

BIODIVERSITY ASSESSMENT REPORT

for a

Poultry Farm Complex

Lots 1 & 2 DP 749831

No. 375 McRaes Road

**GOOLGOWI
NSW**

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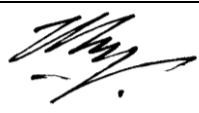
Job No: 12269

Revised December 2018

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Project Name	Biodiversity Assessment Report for a proposed Poultry Farm Complex - Lots 1 & 2 DP 749831 No. 375 McRaes Road, Goolgowi NSW.	
Project Number	12269	
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Disclaimer

This report has been prepared in accordance with the proposal provided by the Client and outlined within this report. All findings, conclusions or recommendations contained within this report are based upon the data and results collected under the times and conditions specified in the report and are only applicable for the proposal considered within this report. This report has been prepared for use exclusively by the Client. No responsibility for its use by any other party is accepted by **WILDTHING** Environmental Consultants.

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1.0 INTRODUCTION

This Biodiversity Assessment Report (BAR) has been undertaken to seek approval for a Poultry Farm Complex at Lots 1 & 2 DP 749831 No. 375 McRaes Road, Goolgowi NSW. This BAR addresses the specific matters raised in the Secretary's Environmental Assessment Requirements (SEARs) that are relevant to biodiversity. In accordance with the SEARs, the BAR uses the Framework for Biodiversity Assessment (FBA). Considerations have also been given to SEPP 44 Koala Habitat Protection, the Fisheries Management Act 1994 and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

1.1 LOCATION OF THE SITE

The proposed development site is located approximately 17km south-west of the town of Goolgowi and occurs just to the east of the Mid Western Highway (Figure 1.1). The unsealed McRaes Road formed the southern boundary of the site.

1.2 DEFINITION OF THE SITE

The 615.9ha site was composed of two parcels of land:

- Lot 1 DP 749831 (409.2ha)
- Lot 2 DP 749831 (206.7ha)

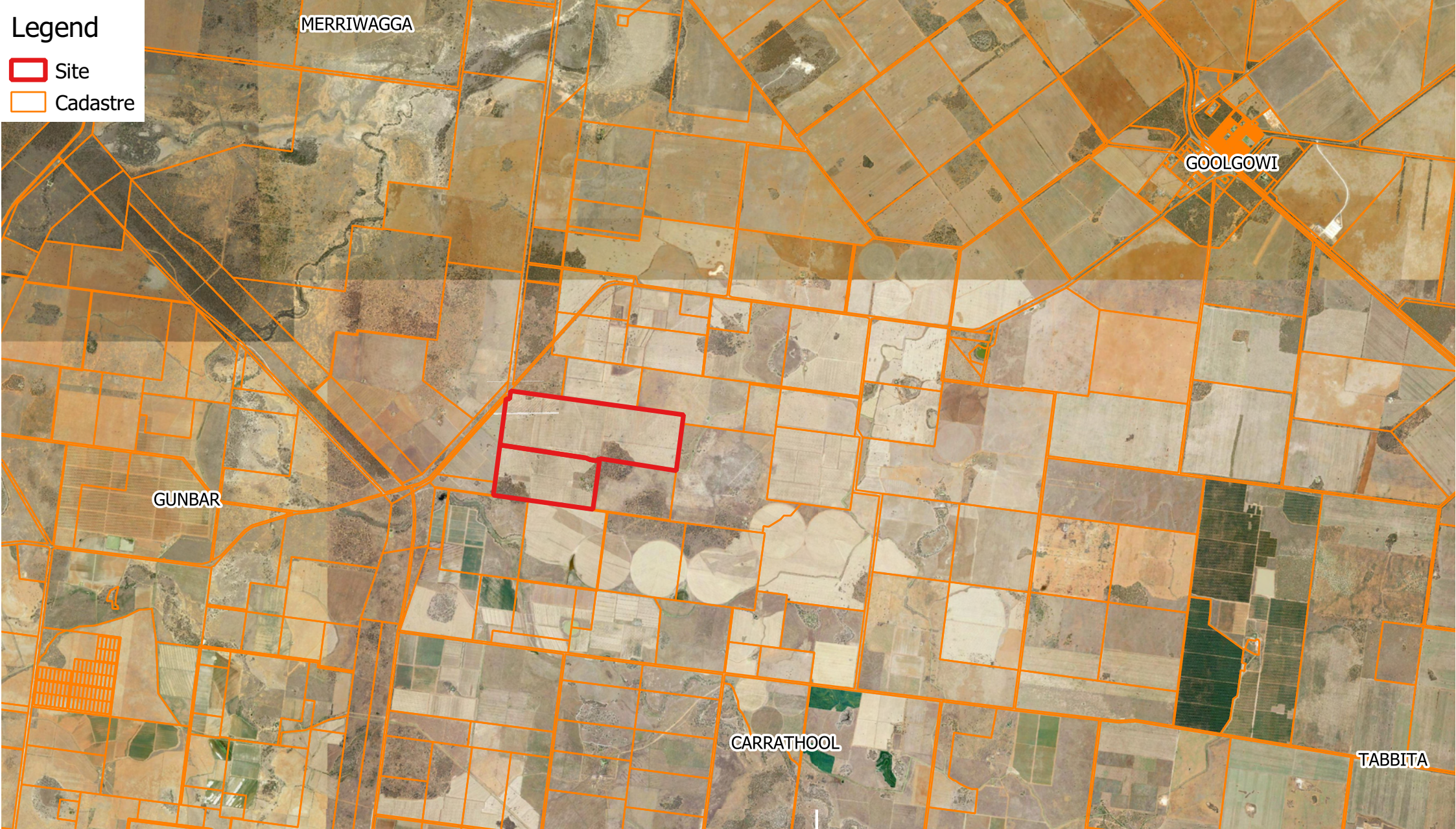
1.2.1 DESCRIPTION OF SITE

Approximately 560ha of the 615.9ha site has been significantly modified by historic land clearing and long-term agricultural activities particularly broad-scale-cropping. At the time of the survey the majority of the site was used for irrigated wheat cropping. Some dryland Oats were also planted around the edges. The Wah Wah Irrigation Channel runs through the centre of the site from east to west. A dwelling and associated farm sheds were located in the south of the site. Despite the disturbance patches of remnant native vegetation were present around parts of the periphery of the site. Woodland patches primarily composed of the canopy species *Casuarina cristata* (Belah) occupied approximately 51ha of the site within the south-west corner and south-east. Other smaller areas of native vegetation included approximately 1.67ha of woodland in the north-west dominated by *Eucalyptus socialis* (Red Mallee).

The topography of the site and surrounding lands is flat with the majority approximately 100m asl. The site largely consisted of alkaline brown calcareous soils. Nodules of limestone which are the product of solonisation were observed within areas of disturbed soil.

1.3 ZONING OF SITE UNDER THE CARRATHOOL LOCAL ENVIRONMENTAL PLAN 2012

The entire study area is zoned RU1 Primary Production. The objective of this direction is to protect the agricultural production value of rural land. A review of the Terrestrial Biodiversity Map under Part 6 Clause 6.3 of the Carrathool LEP found no areas of Terrestrial Biodiversity were indicated within the site or were bordering the site.



Legend

Site

Cadastral

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0 2.5 5 km



Map Projection GDA94 MGA Zone 56
 Data Sources: LPI (2018),

Figure 1.1

Location Map

McRaes Road
 Goolgowi, NSW
 6 December 2018

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1.4 DESCRIPTION OF THE PROPOSAL

The proposed Poultry Farm Complex comprises 5 farms, each with a carrying capacity of 1.2 million birds in 20 Intensive Agricultural Industries – Poultry Tunnel Ventilated Sheds. The development of each farm will have the following general associated activities undertaken:

- Storage Dams of around 300ML;
- Bulk Earthworks;
- Landscaping Mounds to mitigate noise and odour;
- Machinery and Supply Sheds;
- Water storage reservoirs;
- 2 Dwellings;
- Gas tanks, feed silos, odour exhaust stacks;
- Associated infrastructure;
- Upgrade of intersection onto Mid Western Highway.

The development of each farm will be a staged construction. A plan of the proposal is shown in Figure 1.2.

1.5 STRUCTURE OF BIODIVERSITY ASSESSMENT REPORT (BAR)

This BAR follows the requirements of Sections 1 and 2 of the FBA:

Section 1

Identification of the biodiversity values subject to the proposed major development (the proposal):

- Landscape Features;
- Native Vegetation;
- Threatened Species.

Section 2

Impacts of the proposal on biodiversity as part of an application for approval to undertake a Major Proposal under the NSW planning legislation:

- Avoid and Minimise Impacts;
- Impact Summary.

1.6 DEFINITIONS

The Site

Refers to all Lots 1 & 2 DP 749831 and area in the north west required for access onto the Mid Western Highway

Development Site

Refers to the area of the site containing all operational infrastructure. It includes the sheds and associated infrastructure including the upgrade of the intersection onto the Mid Western Highway. dwellings

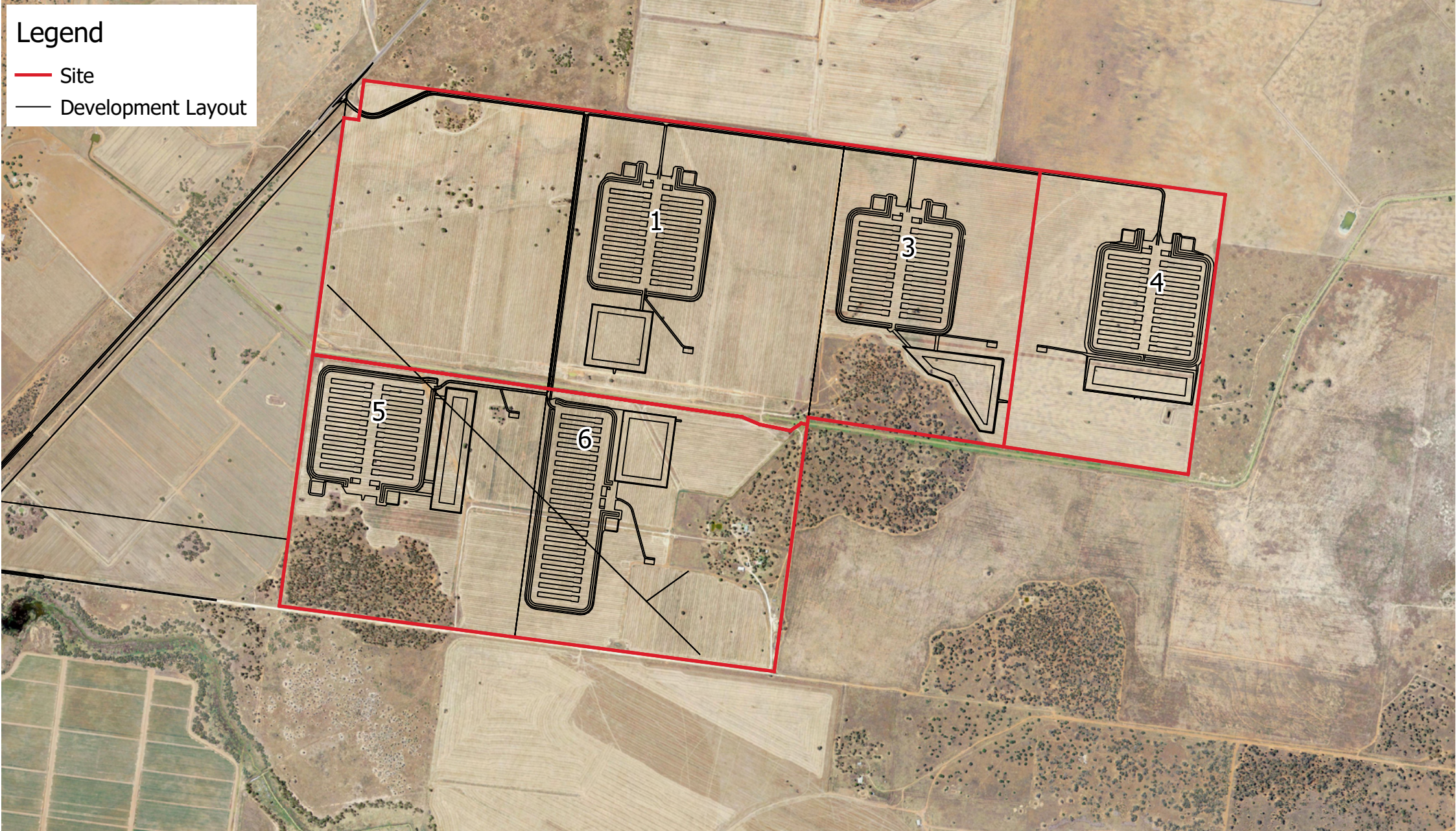
1.7 INFORMATION SOURCES

A list of the resources used to inform this report, the date they were accessed and the spatial extent captured, where relevant, is provided in Table 1.1.

