site are discussed below.

5.1 WETLANDS OF INTERNATIONAL IMPORTANCE

Five wetlands of international importance were returned in the Protected Matters report. The nearest of these (within the locality of the development site) are the Fivebough and Tuckerbil swamps. All other wetlands returned from the search are over 300km away. Fivebough and Tuckerbil swamps occur around 5km north-east of the development site. They are fed by the Murrumbidgee River. There is no apparent connectivity between the Yanco development site and the Murrumbidgee River.

5.2 THREATENED ECOLOGICAL COMMUNITIES

Four threatened ecological communities were identified in the PMST report. Two of these communities, Weeping Myall Woodlands and White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland have the potential to occur within the development site based on characteristic species occurring in close proximity to the development site.

Weeping Myall Woodlands

The patch of Weeping Myall Woodland is not considered to form part of the federally listed EEC as it does not meet the condition thresholds for the community (TSSC, 2009). The patch of Weeping Myall Woodland is less than 0.5ha and is not included as part of the listed ecological community.

Box Gum Woodlands

The patch of Yellow Box – River Red Gum grassy riverine woodland is not considered to form part of the federally listed CEEC. The patch does not meet the condition thresholds for the community (TSSC, 2006) as it has:

- less than 12 native understory species (excluding grasses), and
- is not greater than 2ha in area.

The surrounding grassland could have the potential to be a derived native grassland for this community, however it also does not meet the condition threshold for the community as it has:

- less than 12 native understory species (excluding grasses), and
- has less than 20 trees per hectare and no natural regeneration of eucalyptus species.

Natural Grasslands of the Murray Valley Plains

PCT 44 (*Forb-rich Speargrass – Windmill Grass - White Top grassland of the Riverina Bioregion*) can be associated with the federally listed EEC: Natural Grasslands of the Murray Valley Plains. The grassland is not considered part of the EEC based on the following factors.

- It falls outside the indicative distribution map (SEWPaC, 2012)
- Based on the wooded areas and scattered remnant trees in the close vicinity, is more likely to be a derived grassland from PCT 26 or PCT 74.
- Only one species is present that is listed as frequent in natural grasslands of the Murray Valley Plains (SEWPaC, 2012), and
- There are no past records of diagnostic indicator fauna species such as plains wanderer.

No federally listed threatened ecological communities are considered to occur in the development site.

5.3 THREATENED SPECIES

The PMST report identified 21 threatened species with potential to occur in the locality. Of these, 7 species are considered to potentially occur at the development site. Bold entries were targeted during onsite surveys:

- **Superb Parrot (*Polytelis swainsonii*) – Vulnerable, EPBC Act**
- Swift Parrot (*Lathamus discolor*) – Critically Endangered, EPBC Act
- Painted Honeyeater (*Grantiella picta*) – Vulnerable, EPBC Act
- **Australasian Bittern (*Botaurus poiciloptilus*) – Endangered, EPBC Act**
- **Southern Bell Frog *Litoria raniformis* – Vulnerable, EPBC Act**
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable, EPBC Act
- **Koala (*Phascolarctos cinereus*) – Vulnerable, EPBC Act**

5.4 MIGRATORY SPECIES

Twenty migratory species were identified in the PMST report. Of these, five could potentially occur in the development site based on an assessment of habitat and distribution:

- Fork-tailed Swift (*Apus pacificus*) – Migratory, EPBC Act
- Yellow Wagtail (*Motacilla flava*) – Migratory, EPBC Act
- Satin Flycatcher (*Myiagra cyanoleuca*) – Migratory, EPBC Act
- Wood Sandpiper (*Tringa glareola*) – Migratory, EPBC Act
- Latham's Snipe (*Gallinago hardwickii*) – Migratory, EPBC Act

Based on targeted surveys and evaluation of habitat, none of these species are considered likely to occur in the development site regularly or rely on the habitats present. The proposal is therefore unlikely to have a significant impact on these species.

6 AVOID AND MINIMISE IMPACTS

6.1 AVOIDING AND MINIMISING IMPACTS ON NATIVE VEGETATION AND HABITAT

6.1.1 Site selection – consideration of alternative locations/routes

During the site selection process for Yanco Solar Farm, a number of alternative locations were considered. Ib Vogt selected the proposed site for the following reasons:

- Excellent solar exposure
- Excellent access to local and major roads
- Excellent access to the grid transmission network
- Likely low level of environmental impact – the site has been largely cleared and heavily disturbed by agriculture

The development footprint is of a scale that allows for flexibility in the design, allowing ecological and other constraints to be avoided.

6.1.2 Proposal components – consideration of alternate modes or technologies

The Large-Scale Renewable Energy Target (LRET) and Renewable Energy Action Plan (REAP) outline the commitment by both Australia and NSW to reduce greenhouse gas (GHG) emissions and set targets for increasing the supply of renewable energy. Other forms of large-scale renewable energy accounted for in the LRET include wind, hydro, biomass, and tidal energy. The feasibility of wind, solar, biomass, hydro and tidal projects depend on the availability of energy resources and grid capacity.

Photovoltaic solar technology was chosen because it is cost-effective, low profile, durable and flexible regarding layout and siting. It is a proven and mature technology which is readily available for broad-scale deployment at the site. In terms of its impacts on biodiversity, PV solar has a minimal construction footprint, mounts being either pile driven or on small footings. The largest footprint components are the perimeter track and inverter and switch station footings. The layout can be flexible to minimising impacts on site constraints.

6.1.3 Proposal planning phase – detailed design

A Preliminary Constraints Analysis was conducted by NGH Environmental (2018) which informed the site layout design. Vegetation constituting the highest ecological constraints such as forming components of EECs and providing threatened flora and fauna habitat were avoided and minimised as far as practical by:

- Refining the layout to avoid vegetation clearing whenever possible, reducing the clearing footprint of the project
- Locating ancillary facilities in areas with minimal biodiversity values
- Making provision for the demarcation, ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site.

The final site layout and location has not been able to completely avoid all areas of biodiversity value because the transmission line is required to cross the road corridor to get to the closest substation.

However, the transmission line route was selected over disturbed areas of grassland and avoided clearing the woodland areas (PCT 74).

The final design footprint is detailed in Figure 6-1 and Figure 6-2

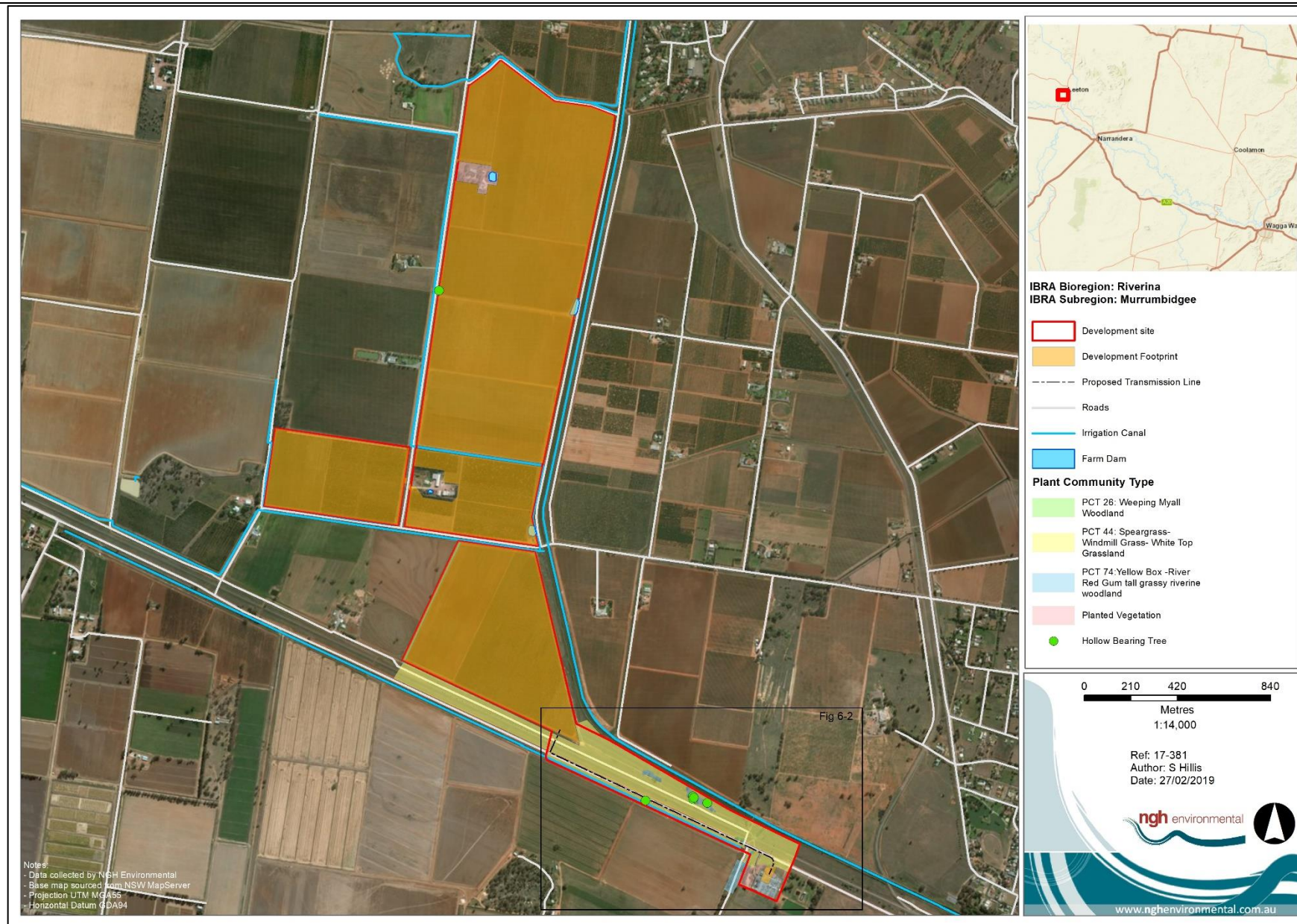


Figure 6-1 Final Project Footprint

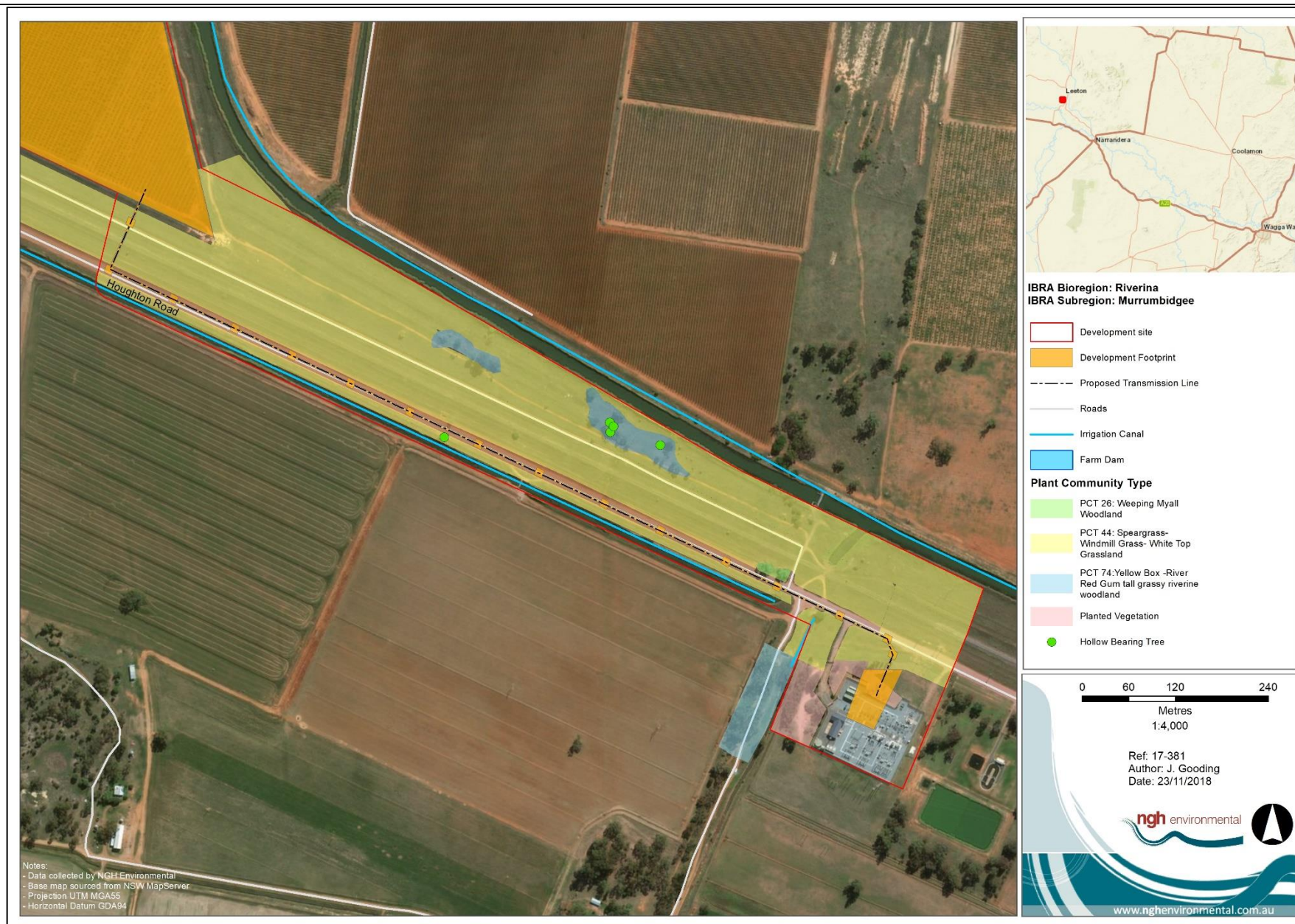


Figure 6-2 Final project footprint along transmission line route

6.2 AVOIDING AND MINIMISING PRESCRIBED BIODIVERSITY IMPACTS

The BC Regulation (clause 6.1) identifies actions that are prescribed as impacts to be assessed under the biodiversity offsets scheme.

The following prescribed impacts are relevant to the proposal:

- Impacts of development on the habitat of threatened species or ecological communities associated with human made structures, or non-native vegetation
- Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
- Impacts of development on movement of threatened species that maintains their life cycle
- Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities
- Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

How these prescribed impacts have been avoided and minimised by the proposal is detailed below.

6.2.1 Impacts of development on the habitat of threatened species or ecological communities associated with human-made structures, or non-native vegetation

The farm dams across the development site could provide potential habitat for Sloane's Froglet and Southern Bell Frog, and would be disturbed by the proposed development. However, targeted surveys at each dam did not detect these species, and so the development is not likely to impact their habitat.

Farm buildings (shown in Figure 4-1) provide potential roosting habitat for Southern Myotis. The development footprint of the proposal was selected to avoid impacts to this man-made habitat.

There are also planted areas of non-native vegetation which may be utilised as foraging habitat by threatened species such as White-bellied Sea-eagle and Grey-headed Flying Fox. These areas would be removed by the proposed development.

6.2.2 Impacts of development on the connectivity of different areas of habitat of threatened species that facilitate the movement of these species across the range

The majority of development has been cleared and there are no significant connectivity features in or adjacent to the development site.

The irrigation channels provide some aquatic connectivity. The development footprint would not impact these channels, which would allow aquatic connectivity to be maintained across the landscape.

6.2.3 Impacts of development on movement of threatened species that maintains their life cycle

There are no significant connectivity features in or adjacent to the development site, and so the movement of threatened species that maintains their life cycle is not likely to be impacted.

6.2.4 Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities

The development site contains four farm dams and several irrigation channels. These features are involved in existing agricultural activities on the subject land, and so water quality is likely already low. The natural hydrology of the site has been largely replaced by irrigation and drainage channels, and storage dams. There would be no removal of irrigation channels throughout the proposal site, but two dams would be disturbed. Targeted surveys found no evidence that these dams sustain any threatened species or ecological communities.

6.2.5 Impacts of vehicle strikes on threatened species or on animals that are part of a TEC

The proposal would not directly increase impacts of vehicle strikes on threatened species. Threatened species would not be funnelled into transport corridors. However, an increase in vehicle traffic may indirectly increase vehicle strikes on threatened species such as the Superb Parrot. Site design would be unlikely to reduce impacts to vehicle strikes as these species generally fly above the canopy. Site management to enforce and reduce site speed limits would minimise impacts of vehicle strikes.

7 IMPACTS UNABLE TO BE AVOIDED

7.1 DIRECT IMPACTS

The construction and operational phases of the proposal has the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts such as habitat clearance and installation and existence of infrastructure.

Table 7-1 Potential impacts to biodiversity during the construction and operational phases.