Legend

— Site

— Development Layout



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Map Projection GDA94 MGA Zone 56

Data Sources: LPI (2018),

Figure 1.2

Development Proposal Map

McRaes Road

Goolgowi, NSW

6 December 2018

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Table 1.1: Desktop Resources

Resource	Date Reviewed	Spatial Extent
Zoning and Regulatory Maps		
The Carrathool Local Environmental Plan (LEP) 2012 (Carrathool Shire Council, 2012)	December 2016	Entire study area
Biodiversity Values and Landscape Maps		
SIX Maps -Base Map - LPI 1:25,000 digital topographic databases (DTDB) (LPI 2018) -Cadastral data LPI digital cadastral database (DCDB) (LPI 2018)	December 2016	Entire study area
NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 (OEH 2016)	December 2016	Entire study area
Threatened Species, Vegetation and Landscape Databases		
Atlas of NSW Wildlife (OEH 2016)	Last accessed 19/09/17	10x10km radius of study area
Commonwealth Protected Matters Search Tool (PMST) (DoEE 2016)	December 2016	10x10km radius of study area
PlantNet NSW (2016) The Royal Botanic Gardens and Domain Trust 2018).	December 2016	-Entire study area
Property Vegetation Plan for clearing – Lot 1 & 2 DP 749831 “Merikee” Carrathool Road, Goolgowi NSW. Alan & Sue Williamment. Murrumbidgee CMA (2011).	December 2016	Entire study area
Survey and Reporting Methodology		
Framework for Biodiversity Assessment – NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014a).	2016-2018	Entire study area
BioBanking Assessment Methodology 2014, OEH (2014b).	December 2016	Entire study area
Climactic Data		
075041 Griffith (BoM 2016)	December 2016	Entire study area

2.0 LEGISLATIVE CONTEXT & SEARS

Environmental impact statements (EIS's) are prepared to assess the impacts of major projects, including State Significant Development (SSD) projects, under the *Environmental Planning and Assessment Act 1979* (EP&A Act). This Biodiversity Assessment Report (BAR) forms part of the EIS being prepared for the Poultry Farm Complex and assesses the biodiversity impacts of the project. Also considered in this report was the Commonwealth Environment Protection and Biodiversity Conservation Act (1999), the Fisheries Management Act 1994 & SEPP 44 – Koala Habitat Protection.

Fieldwork undertaken by Wildthing Environmental Consultants was carried out under the following NPWS Scientific Investigation Licence SL100345 and under Animal Care and Ethics Approval: Animal Research Authority Issue by the Director General of NSW Agriculture (File No. TRIM 13/251) for the Fauna Survey for Biodiversity and Impact Assessment.

2.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEARS)

EIS's are subject to a range of legislative and policy requirements as set out in the Secretary's Environmental Assessment Requirements (SEARs) (issued November 2016).

The SEARs require the BAR to address the following:

- An assessment of biodiversity impacts in accordance with the Framework for Biodiversity Assessment (OEH, 2014) and the NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014), including GIS files used in the assessment; and
- Accurate predictions of any vegetation clearing on or off the site including buildings, access roads and servicing and support infrastructure.

A copy of the SEARs and additional correspondence for the Goolgowi Poultry Farm Complex is contained in Appendix A.

2.2 OEH CONSULTATION

Wildthing Environmental Consultants notified OEH that the only biodiversity impact as a result of the proposal was the removal of a single tree. In an email advice to Daryl Harman of Wildthing Environmental Consultants on 12 September 2017 OEH advised that:

- The SEARS issued from the Department of Planning and Environment (DPE) state that the assessment of biodiversity is to be undertaken in accordance with the Framework for Biodiversity Assessment. However, the original advice from OEH to DPE was that this was required unless "otherwise agreed by OEH".
- The assessment does not require the use of the credit calculator associated with the FBA to determine whether an offset requirement is necessary, given the impact is a single tree;
- An assessment of biodiversity is recommended that is consistent with the FBA in other regards – that evidence of how impacts on biodiversity have been avoided and any mitigation factors, such as fencing, landscaping and weed control are clearly documented.

2.3 EXISTING CONSERVATION OBLIGATION (PROPERTY VEGETATION MANAGEMENT PLAN - PVP)

An existing PVP (Property Vegetation Management Plan) agreement between the landholder and the Local Land Services (LLS) exists within the site (Murrumbidgee CMA, 2011). The PVP has allowed the removal of 47 paddock trees for cropping which has been offset by the protection of woodland in the south-west of the site.

A copy of the subject PVP is contained within Appendix H.

3.0 LANDSCAPE FEATURES

3.1 IDENTIFIED FEATURES

The FBA requires the assessment of landscape features to help describe the biodiversity values of the site and construction footprint and assess the impacts of the project.

3.1.1 BIOREGION & IBRA SUBREGION

Bioregion

The site occurs within the Murray Darling Depression IBRA Region (Interim Biogeographic Regionalisation for Australia) Bioregion (Figure 3.1). The Murray Darling Depression Bioregion lies in the Murray Basin on Tertiary and Quaternary sediments deposited from a shallow sea, lakes and rivers. The landscape is characterised by dunefields, sandplains and undulating plains of brown calcareous soils. There is very little structured drainage but numerous lakes, swamps and depressions are present, some of which are driven by saline groundwater.

IBRA Subregion

The site occurs within the Darling Depression IBRA (Interim Biogeographic Regionalisation for Australia) subregion (Figure 3.1). This subregion occurs on Quaternary aeolian sands and lake sediments. Isolated Devonian quartz sandstone outcrops. Landforms consist of extensive sandplains, dunefields piled against Cobar Peneplain ranges, freshwater overflow lakes fed by rare floods in the Darling River and Stony ridges and ranges.

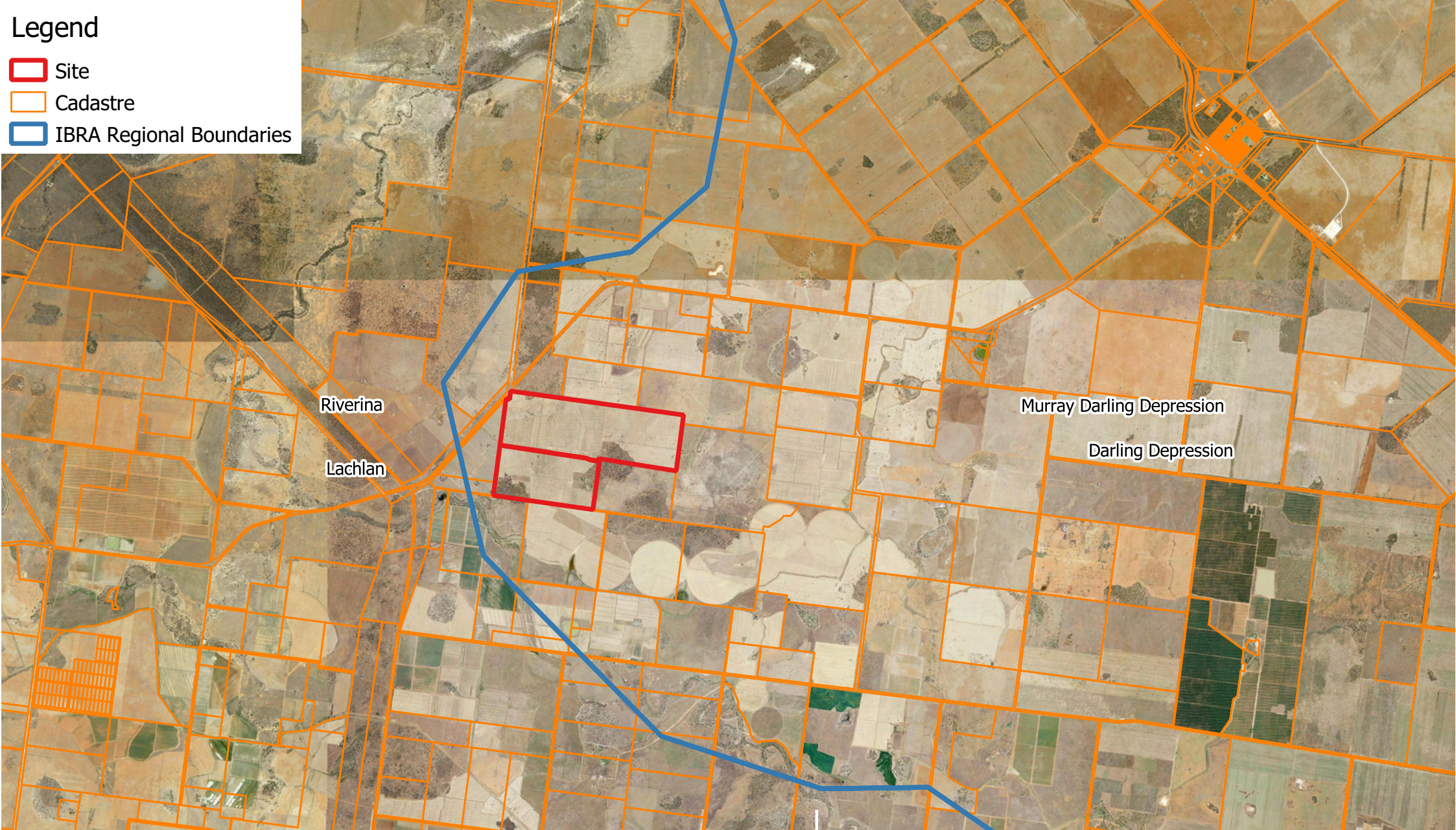
3.1.2 NSW LANDSCAPE REGIONS (MITCHELL LANDSCAPES)

The site falls within the Hsp Hillston Sandplains Mitchell landscape (Figure 3.2). Hsp Hillston Sandplains MDD Ivanhoe – Nangara Hillston Sandplains landscape includes parts of three land systems: Lysmoyle, Karwarn and Nombinnie. Level to undulating sandplain of Quaternary aeolian sands and limited alluvium, relief 2 to 4m. Calcareous red earth and solonized brown soils with deep siliceous sands on hummocks. Extensive dense mallee and broombush communities. *Eucalyptus socialis* (Red mallee), *Eucalyptus dumosa* (White mallee), *Melaleuca uncinata* (Broombush), *Acacia triptera* (Spur-wing Wattle) with *Casuarina cristata* (Belah), *Alectryon oleifolius* (Rosewood), *Apophyllum anomalum* (Warrior Bush), *Eremophila mitchellii* (Budda), *Callitris glaucophylla* (White Cypress Pine), *Hakea leucoptera* (Needlewood), *Dodonea* sp. (Hopbush), *Eremophila stuartii* (Turpentine), occasional ironbark (*Eucalyptus* sp.) and *Brachychiton populneus* (Kurrajong) and *Austrostipa variabilis* (Variable spear grass), *Medicago* sp (Medics) and forbs.

3.1.3 NATIVE VEGETATION EXTENT

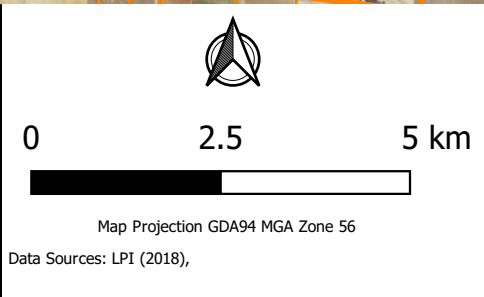
An inner and outer assessment circle with a ratio of 1:10 was established using GIS. A 200ha inner assessment circle and 2000ha outer assessment circle were positioned over the site and was centred over an area of native vegetation (single tree) that was to be impacted most by the proposal.

The total area of native vegetation mapped within the outer assessment circle (2000ha) is 599.3ha (Figure 3.3).



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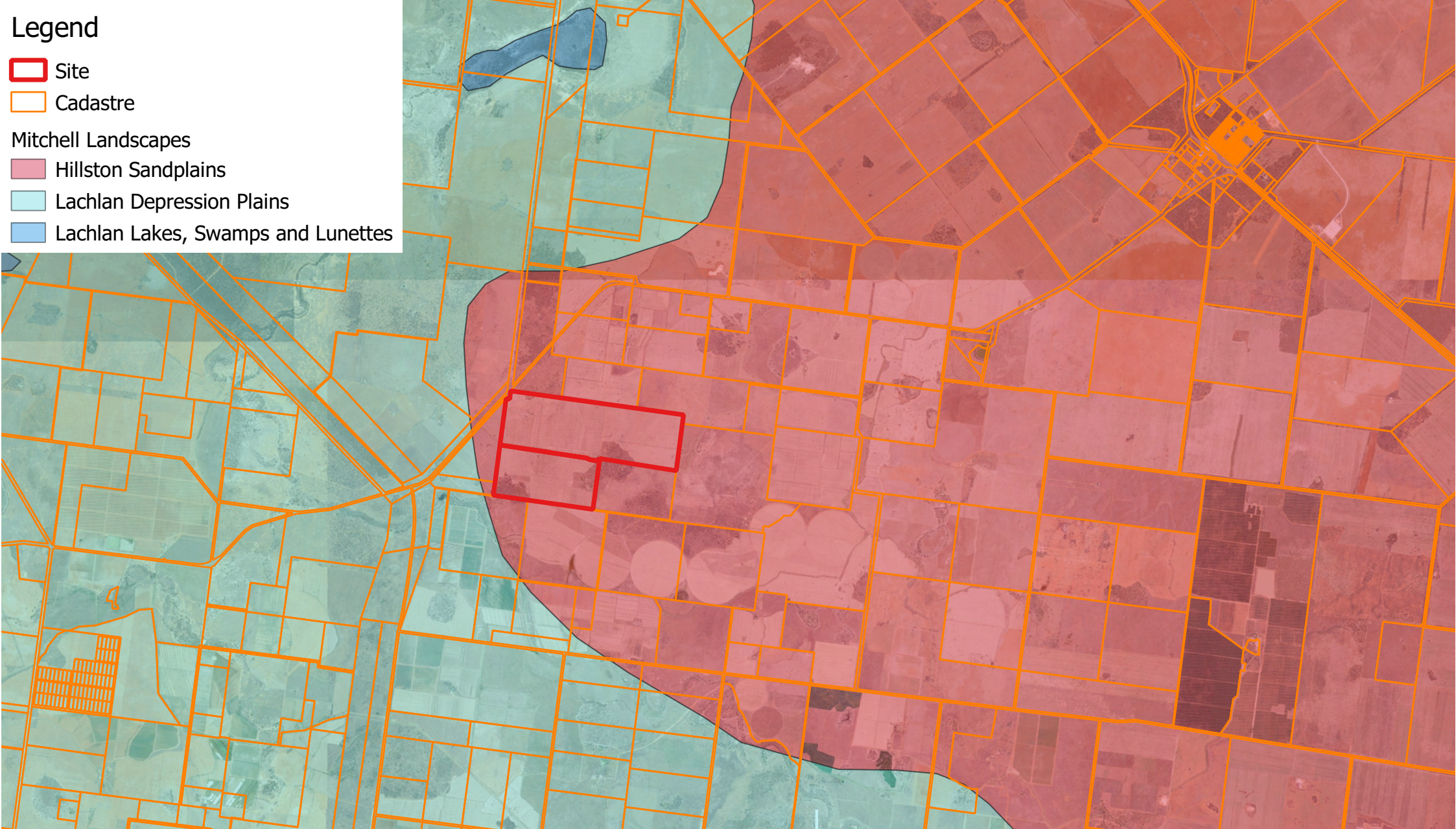


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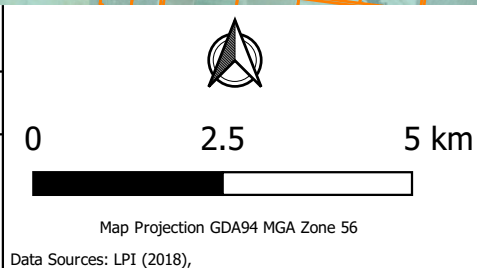


Figure 3.2

Mitchell Landscapes Map

McRaes Road
Goolgowi, NSW

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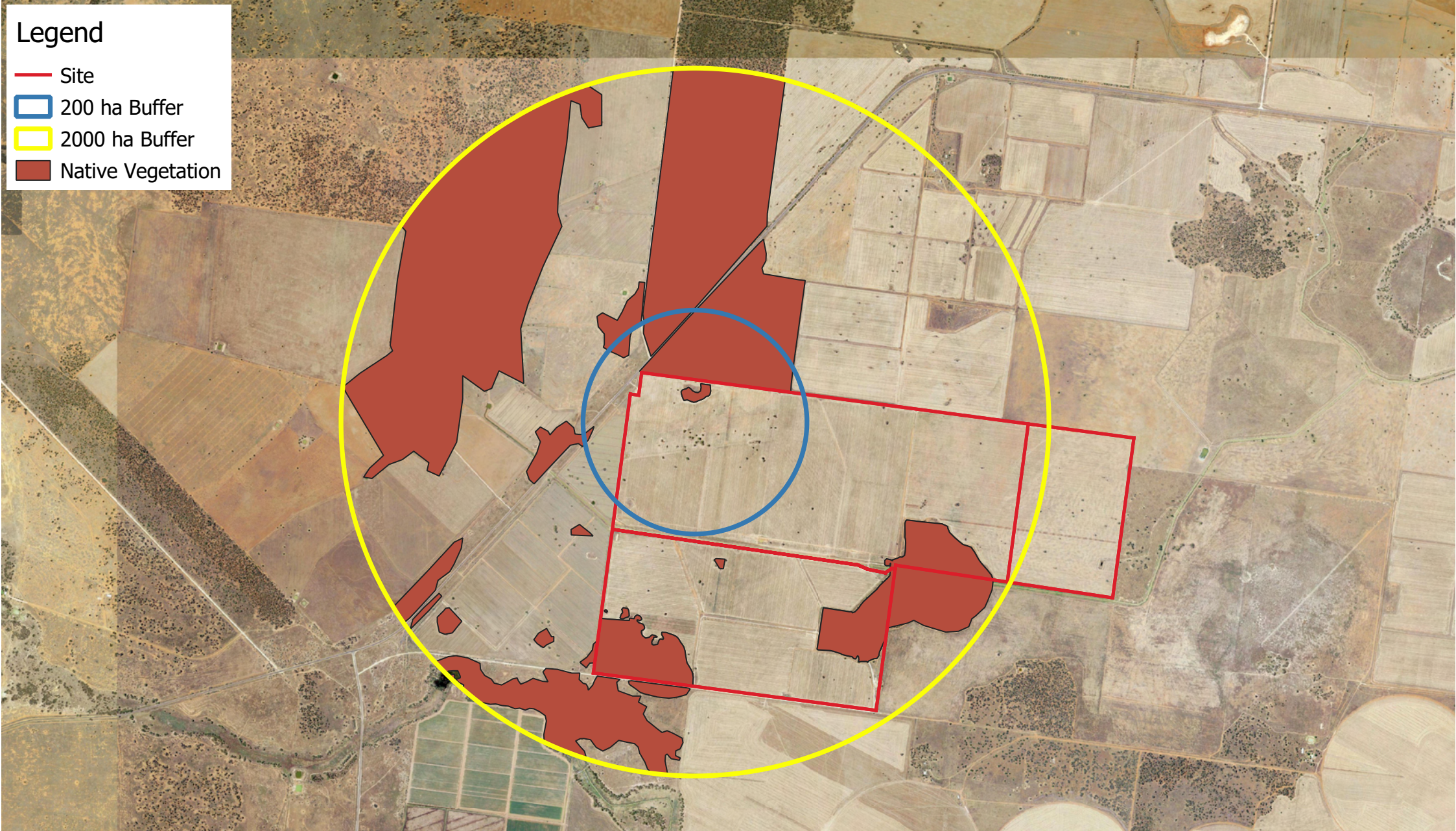
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Site

200 ha Buffer

2000 ha Buffer

Native Vegetation



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Map Projection GDA94 MGA Zone 56
Data Sources: LPI (2018),

Figure 3.3
Assessment Circles Map

McRaes Road
Goolgowi, NSW
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3.1.4 CLEARED AREAS

Cleared areas within the development site are primarily used for agriculture chiefly cropping and provide little in regards to habitat for most native species. The cropping areas would provide some habitat for some reptile, parrot and macropod species. Introduced species such as rabbits, cats and foxes would also utilise this area. Approximately 560ha of the 615.9ha site within the site boundary is cleared non-native vegetation.

3.1.5 EVIDENCE TO SUPPORT DIFFERENCES BETWEEN MAPPED VEGETATION EXTENT AND AERIAL IMAGERY

There was little evidence between the mapped areas of vegetation and the extent shown on the aerial photograph. Some paddock trees present on the aerial photo were missing. The PVP has allowed the removal of 47 paddock trees for cropping which has been offset by the protection of woodland in the south-west of the site (Murrumbidgee CMA, 2011). A copy of the subject PVP is contained within Appendix H.

3.1.6 RIVERS AND STREAMS

The site also occurs within the Murrumbidgee Irrigation Area with the Wah Wah Irrigation Water Channel Running through the middle of the site from east to west. A number of smaller internal irrigation channels were also present. One drainage line was shown in the far east of the site. This drainage line was present within cropping land on was not observable on the ground. The site and surrounds were located within the Wah Wah Creek catchment and Greater Murrumbidgee River Catchment. Wah Wah Creek was located approximately 320m the the south-west of the site (Figure 3.4).

3.1.7 WETLANDS

No wetlands were located within, adjacent to and downstream of the site.

3.1.8 LANDSCAPE VALUE SCORE

The inner and outer assessment circles established using GIS were centred on the area of native vegetation that is most impacted by the proposal:

- The total area of the inner assessment circle is 200ha;
- The total area of the outer assessment circle, including the development site, is 2000ha;
- Current native vegetation cover within the inner assessment circle is 48.3%;
- Current native vegetation cover within the outer assessment circle is 30%.

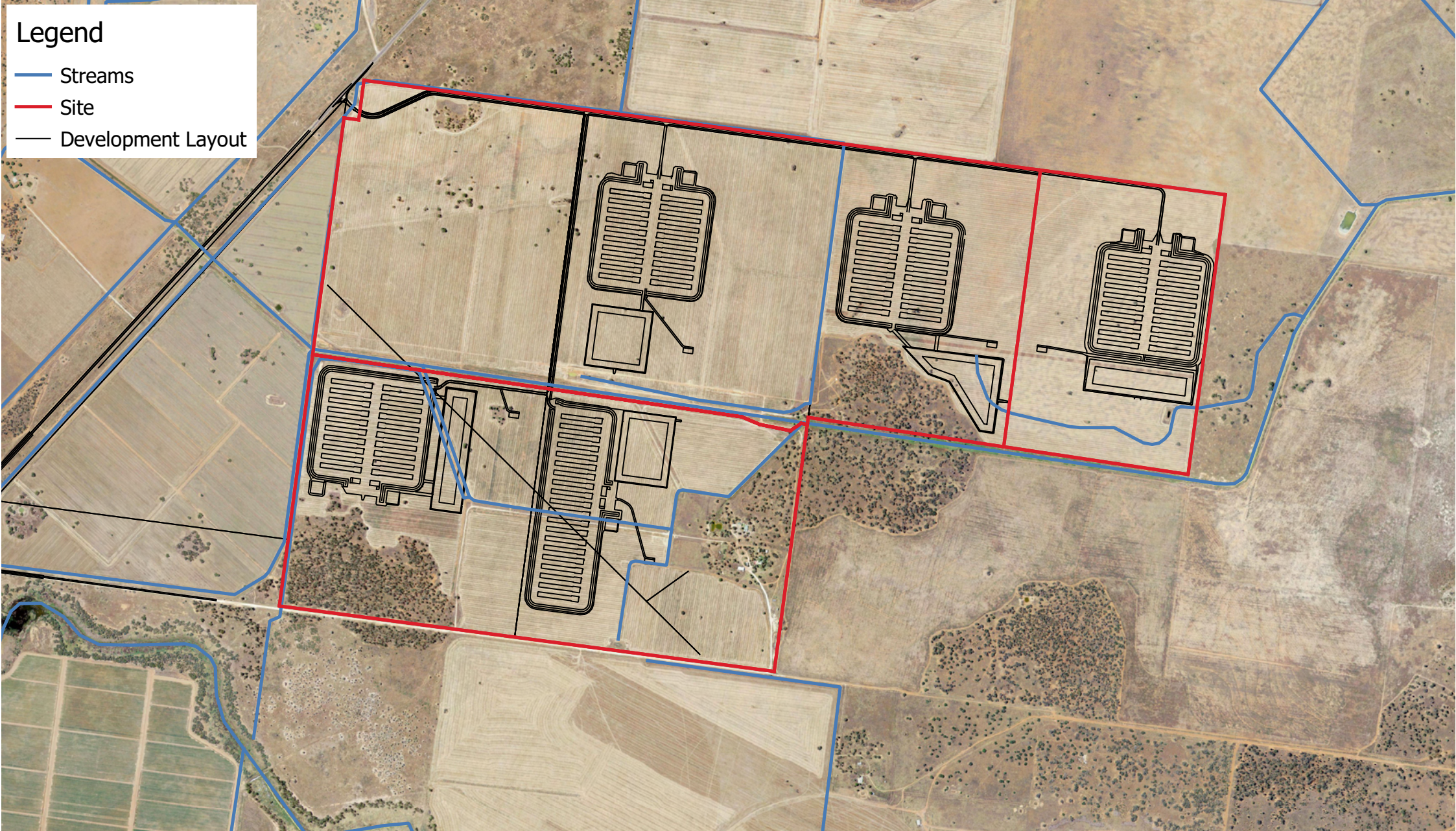
As the only impact on native vegetation is the removal of one specimen of *Eucalyptus socialis* (Red Mallee) on the edge of a wheat crop the future extent of native vegetation was not undertaken.