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities (e.g. solar infrastructure, transmission lines, compound sites, stockpile sites, access tracks)	0.54ha	Regular	Construction	<ul style="list-style-type: none"> • Direct loss of native flora and fauna habitat • Potential over-clearing of habitat outside proposed development footprint • Injury and mortality of fauna during clearing of fauna habitat and habitat trees • Disturbance to stags, fallen timber, and bush rock
Displacement of resident fauna	Unknown	Regular	Construction, operation	<ul style="list-style-type: none"> • Direct loss of native fauna • Decline in local fauna populations
Injury or death of fauna	Unknown	Regular	Construction	<ul style="list-style-type: none"> • Direct loss of native fauna • Decline in local fauna populations
Removal of habitat features e.g. HBTs	0.54ha	Regular	Construction	<ul style="list-style-type: none"> • Direct loss of native fauna habitat • Injury and mortality of fauna during clearing of habitat features
Shading by solar infrastructure	128ha (70% of solar array)	Regular	Operation, long-term	<ul style="list-style-type: none"> • Modification of native fauna habitat • Potential loss of groundcover resulting in unstable ground surfaces and sedimentation of adjacent waterways
Existence of permanent solar infrastructure	183ha	Regular	Operation, long-term	<ul style="list-style-type: none"> • Modification of habitat beneath array (mostly exotic) • Reduced fauna movements across landscape due to fencing • Collision risks of fencing to birds and microbats

7.1.1 Changes in vegetation integrity scores

The changes in vegetation integrity scores as a result of clearing are documented for each vegetation zone in Table 7-2 below.

Table 7-2 Table of current and future vegetation integrity scores for each vegetation zone within the development site.

Zone ID	PCT	EEC and/or threatened species habitat?	Area (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
1	44	No	0.49	36.4	0
2	26	Myall Woodlands in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes EEC	0.05	86.5	0

7.1.2 Loss of species credit species habitat or individuals

The loss of species credit species habitat or individuals as a result of clearing is documented in Table 7-3 below.

Table 7-3 Summary of species credit species loss at the development site.

Species Credit Species	Biodiversity risk weighting	Area of habitat or count of individuals lost
Small Scurf Pea <i>Cullen parvum</i>	2.00	0.54ha

7.1.3 Loss of hollow-bearing trees

Six Hollow-bearing Trees (HBTs) were recorded within the development site (Table 7-4). All HBTS have been avoided by the development and no HBTS would need to be removed.

Table 7-4 Hollow Bearing Trees within the development site

ID	Species	DBH (cm)	No of Hollows (#)				Impacted by proposal
			Small (<10cm)	Medium (10-20cm)	Large (>20cm)	Fissure	
1	Bimble Box (E. <i>populnea</i>)	159	-	1	2	-	No
2	Bimble Box (E. <i>populnea</i>)	30	1	-	-	1	No
3	Bimble Box (E. <i>populnea</i>)	50	1	-	-	-	No

4	Bimble Box (E. <i>populnea</i>)	65	1	-	-	-	No
5	Kurrajong (<i>Brachychiton populneus</i>)	20	1	-	-	-	No
6	Bimble Box (E. <i>populnea</i>)	150	2	2	1	-	No

7.2 INDIRECT IMPACTS

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise. Table 7-5 below details the type, frequency, intensity, duration and consequence of the direct and indirect impacts of the proposal.

Given the current condition of the site, the following indirect impacts are unlikely to occur or be exacerbated as a result of the development;

- Inhibition of nitrogen fixation and increased soil salinity
- Wood collection
- Bush rock removal and disturbance
- Increase in predatory species populations
- Increase in pest animal populations
- Increased risk of fire
- Loss of breeding habitat
- Disturbance to specialist breeding and foraging habitat
- Reduced viability of adjacent habitat due to edge effects
- Reduced viability of adjacent habitats due to noise, dust or light spill
- Increased risk of starvation, exposure and loss of shade or shelter

Table 7-5 Potential impacts to biodiversity during the construction and operation phases.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)					
Inadvertent impacts on adjacent habitat or vegetation	Unknown	Rare	Construction Short-term	<ul style="list-style-type: none"> Myall Woodland TEC 	<ul style="list-style-type: none"> Direct loss of native flora and fauna habitat Injury and mortality of fauna during clearing of fauna habitat and habitat trees Disturbance to stags, fallen timber, and bush rock Increased edge effects
Reduced viability of adjacent habitat due to edge effects	Unknown	Constant	Operation Long-term	<ul style="list-style-type: none"> Myall Woodland TEC 	<ul style="list-style-type: none"> Degradation of Myall Woodland TEC Loss of native flora and fauna habitat
Reduced viability of adjacent habitat due to noise, dust or light spill	Unknown	Rare	Operation Short-term	<ul style="list-style-type: none"> Superb Parrot 	<ul style="list-style-type: none"> May alter fauna activities and/or movements Loss of foraging or breeding habitat Inhibit the function of plant species, soils and dams
Transport of weeds and pathogens from the site to adjacent vegetation	Unknown	Irregular	Construction / operation Long-term	<ul style="list-style-type: none"> Myall Woodland TEC 	<ul style="list-style-type: none"> Degradation of Myall Woodland TEC Weed establishment and spread
Increased risk of starvation, exposure and loss of shade or shelter	Unknown	Rare	Construction / operation Long-term	<ul style="list-style-type: none"> Superb Parrot 	<ul style="list-style-type: none"> Loss of foraging habitat
Loss of breeding habitats	1 HBT	Constant	Construction Long-term	<ul style="list-style-type: none"> Superb Parrot 	<ul style="list-style-type: none"> Loss of potential breeding habitat Potential decline in bioregional population
Earthworks mobilisation and of sediments	Unknown	Regular	Construction	<ul style="list-style-type: none"> Myall Woodland TEC 	<ul style="list-style-type: none"> Erosion and sedimentation and/or pollution of soils, dams and downstream habitats
Trampling of threatened species of flora	Unknown	Unknown	Construction	<ul style="list-style-type: none"> Small Scurf Pea 	<ul style="list-style-type: none"> Loss of native flora habitat

7.3 PRESCRIBED IMPACTS

The following prescribed biodiversity impacts are relevant to the proposal:

- Impacts of development on the habitat of threatened species or ecological communities associated with human made structures, or non-native vegetation
- Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range
- Impacts of development on movement of threatened species that maintains their life cycle
- Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities
- Impacts of vehicle strikes on threatened species or on animals that are part of a TEC.

These are discussed in detail below and the necessary information required by Section 9.2 of the BAM provided.

7.3.1 Impacts of development on the habitat of threatened species or ecological communities associated with human-made structures, or non-native vegetation

The farm dams across the development site could provide potential habitat for Sloane's Froglet and Southern Bell Frog and would be removed by the proposed development. However, targeted surveys at each dam did not detect these species, and so the development is not likely to impact these species.

Farm buildings (Figure 4-1) provide potential roosting habitat for Southern Myotis. The development footprint of the proposal was selected to avoid impacts to this man-made habitat. There would be some short-term, indirect disturbance associated with construction.

3.15ha of planted native vegetation that does not form part of a PCT occurs in the development site. This included a single row of *Casuarina cunninghamiana* (River She-oak) planted as a windbreak. Planted vegetation may still provide habitat for threatened native species. Targeted surveys for threatened species did not detect any threatened species in this habitat. This vegetation would be avoided by the development.

Areas of non-native vegetation such as orange orchards and vineyards, which may be utilised as foraging habitat by threatened species such as White-bellied Sea-eagle and Grey-headed Flying Fox, would be removed by the proposed development. Based on the abundance of food sources that would remain in the development site, the proposal is not likely to impact on the bioregional persistence of White-bellied Sea-eagle or Grey-headed Flying-fox.

7.3.2 Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range

There are no significant connectivity features in or adjacent to the development site. The irrigation channels provide some aquatic connectivity, however the development footprint would not impact these channels, which would allow aquatic connectivity to be maintained across the landscape. The proposal is therefore not likely to impact on the bioregional persistence of threatened species.

7.3.3 Impacts of the development on movement of threatened species that maintains their life cycle

There are no significant connectivity features in or adjacent to the development site, and so the movement of threatened species that maintains their life cycle is not likely to be impacted.

Superb Parrots remain in the Riverina area year-round, where they nest in the hollows of large trees in open box-gum woodland or isolated paddock trees, including Blakely's Red Gum, Yellow Box, Apple Box and Red Box (OEH, 2018). The White-bellied Sea Eagle is wide ranging and forages over rivers and wetlands.

The habitat to be removed is not likely to be important to the life cycle of these species, given their high mobility (described in Section 7.3.1) and the minimal proportion of habitat to be removed. The proposal is therefore not likely to disrupt the movement of these species and would not have a substantive impact on their bioregional persistence.

7.3.4 Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including subsidence or upsidence resulting from underground mining or other development)

The development site contains four farm dams and several irrigation channels. These features are involved in existing agricultural activities on the subject land, and so water quality is likely already low. The natural hydrology of the site has been largely replaced by irrigation and drainage channels, and storage dams. There would be no removal of irrigation channels throughout the proposal site, but two dams would be impacted. Targeted surveys found no evidence that these dams sustain any threatened species or ecological communities, and so the proposed development is not likely to impact their bioregional persistence.

Construction of the proposal would not directly affect surface water quality. Indirectly, the proposed works would involve a range of activities that would disturb soils and potentially lead to sediment-laden runoff, affecting local water ways during rainfall events. These potential impacts are unlikely to significantly impact water quality. The use of fuels and other chemicals on site pose a risk of surface water contamination in the event of a spill. Chemicals used onsite would include fuels, lubricants and herbicides, none of which are considered difficult to manage.

Operation of the proposal would have minimal potential for any impact to surface water quality. Appropriate drainage features would be constructed along internal access roads to minimise the risk of dirty water leaving the site or entering waterways. With the exception of internal roads, parking areas and areas around site offices, the site would be largely vegetated with grass cover (specifically, ground cover would be maintained beneath the solar array). There would be a low risk of contamination in the event of a chemical spill (fuels, lubricants, herbicides etc.) as storage and emergency handling protocols would be implemented.

7.3.5 Impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC

The proposal would not directly increase impacts of vehicle strikes on threatened species. Threatened species would not be funnelled into transport corridors. However, an increase in vehicle traffic may indirectly increase vehicle strikes on threatened species such as the Superb Parrot. Site design would be unlikely to reduce impacts to vehicle strikes as these species generally fly above the canopy. Site management to enforce and reduce site speed limits would minimise impacts of vehicle strikes.

Superb Parrots have been recorded on site and so may be at risk of vehicle strike. Superb Parrots are particularly vulnerable to vehicle strike when feeding on spilled grain along roadsides (Baker-Gabb, 2011). Superb Parrots recorded during site inspections were flying above the canopy, well above vehicle height.

Mitigation measures will be implemented to enforce a site speed. With the recommended mitigation measures, it is therefore not likely that vehicles associated with the proposal will have a substantive impact on this species.

7.4 IMPACTS TO MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Threatened Fauna

One EPBC-listed species was recorded during the field surveys, Superb Parrots seen flying above the canopy in the south of the development site (transmission line route). Habitat for this species in the development site is primarily limited to isolated hollow-bearing paddock trees, which provide low-quality foraging, shelter, and nesting habitat.

Seven threatened fauna species and five migratory birds identified in the PMST report are considered to have the potential to occur in the development site, including:

- Superb Parrot (*Polytelis swainsonii*) – Vulnerable, EPBC Act
- Swift Parrot (*Lathamus discolor*) – Critically Endangered, EPBC Act
- Painted Honeyeater (*Grantiella picta*) – Vulnerable, EPBC Act
- Australasian Bittern (*Botaurus poiciloptilus*) – Endangered, EPBC Act
- Southern Bell Frog (*Litoria raniformis*) – Vulnerable, EPBC Act
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable, EPBC Act
- Koala (*Phascolarctos cinereus*) – Vulnerable, EPBC Act
- Fork-tailed Swift (*Apus pacificus*) – Migratory, EPBC Act
- Yellow Wagtail (*Motacilla flava*) – Migratory, EPBC Act
- Satin Flycatcher (*Myiagra cyanoleuca*) – Migratory, EPBC Act
- Wood Sandpiper (*Tringa glareola*) – Migratory, EPBC Act
- Latham's Snipe (*Gallinago hardwickii*) – Migratory, EPBC Act

EPBC Assessments of Significance were completed for each of these species. These concluded that a significant impact was unlikely, on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of any species
- Introduce invasive species harmful to any species
- Introduce disease that would cause any species to decline
- Interfere with the recovery of these species

Specific mitigation measures have been recommended in Section 8.1 to avoid impacts to these species. With the implementation of these measures, impacts to these species are unlikely and no further assessment is required.

A referral to the federal Department of Environment and Energy is not considered necessary.

The EPBC Referral Guidelines for the Koala (DoE 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is provided as Table 7-6 below as it applies to the proposal. Impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the Koala. The assessment in Table 7-6 resulted in a score of 4 and as such habitat within the study area is not considered to be critical to the survival of the Koala and an assessment of significant impact according to the EPBC Act significant impact criteria is not required.

Table 7-6: Koala habitat assessment tool for inland areas (DoE 2014)

Attribute	Score	Inland	Applicable to the proposal?
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	
	+1 (medium)	Evidence of one or more koalas within 2km of the edge of the impact area within the last 10 years.	
	0 (low)	None of the above.	✓
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	✓ River Red Gum, Bimble Box and Yellow Box are listed food tree species
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	
	0 (low)	None of the above.	
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥1000ha.	
	+1 (medium)	Area is part of a contiguous landscape <1000ha, but ≥500ha.	
	0 (low)	None of the above.	✓
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	✓ No Koala mortality observed during the survey
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR Areas which score 0 for koala occurrence and are likely to have some degree of dog or vehicle threat present.	

Attribute	Score	Inland	Applicable to the proposal?
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives outlined in the EPBC Act referral guidelines. (DoE, 2014)	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives outlined in the EPBC Act referral guidelines. (DoE, 2014)	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives outlined in the EPBC Act referral guidelines (DoE, 2014).	✓ Study area is not considered a habitat refuge, nor does it provide important connectivity to large areas surrounding a habitat refuge
Total	4	Decision: Habitat not critical to the survival of the Koala—no assessment of significance required	

Threatened Flora and TECs

No threatened flora or threatened ecological communities are considered to occur within the development site.

A referral to the federal Department of Environment and Energy is not considered necessary.

7.5 LIMITATIONS TO DATA, ASSUMPTIONS AND PREDICTIONS

It is possible that some species were not recorded during the survey due to the timing of the survey outside their recommended survey period. Where survey effort or timing is not consistent with the BAM or relevant guidelines, this is stated explicitly in the assessment and measures identified to address the limitation; i.e. assumption of occurrence for three species whose survey window could not be met.

Floristic plot surveys were undertaken during dry drought conditions and some grasses and forbs were dried up and difficult to identify. Where identification of a plant was uncertain, it was assumed to be native for the purposes of the BAM assessment. The floristic plots are based on a single visit survey and it is possible that not all plant species were detected that may be present at the site due to seasonal and climatic constraints. In particular, inconspicuous or geophytic species which are present outside the surveyed period may not have been recorded and dry drought conditions may have reduced the abundance and cover of forbs and grasses.

8 MITIGATING AND MANAGING IMPACTS

8.1 MITIGATION MEASURES

A general summary of the key measures required to mitigate the impacts of the proposal are provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure and an analysis of the consequences of any residual impacts are provided in Table 8-1.

8.1.1 *Impacts from the clearing of vegetation and habitats*

1. Time works to avoid critical life cycle events.
2. Implement clearing protocols during tree clearing works, including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or wildlife handler.
3. Relocate habitat features (fallen timber, hollow logs) from within the development site.

8.1.2 *Indirect impacts*

1. Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed.
2. Adaptive dust monitoring programs to control air quality.
3. Temporary fencing to protect significant environmental features such as riparian zones.
4. Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas.
5. Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.

8.1.3 *Prescribed impacts*

1. Appropriate landscape plantings of local indigenous species
2. Sediment barriers and spill management protocols to control the quality of water runoff from the site into the receiving environment.
3. Enforce site speed limits to reduce impacts of vehicle strikes on threatened fauna.

Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Time works to avoid critical life cycle events.	<ul style="list-style-type: none"> If clearing outside this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur Dams would be removed in winter to avoid impacts on wetland birds, while Latham's Snipe and Wood Sandpiper are outside Australia, and outside the summer breeding season for Australasian Bittern 	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted
Implement clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecologist or licensed wildlife handler.	<ul style="list-style-type: none"> Pre-clearing checklist Tree clearing procedure 	Construction	Regular	Contractor	Moderate	Species not detected during pre-clearing surveys may be impacted
Relocate habitat features (fallen timber, hollow logs) from within the development site.	<ul style="list-style-type: none"> Tree-clearing procedure including relocation of habitat features to adjacent areas for habitat enhancement 	Construction	Regular	Contractor	Low	None
Indirect impacts on native vegetation and habitat						
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example,	<ul style="list-style-type: none"> Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing 	Construction	Regular	Contractor	Low	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	<ul style="list-style-type: none"> No stockpiling or storage within the dripline of any mature trees In areas to clear which are adjacent to those to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance 					
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	<ul style="list-style-type: none"> Construction Environmental Management Plan will include measures to avoid noise impacts on adjacent habitats such as avoiding night works wherever possible 	Construction	Regular	Contractor	Low	None
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	<ul style="list-style-type: none"> Avoid night works wherever possible Direct lights away from vegetation 	Construction / operation	Regular	Contractor	Low	None
Adaptive dust monitoring programs to control air quality	<ul style="list-style-type: none"> Daily monitoring of dust generated by construction activities Construction to cease if dust is observed being blown from site until control measures were implemented or weather conditions improve All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site 	Construction	Regular	Contractor	Moderate	Sedimentation in water bodies (including irrigation channels)

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Temporary fencing to protect significant environmental features such as riparian zones	<ul style="list-style-type: none"> Prior to construction commencing, exclusion fencing and signage would be installed around habitat to be retained 	Construction	Regular	Contractor	Low	None
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	<ul style="list-style-type: none"> A Weed Management Procedure would be developed for the proposal to prevent and minimise the spread of weeds. This would include: <ul style="list-style-type: none"> Management protocol for declared priority weeds during and after construction. Weed hygiene protocol in relation to plant, machinery and fill. Any occurrences of pathogens such as Myrtle rust and Phytophthora would be monitored, treated, and reported. The weed management procedure would be incorporated into the Biodiversity Management Plan as part of the CEMP. 	Construction / operation	Regular	Contractor	Moderate	Weed invasion/spread
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	<ul style="list-style-type: none"> Site induction Toolbox talks 	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species from staff training not being followed

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Preparation of a vegetation management plan to regulate activity in vegetation and habitat adjacent to the proposed development	<ul style="list-style-type: none"> Preparation of a Biodiversity Management Plan that would include protocols for: <ul style="list-style-type: none"> Protection of native vegetation to be retained Best practice removal and disposal of vegetation Staged removal of hollow-bearing trees and other habitat features such as fallen logs with attendance by ecologist Weed management Unexpected threatened species finds Rehabilitation of disturbed areas 	Construction	One-off	Contractor	Moderate	Impacts to native vegetation or threatened species from Biodiversity Management Plan not being followed
Erosion and sediment controls	<ul style="list-style-type: none"> An Erosion and Sediment Control Plan (ESCP) would be prepared and implemented in conjunction with the final design 	Construction	Regular	Contractor	Moderate	Impacts may occur if ESCP not implemented
Prescribed biodiversity impacts						
Sediment barriers and spill management procedures to control the quality of water runoff from the site into the receiving environment	<ul style="list-style-type: none"> An ESCP would be prepared and implemented in conjunction with the final design. Spill management procedures would be implemented. 	Construction	Regular	Contractor	Moderate	Impacts may occur to waterways if ESCP not implemented.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Staff training and site briefing to communicate impacts of traffic strike on native fauna	<ul style="list-style-type: none"> Awareness training during site inductions regarding enforcing site speed limits. Site speed limits to be enforced to minimise fauna strike. 	Construction, operation	Regular	Contractor	Moderate	Fauna strikes from vehicles
Appropriate landscape plantings of local indigenous species to replace loss of planted vegetation	<ul style="list-style-type: none"> Landscape plantings for screening to be comprised of locally indigenous species. 	Operation	Regular	Client	Moderate	Plants not surviving resulting in net loss of planted vegetation

8.2 ADAPTIVE MANAGEMENT STRATEGY

No adaptive management strategy is proposed for the development.

9 SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

9.1 POTENTIAL SERIOUS AND IRREVERSIBLE IMPACT (SAII) ENTITIES

9.1.1 *Threatened ecological communities*

There are no SAII candidate EECs recorded at the development site.

9.1.2 *Threatened species*

There are no SAII candidate species recorded at the development site.

9.1.3 *Additional potential entities*

No further species or ecological communities were considered to be potential SAII entities.

10 REQUIREMENT TO OFFSET

10.1 IMPACTS REQUIRING AN OFFSET

10.1.1 Ecosystem credits

An offset is required for all impacts of development on PCTs that are associated with:

- a) a vegetation zone that has a vegetation integrity score ≥ 15 where the PCT is representative of an endangered or critically endangered ecological community, or
- b) a vegetation zone that has a vegetation integrity score of ≥ 17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
- c) a vegetation zone that has a vegetation integrity score ≥ 20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset and the ecosystem credits required are documented in Table 10-1 and mapped in Figure 10-1.

Table 10-1 PCTs and vegetation zones that require offsets.

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	44	Forb-rich Speargrass – Windmill Grass - White Top grassland of the Riverina Bioregion.	0.49	36.4	9
2	26	Weeping Myall Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	0.05	86.5	2

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix H.

10.1.2 Species credits

An offset is required for the threatened species impacted by the development that require species credits. These species and the species credits required are documented in Table 10-2.

Table 10-2 Species credit species that require offsets.

Species Credit Species	Biodiversity risk weighting	Area of habitat or count of individuals lost	Species credits required
Small scurf Pea (<i>Cullen parvum</i>)	2.00	0.54ha	11

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix H.

10.1.3 Offsets required under the EPBC Act

No species listed on the EPBC Act have been identified as having the potential to be significantly impacted by the development. As such, the proposal is not considered to require offsets in accordance with the EPBC Offsets Policy.

10.2 AREAS NOT REQUIRING OFFSETS

185ha of exotic vegetation comprising of orange and grape crops would be impacted by the proposal. No threatened species likely to occur in the development site would be dependent on this habitat. Exotic vegetation is not required to be offset and does not require further assessment.

These areas of habitat are mapped in Figure 10-1.

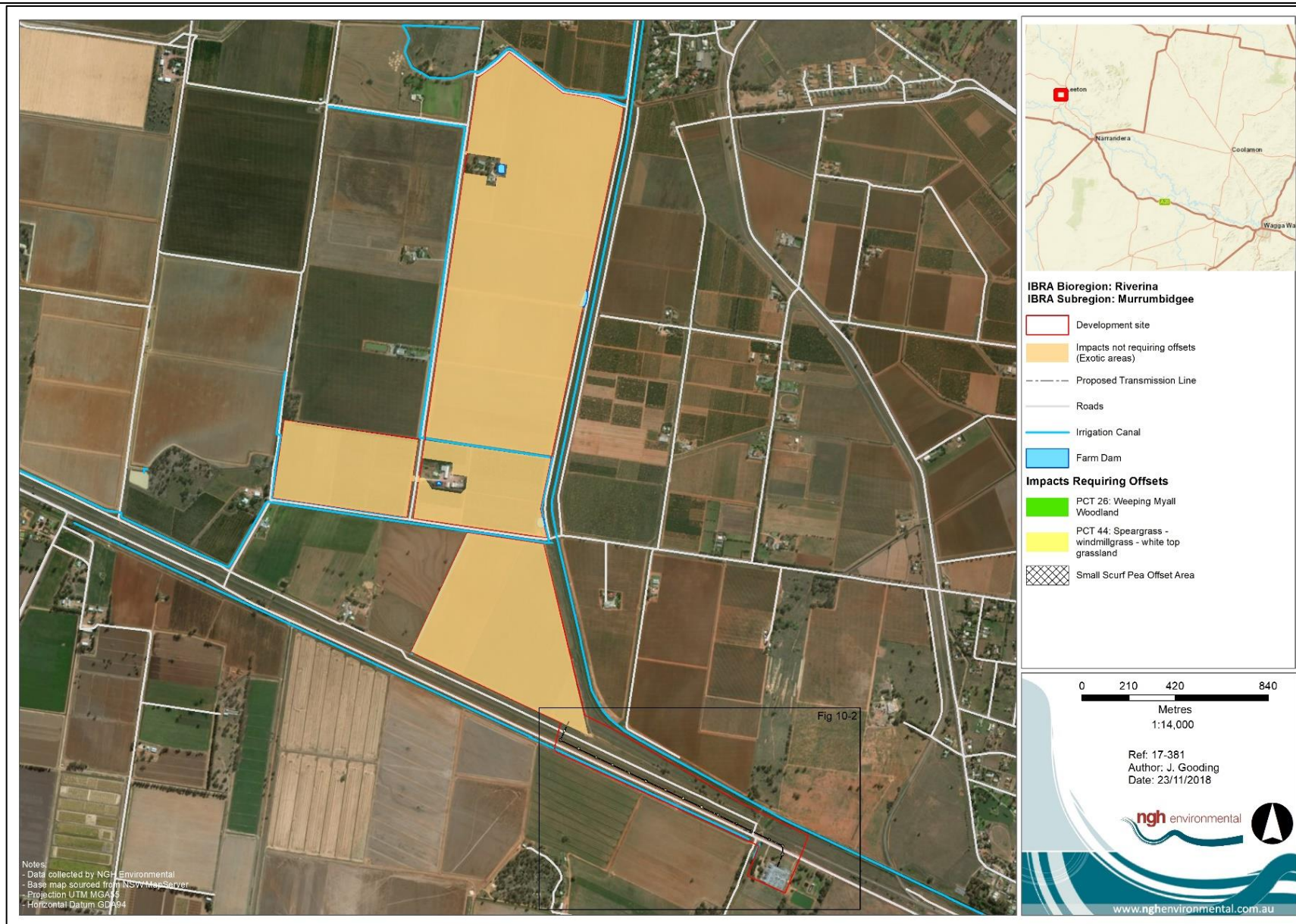


Figure 10-1 Impacts requiring offset, not requiring offset and not requiring assessment.



Figure 10-2 Impacts requiring offsets and not requiring offsets along transmission line route

10.3 SUMMARY OF OFFSET CREDITS REQUIRED

Ecosystem Credits	Offset credits required
PCT 44 – Forb-rich Speargrass – Windmill Grass – White Top grassland of the Riverina Bioregion	9
PCT 26 – Weeping Myall Woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	2
Species Credits	Offset credits required
Small Scurf Pea (<i>Cullen parvum</i>)	11

11 CONCLUSIONS

NGH Environmental has prepared this BDAR on behalf of Ib Vogt for Yanco Solar Farm in Yanco, NSW. The purpose of this BDAR was to address the requirements of the BAM, developed for Major Projects, and to address the biodiversity matters raised in the SEARs. In this BDAR, biodiversity impacts have been assessed through:

- Comprehensive mapping and assessment completed in accordance with the BAM
- The identification of two threatened species within the development site and adjacent vegetation, the impacts of which have been adequately assessed
- Mitigation measures which have been outlined to reduce the impacts to biodiversity
- The generation of 9 Ecosystem Credits within the development site for impacts to (PCT 44) Forb-rich Speargrass – Windmill Grass – White Top grassland of the Riverina Bioregion.
- The generation of 2 Ecosystem Credits within the development site for impacts to (PCT 26) Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion
- The generation of 11 Species credits for impacts to Small Scurf Pea (*Cullen parvum*).

The requirements of these credits will be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Proposals, and will be achieved by either:

- a) Retiring credits under the Biodiversity Offsets Scheme
- b) Making payments into the Biodiversity Conservation Fund
- c) Funding a biodiversity action

12 REFERENCES

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- Office of Environment and Heritage (OEH) (2018) BioNet Threatened Biodiversity Data Collection accessed online at https://www.environment.nsw.gov.au/AtlasApp/UI_Modules/TSM_/Default.aspx
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APPENDIX A PLOT PHOTOS

Plot 1 – PCT 74_Moderate Condition



Plot 2 – PCT 44_Moderate Condition



Plot 3 – PCT 74_Moderate Condition



Plot 4 - PCT 44_Moderate Condition



Plot 5 – PCT 26_Moderate Condition



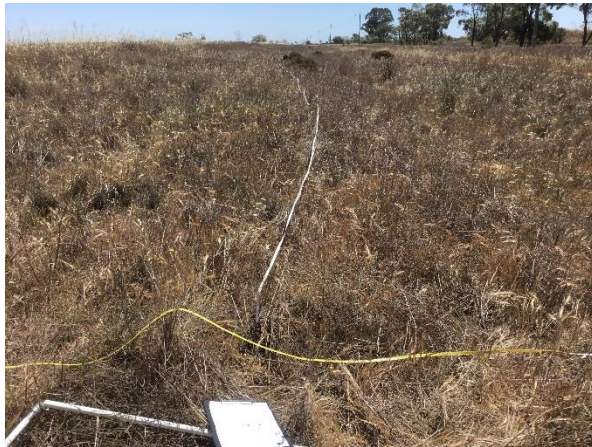
Plot 6 - PCT 26_Roadside



Plot 7 – PCT 44_Moderate Condition



Plot 8 – PCT 44_Moderate Condition



Plot 9 – PCT 44_Moderate Condition



APPENDIX B FLORA SPECIES LISTS

Family	Exotic	Scientific Name	Common Name	PCT 74 Plot 1		PCT 44 Plot 2		PCT 74 Plot 3		PCT 44 Plot 4		PCT 26 Plot 5	
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)
TREES													
Fabaceae (Mimosoideae)		<i>Acacia pendula</i>	Weeping Myall									25	10
Malvaceae		<i>Brachychiton populneus</i>	Kurrajong										
Myrtaceae		<i>Eucalyptus populnea</i> <i>subsp. bimbil</i>	Bimble Box	12	2								
Myrtaceae		<i>Eucalyptus melliodora</i>	Yellow Box			0.1	1	10	1				
Myrtaceae		<i>Eucalyptus camaldulensis</i>	River Red Gum					25	1				
Meliaceae		<i>Melia azedarach</i>	White Cedar					5	6				
SHRUBS													
Fabaceae		<i>Acacia deanei</i>	Deane’s Wattle										
Chenopodiaceae		<i>Atriplex semibaccata</i>	Creeping Saltbush					0.1	10			5	30
Chenopodiaceae		<i>Atriplex suberecta</i>	Sprawling Saltbush										
Chenopodiaceae		<i>Enchylaena tomentosa</i>	Ruby Saltbush	0.1	1			2	10			10	30
Solanaceae	*	<i>Lycium ferocissimum</i>	African Boxthorn					5	8			0.1	1
Chenopodiaceae		<i>Maireana brevifolia</i>	Bluebush							5	25		
Chenopodiaceae		<i>Maireana excavata</i>	Bottle Bluebush									0.2	20
Chenopodiaceae		<i>Rhagodia spinescens</i>	Thorny Saltbush										
Rosaceae	*	<i>Rosa rubiginosa</i>	Sweet Briar										
Chenopodiaceae		<i>Salsola australis</i>	Prickly Saltwort									0.1	5
Chenopodiaceae		<i>Sclerolaena muricata</i>	Black Rolypoly	0.1	1							0.5	5
FORBS													
Asphodelaceae	*	<i>Aloe spp.</i>										2	10
Chenopodiaceae		<i>Atriplex suberecta</i>										2	5

Family	Exotic	Scientific Name	Common Name	PCT 74 Plot 1		PCT 44 Plot 2		PCT 74 Plot 3		PCT 44 Plot 4		PCT 26 Plot 5	
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)
Asparagaceae	*	<i>Asparagus asparagoides</i>	Bridal Creeper										
Nyctaginaceae		<i>Boerhavia dominii</i>	Tarvine									0.1	5
Brassicaceae	*	<i>Brassica spp.</i>	Brassica					0.1	10				
Asteraceae	*	<i>Chondrilla juncea</i>	Skeleton Weed							2	10		
Anthericaceae	*	<i>Chlorophytum comosum?</i>	Spider Plant	1	0.1	20	2	100	1				
Asteraceae	*	<i>Cirsium vulgare</i>	Spear Thistle			0.1	10	0.1	10	0.5	30		
Asteraceae	*	<i>Conyza spp.</i>	A Fleabane	0.1	1								
Boraginaceae	*	<i>Echium plantagineum</i>	Patterson's Curse	0.1	30	0.1	10			0.2	40	0.1	5
Chenopodiaceae		<i>Einadia nutans subsp. nutans</i>	Climbing Saltbush	0.1	2			5	30			8	50
Onagraceae		<i>Epilobium billardierianum</i>	Willow Herb										
Geraniaceae	*	<i>Erodium spp.</i>	Crowfoot							0.1	5		
Euphorbiaceae		<i>Euphorbia drummondii</i>	Caustic Weed										
Boraginaceae	*	<i>Heliotropium europaeum</i>	Potato Weed										
Asteraceae	*	<i>Lactuca serriola</i>	Prickly Lettuce							0.5	10	0.1	1
Brassicaceae	*	<i>Lepidium sp.</i>	Peppercress										
Malvaceae	*	<i>Malva parviflora</i>	Small-flowered Mallow										
Lamiaceae	*	<i>Marrubium vulgare</i>	White Horehound					8	70			0.1	1
Fabaceae (Faboideae)	*	<i>Medicago sativa</i>	Lucerne	2	20			1	20			0.1	5
Fabaceae (Faboideae)	*	<i>Medicago spp.</i>	A Medic			0.1	10						
Oxalidaceae	*	<i>Oxalis pes-caprae.</i>	Soursob			0.1	5			5	1000		
Oxalidaceae		<i>Oxalis perennans</i>		0.1	1								
Plantaginaceae	*	<i>Plantago lanceolata</i>	Lamb's Tongues	2	400			5	200				
Polygonaceae	*	<i>Polygonum aviculare</i>	Wireweed										