Legend

Streams

Site

Development Layout



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Map Projection GDA94 MGA Zone 56

Data Sources: LPI (2018),

Figure 3.4

Watercourse Map

McRaes Road

Goolgowi, NSW

6 December 2018

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3.1.9 CONNECTIVITY VALUE

A connecting link is when native vegetation on the site adjoins native vegetation surrounding the site and the native vegetation:

- Is in moderate to good condition, and
- Has a patch size >1ha, and
- Is separated by a distance of <100m (or <30m for non-woody ecosystems), and
- Is not separated by a large waterbody, dual carriageway, wider highway or similar hostile link.

Native vegetation occurring within the site was subject to a high degree of fragmentation. The two areas 13.5ha & 14.72ha of Belah Woodland in the east formed part of a larger isolated fragment extending outside the site (52ha in total) which was surrounded by cropping land. The 22.5ha area of Belah Woodland in the south-west was connected to a smaller area of Belah Woodland in the south and larger areas of Myall Woodland and other communities associated with Wah Wah Creek. The area of Red Mallee Woodland in the north-west was associated with larger areas of native grassland to the north including areas beyond the Mid Western Highway.

The proposal which will be situated within cropping land is unlikely to result in a further fragmentation or reduction of connectivity for flora and fauna species present within the locality.

The development will not impact on any connecting links or state or regional biodiversity links.

3.1.10 AREA TO PERIMETER RATIO

As the proposal is a site-based development or a multiple fragmentation development, the area to perimeter ratio for the proposal is not required to be assessed.

3.1.11 PATCH SIZE

As indicated in Section 3.1.8 areas of moderate to good vegetation were connected to areas of adjacent vegetation occurring outside the site. A patch size of 50ha was entered giving a patch size score of 3.

4.0 NATIVE VEGETATION

4.1 PLANT COMMUNITY TYPES

The majority of the site has been developed for agricultural purposes with approximately 560ha of the 615ha site was found to be utilised for broad scale cropping. Despite the disturbance remnant patches of native vegetation were present around parts of the periphery of the site. A total of two Plant Community Types (PCT's) were delineated on site. The delineation of these vegetation communities was based on structure and flora species composition. PCT's present within the site:

- PCT 57 - Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion (approximately 51ha intact & 6.5ha derived);
- PCT 193 - Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW (1.67ha):

Other Vegetation that was not given a PCT consisted of areas that were dominated by non-indigenous vegetation. The Wah Wah Irrigation Channel and small man-made dams were also not assigned a PCT. Other vegetation assemblages were:

- Cultivated Crops (560ha);
- Aquatic Vegetation;
- Disturbed Roadside Vegetation.

Detail of each PCT and other vegetation is shown in Table 4.1. A total list of flora species recorded within the site is contained in Appendix B.

Table 4.1: Details of PCT'S and other vegetation within the site

Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion	
Vegetation Formation	Semi-arid Woodlands (Shrubby sub-formation)
Vegetation Class	Semi-arid Sand Plain Woodlands
Vegetation Community Type (PCT) No.	PCT - 57
Biometric Type	CW105; LA106; MR515; WE124
PCT Name	Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion
Extent within site	51ha
Description	A 22.5ha area was present in the far south-west and two areas 13.5ha & 14.72ha in the east (Plates 1, 2, 3, 4 & 5). The two areas in the east formed part of a larger fragment extending outside the site (52ha in total) which was surrounded by cropping land. The mid-high woodland was dominated by a canopy of <i>Casuarina cristata</i> (Belah) and to a lesser extent <i>Casuarina pauper</i> (Black Oak). Common species within the mid-storey/shrub layer were <i>Alectryon oleifolius</i> subsp. <i>canescens</i> (Western Rosewood), <i>Geijera parviflora</i> (Wilga) and <i>Apophyllum anomalum</i> (Warrior Bush). Common native groundcovers included grasses; <i>Austrostipa scabra</i> subsp. <i>scabra</i> (Speargrass), Chenopods; <i>Enchylaena tomentosa</i> (Ruby Saltbush), <i>Sclerolaena diacantha</i> (Grey Copperburr), <i>Rhagodia spinescens</i> (Spiny Saltbush). Other native ground covers included <i>Rhodanthe floribunda</i> (Common White Sunray), <i>Calotis cuneifolia</i> (Blue Burr-daisy), <i>Sida corrugata</i> (Corrugated Sida), <i>Boerhavia dominii</i> (Tarvine) and <i>Vittadinia cuneata</i> var. <i>cuneata</i> (Fuzzweed). The weed species <i>Sisymbrium</i> sp. (Musturd) formed dense low thickets over large areas of this community. Other common introduced species included <i>Lactuca serriola</i> (Prickly Lettuce), <i>Sonchus asper</i> (Prickly Sowthistle), <i>Bromus diandrus</i> (Great Brome), <i>Echium plantagineum</i> (Patterson's Curse) and <i>Trifolium angustifolium</i> (Narrow-leaved Clover). Approximately 6.5ha of highly disturbed PCT 57 was found border more intact areas (Plate 6). These areas were most likely the result of past clearing. These areas were highly modified and were composed of a mixture of native and introduced ground covers. Common native species included <i>Chloris truncata</i> (Windmill Grass), <i>Rytidosperma</i> sp., <i>Vittadinia cuneata</i> var. <i>cuneata</i> (Fuzzweed), <i>Enchylaena tomentosa</i> (Ruby Saltbush), <i>Salsola australis</i>, <i>Sclerolaena muricata</i> (Black Roly Poly) and <i>Sclerolaena birchii</i> (Galvanised Burr) Introduced species included <i>Cirsium vulgare</i> (Spear Thistle), <i>Echium plantagineum</i> (Patterson's Curse), <i>Avena fatua</i> (Wild Oats), <i>Hordeum leporinum</i> (Barley Grass), <i>Lactuca serriola</i> (Prickly Lettuce) and <i>Sisymbrium</i> sp.
Species relied upon for PCT identification	<i>Casuarina cristata</i> ; <i>Casuarina pauper</i> ; <i>Callitris glaucophylla</i> ; <i>Alectryon oleifolius</i> subsp. <i>canescens</i> ; <i>Geijera parviflora</i> ; <i>Apophyllum anomalum</i> ; <i>Maireana decalvans</i> ; <i>Rhagodia spinescens</i> ; <i>Maireana pyramidata</i> ; <i>Dodonaea viscosa</i> subsp. <i>cuneata</i> ; <i>Enchylaena tomentosa</i> ; <i>Atriplex stipitata</i> ; <i>Sclerolaena birchii</i> ; <i>Calotis cuneifolia</i> ; <i>Rhodanthe floribunda</i> ; <i>Austrodanthonia caespitosa</i> ; <i>Austrostipa scabra</i> subsp. <i>scabra</i> .
TEC Status	This PCT is not likely to form part of a TEC



Plate 1: PCT 57 within east of site.



Plate 2: PCT 57 within east of site (High infestation of *Sisymbrium* sp. Mustard).



Plate 3: PCT 57 around residence within south-east of site.



Plate 4: PCT 57 within south-west of subject site.



Plate 5: PCT 57 within south-west of subject site.



Plate 6: PCT 57 highly disturbed eastern portion of site.

Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW	
Vegetation Formation	Semi-arid Woodlands (Shrubby sub-formation)
Vegetation Class	Sand Plain Mallee Woodlands
Vegetation Community Type (PCT) No.	PCT 193
Biometric Type	CW199; LA209; WE147
PCT Name	Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW
Extent within site	1.67ha
Description	Approximately 1.67ha of PCT 193 was located just below the northern boundary access road of the subject site in the far west (Plates 7, 8 & 9). The canopy of this community reached a height of up to 10m and was dominated by one species, <i>Eucalyptus socialis</i> (Red Mallee). The mid-storey was sparse with <i>Alectryon oleifolius</i> (Western Rosewood) being present. The shrub layer was also very sparse with <i>Geijera parviflora</i> (Wilga) one of the few species present. Many of the understorey plants had dried off making them difficult to identify. Native grasses present included <i>Austrostipa scabra</i> subsp. <i>scabra</i> (Speargrass) and <i>Rytidosperma</i> sp. (Wallaby Grass). Native groundcovers included <i>Enchylaena tomentosa</i> (Ruby Saltbush), <i>Sida corrugata</i> (Corrugated Sida), <i>Calotis cuneifolia</i> (Blue Burr-daisy), <i>Boerhavia dominii</i> (Tarvine) and <i>Oxalis perennans</i> (Oxalis). <i>Malva preissiana</i> (Australian Hollyhock) was also common within this area. Patches of the introduced <i>Sisymbrium</i> sp. (Mustard) were quite dense in areas. Other common weed species noted included <i>Lactuca serriola</i> (Prickly Lettuce), <i>Bromus diandrus</i> (Great Brome), <i>Cirsium vulgare</i> (Spear Thistle), <i>Echium plantagineum</i> (Patterson's Curse), <i>Avena fatua</i> (Wild Oats), <i>Marrubium vulgare</i> (Horehound), <i>Solanum nigrum</i> (Blackberry Nighshade) and <i>Malva parviflora</i> (Small-flowered Mallow).
Species relied upon for PCT identification	<i>Eucalyptus socialis</i> , <i>Geijera parviflora</i> ; <i>Dodonaea viscosa</i> subsp. <i>cuneata</i> ; <i>Eremophila debilis</i> ; <i>Enteropogon acicularis</i> ; <i>Sida corrugata</i> ; <i>Calotis cuneifolia</i> , <i>Einadia nutans</i> subsp. <i>nutans</i> ; <i>Austrostipa scabra</i> subsp. <i>scabra</i> ; <i>Vittadinia cuneata</i> ; <i>Oxalis perennans</i> .
TEC Status	Not a TEC



Plate 7: PCT 193 within north-west of site.



Plate 8: PCT 193 within north-west of site.



Plate 9: PCT 193 within north-west of site.

Cultivated Crops	
Vegetation Formation	NA
Vegetation Class	NA
Vegetation Community Type (PCT) No.	NA
Biometric Type	NA
PCT Name	NA
Extent within site	557ha
Description	Broad-scale cultivated crops occupied approximately 557ha of the site. The majority of the cropping area was irrigated and was composed of <i>Triticum</i> sp (Wheat) at the time of the survey (Plates 10 & 11). A small amount of dryland cropping in the form of <i>Avena sativa</i> (Oats) was being conducted around the periphery of the larger irrigated area (Plate 12). A very small number of individual isolated trees were recorded within the cropping areas and included remnant specimens of <i>Eucalyptus socialis</i> (Red Mallee), <i>Callitris glaucophylla</i> (White Cypress), <i>Eucalyptus populnea</i> (Bimblebox) and <i>Acacia pendula</i> (Weeping Myall).
Species relied upon for PCT identification	NA
TEC Status	NA



Plate 10: Mature Irrigated Wheat Crop within east of site.



Plate 11: Mature Irrigated Wheat Crop along northern boundary of site.



Plate 12: Dryland Oats Crop south of Farm 5.

Aquatic Vegetation	
Vegetation Formation	NA
Vegetation Class	NA
Vegetation Community Type (PCT) No.	NA
Biometric Type	NA
PCT Name	NA
Extent within site	Two small dams, Wah Wah Irrigation Channel.
Description	Areas of aquatic vegetation were located within and along the Wah Wah Channel and other minor irrigation channels and the few constructed dams. Common native aquatic flora species located along Wah Wah Channel running through the site included <i>Phragmites australis</i> (Austalian Reed), <i>Pratia concolor</i> (Poison Pratia), <i>Typha domingensis</i> (Narrow-leaf Cumbungi), <i>Potamogeton tricarlinatus</i> (Floating Pondweed) and <i>Juncus usitatus</i> (Common Rush). Introduced aquatic species included <i>Cyperus eragrostis</i> (Umbrella Sedge) and <i>Polypogon monspeliensis</i> (Annual Beardgrass)(Plates 13 & 14). Common species within the constructed dam near the residence in the south were <i>Typha domingensis</i> (Narrow-leaf Cumbungi) and <i>Juncus usitatus</i> (Common Rush) (Plate 15). The remaining smaller dams contained few flora species (Plate 16).
Species relied upon for PCT identification	NA
TEC Status	NA



Plate 13: Wah Wah Channel within eastern portion of site.



Plate 14: Vegetation within Wah Wah Channel.



Plate 15: Constructed dam in the south of the site just north of the residence.



Plate 16: Constructed dam in the east of the site containing few flora species.

Disturbed Roadside Reserve Vegetation.	
Vegetation Formation	NA
Vegetation Class	NA
Vegetation Community Type (PCT) No.	NA
Biometric Type	NA
PCT Name	NA
Extent within site	0.24
Description	Vegetation within roadside reserve largely consisted of introduced species such as <i>Avena fatua</i> (Wild Oats), <i>Echium plantagineum</i> (Paterson's Curse) and <i>Conyza bonariensis</i> (Fleabane). The small number of native species present included <i>Chloris truncata</i> (Windmill Grass), <i>Salsola australis</i> (Prickly Saltwort).
Species relied upon for PCT identification	NA
TEC Status	NA



Plate 17: Disturbed vegetation along Mid Western Highway.

4.2 TREE SURVEY

All trees within the site occurring outside the main remnant areas of native vegetation were tagged and located. Details of these trees including, diameter at breast height (dbh), height and fauna attributes such as hollows are contained within Appendix E. The presence of activity in the form of scratches on the trunks of trees and scats around the base were also noted. The trees had been previously tagged and numbered with cattle tags.

It must be noted that observations made from ground level may fail to record a small number of hollows that are obscured. Some entrances may also not lead to a cavity. The internal dimensions of the hollows are also impossible in many cases to determine from the ground. A map showing the location of these trees is shown in Figure 4.1.

4.3 ENDANGERED ECOLOGICAL COMMUNITIES

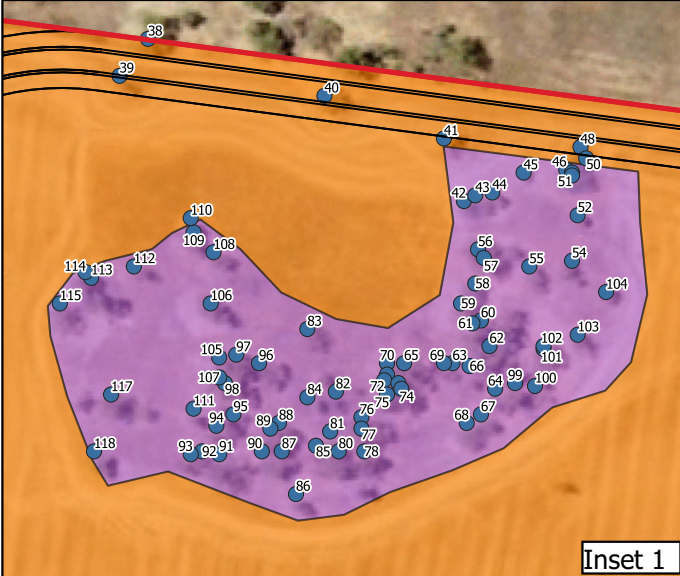
Four Endangered Ecological Communities listed under the TSC Act are known to occur within the local area. A further two Endangered Ecological Communities listed under the EPBC Act have also been considered:

- *Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression bioregions (Endangered Ecological Community – TSC Act)
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Endangered Ecological Community – TSC Act)
- Sandhill Pine Woodland in the Riverina, Murray–Darling Depression and NSW South Western Slopes Bioregions (Endangered Ecological Community – TSC Act).
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Endangered Ecological Community – TSC Act).
- Weeping Myall Woodlands EPBC Act (Endangered)
- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions EPBC Act (Vulnerable)

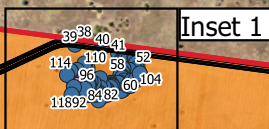
No Endangered Ecological Communities were identified within the site at the time of the survey. Areas of Myall Woodland were found to be present outside the site to the south-west along McRaes Road. One specimen of *Acacia pendula* (Weeping Myall) Tree No. 120 (Tag 220)(Appendix E) was recorded in the far north-east of the site (Plate 18). This remnant tree was completely surrounded by cropping and was unlikely to be consistent with the Myall Woodland or Weeping Myall Woodlands definition of an Endangered Ecological Community. This specimen of *A. pendula* is outside the development footprint and will not be impacted.

4.4 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater Dependent Ecosystems (GDE's) are ecosystems that are fully or partially dependent on groundwater to maintain ecosystem function. No groundwater dependent ecosystems were likely to be present within the site.



Inset 1



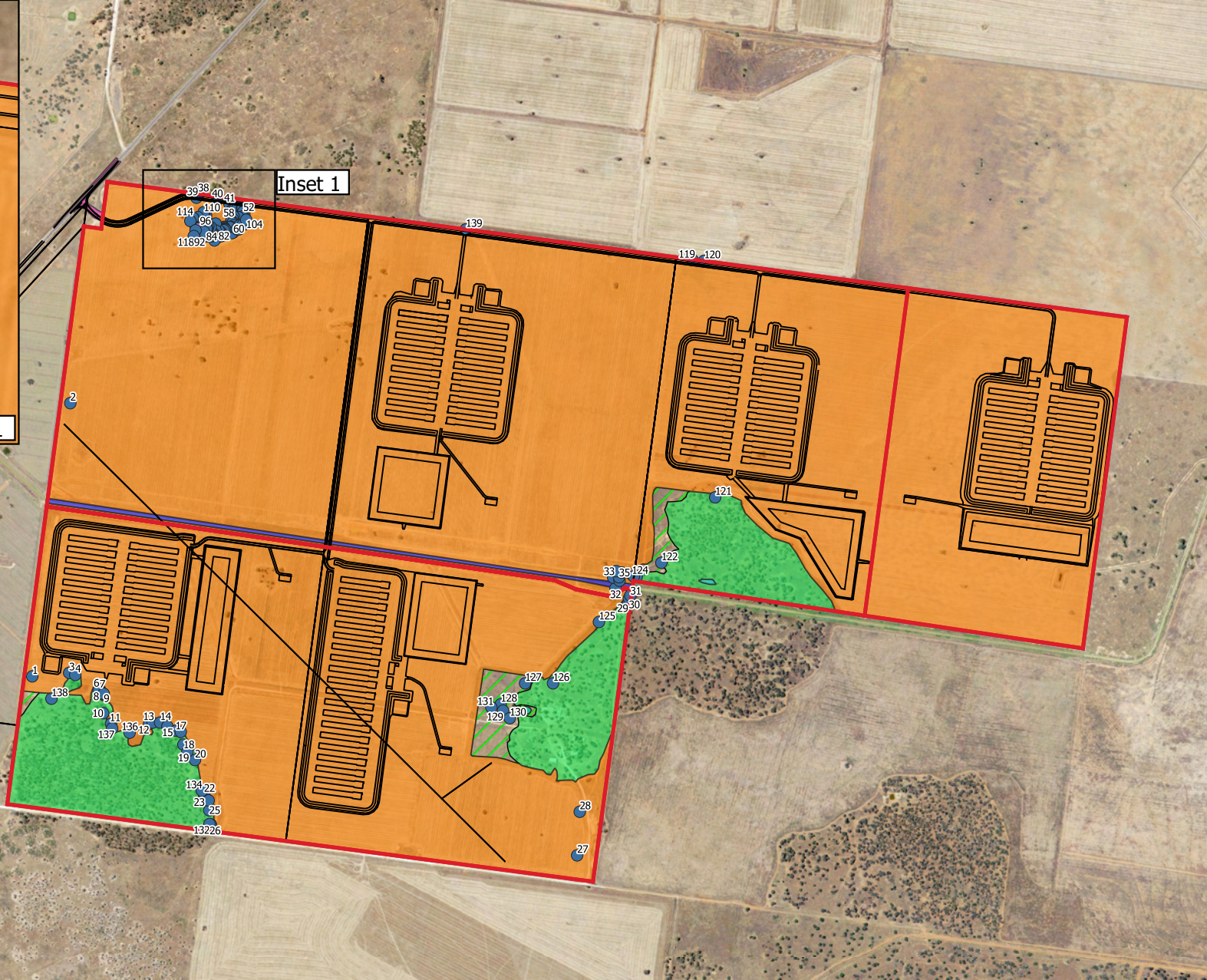
Inset 1

Legend

- Site
- Development Layout
- Tree Locations

Vegetation

- 193_Mod_Good
- 57_Mod_Good
- 57_Poor
- Aquatic Vegetation
- Cultivated Crops
- Disturbed Roadside Vegetation
- Waterbody



Job Ref	12269
A4 Scale	1:20,000

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

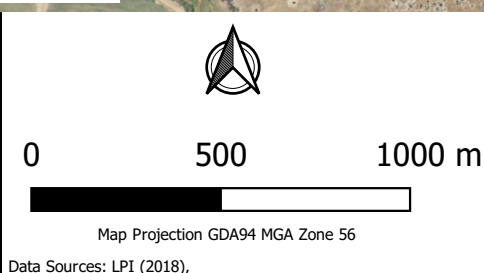


Figure 4.1

Tree Location Map

McRaes Road
Goolgowi, NSW

6 December 2018

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(a Division of Tattersall Lander Pty Ltd)
ABN 41 003 509 215



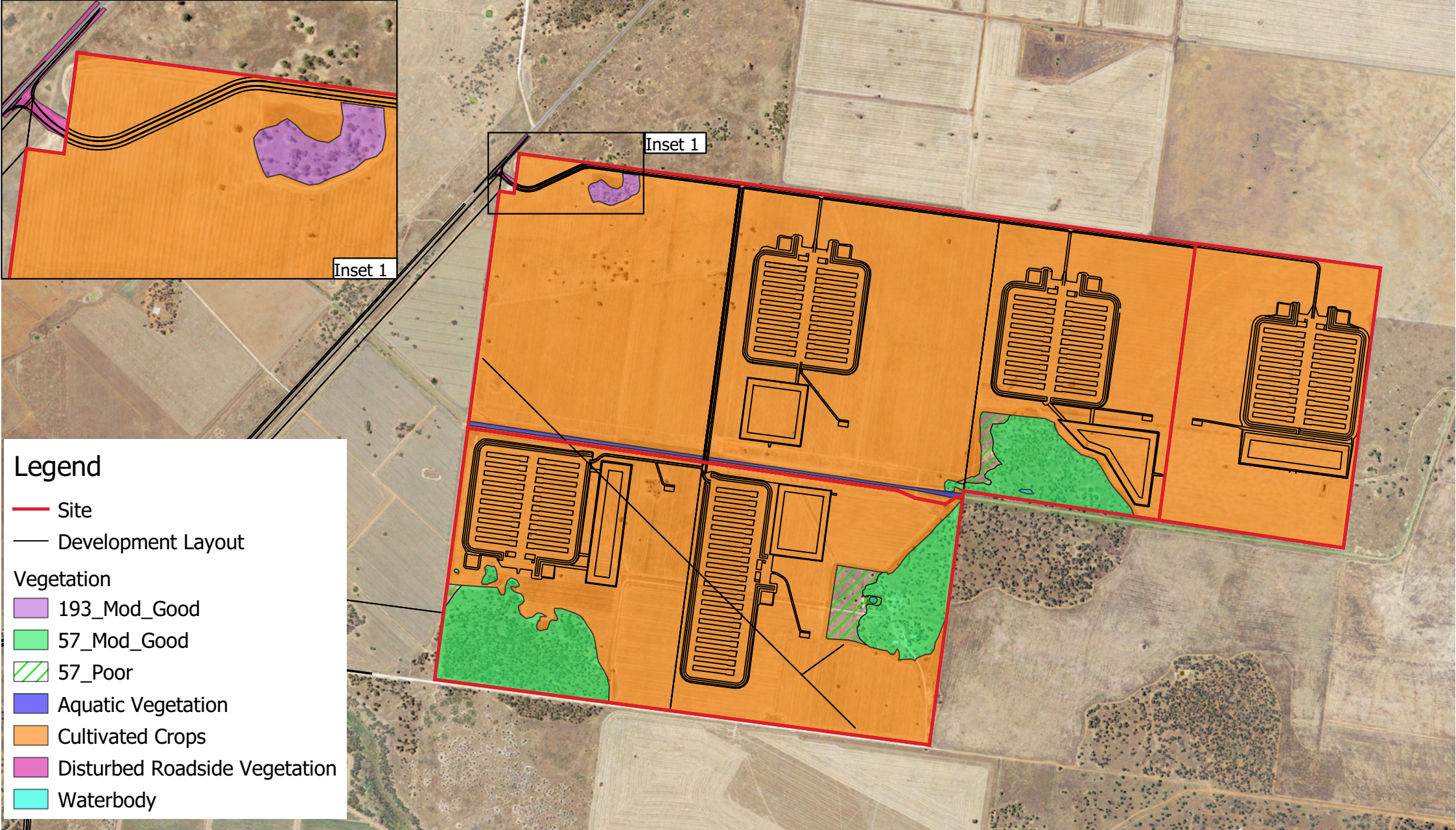
Plate 18: One specimen of *Acacia pendula* (Weeping Myall) Tree No. 120 (Tag 220)(Appendix E).