Family	Exotic	Scientific Name	Common Name	PCT 74 Plot 1		PCT 44 Plot 2		PCT 74 Plot 3		PCT 44 Plot 4		PCT 26 Plot 5	
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)
Asteraceae		<i>Pseudognaphalium lutealbum</i>	Jersey Cudweed										
Polygonaceae	*	<i>Rumex crispus</i>	Curled Dock	0.1	1					0.1	5		
Polygonaceae	*	<i>Rumex spp.</i>	Dock										
Lamiaceae	*	<i>Salvia verbenaca</i>	Vervain	0.3	20	2	20	1	80	5	100	0.1	1
Malvaceae		<i>Sida corrugata</i>	Corrugated Sida	0.1	10	0.1	1			0.1	10	0.1	20
Solanaceae	*	<i>Solanum elaeagnifolium</i>	Silver-leaved Nightshade	25	300	40	500	1	50	20	200	10	100
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sowthistle							0.1	10		
Asteraceae	*	<i>Taraxacum officinale</i>	Dandelion							0.1	5		
Asteraceae	*	<i>Tragopogon porrifolius</i>	Salsify										
Fabaceae (Faboideae)	*	<i>Trifolium angustifolium</i>	Narrow-leaved Clover							0.1	5		
Fabaceae (Faboideae)	*	<i>Trifolium subterraneum</i>	Subterranean Clover	0.1	1								
Verbenaceae	*	<i>Verbena bonariensis</i>	Purpletop	0.1	5								
Fabaceae (Faboideae)	*	<i>Vicia sativa</i>	Common vetch	0.2	50			0.1	20				
Asteraceae		<i>Vittadinia gracilis</i>	Woolly New Holland Daisy									0.2	20
Asteraceae		<i>Vittadinia spp.</i>	Fuzzweed	0.1	1								
Campanulaceae		<i>Wahlenbergia spp.</i>	Bluebell										
Aizoaceae		<i>Zaleya galericulata</i>	Hogweed									0.1	2
GRASS /GRASSLIKE													
Poaceae		<i>Austrostipa scabra</i>	Speargrass									0.1	5
Poaceae		<i>Austrostipa sp.</i>	Spear Grass	0.2	5					0.5	20	15	200
Poaceae	*	<i>Avena fatua</i>	Wild Oats	5	500	40	1000			40	1000	4	50

Family	Exotic	Scientific Name	Common Name	PCT 74 Plot 1		PCT 44 Plot 2		PCT 74 Plot 3		PCT 44 Plot 4		PCT 26 Plot 5	
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)
Poaceae		<i>Bothriochloa macra</i>	Red Grass	5	40					5	50		
Poaceae	*	<i>Bromus diandrus</i>	Great Brome									10	1000
Poaceae	*	<i>Bromus molliformis</i>	Soft Brome										
Poaceae	*	<i>Bromus spp.</i>	A Brome										
Cyperaceae		<i>Carex spp.</i>								0.1	4		
Poaceae		<i>Chloris truncata</i>	Windmill Grass										
Poaceae		<i>Cynodon dactylon</i>	Common Couch	2	5							0.2	5
Poaceae		<i>Enteropogon acicularis</i>	Curly Windmill Grass	15	80	5	30			3	50		
Juncaceae		<i>Juncus spp.</i>	A Rush										
Poaceae	*	<i>Lolium spp.</i>	A Ryegrass	40	1000	20	1000	5	100			4	1000
Iridaceae	*	<i>Moraea setifolia</i>	Thread Iris										
Poaceae	*	<i>Panicum spp.</i>								0.3	20		
Poaceae		<i>Panicum effusum</i>	Hairy Panic			0.1	10					0.1	10
Poaceae	*	<i>Paspalum dilatatum</i>	Paspalum					2	20				
Poaceae		<i>Paspalidium spp.</i>								30	200	0.1	10
Poaceae	*	<i>Poa annua</i>	Winter Grass							0.1	1		
Iridaceae	*	<i>Romulea rosea var. australis</i>	Onion Grass							0.2	200		
Poaceae		<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass										
Poaceae		<i>Rytidosperma setaceum</i>	Small-flowered Wallaby-grass									5	80
Poaceae		<i>Rytidosperma sp.</i>	Wallaby Grass	5	40			5	50	0.1	4		
Poaceae	*	<i>Vulpia myuros</i>	Rat's Tail Fescue										
Poaceae		<i>Walwhalleya proluta</i>	Panic Grass										
OTHER													

Family	Exotic	Scientific Name	Common Name	PCT 74 Plot 1		PCT 44 Plot 2		PCT 74 Plot 3		PCT 44 Plot 4		PCT 26 Plot 5	
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)
Convolvulaceae		<i>Convolvulus spp.</i>	A Bindweed	0.1	1	0.1	1			0.1	1	2	30
Loranthaceae		<i>Amyema quandang</i>	Grey Mistletoe									0.2	1
Cactaceae	*	<i>Opuntia stricta</i>	Common Prickly Pear										

Family	Exotic	Scientific Name	Common Name	PCT 26 Plot 6		PCT 44 Plot 7		PCT 44 Plot 8		PCT 44 Plot 9		Incidentals
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	
TREES												
Fabaceae (Mimosoideae)		<i>Acacia pendula</i>	Weeping Myall	40	25							
Malvaceae		<i>Brachychiton populneus</i>	Kurrajong									v
Myrtaceae		<i>Eucalyptus populnea</i> <i>subsp. bimbil</i>	Bimble Box									
Myrtaceae		<i>Eucalyptus melliodora</i>	Yellow Box									
Myrtaceae		<i>Eucalyptus camaldulensis</i>	River Red Gum									
Meliaceae		<i>Melia azedarach</i>	White Cedar									
SHRUBS												
Fabaceae		<i>Acacia deanei</i>	Deane's Wattle									v
Chenopodiaceae		<i>Atriplex semibaccata</i>	Creeping Saltbush							2	5	
Chenopodiaceae		<i>Enchylaena tomentosa</i>	Ruby Saltbush	5	30	1	20			2	50	
Solanaceae	*	<i>Lycium ferocissimum</i>	African Boxthorn	2	10							
Chenopodiaceae		<i>Maireana brevifolia</i>	Bluebush							4	30	
Chenopodiaceae		<i>Maireana excavata</i>	Bottle Bluebush	0.1	20	0.2	20	0.1	3			
Chenopodiaceae		<i>Rhagodia spinescens</i>	Thorny Saltbush	70	60							
Rosaceae	*	<i>Rosa rubiginosa</i>	Sweet Briar									v

Family	Exotic	Scientific Name	Common Name	PCT 26 Plot 6		PCT 44 Plot 7		PCT 44 Plot 8		PCT 44 Plot 9		Incidentals
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	
Chenopodiaceae		<i>Salsola australis</i>	Prickly Saltwort							2	200	
Chenopodiaceae		<i>Sclerolaena muricata</i>	Black Rolypoly	0.1	2	0.2	2	0.1	1	5	30	
FORBS												
Asphodelaceae	*	<i>Aloe spp.</i>										
Chenopodiaceae		<i>Atriplex suberecta</i>	Sprawling Saltbush			0.4	5			2	100	
Asparagaceae	*	<i>Asparagus asparagoides</i>	Bridal Creeper									v
Nyctaginaceae		<i>Boerhavia dominii</i>	Tarvine	0.1	2	0.1	1	0.1	1	2	50	
Brassicaceae	*	<i>Brassica spp.</i>	Brassica	0.1	2							
Asteraceae	*	<i>Chondrilla juncea</i>	Skeleton Weed							0.1	2	
Anthericaceae	*	<i>Chlorophytum comosum?</i>	Spider Plant									
Asteraceae	*	<i>Cirsium vulgare</i>	Spear Thistle			0.1	1	0.1	1	0.1	1	
Asteraceae	*	<i>Conyza spp.</i>	A Fleabane									
Boraginaceae	*	<i>Echium plantagineum</i>	Patterson's Curse	0.1	5			0.2	30	1	50	
Chenopodiaceae		<i>Einadia nutans subsp. nutans</i>	Climbing Saltbush	0.2	10	0.1	1			1	50	
Onagraceae		<i>Epilobium billardierianum</i>	Willow Herb			0.1	1					
Geraniaceae	*	<i>Erodium spp.</i>	Crowfoot									
Euphorbiaceae		<i>Euphorbia drummondii</i>	Caustic Weed							0.1	20	
Boraginaceae	*	<i>Heliotropium europaeum</i>	Potato Weed					0.1	1			
Asteraceae	*	<i>Lactuca serriola</i>	Prickly Lettuce	0.1	20			0.1	2	0.1	30	
Brassicaceae	*	<i>Lepidium sp.</i>	Peppergrass							0.1	2	
Malvaceae	*	<i>Malva parviflora</i>	Small-flowered Mallow							0.1	1	
Lamiaceae	*	<i>Marrubium vulgare</i>	White Horehound	0.1	2	0.2	5	0.1	1	0.1	2	
Fabaceae (Faboideae)	*	<i>Medicago sativa</i>	Lucerne			0.1	1					

Family	Exotic	Scientific Name	Common Name	PCT 26 Plot 6		PCT 44 Plot 7		PCT 44 Plot 8		PCT 44 Plot 9		Incidentals
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	
Fabaceae (Faboideae)	*	<i>Medicago spp.</i>	A Medic									
Oxalidaceae	*	<i>Oxalis pes-caprae.</i>	Soursob									
Oxalidaceae		<i>Oxalis perennans</i>		0.1	5	0.1	10	0.1	1	0.1	1	
Plantaginaceae	*	<i>Plantago lanceolata</i>	Lamb's Tongues							0.1	10	
Polygonaceae	*	<i>Polygonum aviculare</i>	Wireweed							0.1	5	
Asteraceae		<i>Pseudognaphalium lutealbum</i>	Jersey Cudweed							0.1	1	
Polygonaceae	*	<i>Rumex crispus</i>	Curled Dock									
Polygonaceae	*	<i>Rumex spp .</i>	Dock			0.1	1					
Lamiaceae	*	<i>Salvia verbenaca</i>	Vervain			1	40	0.3	30	4	200	
Malvaceae		<i>Sida corrugata</i>	Corrugated Sida	0.1	2	0.1	10	0.2	20			
Solanaceae	*	<i>Solanum elaeagnifolium</i>	Silver-leaved Nightshade			10	200	5	100	20	200	
Asteraceae	*	<i>Sonchus oleraceus</i>	Common Sowthistle							0.1	10	
Asteraceae	*	<i>Taraxacum officinale</i>	Dandelion									
Asteraceae	*	<i>Tragopogon porrifolius</i>	Salsify							0.1	30	
Fabaceae (Faboideae)	*	<i>Trifolium angustifolium</i>	Narrow-leaved Clover									
Fabaceae (Faboideae)	*	<i>Trifolium subterraneum</i>	Subterranean Clover									
Verbenaceae	*	<i>Verbena bonariensis</i>	Purpletop									
Fabaceae (Faboideae)	*	<i>Vicia sativa</i>	Common vetch			0.1	5					
Asteraceae		<i>Vittadinia gracilis</i>	Woolly New Holland Daisy			0.1	10					
Asteraceae		<i>Vittadinia spp.</i>	Fuzzweed									

Family	Exotic	Scientific Name	Common Name	PCT 26 Plot 6		PCT 44 Plot 7		PCT 44 Plot 8		PCT 44 Plot 9		Incidentals
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	
Campanulaceae		<i>Wahlenbergia spp.</i>	Bluebell									v
Aizoaceae		<i>Zaleya galericulata</i>	Hogweed					0.1	2	0.1	2	
GRASS /GRASSLIKE												
Poaceae		<i>Austrostipa scabra</i>	Speargrass							0.1	2	
Poaceae		<i>Austrostipa sp.</i>	Spear Grass	0.2	5	0.1	2					
Poaceae	*	<i>Avena fatua</i>	Wild Oats	0.2	50	5	1000	15	1000	5	1000	
Poaceae		<i>Bothriochloa macra</i>	Red Grass							0.1	2	
Poaceae	*	<i>Bromus diandrus</i>	Great Brome	0.5	200	5	1000	20	1000			
Poaceae	*	<i>Bromus molliformis</i>	Soft Brome			1	100					
Poaceae	*	<i>Bromus spp.</i>	A Brome	0.5	50							
Cyperaceae		<i>Carex spp.</i>										
Poaceae		<i>Chloris truncata</i>	Windmill Grass	0.1	5							
Poaceae		<i>Cynodon dactylon</i>	Common Couch			0.2	5	0.1	2			
Poaceae		<i>Enteropogon acicularis</i>	Curly Windmill Grass					15	200	1	20	
Juncaceae		<i>Juncus spp.</i>	A Rush					0.1	3			
Poaceae	*	<i>Lolium spp.</i>	A Ryegrass	0.2	100	1	200	1	100	0.5	200	
Iridaceae	*	<i>Moraea setifolia</i>	Thread Iris									v
Poaceae	*	<i>Panicum spp.</i>										
Poaceae		<i>Panicum effusum</i>	Hairy Panic	0.1	1	1	30					
Poaceae	*	<i>Paspalum dilatatum</i>	Paspalum							0.1	1	
Poaceae		<i>Paspalidium spp</i> (<i>constrictum?</i>).				0.1	1	1	30			
Poaceae	*	<i>Poa annua</i>	Winter Grass									
Iridaceae	*	<i>Romulea rosea var.</i> <i>australis</i>	Onion Grass									

Family	Exotic	Scientific Name	Common Name	PCT 26 Plot 6		PCT 44 Plot 7		PCT 44 Plot 8		PCT 44 Plot 9		Incidentals
				C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	C (%)	A (#)	
Poaceae		<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass									
Poaceae		<i>Rytidosperma setaceum</i>				0.2	10	0.1	10			
Poaceae		<i>Rytidosperma sp.</i>	Wallaby Grass	0.2	20							
Poaceae	*	<i>Vulpia myuros</i>	Rat's Tail Fescue	0.1	50							
Poaceae		<i>Walwhalleya proluta</i>	Panic Grass							0.1	10	
OTHER												
Convolvulaceae		<i>Convolvulus spp.</i>	A Bindweed			0.3	5	0.5	10			
Loranthaceae		<i>Amyema quandang</i>	Grey Mistletoe	3	20							
Cactaceae	*	<i>Opuntia stricta</i>	Common Prickly Pear									v

APPENDIX C FAUNA SIGHTINGS

Common Name	Scientific Name	Status (BC/EPBC)	Observation Type
BIRDS			
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>	Not listed	Seen
Australian Magpie	<i>Cracticus tibicen</i>	Not listed	Seen
Australian Pelican	<i>Pelecanus conspicillatus</i>	Not listed	Seen
Australian Raven	<i>Corvus coronoides</i>	Not listed	Seen
Blackbird	* <i>Turdus merula</i>	Not listed	Seen
Common Starling	* <i>Sturnus vulgaris</i>	Not listed	Seen
Corella sp.	<i>Cacatua</i> sp.	Not listed	Seen
Crested Pigeon	<i>Ocyphaps lophotes</i>	Not listed	Seen
Eastern Rosella	<i>Platycercus eximius</i>	Not listed	Seen
Feral Pigeon	* <i>Columba livia domestica</i>	Not listed	Seen
Fork-tailed Kite	<i>Milvus migrans</i>	Not listed	Seen
Galah	<i>Eolophus roseicapilla</i>	Not listed	Seen
Great Egret	<i>Ardea modesta</i>	Not listed	Seen
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	Not listed	Seen
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	Not listed	Seen
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	Not listed	Seen
Little Raven	<i>Corvus mellori</i>	Not listed	Seen
Nankeen Kestrel	<i>Falco cenchroides</i>	Not listed	Seen
Noisy Friarbird	<i>Philemon corniculatus</i>	Not listed	Seen
Noisy Miner	<i>Manorina melanocephala</i>	Not listed	Seen
Pacific Black Duck	<i>Anas superciliosa</i>	Not listed	Seen
Peewee	<i>Grallina cyanoleuca</i>	Not listed	Seen
Pied Butcherbird	<i>Cracticus nigrogularis</i>	Not listed	Seen
Pied Currawong	<i>Strepera graculina</i>	Not listed	Seen
Red-capped Robin	<i>Petroica goodenovii</i>	Not listed	Seen
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	Not listed	Seen

Striated Pardalote	<i>Pardalotus striatus</i>	Not listed	Seen
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	Not listed	Seen
Superb Blue Wren	<i>Malurus cyaneus</i>	Not listed	Seen
Superb Parrot	<i>Polytelis swainsonii</i>	Vulnerable	Seen
Welcome Swallow	<i>Hirundo neoxena</i>	Not listed	Seen
White-bellied Sea-eagle	<i>Haliaeetus leucogaster</i>	Vulnerable	Seen
White-faced Heron	<i>Egretta novaehollandiae</i>	Not listed	Seen
Willy Wagtail	<i>Rhipidura leucophrys</i>	Not listed	Seen
Wood Duck	<i>Chenonetta jubata</i>	Not listed	Seen
Yellow Rosella	<i>Platycercus elegans flaveolus</i>	Not listed	Seen
Zebra Finch	<i>Taeniopygia guttata</i>	Not listed	Seen
AMPHIBIANS			
Barking Frog	<i>Limnodynastes fletcheri</i>	Not listed	Heard
Beeping Froglet	<i>Crinia parinsignifera</i>	Not listed	Heard
Peron's Tree Frog	<i>Litoria peronii</i>	Not listed	Heard
Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>	Not listed	Heard
REPTILES			
Eastern Brown Snake	<i>Pseudonaja textilis</i>	Not listed	Seen

*Indicates non-native species

APPENDIX D EPBC PROTECTED MATTERS SEARCH



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 13/09/18 11:10:46

[Summary](#)

[Details](#)

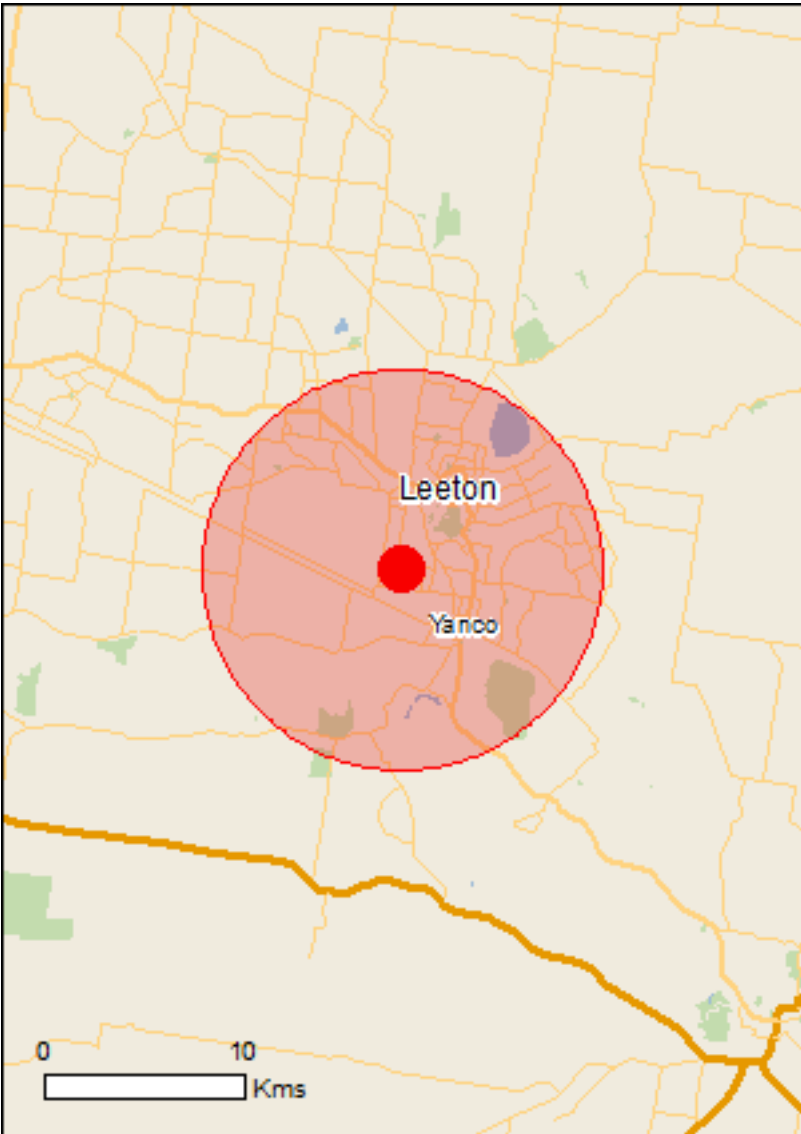
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

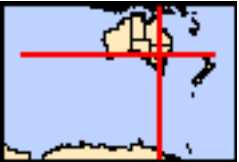
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

[Buffer: 10.0Km](#)



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	5
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	23
Listed Migratory Species:	20

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	31
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	29
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	500 - 600km upstream	
Fivebough and tuckerbil swamps	Within Ramsar site	
Hattah-kulkyne lakes	300 - 400km upstream	
Riverland	400 - 500km upstream	
The coorong, and lakes alexandrina and albert wetland	600 - 700km upstream	

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Breeding known to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area
Brachyscome papillosa Mossgiel Daisy [6625]	Vulnerable	Species or species habitat may occur within area
Caladenia arenaria Sand-hill Spider-orchid [9275]	Endangered	Species or species habitat may occur within area
Sclerolaena napiformis Turnip Copperburr [11742]	Endangered	Species or species habitat may occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		

Name	Threatened	Type of Presence
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur

Name	Threatened	Type of Presence
Tringa nebularia Common Greenshank, Greenshank [832]		within area Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land	[Resource Information]
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The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Commonwealth Land - Australian Telecommunications Commission Commonwealth Land - Commonwealth Bank of Australia Commonwealth Land - Telstra Corporation Limited Defence - LEETON ARES DEPOT ; 4/3 RNSWR ANNEX & POL STORE

Listed Marine Species	[Resource Information]
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* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species

Name	Threatened	Type of Presence
Calidris ruficollis Red-necked Stint [860]		habitat known to occur within area Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]		Species or species habitat may occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	within area
Stiltia isabella Australian Pratincole [818]		Species or species habitat likely to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Murrumbidgee Valley	NSW

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Nationally Important Wetlands		[Resource Information]
Name		State
Fivebough Swamp		NSW

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-34.58086 146.38293

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

APPENDIX E EPBC HABITAT ASSESSMENT

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Aves				
Superb Parrot <i>Polytelis swainsonii</i> V BC V EPBC	Inhabit Box-Gum, Box-Cypress, and Boree Woodlands and River Red Gum Forests. They nest in hollows of large trees in tall open forest or woodland.	Present Patches of Box – Gum woodland.	Possible Breeding known in locality.	Yes AoS completed.
Swift Parrot <i>Lathamus discolor</i> E BC CE EPBC	In NSW mostly occurs on the coast and south west slopes. Areas where eucalypts are flowering profusely or where there are abundant lerp infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark and White Box.	Present Patches of woodland including River Red Gum which can flower in winter.	Known Recorded during surveys.	Yes AoS completed.
Painted Honeyeater <i>Grantiella picta</i> V BC V EPBC	Occur in Boree/Weeping Myall, Brigalow, and Box-Gum Woodlands and Box-Ironbark Forests.	Present Patches of Box-Gum woodland.	Possible Known in locality.	Yes AoS completed.
Fork-tailed Swift <i>Apus pacificus</i> M EPBC	Fork-tailed Swifts are found flying over open habitat including semi-arid areas, coasts, islands, and occasionally forests and cities.	Present Open agricultural habitat.	Possible Likely in locality.	Yes AoS completed.

¹ Information sourced from species profiles on NSW OEH's threatened species database, NSW DPI's listed profiles of threatened species, populations and ecological communities, and the Australian Government's *Species Profiles and Threats* database (SPRAT) unless otherwise stated.

OEH threatened species database: <http://www.threatenedspecies.environment.nsw.gov.au/index.aspx>

DPI listed threatened species, populations and ecological communities profiles: <http://www.dpi.nsw.gov.au/fishing/species-protection/conservation/what-current#key>

SPRAT: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Yellow Wagtail <i>Motacilla flava</i> M EPBC	Yellow Wagtails occur in variable habitat, but typically flat, open, grassy area near water, which may include grasslands, air strips, pastures, sports fields, and edges of wetlands, rivers, and dams. Roosts in mangroves and dense vegetation. No breeding habitat in Australia.	Present Open grassy habitat near water bodies.	Possible May occur in locality.	Yes AoS completed.
Satin Flycatcher <i>Myiagra cyanoleuca</i> M EPBC	Satin Flycatchers are found in eucalypt forest and woodland, especially tall, wet sclerophyll forests along gullies and water courses, and open, grassy areas of woodland.	Present Patches of eucalypt woodland along irrigation channels.	Possible May occur in locality.	Yes AoS completed.
Australasian Bittern <i>Botaurus poiciloptilus</i> E BC E EPBC	Favour permanent freshwater wetlands with tall, dense vegetation, particularly bulrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.).	Present Water bodies with dense vegetation.	Possible Known in locality.	Yes AoS completed.
Wood Sandpiper <i>Tringa glareola</i> M EPBC	Well-vegetated, shallow, freshwater wetlands. Typically associated with emergent aquatic plants or grass and dominated by taller fringing vegetation. Also inundated grasslands, short herbage or wooded floodplains, in receding floodwaters, and irrigated crops.	Present Irrigation channels in fruit crops.	Possible Known in locality.	Yes AoS completed.
Latham's Snipe <i>Gallinago hardwickii</i> M EPBC	Latham's Snipe occurs in permanent and ephemeral wetlands, usually open freshwater wetlands with low, dense vegetation such as swamps, flooded grasslands or heathlands, and bogs, but also in saline or brackish water bodies, and in both modified and artificial habitats.	Present Dams and irrigation channels with fringing vegetation.	Possible Known in locality.	Yes AoS completed.
Australian Painted Snipe <i>Rostratula australis/benghalensis</i> E BC E EPBC	Australian Painted Snipes generally inhabit shallow terrestrial freshwater or occasionally brackish wetlands, including temporary and permanent lakes, swamps, and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms, and bore drains.	Absent No shallow wetlands.	Possible Likely in locality.	No No suitable habitat in proposal area.

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Plains-wanderer <i>Pedionomus torquatus</i> E BC CE EPBC	Plains-wanderers are found in semi-arid, lowland native grasslands on hard red-brown soils, in a typical habitat structure of 50% bare ground, 10% fallen litter, and 40% herbs, forbs, and grasses.	Absent No native grassland with suitable habitat structure.	Possible May occur in locality.	No No suitable habitat in proposal area.
Common Sandpiper <i>Actitis hypoleucos</i> M EPBC	Forages in shallow water and on bare soft mud at the edges of wetlands, often where obstacles project from substrate. Sometimes venture into grassy areas adjoining wetlands.	Absent No mudflats or shallow wetlands.	Possible May occur in locality.	No No suitable habitat in proposal area.
Sharp-tailed Sandpiper <i>Calidris acuminata</i> M EPBC	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh, or other low vegetation. This includes dams, waterholes, soaks, bore drains and bore swamps, salt pans, and hypersaline salt lakes, and inundated paddocks, sedgeland, and other ephemeral wetlands inland.	Present No wetlands with shallow muddy edges.	Unlikely Known in locality.	No No suitable habitat in proposal area.
Pectoral Sandpiper <i>Calidris melanotos</i> M EPBC	Prefers shallow fresh to saline wetlands. Usually found in coastal or near-coastal habitat but occasionally found further inland. Prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation.	Absent No wetlands with fringing mudflats.	Unlikely Known in locality.	No No suitable habitat in proposal area.
Red-necked Stint <i>Calidris ruficollis</i> M EPBC	Coastal areas, including sheltered inlets, bays, lagoons and estuaries with intertidal mudflats. Saltworks and sewage farms, saltmarshes, shallow wetlands, flooded paddocks and damp grasslands. Forage on bare wet mud on intertidal mudflats or sandflats, or in very shallow water.	Absent No mudflats or shallow wetlands.	Unlikely Known in locality.	No No suitable habitat in proposal area.
Long-toed Stint <i>Calidris subminuta</i> M EPBC	Shallow freshwater or brackish wetlands, muddy shorelines, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire. Open, less vegetated shores of larger lakes and ponds. Common on muddy fringes of drying ephemeral lakes and swamps. Forages on wet mud or in shallow water, often among low vegetation around the edges of wetlands,	Absent No mudflats or shallow wetlands.	Unlikely Known in locality.	No No suitable habitat in proposal area.

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Common Greenshank <i>Tringa nebularia</i> M EPBC	Inland wetland and sheltered coastal habitats, such as harbours, embayments, estuaries, deltas, and lagoons, typically with large mudflats and saltmarsh, mangroves, or seagrass. Forages at edge of wetlands, in soft mud on mudflats, in channels, or in shallows around edges of water.	Absent No mudflats or wetlands with shallow edges.	Possible May occur in locality.	No No suitable habitat in proposal area.
Black-tailed Godwit <i>Limosa limosa</i> V BC M EPBC	Seen on coastal sandy shores, mud-flats and marshes, probing, sweeping and jabbing into mud or sand between the tides for small crustaceans and worms.	Absent No coastal habitat or mudflats.	Unlikely Known in locality.	No No suitable habitat in proposal area.
Bar-tailed Godwit <i>Limosa lapponica</i> M EPBC	Coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. Rarely found on inland wetlands or areas of short grass, such as farmland, paddocks and airstrips. Forages near edge of water or in shallow water.	Absent No coastal habitats or shallow wetlands.	Possible Species or habitat known in locality.	No No suitable habitat in proposal area.
Ruddy Turnstone M EPBC	Coastal regions with exposed rock coast lines or coral reefs.	Absent No coastal regions.	Possible Species or habitat known in locality.	No No suitable habitat in proposal area.
Curlew Sandpiper <i>Calidris ferruginea</i> E BC CE, M EPBC	Curlew Sandpipers mainly occur on intertidal mudflats in both fresh and brackish waters in sheltered coastal areas, such as estuaries, bays, inlets, and lagoons. They are also recorded inland, including around ephemeral and permanent lakes, dams, and waterholes, usually with bare edges of mud or sand.	Absent No mudflats or sandflats.	Possible Known in locality.	No No suitable habitat in proposal area.
Eastern Curlew <i>Numenius madagascariensis</i> CE, M EPBC	Eastern Curlews are mostly commonly found on large intertidal mudflats often with seagrass beds along sheltered coasts including in estuaries, bays, harbours, inlets, lagoons, and among saltmarshes and mangroves.	Absent No intertidal mudflats.	Possible May occur in locality.	No No suitable habitat in proposal area.

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Double-banded Plover <i>Charadrius bicinctus</i> M EPBC	Littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. Muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers. Further inland, open grassy areas including short pasture, ploughed or newly cropped paddocks, swards, airstrips and sports grounds.	Absent No wetlands or open grassy areas.	Possible Known in locality.	No No suitable habitat in proposal area.
Ruff <i>Philomachus pugnax</i> M EPBC	Fresh, brackish or saline wetlands with exposed mudflats at the edges.	Absent No mudflats.	Possible Known in locality.	No No suitable habitat in proposal area.
Pacific Golden Plover <i>Pluvialis fulva</i> M EPBC	Usually coastal habitats; occasionally around inland wetlands. Forages on sandy or muddy shores or margins of sheltered areas such as estuaries or lagoons, and occasionally in vegetation such as saltmarsh, mangroves, pasture or crops.	Absent No coastal habitat or suitable wetlands.	Possible Known in locality.	No No suitable habitat in proposal area.
Marsh Sandpiper <i>Tringa stagnatilis</i> M EPBC	Permanent or ephemeral wetlands of varying salinity, foraging in shallow water at the edge of wetlands. Probe in mudflats or among marshy vegetation.	Absent No shallow wetlands or mudflats.	Possible Known in locality.	No No suitable habitat in proposal area.
Malleefowl <i>Leipoa ocellate</i> E BC V EPBC	Mallee communities, preferring tall, dense and floristically-rich mallee in higher rainfall areas. Uses mallee with spinifex understorey, but usually at lower densities than areas with shrub understorey. Prefers areas of light sandy to sandy loam soils and habitats with dense but discontinuous canopy and dense and diverse shrub and herb layers.	Absent No Mallee communities.	Possible Likely in locality.	No No suitable habitat in proposal area.
Amphibians				
Southern Bell Frog <i>Litoria raniformis</i> E BC V EPBC	Southern Bell Frogs are only known to exist in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain, and around Lake Victoria. The species is usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps or billabongs along floodplains and river valleys, and where there is no available natural habitat they may occur in irrigated rice crops.	Present Farms dams and irrigation channels.	Possible Likely in locality.	Yes AoS completed.

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Mammals				
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> V BC V EPBC	Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps, urban gardens and cultivated fruit crops. Generally roost within 20 km of a regular food source, commonly in gullies, close to water, in vegetation with a dense canopy.	Present Patches of eucalypt woodland within cultivated fruit crops.	Possible May occur in locality.	Yes AoS completed.
Koala <i>Phascolarctos cinereus</i> V BC V EPBC	Range of temperate, subtropical and tropical eucalypt woodlands and forests where suitable food trees grow, of which there are more than 70 eucalypt species and 30 non-eucalypt species that are particularly abundant on fertile clay soils.	Present River Red Gum forest (koala feed tree).	Possible Known in locality.	Yes AoS completed.
Corben's Long-eared Bat <i>Nyctophilus corbeni</i> V BC V EPBC	Corben's Long-eared Bats inhabit a variety of vegetation types, most commonly Mallee, Bulloke, and Box-dominated communities, but are most common in vegetation which has a distinct canopy and dense understorey. They roost in tree hollows, crevices, and under loose bark.	Absent No dense understorey.	Possible May occur in locality.	No No suitable habitat in proposal area.
Fishes				
Flathead Galaxias <i>Galaxias rostratus</i> CE FM CE EPBC	Flathead Galaxias prefer still or slow-flowing habitats including billabongs, lakes, swamps, and rivers.	Absent Only dams and irrigation channels.	Possible May occur in locality.	No No suitable habitat in proposal area.
Murray Cod <i>Maccullochella peelii</i> V EPBC	Wide range of warm water habitat including clear rocky streams, slow turbid rivers, and billabongs. Usually found near complex structural cover such as rocks, woody debris, and overhanging vegetation, and most frequently found in main river channel and larger tributaries but occasionally in floodplain channels during floods.	Absent Only dams and irrigation channels.	Possible May occur in locality.	No No suitable habitat in proposal area.