4.5 VEGETATION ZONES

A total of three Vegetation Zones were present within the site. Their condition, number of biometric plots undertaken within them and their current site value score is shown in Table 4.2. A map showing the location of the Vegetation Zones and biometric plots is shown in Figure 4.2.

4.5.1 BIOBANKING PLOT/TRANSECT SURVEYS

Four quantitative (plot/transect) site surveys were completed within the study area as outlined in the methodology contained in the BioBanking Assessment Methodology (Office of Environment and Heritage 2014a) and described below. Plate 5 illustrates the plot layout that was used. The location of the plot/transects are shown in Figure 4.2. A list of flora species found in each plot/transect are listed in Appendix B. Vegetation Plot species are shown in Appendix C within the Field datasheets for each plot/transect contained in Appendix D. Table 4.3 contains a summary Vegetation Transect/Plot results.



Job Ref	12269
A4 Scale	1:20,000

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

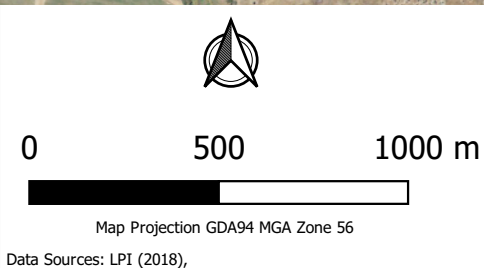


Figure 4.2

Vegetation Zones Map

McRaes Road
Goolgowi, NSW

6 December 2018

WILDTHING
Environmental Consultants
(a Division of Tattersall Lander Pty Ltd)
ABN 41 003 509 215

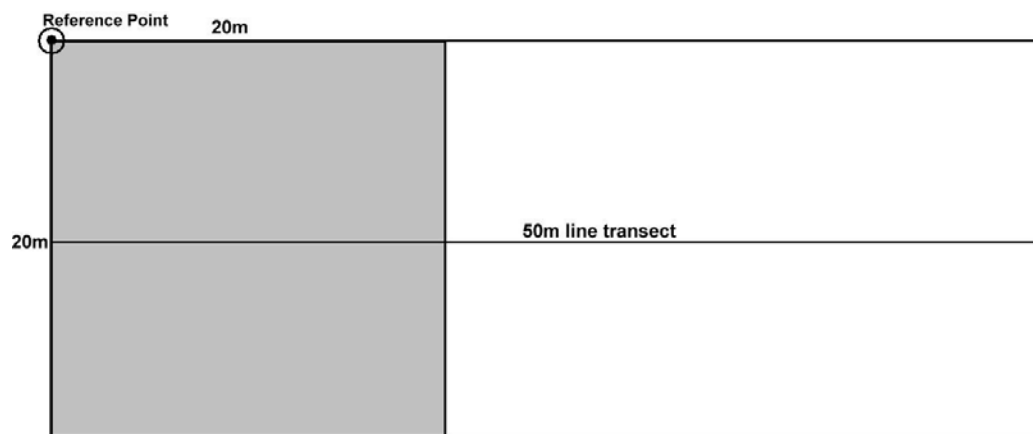


Plate 19: Diagram illustrating the layout of the nested 20 m x 50 m and 20 m x 20 m quadrats used for the assessment of condition attributes at each site

The following site attributes were recorded at each site:

- Location (easting – northing grid type MGA 94, Zone 55).
- Vegetation structure and dominant species and vegetation condition.
- Native and exotic species richness (within a 400 m² quadrat): this consisted of recording all species by systematically walking through each 20m x 20m quadrat. The cover abundance of each species was estimated.
- Number of trees with hollows (1,000 m² quadrat): this was the frequency of hollows within living and dead trees within each 50m x 20m quadrat. A hollow was only recorded if:
 - the entrance could be seen;
 - the estimated entrance width was at least 5 cm across;
 - the hollow appeared to have depth;
 - the centre of the tree was located within the sampled quadrat.
- Total length of fallen logs (1,000 m² quadrat): this was the cumulative total of logs within each 50m x 20 m quadrat with a diameter of at least 10 cm and a length of at least 0.5 m.
- Native over-storey cover: this consisted of estimating the percentage cover of the tallest woody stratum present (>1 m and including emergents). The woody stratum included species that were native to NSW and not necessarily those that were locally endemic;
- Native mid-storey cover: this involved estimating the cover of vegetation between the over-storey stratum and a height of one m (i.e. tall shrubs, under-storey trees and tree regeneration).
- Ground cover: this comprised estimating the cover of plants below 1 m in height. The following categories of plants were recorded:
 - native ground cover (grasses): native grasses (Poaceae family native to NSW);
 - native ground cover (shrubs): all woody vegetation below one m in height and native to NSW
 - native ground cover (other): non-woody vegetation (i.e. vascular plants – ferns and herbs) below one m in height and native to NSW
 - exotic plant cover: vascular plants not native to Australia.
 - Evaluation of regeneration: this was estimated as the proportion of over-storey species present at the site that was regenerating (i.e. saplings with a diameter at breast height ≤ 5 cm). The maximum value for this measure was one.

4.5.2 SITE VALUES

The following plot/transect data was collected in December 2016 for Vegetation Zones 1 & 2.

Table 4.2: Vegetation Zones

Zone No.	PCT ID	PCT Name/Condition	Area (ha)	Condition	Patch Size (ha)	No. of Plots	
1	193	Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW	1.67h	Moderate	>5	1	 Plate 19: Vegetation Zone 1 - northwest of the site.
2	57	Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion	51	Moderate	>100	3	 Plate 20: Vegetation Zone 2 - south-west of the site.

Zone No.	PCT ID	PCT Name/Condition	Area (ha)	Condition	Patch Size (ha)	No. of Plots	
3	57	Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion	6.5	Poor	>100	0	 Plate 21: Vegetation Zone 3

Table 4.3: Vegetation Transect/Plot results.

Transect/Plot Number	Native plant No.	Over-storey Cover (%)	Mid-storey Cover (%)	Native Ground Cover (Grasses) (%)	Native Ground Cover (Shrubs)(%)	Native Ground Cover (Other)(%)	Exotic Plant Cover (%)	Number of trees with hollows	Over-storey Regeneration	Total length of fallen logs (m)	Easting	Northing	Zone MGA
Zone 1 – 193 - Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW													
1	9	6	5	10	14	4	64	2	0.5	3.5	366492	6234332	55
Zone 3 – PCT 57 - Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion													
2	11	3	1	22	4	28	74	5	0.5	31.3	368213	6233319	55
3	14	3.5	0	46	14	2	72	3	1.0	41.6	368315	6233320	55
4	13	11	2.5	30	2	32	28	5	0.7	37.5	366083	6232473	55

5.0 THREATENED SPECIES

5.1 GEOGRAPHIC/HABITAT FEATURES

Two geographic/habitat features suitable for ecosystem credit species were generated by the BCC. These features and whether they would be impacted by the proposal are shown in Table 5.1.

Table 5.1: Geographic/Habitat Features

Impact	Common Name	Scientific Name	Feature
No	Black-breasted Buzzard	<i>Hamirostra melanosternon</i>	Land within 40m of riparian woodland on inland watercourses/waterholes containing dead or dying eucalypts.
No	Grey Falcon	<i>Falco hypoleucos</i>	Land containing within 100 m of riparian woodland on inland rivers containing mature living eucalypts or isolated paddock trees overhanging water or dry watercourses.

5.2 ECOSYSTEM CREDIT SPECIES

Based on the data entered into the Biobanking Credit Calculator for the landscape assessment and vegetation zones ten ecosystem credit species were predicted to occur within the site. A list of the ecosystem credit species generated for the site is shown in Table 5.2.

Table 5.2: Ecosystem credit species generated by the BCC

Common name	Scientific name	TS offset multiplier
Diamond Firetail	<i>Stagonopleura guttata</i>	1.3
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis subsp. temporalis</i>	1.3
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata subsp. cucullata</i>	1.7
Little Eagle	<i>Hieraaetus morphnoides</i>	1.4
Major Mitchell's Cockatoo	<i>Lophochroa leadbeateri</i>	1.9
Painted Honeyeater	<i>Grantiella picta</i>	1.3
Pied Honeyeater	<i>Certhionyx variegatus</i>	1.3
Spotted Harrier	<i>Circus assimilis</i>	1.4
Varied Sittella	<i>Daphoenositta chrysoptera</i>	1.3
White-browed Treecreeper Endangered Population	<i>Climacteris affinis</i> - endangered population	2.0

5.3 SPECIES CREDIT SPECIES

No species credit species generated as a result of the BCC. The BCC found no fauna species credit species were generated as a result of the BCC. According to Attachment B Specific Environmental Assessment Requirements in the SEARS (Appendix A) the following five fauna species, populations require further consideration:

- *Falco subniger* (Black Falcon)(nest trees only);
- *Falco hypoleucos* (Grey Falcon)(nest trees only);
- *Hamirostra melanosternon* (Square-tailed Kite)(nest trees only);
- *Climacteris affinis* (White-browed Treecreeper) population in Carrathool local government area south of the Lachlan River and Griffith local government area;
- *Calyptorhynchus lathami* (Glossy Black-Cockatoo), Riverina Population.

5.4 TARGETED SURVEY METHODOLOGIES

Flora and fauna field surveys were undertaken in December 2016 to ensure the majority of the species likely to occur within the site could be detected. Appendix I details the Flora and Fauna Assessment undertaken within the site.

5.5 HABITAT DESCRIPTION AND DISTRIBUTION

The vegetation and landforms present within the study area offered habitat for a variety of native species. The main habitat types within the study area were Dry Woodland, Freshwater, Grassy Open Areas and Cropping areas.

Dry Woodland

Dry Woodland in the form of Belah Woodland and Red Mallee Woodland occupied approximately 53ha of the site. Dry Woodland would provide suitable habitat opportunities for a variety of species. Frugivorous, nectivorous, granivorous and insectivorous birds and microchiropteran bat species would all find potential foraging resources within this complex. The relatively large number of hollow-bearing trees would provide nesting and roosting sites for a variety of avifauna and other hollow dependant species such as arboreal mammals, tree-roosting bats and birds. Hunting opportunities exist for birds of prey, given that the variable tree coverage and understorey vegetation has created a myriad of ecotones and habitat densities. Such habitat is suitable for terrestrial species including small and medium sized mammals, macropods, reptiles and potentially for some frog species adapted to drier areas.

Freshwater Wetland

Areas containing Freshwater habitat were found along Wah Wah Channel and to a lesser extent the constructed dams. These areas containing preferred habitat for a number of amphibian, reptile and waterbird species. Habitat for fish species would largely be restricted to Wah Wah Channel. These areas would also act as a water source for other native animals such as macropods and offer hunting habitat for microchiropteran bats that prefer to hunt above or around water bodies.

Cleared Derived Open Grass Areas

The cleared open areas of habitat provide opportunity for a variety of avifauna, including predominantly terrestrial species preferring open spaces, seed eating birds and several birds of prey, which may hunt over this area in search of potential prey species. Macropods may also frequent such areas whilst grazing. Some species of bats may also forage over this cleared area for insects. However, the lack of vegetative cover often limits the value of such areas as this for many species, particularly reptiles and small mammals which are vulnerable to predation in open spaces.