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Macquarie Perch <i>Macquaria australasica</i> E FM E EPBC	Macquarie Perch are found in rivers, clear, deep, rocky holes with plenty of cover including aquatic vegetation, large boulders, large woody debris, and overhanging banks.	Absent No rivers in study area.	Possible May occur in locality.	No No suitable habitat in proposal area.

E BC = listed as Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*.

E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

V BC = listed as Vulnerable under Schedule 1 of the NSW *BC Act 2016*.

V EPBC = listed as Vulnerable under the Commonwealth *EPBC Act 1999*.

M EPBC = listed as Migratory under the Commonwealth *EPBC Act 1999*.

CE EPBC = listed as Critically Endangered under the Commonwealth *EPBC Act 1999*.

Species	Description of habitat	Presence of habitat	Likelihood of occurrence	Possible impact?
Herbs & Forbs				
Spear Grass <i>Austrostipa wakoolica</i> E BC E EPBC	Grows on floodplains of Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils. Habitats include edges of lignum swamp with box and mallee, creek banks in grey, silty clay, mallee and lignum sandy-loam flat, open cypress forest on low sandy range, and a low, rocky rise.	Absent No woodland on Murray River tributary floodplains.	Possible May occur in locality.	No No suitable habitat in proposal area.
Mossgiel Daisy <i>Brachyscome papillosa</i> V BC V EPBC	Recorded primarily in clay soils on Bladder Saltbush and Leafless Bluebush plains, but also in grassland and in Inland Grey Box – Cypress Pine woodland.	Present Box woodland on clay soil.	Unlikely Targeted surveys did not detect species on site.	No Species not recorded in impact area.
Sand-hill Spider Orchid <i>Caladenia arenaria</i> E BC	Woodland with sandy soil, especially dominated by White Cypress Pine.	Absent No woodland with sandy soil and cypress pines.	Possible May occur in locality.	No No suitable habitat in proposal area.

Species and Status	Description of habitat ¹	Presence of habitat	Likelihood of occurrence	Potential for impact?
Turnip Copperburr <i>Sclerolaena napiformis</i> E BC	Confined to remnant grassland habitat on clay-loam soils. Level plains in tussock grassland of <i>Austrostipa nodosa</i> and <i>Chloris truncata</i> , in grey cracking clay to red-brown loamy clay. Grows in areas with intermittent light grazing.	Absent No native tussock grasslands present.	Possible May occur in locality.	No No suitable habitat in proposal area.
Slender Darling-pea <i>Swainsona murrayana</i> V EPBC	Clay-based soils, ranging from grey, red, and brown cracking clays to red-brown earths and loams. Variety of vegetation types including Bladder Saltbush, Black Box, and grassland communities on level plains, floodplains, and depressions. Also found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	Present Open pastoral land on clay soils. Riverine Plain Grasslands is associated vegetation type.	Unlikely Targeted surveys did not detect species on site.	No Species not recorded in impact area.

E BC = listed as Endangered under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*.

E EPBC = listed as Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

V BC = listed as Vulnerable under Schedule 1 of the NSW *Biodiversity Conservation Act 2016*.

V EPBC = listed as Vulnerable under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

EEC BC = Endangered Ecological Community listed under Schedule 2 of the NSW *Biodiversity Conservation Act 2016*.

CE EPBC = listed as Critically Endangered under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*.

APPENDIX F EPBC ASSESSMENT OF SIGNIFICANT

Endangered/Critically Endangered Species

- Swift Parrot (*Lathamus discolor*) – Critically Endangered, EPBC Act)
- Australasian Bittern (*Botaurus poiciloptilus*) – Endangered, EPBC Act)

a) Will the action lead to a long-term decrease in the size of a population of a species?

Swift Parrot

Swift Parrots breed in Tasmania in summer, and the entire population migrates to the mainland in winter. In NSW, Swift Parrots forage on winter flowering eucalypt species and lerp-infested eucalypts. There is potential foraging habitat for Swift Parrot in the development site that would be removed by the proposal. Surveys did not detect these species and so the development site is not considered known habitat, but does provide potential foraging habitat.

The proposal would involve the removal of around 0.05ha of Weeping Myall Woodland and 0.5ha of Forb-rich speargrass - windmill grass - white top grassland. There would also be some disturbance associated with construction, including noise, vibration, light, and risk of introduction or spread of weeds, pests, and pathogens.

The quality of potential habitat for this species is low, being highly disturbed and fragmented within an existing road, railway line and powerline easement. Given the relatively small amount of habitat to be removed, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of a population of Swift Parrot is minimal.

Australasian Bittern

Australasian Bitterns breed in relatively deep, densely vegetated freshwater swamps and pools, building their nests under dense cover over shallow water.

The proposal would involve the removal of around 0.3ha of aquatic habitat in farm dams. There would also be some disturbance of irrigation channels, which provide potential nesting habitat, including noise, vibration, light, and risk of introduction or spread of weeds, pests, and pathogens.

The quality of potential habitat for this species is low, being artificially constructed and managed, and highly disturbed by agriculture. Given the relatively small amount of habitat to be removed or disturbed, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of a population of Australasian Bittern is minimal.

b) Will the action reduce the area of occupancy of the species?

Swift Parrot

The proposal would impact around 0.05ha of woodland habitat in total. The habitat to be removed is similar to the habitat that exists in the rest of the locality, and is low quality due to being largely cleared and highly disturbed.

In this context, the removal of a relatively small area of low-quality habitat as a result of the proposal is unlikely to reduce the area of occupancy of Swift Parrot.

Australasian Bittern

The proposal would impact around 0.3ha of aquatic habitat in total. The habitat to be removed is similar to the habitat that exists in the rest of the locality, and is low quality due to being artificially constructed and managed, and highly disturbed.

In this context, the removal of a relatively small area of low-quality habitat as a result of the proposal is unlikely to reduce the area of occupancy of Australasian Bittern.

c) Will the action fragment an existing population into two or more populations?

Swift Parrot

The proposal would impact an area of low-quality habitat in an area surrounded by similar habitat. The proposal will not prevent the movement of this highly mobile species through the landscape. In this context, the proposal would not fragment an existing Swift Parrot population into two or more populations.

Australasian Bittern

The proposal would impact an area of low-quality habitat in an area surrounded by similar habitat. The proposal will not prevent the movement of this highly mobile species through the landscape. In this context, the proposal would not fragment an existing Swift Parrot population into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Swift Parrot

No areas of critical habitat have been declared for Swift Parrot.

Australasian Bittern

No areas of critical habitat have been declared for Australasian Bittern.

e) Will the action disrupt the breeding cycle of a population?

Swift Parrot

Swift Parrots breed in Tasmania, and so the proposal area is outside suitable breeding areas. The proposal is therefore unlikely to disrupt the breeding cycle of the Swift Parrot.

Australasian Bittern

Australasian Bitterns breed in deep water under dense vegetation cover, which could provide some low-quality breeding habitat. The proposal would result in indirect impacts to a small area of artificially constructed and managed, highly disturbed potential habitat. With the recommended mitigation measures, the likelihood of the proposal disrupting the breeding cycle of a population of Australasian Bitterns is minimal.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Swift Parrot

The proposal would involve the removal of around 0.05ha of woodland habitat, reducing the total availability of habitat in the locality, as well as some indirect disturbance associated with construction which could decrease the quality of some habitat.

The habitat to be impacted is similar to the habitat that exists in the rest of the locality, and is highly disturbed due to the agricultural history of the site.

In this context, and with the recommended mitigation measures, the proposal is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that Swift Parrots are likely to decline.

Australasian Bittern

The proposal would involve the removal of around 0.3ha of aquatic habitat, reducing the total availability of habitat in the locality, as well as some indirect disturbance associated with construction which could decrease the quality of some habitat.

The habitat to be impacted is similar to the habitat that exists in the rest of the locality, and is highly disturbed due to the agricultural history of the site.

In this context, and with the recommended mitigation measures, the proposal is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that Australasian Bitterns are likely to decline.

g) Will the action result in invasive species that are harmful to a critically endangered or endangered/vulnerable species becoming established in the endangered / critically endangered /vulnerable species habitat?

The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal is therefore unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.

h) Will the action introduce disease that may cause the species to decline?

There is a risk that pathogens could be established or spread in the proposal area via machinery during construction. However, with the recommended mitigation measures, the action is unlikely to introduce any disease which may cause these species to decline.

i) Will the action interfere with the recovery of the species?

Swift Parrot

The National Recovery Plan for Swift Parrot lists the following recovery objectives:

1. To identify and prioritise habitat and sites used by the species across its range, on all land tenures.
2. To implement management strategies to protect and improve habitats and sites on all land tenures.
3. To monitor and manage the incidence of collisions, competition, and Beak and Feather Disease (BFD).
4. To monitor population trends and distribution throughout the range.

The proposal would not interfere with any of these objectives.

Australasian Bittern

A recovery plan has not been prepared for Australasian Bittern. The proposal is consistent with general recovery plan principles, and so is unlikely to interfere with the recovery of the Australasian Bittern.

A significant impact is not considered likely on the Swift Parrot and Australasian Bittern, on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of any species
- Introduce invasive species harmful to any species
- Introduce disease that would cause any species to decline
- Interfere with the recovery of these species

Vulnerable Species

- Canopy birds:
 - Superb Parrot (*Polytelis swainsonii*) – Vulnerable, EPBC Act
 - Painted Honeyeater (*Grantiella picta*) – Vulnerable, EPBC Act
- Southern Bell Frog (*Litoria raniformis*) – Vulnerable, EPBC Act
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable, EPBC Act
- Koala (*Phascolarctos cinereus*) – Vulnerable, EPBC Act

a) Will the action lead to a long-term decrease in the size of an important population of a species?

Canopy birds

Superb Parrots occur in Box-Gum, Box-Cypress and Boree Woodlands and River Red Gum Forest, and nest between September and December in hollows of large trees along rivers.

Painted Honeyeaters occur in Boree/Weeping Myall, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests, feeding on the fruits of mistletoes and nesting in the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches. There is potential foraging habitat for Superb Parrot in the development site that would be removed by the proposal, and the species was recorded during site surveys. There is potential foraging and breeding habitat for Painted Honeyeater in the development site that would be removed by the proposal. The proposal area is not located in a known important population of either of these species.

The proposal would involve the removal of around 0.05ha of Weeping Myall Woodland and 0.5ha of Forbrich Speargrass – Windmill Grass – White Top Grassland. There would also be some disturbance associated with construction, including noise, vibration, light, and risk of introduction or spread of weeds, pests, and pathogens.

The quality of potential habitat for this species is low, being largely cleared and highly disturbed between the existing road, powerline and railway line easement. Given the relatively small amount of habitat to be removed, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of an important population of Superb Parrot or Painted Honeyeater is minimal.

Southern Bell Frog

Southern Bell Frog can occur in artificial water bodies such as farm dams, irrigation channels, irrigated rice crops and disused quarries in disturbed areas. Permanent water bodies, or those in close proximity to permanent water, are favoured for breeding. The proposal area is not located in a known important population of this species.

The proposal would involve the removal of 0.3ha of aquatic habitat in farm dams. There would also be some disturbance of irrigation channels, which provide potential nesting habitat, including noise, vibration, light, and risk of introduction or spread of weeds, pests, and pathogens. Targeted surveys were carried out for this species, which found no evidence that the species occurs on site. It is therefore unlikely to support an important population of Southern Bell Frog.

The quality of potential habitat for this species is low, being artificially constructed and managed, and highly disturbed by agriculture. Given the relatively small amount of low-quality habitat to be removed or disturbed, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of an important population of Southern Bell Frog is minimal.

Grey-headed Flying-fox

Grey-headed Flying-fox feed on the nectar and pollen of native trees, fruits of rainforest trees and vines, and in cultivated gardens and fruit crops. They breed in large camps, in gullies, close to water, and in vegetation with a dense canopy. The proposal area is not located in a known important population of this species.

The proposal would involve the removal of around 0.05ha of Weeping Myall woodland, 0.5ha of Forbrich Speargrass - Windmill Grass – White Top Grassland and 204ha of fruit crops. There would also be

some disturbance associated with construction, including noise, vibration, light, and risk of introduction or spread of weeds, pests, and pathogens.

The habitat to be impacted is similar to the habitat that exists in the rest of the locality, and is highly disturbed due to the agricultural history of the site.

In this context, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of an important population of Grey-headed Flying-fox is minimal.

Koala

Potential foraging and breeding habitat for Koala (including potential feed trees) occurs within the proposal area and would be impacted by the proposal. The proposal area is not located in a known important population of this species.

The proposal would involve the removal of around 0.05ha of Weeping Myall woodland and 0.5ha of Forb-rich Speargrass - Windmill Grass – White Top Grassland. There would also be some disturbance associated with construction, including noise, vibration, light, and risk of introduction or spread of weeds, pests, and pathogens.

The quality of potential habitat for this species is low, being largely cleared and highly disturbed by agriculture. Given the relatively small amount of habitat to be removed, and with the recommended mitigation measures, the likelihood of the proposal leading to a long-term decrease in the size of an important population of Koala is minimal.

b) Will the action reduce the area of occupancy of an important population of a species?

Canopy birds

The proposal would impact around 0.05ha of woodland habitat in total. The habitat to be removed is low quality due to being largely cleared and highly disturbed. The proposal area is not located in a known important population of these species.

In this context, the removal of a relatively small area of low-quality habitat as a result of the proposal is unlikely to reduce the area of occupancy of an important population of Superb Parrot or Painted Honeyeater.

Southern Bell Frog

The proposal would impact around 0.3ha of aquatic habitat in total. The habitat to be removed is similar to the habitat that exists in the rest of the locality, and is low quality due to being artificially constructed and managed, and highly disturbed. The proposal area is not located in a known important population of this species.

In this context, the removal of a relatively small area of low-quality habitat as a result of the proposal is unlikely to reduce the area of occupancy of Southern Bell Frog.

Grey-headed Flying-fox

The proposal would impact around 0.05ha of woodland habitat and 204ha of fruit crop habitat in total. The habitat to be removed is similar to the habitat that exists in the rest of the locality, and is low quality due to being largely cleared and highly disturbed. The proposal area is not located in a known important population of this species.

In this context, the removal of a relatively small area of low-quality habitat as a result of the proposal is unlikely to reduce the area of occupancy of an important population of Grey-headed Flying-fox.

Koala

The proposal would impact around 0.05ha of woodland habitat in total. The habitat to be removed is low quality due to being largely cleared and highly disturbed. The proposal area is not located in a known important population of this species.

In this context, the removal of a relatively small area of low-quality habitat as a result of the proposal is unlikely to reduce the area of occupancy of an important population of Koala.

c) Will the action fragment an existing important population into two or more populations?

Canopy birds

The proposal would impact an area of low-quality habitat in an area surrounded by similar habitat. The proposal will not prevent the movement of these mobile species through the landscape. The proposal area is not located in a known important population of these species. In this context, the proposal would not fragment existing important Superb Parrot or Painted Honeyeater populations into two or more populations.

Southern Bell Frog

The habitat to be removed is similar to the habitat that exists in the rest of the locality, and is low quality due to being artificially constructed and managed, and highly disturbed. The proposal area is not located in a known important population of this species.

In this context, the proposal would not fragment an existing important Southern Bell Frog population into two or more populations.

Grey-headed Flying-fox

The proposal would impact an area of low-quality habitat in an area surrounded by similar habitat. The proposal will not prevent the movement of this highly mobile species through the landscape. The proposal area is not located in a known important population of this species. In this context, the proposal would not fragment an existing important Grey-headed Flying-fox population into two or more populations.

Koala

The proposal would impact an area of low-quality habitat in an area surrounded by similar habitat. The proposal will not prevent the movement of this mobile species through the landscape. The proposal area is not located in a known important population of this species. In this context, the proposal would not fragment an existing important Koala population into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Canopy birds

No areas of critical habitat have been declared for these species.

Southern Bell Frog

No areas of critical habitat have been declared for this species.

Grey-headed Flying-fox

No areas of critical habitat have been declared for this species.

Koala

No areas of critical habitat have been declared for this species.

e) Will the action disrupt the breeding cycle of an important population?

Canopy birds

Superb Parrot nests between September and December in hollows of large trees. The proposal area is not suitable breeding habitat for Superb Parrot. Painted Honeyeaters breed in Boree/Weeping Myall, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests, nesting in the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.

The proposal would involve the removal of a small area of potential low-quality breeding habitat, in an area that is surrounded by similar habitat. The proposal area is not located in a known important population of this species. The proposal is unlikely to disrupt the breeding cycle of an important population of Painted Honeyeater.