Cropping Areas

The cropping areas would provide limited habitat opportunities for some avifauna, mammal and reptile species. Several birds of prey, may hunt over these areas.

In general, the habitats within the study area offer a range of habitat opportunities for a range of native species. The cropping area proposed to be directly affected by the proposal are regarded as

less ecologically significant areas capable of offering few suitable resources to both resident and transitory species.

5.5.1 THREATENED FLORA SPECIES

No species credit species generated as a result of the Biobanking Credit Calculator (BCC). The following additional candidate flora species, listed in Table 5.3 have been recorded on the Atlas of NSW Wildlife (OEH, 2017) and the Department of Environment and Energy (DoEE) databases for within 10km of the study area.

Table 5.3: Threatened flora species, endangered populations and ecological communities considered.

Scientific Name	Common Name	TSC Act 1995	EPBC Act 1999
Flora			
<i>Leptorhynchus orientalis</i>	Lanky Buttons	E1	
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V
* <i>Austrostipa metatoris</i>	A spear-grass	V	V
* <i>Austrostipa wakoolica</i>	A spear-grass	E1	E
* <i>Brachsycome papillosa</i>	Mossgiel Daisy	V	V
* <i>Lepidium monoplacoides</i>	Winged Pepper-cress	E	E
* <i>Solanum karsense</i>	Menindee Nightshade	V	V
* <i>Swainsona murrayana</i>	Slender Darling-pea	V	V

Despite targeted surveys within areas of native vegetation no threatened flora species were recorded within the site. There were no nearby records of any of these species on the BioNet Atlas (OEH, 2017). As the development will be located outside any suitable habitat and taking into consideration the recommendations of management and protection of areas of native vegetation on site, the proposal is unlikely to have a significant impact on any of the above listed flora species on site such that a local population would be placed at risk of extinction.

Field surveys identified 106 plant species occurring within the site. A total list of flora species contained within the site are shown in Appendix B.

5.5.2 THREATENED FAUNA SPECIES

Fauna surveys were conducted within the site to advise what fauna species were present (Appendix I). Three threatened fauna species listed under the NSW TSC Act 1995 were recorded within the site during the survey:

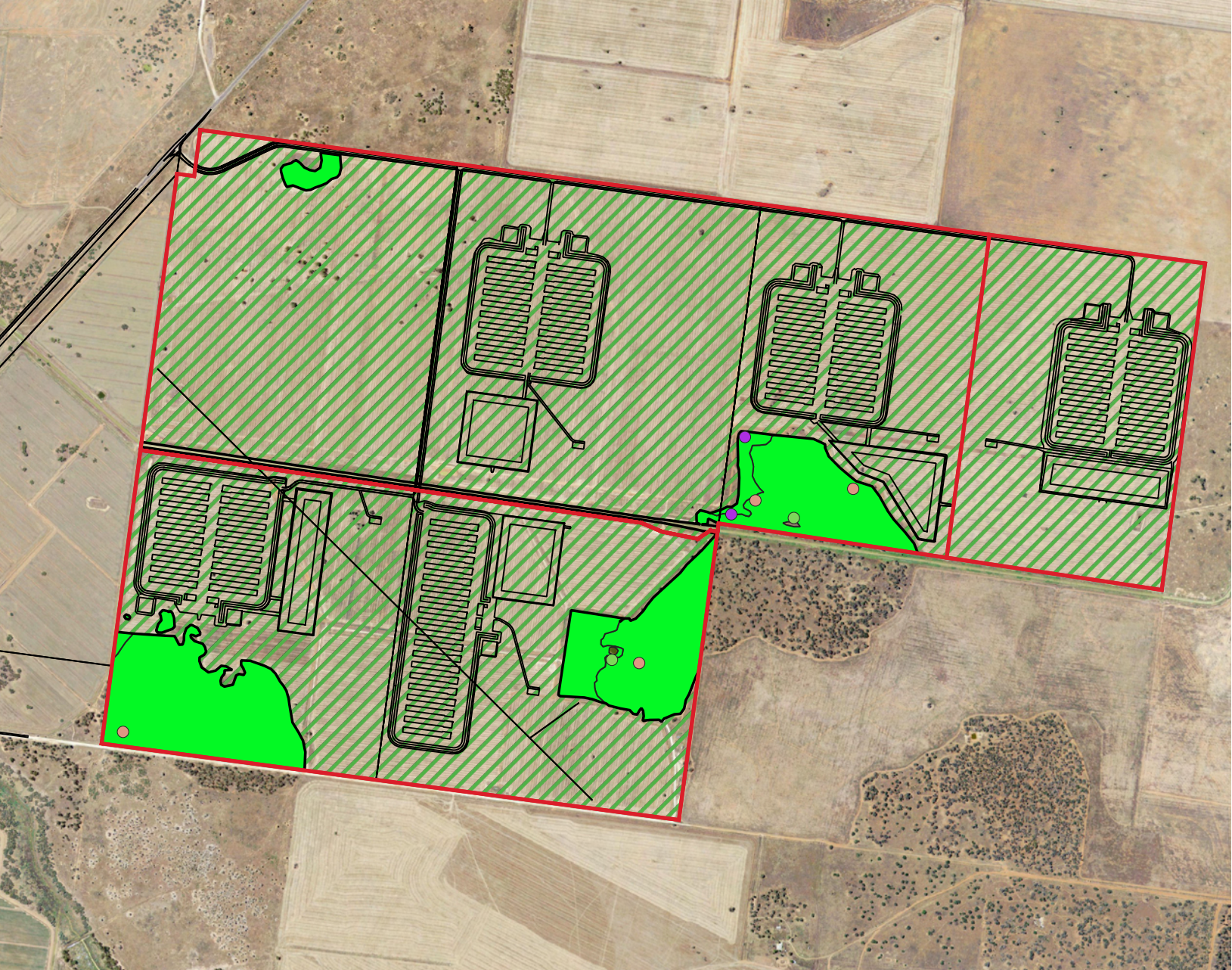
- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler);
- *Circus assimilis* (Spotted Harrier);
- *Chalinolobus picatus* (Little Pied-bat).

Due to the similarity of calls within the Genus *Nyctophilus*, the precautionary principle has been applied and further consideration has also been given to the threatened *Nyctophilus corbeni* (Corben's Long-eared Bat).

These species are ecosystem credit species which are already accounted for in the assessment and do not generate species credits. All four species were recorded within areas of native vegetation outside the proposed development footprint. The location of each of these threatened species and suitable habitat areas within the site is shown in Figure 5.1.

Legend

- Site
- Development Layout
- Threatened Species
 - Chalinolobus picatus (Little Pied-bat)
 - Circus assimilis (Spotted Harrier)
 - Pomatostomus temporalis temporalis (Grey-crowned Babbler)
- Threatened Species Habitat
 - Primary Habitat for:
Spotted Harrier
Grey-crowned Babbler
Little Pied-bat
 - ▨ Marginal Hunting Habitat for:
Spotted Harrier
Little Pied-bat



Job Ref	12269
A4 Scale	1:20,000

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

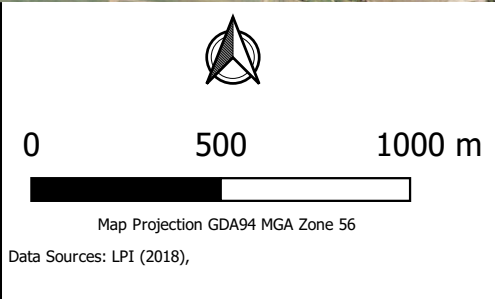


Figure 5.1

Threatened Species Map

McRaes Road
Goolgowi, NSW

6 December 2018

WILDTHING

Environmental Consultants

(a Division of Tattersall Lander Pty Ltd)

ABN 41 003 509 215

***Pomatostomus temporalis temporalis* (Grey-crowned Babbler)**

At least two groups of *Pomatostomus temporalis* subsp. *temporalis* (Grey-crowned Babblers) were observed and heard calling a number of times within the site. A small number of unkempt Grey-crowned Babbler nest/roost's were also recorded within areas of Belah Woodland near the current residence. A number of local records for this species were present on the Bionet Wildlife Atlas (OEH, 2017). Suitable foraging nesting/roosting habitat were present within Belah and Red Mallee Woodland outside the development footprint. The home range of any group of Grey-crowned Babblers would also include similar habitat occurring outside the site.

***Circus assimilis* (Spotted Harrier)**

The Spotted Harrier was observed within the site on a number of occasions. At least one juvenile was also recorded indicating that breeding had likely occurred nearby. A number of local records of this species were present on the Bionet Wildlife Atlas (OEH, 2017). No large nests indicative of breeding were recorded within the site. The site, particularly the areas of woodland and derived grassland contained suitable hunting habitat for this bird of prey. Areas of Belah Woodland also contained suitable nesting habitat.

***Chalinolobus picatus* (Little Pied-bat) and *Nyctophilus corbeni* (Corben's Long-eared Bat)**

Chalinolobus picatus (Little Pied-bat) was positively recorded within the site as a result of the bat call survey. Due to the similarity of calls within the Genus *Nyctophilus*, the precautionary principle has been applied to include *Nyctophilus corbeni* (Corben's Long-eared Bat) as being possibly present within the site. No specimens of either species were captured during the harp trapping component of the survey. The majority of the site particularly areas of woodland and derived grassland and to a lesser extent cropland contained suitable hunting habitat for these microchiropteran bat species. A large amount of suitable roosting habitat in the form of tree hollows was present with areas of Belah Woodland and to a lesser extent Red Mallee Woodland. No hollow-bearing trees area required to be removed for the proposal.

None of these species credit species were recorded within the site despite targeted surveys. Areas of Belah Woodland within the site contained suitable foraging and nesting habitat for the White-browed Treecreeper and hunting and nesting habitat for the Squire-tailed Kite and Black and Grey Falcons. The Riverina population of the Glossy Black-cockatoo hills is largely restricted to the low ridges where suitable stands of its food plant, *Allocasuarina verticillata* (Drooping She-Oak) are present such as Cocoparra Range approximately 57km to the east. Native vegetation within the site would only provide maginal foraging and transitory habitat for this Cockatoo species.

As the development will almost entirely be located outside any suitable habitat and taking into consideration the recommendations of management and protection of areas of native vegetation on site the proposal is unlikely to have a significant impact on these species such that a local population would be placed at risk of extinction.

6.0 CONSIDERATIONS UNDER SEPP 44 – ‘KOALA HABITAT PROTECTION’

The principal aim of State Environment Planning Policy 44 - Koala Habitat Protection is to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and to reverse the current trend of Koala population decline.

This policy applies to areas of more than one hectare or an area which has together with any adjoining land in the same ownership an area of more than 1 hectare whether or not the development application applies to the whole, or only part of the land. In addressing SEPP44 there are two questions to be considered regarding the occurrence of ‘Potential’ and ‘Core’ Koala Habitat on site.

6.1 FIRST CONSIDERATION - IS THE LAND ‘POTENTIAL KOALA HABITAT’?

‘Potential Koala Habitat’ is defined in SEPP44 as, “...an area of native vegetation where trees of the type listed in Schedule 2 (Koala feed tree species) constitute at least 15% of the total number of trees in the upper or lower strata of the tree component”.

Three largely isolated specimens of *Eucalyptus populnea* (Bimblebox) a ‘Koala Feed Trees’, were identified within the site and would not comprise over 15% of the total trees present within the site, therefore would not be considered to constitute Potential Koala Habitat and accordingly no further provisions of this policy apply to the site.

No koalas were identified during site surveys or within the site or nearby within the Bionet Atlas (OEH, 2017) nor was there any recent evidence such as scats and scratches to suggest recent use of the site by koalas.

7.0 AQUATIC ECOLOGY

7.1 AQUATIC HABITAT WITHIN THE STUDY AREA

No natural watercourses were noted onsite. Suitable habitat for a number of aquatic species was present within the constructed Wah Wah Irrigation Channel which cuts through the site from east the west and a small number of dams. A number of minor constructed irrigation channels were also connected to the main Wah Wah Channel. The nearest natural Water Course to the site is Wah Wah Creek which occurs approximately 300m to the SW of the site below McRaes Road.

7.2 AQUATIC SURVEY & ASSESSMENT

7.2.1 WATER QUALITY

Water quality was assessed within the Wah Wah Channel that flowed through the centre of the site. Water measurements were also taken within the dam near the residence in the south. Physical water quality measurements were sampled in situ at each site on 14 December 2016. Water quality was measured using a Horiba U 50 Water Meter. Parameters measured included pH, temperature, Oxidation Reduction Potential (ORP), Dissolved Oxygen (mg/L DO), Dissolved Oxygen (DO%), Conductivity (dS/m), Turbidity TDU, Total Dissolved Solids (TDS) and Salinity. The water parameters are shown in Table 8.