Southern Bell Frog

Southern Bell Frog occur in artificial water bodies such as farm dams, irrigation channels, irrigated rice crops and disused quarries in disturbed areas, and favour permanent water bodies, or those in close

proximity to permanent water, for breeding. The proposal area is not located in a known important population of this species, and was not recorded on site in targeted surveys.

The proposal would involve impacts to a small area of potential low-quality breeding habitat, in an area that is surrounded with areas of similar habitat.

The proposal is unlikely to disrupt the breeding cycle of an important population of Southern Bell Frog.

Grey-headed Flying-fox

Grey-headed Flying-fox breeds in large camps, in gullies, close to water, in vegetation with a dense canopy. The proposal area is not suitable breeding habitat for this species. The proposal is unlikely to disrupt the breeding cycle of an important population of Grey-headed Flying-fox.

Koala

Potential foraging and breeding habitat for Koala (including feed tree species) occurs within the proposal area and would be impacted by the proposal. The proposal area is not located in a known important population of this species.

The proposal would involve the removal of a small area of potential low-quality breeding habitat, in an area that is surrounded by similar habitat. The proposal area is not located in a known important population of this species. The proposal is unlikely to disrupt the breeding cycle of an important population of Koala.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

Canopy birds

The proposal would involve the removal of around 0.05ha of woodland habitat, reducing the total availability of habitat in the locality, as well as some indirect disturbance associated with construction which could decrease the quality of some habitat.

The habitat to be impacted is similar to the habitat that exists in the rest of the locality, and is highly disturbed due to the agricultural history of the site.

In this context, and with the recommended mitigation measures, the proposal is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that Superb Parrot or Painted Honeyeater are likely to decline.

Southern Bell Frog

The proposal would involve the removal of around 0.3ha of aquatic habitat, reducing the total availability of habitat in the locality, as well as some indirect disturbance associated with construction which could decrease the quality of some habitat.

The habitat to be impacted is similar to the habitat that exists in the rest of the locality, and is highly disturbed due to the agricultural history of the site.

In this context, and with the recommended mitigation measures, the proposal is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that Southern Bell Frogs are likely to decline.

Grey-headed Flying-fox

The proposal would involve the removal of around 0.05ha of woodland habitat and 204ha of fruit crop habitat, reducing the total availability of foraging habitat in the locality, as well as some indirect disturbance associated with construction which could decrease habitat quality.

The habitat to be impacted is similar to the habitat that exists in the rest of the locality, and is highly disturbed due to the agricultural history of the site.

In this context, and with the recommended mitigation measures, the proposal is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that Grey-headed Flying-fox is likely to decline.

Koala

The proposal would involve the removal of around 0.05ha of Weeping Myall woodland reducing the total availability of habitat in the locality, as well as some indirect disturbance associated with construction which could decrease habitat quality.

The habitat to be impacted is similar to the habitat that exists in the rest of the locality, and is highly disturbed due to the agricultural history of the site.

In this context, and with the recommended mitigation measures, the proposal is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that Koalas are likely to decline.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The proposal has the potential to contribute to the spread of invasive species in the proposal area through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal is therefore unlikely to result in invasive species that are harmful to these vulnerable species becoming established in their potential habitat.

h) Will the action introduce disease that may cause the species to decline?

There is a risk that pathogens could be established or spread in the proposal area via machinery during construction. However, with the recommended mitigation measures, the action is unlikely to introduce any disease which may cause these species to decline.

i) Will the action interfere substantially with the recovery of the species?

Canopy birds

The National Recovery Plan for Superb Parrot lists the following specific objectives:

1. Determine population trends in the Superb Parrot.
2. Increase the level of knowledge of the Superb Parrot's ecological requirements.
3. Develop and implement threat abatement strategies.
4. Increase community involvement in and awareness of the Superb Parrot recovery program.

The Conservation Advice for Painted Honeyeater lists the following primary conservation objectives:

1. Stable population at key sites.
2. No further clearance of suitable habitat.
3. Adequate numbers of mature trees and mistletoe populations across its distribution.

The proposal would not interfere with any of these objectives.

Southern Bell Frog

The National Recovery Plan for Southern Bell Frog lists the following recovery objectives:

1. Secure extant populations of Southern Bell Frogs, particularly those occurring in known breeding habitats, and improve their viability through increases in size and/or area of occurrence.
2. Determine distribution, biology and ecology of the Southern Bell Frog, and identify causes of the decline of the species across its geographic range.
3. Address known or predicted threatening processes, and implement appropriate management practices where possible to ensure that land use activities do not threaten the survival of the Southern Bell Frog.
4. Increase community awareness of and support for Southern Bell Frog conservation.

The proposal would not interfere with any of these objectives.

Grey-headed Flying-fox

The National Recovery Plan for Grey-headed Flying Fox lists the following specific objectives:

1. Identify, protect and enhance native foraging habitat critical to the survival of the Grey-headed Flying Fox.

2. Identify, protect and enhance roosting habitat of Grey-headed Flying Fox camps.
3. Determine population trends in Grey-headed Flying Foxes so as to monitor the species' national distribution and conservation status.
4. Build community capacity to co-exist with Flying Foxes and minimise the impacts on urban settlements from existing camps without resorting to dispersal.
5. Increase public awareness and understanding of Grey-headed Flying Foxes and the recovery program, and involve the community in the recovery program where appropriate.
6. Improve the management of Grey-headed Flying Fox camps in sensitive areas.
7. Significantly reduce levels of deliberate Grey-headed Flying Fox destruction associated with commercial horticulture.
8. Support research activities that will improve the conservation status and management of Grey-headed Flying Foxes.
9. Assess and reduce the impact on Grey-headed Flying Foxes of electrocution on power lines, and entanglement in netting and on barbed wire.

The proposal would not interfere with any of these objectives.

Koala

The NSW Recovery Plan for Koala lists the following specific objectives:

1. To conserve koalas in their existing habitat.
2. To rehabilitate and restore koala habitat and populations.
3. To develop a better understanding of the conservation biology of koalas.
4. To ensure that the community has access to factual information about the distribution, conservation and management of koalas at a national, state and local scale.
5. To manage captive, sick or injured koalas and orphaned wild koalas to ensure consistent and high standards of care.
6. To manage over browsing to prevent both koala starvation and ecosystem damage in discrete patches of habitat.
7. To coordinate, promote the implementation, and monitor the effectiveness of the NSW Koala Recovery Plan across NSW.

The proposal would not interfere with any of these objectives.

A significant impact is not considered likely on the Superb Parrot, Painted Honeyeater, Southern Bell Frog, Grey-headed Flying Fox and Koala, on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of any species
- Introduce invasive species harmful to any species
- Introduce disease that would cause any species to decline
- Interfere with the recovery of these species

Migratory Species

- Fork-tailed Swift (*Apus pacificus*) – Migratory, EPBC Act
- Yellow Wagtail (*Motacilla flava*) – Migratory, EPBC Act
- Satin Flycatcher (*Myiagra cyanoleuca*) – Migratory, EPBC Act
- Shorebirds:
 - Wood Sandpiper (*Tringa glareola*) – Migratory, EPBC Act
 - Latham's Snipe (*Gallinago hardwickii*) – Migratory, EPBC Act

a) Will the action substantially modify (including by fragmenting, alerting fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?

Fork-tailed Swift

The proposal would impact an area of around 205ha, including 0.05ha of woodland, 0.5ha of grassland and 204ha of fruit crops. There would also be some disturbance associated with construction which could decrease habitat quality. The proposal would not directly impact the aerial habitat of this species.

The habitat to be impacted is the same as the habitat that would remain in the rest of the locality, and is highly disturbed by agriculture. The proposal area is not located in a known area of important habitat for this species.

With the implementation of the recommended mitigation measures, the likelihood of the action substantially modifying, destroying, or isolating an area of important habitat for Fork-tailed Swift is minimal.

Yellow Wagtail

The proposal would impact an area of around 205ha, including 0.05ha of woodland, 0.5ha of grassland and 204ha of fruit crops in areas close to irrigation channels. There would also be some disturbance associated with construction which could decrease habitat quality.

The habitat to be impacted is the same as the habitat that would remain in the rest of the locality, and is highly disturbed due to the industrial history of the site. The proposal area is not located in a known area of important habitat for this species.

With the implementation of the recommended mitigation measures, the likelihood of the action substantially modifying, destroying, or isolating an area of important habitat for Yellow Wagtail is minimal.

Satin Flycatcher

The proposal would impact an area of around 0.05ha of woodland and 0.5ha of grassland. There would also be some disturbance associated with construction which could decrease habitat quality.

The habitat to be impacted is the same as the habitat that would remain in the rest of the locality, and is highly disturbed by agriculture. The proposal area is not located in a known area of important habitat for this species.

With the implementation of the recommended mitigation measures, the likelihood of the action substantially modifying, destroying, or isolating an area of important habitat for Satin Flycatcher is minimal.

Shorebirds

The proposal would involve the removal of around 0.3ha of aquatic habitat in farm dams. There would also be some disturbance associated with construction which could decrease habitat quality.

The habitat to be impacted is the same as the habitat that would remain in the rest of the locality, and is highly disturbed by agriculture. The proposal area is not located in a known area of important habitat for these species.

With the implementation of the recommended mitigation measures, the likelihood of the action substantially modifying, destroying, or isolating an area of important habitat for Wood Sandpiper or Latham's Snipe is minimal.

b) Will the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?

There is a risk that invasive species could be introduced to the proposal area via machinery, vehicles, and materials during construction and operation. However, with the implementation of the recommended mitigation measures, the likelihood of the action resulting in harmful invasive species becoming established in the habitat of these species is minimal.

c) Will the action seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?

Fork-tailed Swift

The proposal would impact an area of around 205ha, including 0.05ha of woodland, 0.5ha of grassland and 204ha of fruit crops. There would also be some disturbance associated with construction which could decrease habitat quality. The proposal would not directly impact the aerial habitat of this species, and the proposal area is outside the breeding habitat of Fork-tailed Swift in Siberia.

The quality of potential habitat in the proposal area is low, and it is therefore unlikely to support an ecologically significant proportion of the population of Fork-tailed Swift. The habitat to be impacted is the same as the habitat that would remain in the rest of the locality.

With the recommended mitigation measures, the likelihood of the action seriously disrupting the lifecycle of an ecologically significant proportion of the population of Fork-tailed Swift is minimal.

Yellow Wagtail

The proposal would impact an area of around 205ha, including 0.05ha of woodland, 0.5ha of grassland and 204ha of fruit crops in areas close to irrigation channels. There would also be some disturbance associated with construction which could decrease habitat quality.

The quality of potential habitat in the proposal area is low, and it is therefore unlikely to support an ecologically significant proportion of the population of Yellow Wagtail. The habitat to be impacted is the same as the habitat that would remain in the rest of the locality.

With the recommended mitigation measures, the likelihood of the action seriously disrupting the lifecycle of an ecologically significant proportion of the population of Yellow Wagtail is minimal.

Satin Flycatcher

The proposal would impact an area of around 0.05ha of woodland. There would also be some disturbance associated with construction which could decrease habitat quality.

The habitat to be impacted is the same as the habitat that would remain in the rest of the locality, and is highly disturbed by agriculture. The proposal area is not located in a known area of important habitat for this species.

The quality of potential habitat in the proposal area is low, and it is therefore unlikely to support an ecologically significant proportion of the population of Satin Flycatcher. The habitat to be impacted is the same as the habitat that would remain in the rest of the locality.

With the recommended mitigation measures, the likelihood of the action seriously disrupting the lifecycle of an ecologically significant proportion of the population of Satin Flycatcher is minimal.

Shorebirds

The proposal would involve the removal of around 0.3ha of aquatic habitat in farm dams. There would also be some disturbance associated with construction which could decrease habitat quality. The proposal area is outside the breeding habitat of Wood Sandpiper in Eurasia, and Latham's Snipe in Japan and eastern Russia.

The quality of potential habitat in the proposal area is low, and it is therefore unlikely to support an ecologically significant proportion of the population of this species. The habitat to be impacted is the same as the habitat that would remain in the rest of the locality.

With the implementation of the recommended mitigation measures, the likelihood of the action seriously disrupting the lifecycle of an ecologically significant proportion of the population of Wood Sandpiper or Latham's Snipe is minimal.

A significant impact is not considered likely on the Fork-tailed Swift, Yellow Wagtail, Satin Flycatcher, Wood Sandpiper and Latham's Snipe on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of a population, or fragment or disrupt the breeding cycle of a population
- Affect habitat critical to the survival of any species
- Introduce invasive species harmful to any species
- Introduce disease that would cause any species to decline
- Interfere with the recovery of these species

APPENDIX G FIELD DATA SHEETS

Zone 2 PCT74-RRG-YB Woodland

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BAM Site – Field Survey Form	Site Sheet no: 1 of 1
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		Survey Name	Zone ID	Recorders		
Date	9 8 17	Yanco	2-Zone 2	J. Gooding		
Zone	551	Plot ID	1.	Plot dimensions	20x50	Photo #
Easting	444427	IBRA region	SW Slopes	Midline bearing from 0 m	288° N	Magnetic
Vegetation Class						Confidence: H M L
Plant Community Type		Bimble Box				EEC: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	2
	Grasses etc.	6
	Forbs	4
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	12
	Shrubs	0.2
	Grasses etc.	27.3
	Forbs	0.4
	Ferns	0
	Other	0.1
High Threat Weed cover		25%

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	1111	—
20 – 29 cm		—
10 – 19 cm		—
5 – 9 cm	✓1	✓
< 5 cm	1,1	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	2m, 0.5, 0.5, 1m 4m.	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70 70 60 75 75			
Average of the 5 subplots	70			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type
			irrigation channel

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			- roadside between 2 powerline easements.
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			Dominated by silver leaf Nightshade
Other			along roadside

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Zone 1. PCT44 - Riverine Plain Grassland

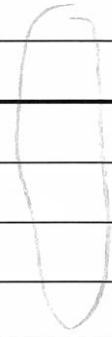
-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

BAM Site – Field Survey Form	Site Sheet no: 1 of 1
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Date		Survey Name	Zone ID	Recorders	
09 08 18		Plot 2 - Yanco (A) 1		J MURPHY / J GOODING	
Zone 55	Datum	Plot ID ②	Plot dimensions 50 x 20	Photo #	
Easting 444147	Northing 6171337	IBRA region SW slopes	Midline bearing from 0 m 285°	Midline	
Vegetation Class Derived grassland		Confidence: H M L			
Plant Community Type		EEC:			Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	1
Shrubs	0
Grasses etc.	1
Forbs	1
Ferns	0
Other	1
Sum of Cover of native vascular plants by growth form group	
Trees	0.1
Shrubs	0
Grasses etc.	5.1
Forbs	0.1
Ferns	0
Other	0.1
High Threat Weed cover	40.1

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	
50 – 79 cm	0	
30 – 49 cm	0	
20 – 29 cm	0	
10 – 19 cm	0	
5 – 9 cm	0	
< 5 cm	1	n/a
Length of logs (m) (>10 cm diameter, >50 cm in length)		0

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	30 50 40 60 30			
Average of the 5 subplots	42%			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Zone 2 - PCT74- YB -RRG Woodland

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BAM Site – Field Survey Form				Site Sheet no: 1 of 1	
Date 09/08/18		Survey Name Yanco	Zone ID Zone 2	Recorders J. Murphy / J. Gooding	
Zone 55	Datum	Plot ID 3	Plot dimensions 10x50	Photo #	
Easting 444165	Northing 6171358	IBRA region SW slopes	Midline bearing from 0 m 275°	Magnetic	
Vegetation Class				Confidence: H M L	
Plant Community Type 277 YellowBox -RRG Woodland				EEC:	Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	3
	Shrubs	2
	Grasses etc.	1
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	40%
	Shrubs	2.1
	Grasses etc.	5%
	Forbs	5%
	Ferns	0
	Other	0
High Threat Weed cover		0%

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	1 (165cm)	
50 – 79 cm	—	
30 – 49 cm		
20 – 29 cm	—	
10 – 19 cm		
5 – 9 cm	—	
< 5 cm	—	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		10 + 11 + 4 Tally space 25m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, ..., 100, 200, 300, ...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	15	60	40	20	10															
Average of the 5 subplots	29																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	09 08 18	Yanco	3	J. GOODING

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
	Lamb's tongue	<i>Plantago lanceolata</i>		5'	200		
T	Blackberry's red gum	<i>Eucalyptus camadulensis</i>	N	25'	1		
T	White Cedar	<i>Melia azedarach</i>	N	5'	6		
	African Boxthorn	<i>Lycium ferocissimum</i>	HTE	5'	8		
	Vernain	<i>Oxalis verbanacea</i>		1'	80		
	Spiderplant?	<i>Garden escape</i>		2'	100		
	Lucerne	<i>Medicago sativa</i>		1'	20		
G	<i>Rytidosperma</i> sp.		N	5'	50		
	Horehound	<i>Marrubium vulgare</i>		8'	70		
	<i>Paspalum dilatatum</i>		HTE	2'	20		
F	<i>Cinacalia nutans</i>		N	5'	30		
	Common vetch	<i>Vicia sativa</i>		0.1	20		
	Wild Brassica	<i>Brassica</i> sp.		0.1	10		
	Rye Grass (seedling)	<i>Lolium</i> sp.		5	100		
	Silver leaf nightshade	<i>Solanum elaeagnifolium</i>	HTE	1'	50		
T	Yellow Box	<i>Eucalyptus melliodora</i>	N	10'	1		
	Spear thistle	<i>Cirsium vulgare</i>		0.1	10		
S	Ruby Saltbush	<i>Enchylaena tomentosa</i>	N	2'	10		
S	Creeping saltbush	<i>Atriplex nemibaccata</i>	N	0.1	1		
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Zone 1 - PCT44 - Derwed Grassland

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BAM Site – Field Survey Form				Site Sheet no: 1 of	
		Survey Name	Zone ID	Recorders	
Date	09 08 18	Yanco	①	J MURPHY / J GOODING	
Zone	55	Datum		Plot ID	4 - PLOT 4
Easting	444712	Plot dimensions	50x20	Photo #	
Northing	6171039	IBRA region	SW Slopes	Midline bearing from 0 m	113°
Vegetation Class				Grassland - Derwed	
Plant Community Type				EEC:	
				Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	2
	Grasses etc.	5
	Forbs	3
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	5.1
	Grasses etc.	38.6
	Forbs	5.2
	Ferns	0
	Other	0.1
High Threat Weed cover		20.2%

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm		
20 – 29 cm		
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0m

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)	Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	30	80	70	50											
Average of the 5 subplots	52%															

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage	D	Distance to nearest water and type	

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			adjacent to railway line
Cultivation (inc. pasture)			
Soil erosion			Drainage from Railway line
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	15 8 18	Yanco SF	(4)	J GOODING

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
	silver leaf nightshade	<i>Solanum elaeagnifolium</i>	HTE	20%	200		
	Panicum sp. (annual exotic)			0.3	20		
	Onion Grass fair	<i>Romulea rosea</i>	HTE	0.2	200		
	Skeleton Weed	<i>Chenilla juncea</i>		2%	10		
	Patterson's curse	<i>Echium plantagineum</i>		0.2	40		
G	Curly Windmill Grass	<i>Entropogon acicularis</i>	N	3%	50		
	Prickly Lettuce	<i>Lactuca serriola</i>		0.5	10		
	Wild Oats	<i>Avena fatua</i>		40%	1000+		
F	Cicla corrugata		N	0.1	10		
	Vervain	<i>Salvia verbanaca</i>		0.5%	100		
S	Maureana brevifolia		N	5%	25		
	Spear thistle	<i>Cirsium vulgare</i>		0.5	30		
	Rumex crispus			0.1	5		
F	Geranium	<i>Erodium</i> sp.	N	0.1	5		
	Now thistle	<i>Sparganium</i> sp.		0.1	10		
G	Grass (unidentified - dead)	(paspalidium?)	N	30%	200		
	Narrow leaf clover	<i>Trifolium angustifolium</i>		0.1	5		
G	Austrostipa sp.		N	0.5	20		
	Dandelion	<i>Taraxacum officinale</i>		0.1	5		
G	Red Grass	<i>Bothriochloa macra</i>	N	5%	50		
F	Oxalis sp.		N	5%	1000		
O	Convolvulus sp. (no flowers/fruit)		N	0.1	1		
S	Monobaca (unid shrub)		N	0.1	4		v1
G	Carex Sedge (Curly Carex Sedge)			0.1	4		
G	Many Green Ryhidosperma (no fruit)		N	0.1	1		
	Winter Grass	<i>Poa annua</i>		0.1	10		
27							
28							
29							
30							
31							
32	-very many dead grasses - perennial						
33							
34							
35							
36							
37							
38							
39							
40							

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Zone 3 - Myall Woodland

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BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name	Zone ID	Recorders	
24 10 18		Yanco SF	(3)	Bridgette Poulton	
Zone	Datum	Plot ID	Plot dimensions	Photo #	
55	ADA 94	(5)	20 x 50m		
Easting	Northing	IBRA region	Midline bearing from 0 m		
241062	6171084	SW slopes	322°		
Vegetation Class				Confidence:	
Myall Woodland				H M L	
Plant Community Type				Confidence:	
				H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)	Sum values
Trees	1
Shrubs	5
Grasses etc.	6
Forbs	6
Ferns	0
Other	2
Count of Native Richness	
Trees	25%
Shrubs	15.8%
Grasses etc.	20.5
Forbs	10.5
Ferns	0
Other	0/2.2
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	20.1

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	11	
20 – 29 cm	1111	
10 – 19 cm	111111	
5 – 9 cm	11	
< 5 cm	111111111111111111	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	13, 3.5, 3.4, 4, 5, 2.5 (30.5m)	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, 100, 200, 300). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	20 60 50 60	0 70 0 5 0	0 0 0 0 0	0 10 0 0 0
Average of the 5 subplots	56	15	0	2

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	modified	Landform Element	Brown loam	Landform Pattern		Microrelief	
Lithology	soil/no rocks.	Soil Surface Texture	fine / organic high	Soil Colour	Brown	Soil Depth	76 cm
Slope	flat	Aspect	0	Site Drainage	logged	Distance to nearest water and type	30 m / canal

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			Clearing roadside verge with drainage line
Cultivation (inc. pasture)			Verge - weed dominated. / heavy earth works.
Soil erosion			NR
Firewood / CWD removal			Yes - some large tree stumps.
Grazing (identify native/stock)			No
Fire damage			No
Storm damage			No
Weediness			Yes
Other			Railway line just to the other side of road. (East)

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

0.1

GF – circle code if 'top 3'.

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Zone 4-Myall Woodland (Roadside)

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BAM Site – Field Survey Form				Site Sheet no: <u>101</u>	
		Survey Name	Zone ID	Recorders	
Date	<u>24 10 18</u>	<u>Yanco</u>	<u>24 64</u>	<u>Bridgette Boulton</u>	
Zone	<u>55</u>	Datum	<u>GDA 94</u>	Plot ID	<u>Plot 6</u>
Easting	<u>443584</u>	Northing	<u>6176457</u>	Plot dimensions	<u>20m x 50m</u>
		IBRA region	<u>SW Slopes</u>	Midline bearing from 0 m	<u>320° 170°</u>
Vegetation Class				Confidence: H M L	
Plant Community Type				EEC:	Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)	Sum values
Trees	<u>1</u>
Shrubs	<u>4</u>
Grasses etc.	<u>3</u>
Forbs	<u>4</u>
Ferns	<u>0</u>
Other	<u>1</u>
Count of Native Richness	
Trees	<u>40.1</u>
Shrubs	<u>75.2</u>
Grasses etc.	<u>0.5</u>
Forbs	<u>0.5</u>
Ferns	<u>0</u>
Other	<u>3</u>
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	<u>2.5</u>

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		
50 – 79 cm		
30 – 49 cm	<u>11</u>	
20 – 29 cm	<u>11</u>	
10 – 19 cm	<u>11</u>	
5 – 9 cm	<u>11</u>	<u>No</u>
< 5 cm	<u>11</u>	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	<u>4.1</u>	<u>5m</u>

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, 100, 200, 300). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	<u>50 20 20 20 30</u>	<u>0 0 0 0 0</u>	<u>0 0 0 0 0</u>	<u>0 0 0 0 0</u>
Average of the 5 subplots	<u>28</u>	<u>0</u>	<u>0</u>	<u>0</u>

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Pattern	Microrelief
Lithology	Soil Surface Texture	Soil Colour	Soil Depth
Slope	Aspect	Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			<u>None</u>
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			<u>None</u>
Fire damage			
Storm damage			
Weediness			
Other			<u>Roadside vegetation</u>

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	24 10 18	Yanco SF	⑥	J. GOODING

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	Weeping Myall Acacia pendula	N	40%	25		
S	Rhipoghodia spinescens	N	70%	60		
S	Echylaena tormentosa	N	5%	30		
	Axiopoda pinnata? Bromes?	E	0.5			
	Pilea fabia	E	0-2	50		
	Vulpia myuros	E	0.1	50		
	Lolium sp.	E	0-2	100		
	Lactuca hernicola	E	0.1	20		
F	Einadia nutans	N	0.2	10		
	Marrubium vulgare	E	0.1	2		
	Brassica sp.	E	0.1	2		
F	Tar vine Boerhaavia dominus	N	G 1	2		
G	Hairy Panic Panicum effusum	N	G 1	1		
	Great Brome Brpmus diandrus	HTE	0.5	200		
S	Maureana (Hairy) excavata	N	0.1	20		
G	Anostetipa sp.	N	0.2	8		
	Lycium ferocissimum	HTE	2%	10		
F	Oxalis perennans	N	0.1	5		
G	Ryhdosperma sp	N	0.2	20		
S	Sclaiolaena mucicata	N	0.1	2		
F	Nida conjugate	N	0.1	2		
	Donchis oleraceus	E	0.1	1		
G	Tall chloris Chloris sp?	N	0.1	5		
	Echinum plurigyneum	E	0.1	5		
O	Gray Mistlebe	N	3!	20		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

BAM Site – Field Survey Form				Site Sheet no: _____	
		Survey Name	Zone ID	Recorders	
Date	25 10 18	Yanco	①	Bridgette Poylton	
Zone	65	Datum	GDA 94	Plot ID	Plot 7
Plot dimensions	20m x 60m	Photo #			
Easting	444483	Northing	6171127	IBRA region	SW Slopes
Midline bearing from 0 m	320°				
Vegetation Class	Grassland - Derived				Confidence: H M L
Plant Community Type					EEC: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	3
	Grasses etc.	5
	Forbs	7
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	1.4
	Grasses etc.	1.6
	Forbs	4
	Ferns	0
	Other	0.3
High Threat Weed cover		15%

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	
50 – 79 cm	0	
30 – 49 cm	0	
20 – 29 cm	0	
10 – 19 cm	0	
5 – 9 cm	0	
< 5 cm	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		Nil

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, 100, 200, 300). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	60	70	90	70	50	0	5	0	0	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	68					3					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Modified.	Landform Element		Landform Pattern	Modified roadside	Microrelief	Creeks/drains
Lithology		Soil Surface Texture	fine loam	Soil Colour	brown	Soil Depth	deep
Slope	Fly	Aspect	0°	Site Drainage	Creeks.	Distance to nearest water and type	20m Canal

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			Modified roadside between road and rail line.
Cultivation (inc. pasture)			Nil
Soil erosion			Nil
Firewood / CWD removal			Completely cleared groundcover only.
Grazing (identify native/stock)			Nil
Fire damage			
Storm damage			
Weediness			Extensive.
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form

Site Sheet no: 51

Date		Survey Name	Zone ID	Recorders	
25 10 18		Yanco	1	Bridgette Poylton	
Zone	Datum	Plot ID	Plot dimensions	Photo #	
65	GDA 94	A (8)	20m x 50m		
Easting	Northing	IBRA region	Midline bearing from 0 m		
444469	6171149	SW Slopes	315°		
Vegetation Class					Confidence: H M L
Plant Community Type		Grassland / weeds			Confidence: H M L
		EEC:			

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m ² plot)	Sum values
Trees	0
Shrubs	2
Grasses etc.	5
Forbs	4
Ferns	0
Other	1
Count of Native Richness	
Trees	0
Shrubs	0.2
Grasses etc.	16.3
Forbs	0.5
Ferns	0
Other	0.5
Sum of Cover of native vascular plants by growth form group	
High Threat Weed cover	25%

BAM Attribute (1000 m ² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	
50 – 79 cm	0	
30 – 49 cm	0	
20 – 29 cm	0	
10 – 19 cm	0	
5 – 9 cm	0	
< 5 cm	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	NIL	

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, 100, 200, 300). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	60	50	60	90	30	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	(56)					(1)					0					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern	Modified verge	Microrelief	Crested Drains
Lithology	Soil / No rocks	Soil Surface Texture	fine loam	Soil Colour	Brown	Soil Depth	75 cm
Slope	flat	Aspect	0	Site Drainage		Distance to nearest water and type	40 m Canal

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			cleared.
Cultivation (inc. pasture)			—
Soil erosion			—
Firewood / CWD removal			completely devoid of trees
Grazing (identify native/stock)			—
Fire damage			—
Storm damage			—
Weediness			Heavy burden
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders			
Date	25 10 18	Yanco	(8)	J. GOODING			
GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
	Silverleaf Nightshade	Solanum elaeagnifolium	HTE	5%	100		
	Great Brome - Red Brome	Bromus diandrus	HTE	20%	1000+		
	Arenaria			15'	1000'		
	Salvia verbenacea			0.3	30		
G	Curly Windmill Grass	Entolasia ramosus	N	15'	200		
G	Couch	Cynodon dactylon	N	0.1	2		
F	Alopecurus		N	0.2	20		7/1
	Lolium sp.			1'	100		
G	Rhynchospora setacea		N	0.1	10		1/1
G	Warrego summer grass (dead)	Paspalum	N	1'	30		
S	Asterolaena muricata		N	0.1	1		1
F	Hogweed	Zizia aurea	N	0.1	2		1
	Common heliotrope	Heliotropium europaeum		0.1	1		
	Lactuca serriola			0.1	2		
S	Maireana caustophylla excavata		N	0.1	3		1/1
O	Convolvulus		N	0.5	10		1/1
	Echium plantagineum			0.2	30		
G	Juncus sp.		N	0.1	2		
F	Tarvine	Boerhaavia diffusa	N	0.1	1		
	Aster thistle	Cirsium vulgare		0.1	1		
	Manisuris Vulgare			0.1	1		
F	Orchis pinnatifida		N	0.1	1		

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

AM Site – Field Survey Form

Site Sheet no: 1

Date		Survey Name	Zone ID	Recorders		
26 11 18		Yanco		B. Poylton		
Zone	Datum	Plot ID	Plot dimensions	Photo #		
SS		Plot 9	10 x 10			
Easting	Northing	IBRA region	Midline bearing from 0 m			
644028	6171291	SWS	290°			
Vegetation Class		Derived grassland			Confidence: H M L	
Plant Community Type					Confidence: H M L	
		EEC: 44			(H) M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)	Sum values
Trees	0
Shrubs	5
Grasses etc.	4
Forbs	7
Ferns	0
Other	0
Count of Native Richness	
Trees	0
Shrubs	15
Grasses etc.	13
Forbs	54
Ferns	0
Other	0
Sum of Cover of native vascular plants by growth form group	
Trees	0
Shrubs	15
Grasses etc.	13
Forbs	54
Ferns	0
Other	0
High Threat Weed cover	20 1

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	0
50 – 79 cm	0	0
30 – 49 cm	0	0
20 – 29 cm	0	0
10 – 19 cm	0	0
5 – 9 cm	0	2
< 5 cm	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		
NIL		

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	40 0 40 5 60	60 90 60 90 60	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	21	62	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type	Sedimentary	Landform Element	Shed plain	Landform Pattern	Valley	Microrelief	Carb bank
Lithology	Alluvial	Soil Surface Texture	Fine	Soil Colour	Brown	Soil Depth	>10cm
Slope	Flat 0°	Aspect	Nil	Site Drainage	roadside	Distance to nearest water and type	1m Carb

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3	NR	
Cultivation (inc. pasture)	0	-	
Soil erosion	0	-	
Firewood / CWD removal	0	-	
Grazing (identify native/stock)	0	-	
Fire damage	0	-	
Storm damage	0	-	
Weediness	2	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

APPENDIX H BAM CALCULATOR CREDIT REPORT



BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00011569/BAAS18074/19/00011570	Yanco Solar Farm	04/01/2019
Assessor Name	Report Created	BAM Data version *
Julie Gooding	07/01/2019	6
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS18074		

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAI	Ecosystem credits
Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion								
1	44_Low	36.4	0.5	0.25	High Sensitivity to Potential Gain	2.00		9
							Subtotal	9

BAM Credit Summary Report

Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion							
2	26_Mod	86.5	0.1	0.25	High Sensitivity to Potential Gain	2.00	2
						Subtotal	2
						Total	11

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAll	Species credits
<i>Cullen parvum</i> / <i>Small Scurf-pea</i> (<i>Flora</i>)						
44_Low	36.4	0.49	0.25	2	False	9
26_Mod	86.5	0.05	0.25	2	False	2
					Subtotal	11

APPENDIX I PERSONNEL

Name	Title	Qualifications	Roles
Mitch Palmer	Senior Ecologist	<ul style="list-style-type: none"> BAM Accredited Assessor (BAAS17051) B. Science 	Review of BDAR
Julie Gooding	Environmental Consultant - Ecologist	<ul style="list-style-type: none"> BAM Accredited Assessor (BAAS18074) B. Science (Biology) 	Field Work Co-author of BDAR
Jess Murphy	Environmental Consultant - Ecologist	<ul style="list-style-type: none"> B. Science Master Environmental Science and Management 	Field Work Co-author of BDAR
Bridgette Poulton	Environmental Consultant	<ul style="list-style-type: none"> B. Science (Biology & Environmental science) Master Environmental Science 	Field Work