Table 7.1: Surface water quality measurements within the site.

Water parameter	Channel GDA 94 E – 367661 N - 6233100	Constructed Dam Near residence
Temperature 0C	22.63	25.25
pH	7.85	8.17
Oxidation Reduction Potential (ORP) pHmV	-57	-76
Dissolved Oxygen (mg/L DO)	5.75	8.95
Dissolved Oxygen (DO%),	68.4	110
Conductivity (mS/m),	1.20	0.583
Turbidity TDU	49	8.9
Total Dissolved Solids g/L TDS	0.765	0.388
Salinity ppt	0.6	0.3

The areas of surface water within Wah Wah Channel and the dam were found to be in relatively good condition.

7.2.2 AQUATIC VERTEBRATES WITHIN THE SITE

With the exception of amphibians, no targeted surveys were conducted for aquatic vertebrates such as fish within the site. Observation within the Wah Wah Channel found the introduced *Cyprinus carpio* (European Carp) and *Gambusia holbrooki* (Mosquitofish) to be common.

7.3 FISHERIES MANAGEMENT ACT (FM ACT)

The objectives of the Fisheries Management Act (FM Act) are to conserve, develop and share the fishery resources of the state for the benefit of present and future generations. Part 7A of the

Fisheries Management Act 1994 (FM Act 1994) provides for the listing of threatened species, populations and endangered ecological communities. Table 9 lists the threatened species and endangered populations that may occur in the local area.

Table 7.2: Threatened Species and Populations under the FM Act that may occur within 10km of the proposal.

SPECIES	FM ACT 1994	HABITAT PREFERRED	HABITAT PRESENT
<i>Maccullochella macquariensis</i> (Trout Cod)	E	Occurring within the Murray-Darling drainage system. The site is adjacent to the reach of the Murray River containing the only remnant wild population of in NSW.	Suitable habitat is unlikely to be present.
<i>Craterocephalus fluviatilis</i> (Murray Hardyhead)	E	Known from the lower reaches of the Murray drainage system. It has suffered serious population decline in NSW, such that no populations are currently known in this State.	Marginal habitat was present within Wah Wah Channel.
<i>Notopala sublineata</i> (River Snail)	E	Was once common and widely distributed in the Murray-Darling system. This species was thought to be extinct in the lower Murray before being found in irrigation pipes in 1992.	Marginal habitat was present within Wah Wah Channel.
<i>Bidyanus bidyanus</i> (Silver Perch)	V	Has been recorded widely throughout the Murray-Darling Basin. Only one remnant natural population is known, which occurs downstream of Torrumbarry Weir in the Murray River.	Marginal habitat was present within Wah Wah Channel.
<i>Macquaria australasica</i> (Macquarie Perch)	V	Occurs naturally in western flowing drainages from the Lachlan River southward into Victoria.	Suitable habitat is unlikely to be present.
<i>Nannoperca australis</i> Southern (Pygmy Perch)	V	This species prefers slow-flowing waters, and still, vegetated habitats in small streams, lakes, billabongs and wetlands. Historical records show this species was common in NSW in the Murrumbidgee catchment upstream from Narrandra and in tributaries of the Murray River.	Suitable habitat is unlikely to be present.
<i>Ambassis agassizii</i> (Olive Perchlet)	EP	Rivers, creeks, ponds, reservoirs, drainage ditches and swamps.	Marginal habitat was present within Wah Wah Channel.
<i>Mogurnda adspersa</i> (Purple Spotted Gudgeon)	EP	Rivers Creeks and billabongs, usually in quite or slow flowing sections over rocks or among vegetation.	Suitable habitat is unlikely to be present.
<i>Maccullochella peelii peelii</i> (Murray Cod)	V EPBC Act.	Rivers Creeks and billabongs.	Marginal habitat was present within Wah Wah Channel.

E=Endangered Species

V=Vulnerable Species

EP=Endangered Population

7.3.1 SEVEN-PART TEST FOR THREATENED AQUATIC SPECIES

- a) *in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

No threatened aquatic species were recorded within the site during fieldwork. Four species of threatened fish and one snail listed above were considered to have suitable habitat within Wah Wah Channel:

- *Craterocephalus fluviatilis* (Murray Hardyhead);
- *Maccullochella peelii peelii* (Murray Cod);
- *Bidyanus bidyanus* (Silver Perch);
- *Nannoperca australis* (Southern Pygmy Perch);
- *Notopala sublineata* (River Snail).

Although a small number of aquatic species were recorded during fieldwork no targeted surveys for these species were completed during the survey.

It is proposed that the Wah Wah Irrigation Channel be replaced with pipes between Farm 1 and Farm 5. Water falling on hard surfaces within the development will be contained in large storage dams.

The proposal is unlikely to have an adverse effect on any of the addressed species.

- b) *in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.*

Both the western populations of *Ambassis agassizii* (Olive Perchlet) and *Mogurnda adspersa* (Purple Spotted Gudgeon) are listed as endangered and occur in the drainages of the Murray Darling Basin. Neither of these species were considered to have suitable habitat within the site.

- c) *in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
- (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
 - (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.*

No endangered or critically endangered community was identified within the site.

- d) *in relation to the habitat of a threatened species, population or ecological community:*
- (i) *the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*
 - (ii) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
 - (iii) *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.*

The proposal is not likely to habitat any direct or indirect impacts on threatened species, populations or ecological communities listed under the Fisheries Management Act.

- e) *whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

None of the site has been designated 'critical habitat'.

- f) *whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.*

A Recovery Plan has been completed for a number of the subject species. The proposal is unlikely to significantly compromise these plans.

- g) *whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposed poultry farm is unlikely to cause or increase any 'Key Threatening Processes' currently listed on the schedules of the FM Act within the site.

8.0 CONSIDERATIONS UNDER THE COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Assessments have been made to determine whether or not the proposal or activity has, will have, or is likely to have a significant impact on a matter of National Environmental Significance. The matters of National Environmental Significance and the appropriate responses are listed below:

- *World Heritage properties;*

The proposed development is not considered to affect any World Heritage properties.

- *wetlands recognised under the Ramsar convention as having international significance;*

No RAMSAR Wetlands occur within the vicinity of the site.

- *listed threatened species and communities;*

No nationally threatened communities were considered to be present within the study area.

Twenty-three nationally threatened species were recorded on the DoEE database as occurring or having potential habitat available within 10km of the site, these being:

- *Swainsona murrayana* (Slender Darling Pea)
- *Austrostipa metatoris* (A spear-grass)
- *Austrostipa wakoolica* (A spear-grass)
- *Brachsycome papillosa* (Mossgiel Daisy)
- *Lepidium monoplocoides* (Winged Pepper-cress)
- *Solanum karsense* (Menindee Nightshade)
- *Swainsona murrayana* (Slender Darling-pea)
- *Galaxias rostratus* (Flathead Galaxias)
- *Maccullochella peelii* (Murray Cod)
- *Macquaria australasica* (Macquarie Perch)
- *Litoria raniformis* (Southern Bell Frog)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Rostratula benghalensis australis* (Australian Painted Snipe)
- *Numenius madagascariensis* (Eastern Curlew)
- *Botaurus poiciloptilus* (Australian Bittern)
- *Pedionomus torquatus* (Plains-wanderer)
- *Leipoa ocellata* (Malleefowl)
- *Polytelis swainsonii* (Superb Parrot)
- *Pezoporus occidentalis* (Night Parrot)
- *Lophochroa leadbeateri* (Major Mitchell's Cockatoo)
- *Grantiella picta* (Painted Honeyeater)
- *Phascolarctos cinereus* (Koala)
- *Nyctophilus corbeni* (Corben's Long-eared Bat)

Under the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (DEWHA, 2009) an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;

- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

Only one nationally listed species *Nyctophilus corbeni* (Corben's Long-eared Bat) was considered to be present within the site. This species was addressed as a precaution due to the similarity of the calls between the Genus *Nyctophilus*. The proposal is not likely to have any significant impact on foraging and roosting habitat for this microchiropteran bat species.

Of the remaining nationally listed species suitable habitat in the form of woodland, derived grassland or Wah Wah Irrigation channel was considered to be present for all addressed species with the exception of *G. rostratus*, *M. australasica*, *N. madagascariensis*, *C. ferruginea* and *P. cinereus*. The proposal is unlikely to have a significant impact under the EPBC Act on any of the addressed species.

- *migratory species protected under international agreements;*

Eleven nationally listed migratory species were recorded on the DoEE on-line database as occurring or having potential habitat available within 10km of the study area, these being:

Migratory Terrestrial Species:

- *Motacilla flava* (Yellow Wagtail)
- *Myiagra cyanoleuca* (Satin Flycatcher)

Migratory Wetland Species:

- *Actitis hypoleucos* (Common Sandpiper)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris melanotos* (Pectoral Sandpiper)
- *Gallinago hardwickii* (Latham's Snipe)
- *Numenius madagascariensis* (Eastern Curlew)
- *Pandion haliaetus* (Osprey)
- *Tringa nebularia* (Common Greenshank)

Migratory Marine Birds

- *Apus pacificus* (Fork-tailed Swift)

Under the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (Department of the Environment, Water, Heritage and the Arts, 2009) an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or

- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

No migratory species were recorded within the site during fieldwork. Considering the small impact on habitat in the locality it is unlikely that these listed migratory species would be significantly impacted by the proposed Poultry Farm.

- *nuclear activities;*

The proposal does not involve any type of nuclear activity.

- *the Commonwealth marine environment;*

The proposal does not involve the modification of the Commonwealth marine environment.

9.0 IMPACT ASSESSMENT

9.1 AVOIDANCE AND MINIMISE IMPACTS

The proposed Poultry Farm Complex including internal roads and residences have been positioned entirely within cropping land allowing for the avoidance of many impacts. The potential for conflict between the poultry farm development and the existing native flora and fauna is considered low.

9.2 DIRECT IMPACTS

According to the FBA direct impacts on biodiversity values are described as “an impact on biodiversity values that is a direct result of vegetation clearance from a development. Direct impacts are predictable, usually occur at or near to the development site and can be readily identified during the planning, design, construction and operational phases of the development.

The proposed Poultry Farm Complex following direct and potential impacts/losses:

- The footprint of the Poultry Farm Complex including internal roads, mounds and dwellings will be situated on approximately 167ha of cropping land (Figure 1.2);
- The north-western internal access road upgrade is likely to result in the removal of a single native remnant tree, Tree No. 40 (Tag 140) (Plate 22) (Figure 4.1) a specimen of *Eucalyptus socialis* (Red Mallee) to upgrade of the access road along the northern boundary of the site;
- Based upon the plans provided approximately 0.2ha of disturbed roadside reserve vegetation will be required to be cleared for the Mid Western Highway intersection upgrade. Although the intersection is already present the upgrade will include additional clearing of roadside vegetation for a deceleration lane on the eastern side and widening on the western side for right hand turns (Figure 1.2).



Plate 22: Photo of Tree No. 40 (Tag 140) – *Eucalyptus socialis* which will likely require removal.

9.3 INDIRECT IMPACTS

According to the FBA indirect impacts on biodiversity values are described as “an impact on biodiversity values that occurs when development related activities affect threatened species, threatened species habitat, populations or ecological communities in a manner other than direct impact.

The proposed Poultry Farm Complex may result in the following indirect and potential impacts;

- Potential for weed introduction and spread due to construction increasing the spread of weeds into native vegetation;
- Edge effects;
- Sedimentation and runoff;
- Increase in noise from machinery, vehicles etc;
- Increase in dust;
- Increased spread of pest fauna species;
- Increase in artificial lighting.
- Increased vehicle traffic

9.3.1 WEEDS

The site was found to be subject to a high degree of weed incursion. Site landscaping, revegetation and other works have the potential to introduce additional exotic species into remnant vegetation particularly the PVP offset and other areas of native vegetation.

9.3.2 EDGE EFFECTS

As a result of the positioning of the proposal within cropping land there will be few edge effects on native vegetation. Farm 5 in the south-west of the site will have a buffer of approximately 30m from the PVP Offset Area. According to the PVP for the south-western remnant (Murrumbidgee CMA, 2011) the offset area was 28.9ha. The outline of the PVP area the buffer between the offset and the development would be approximately 50m. If isolated clumped trees are taken into consideration the buffer would be approximately 30m. This buffer area is already disturbed as a result of dryland cropping namely oats (Plate 12).

9.3.3 SEDIMENTATION AND RUNOFF

Earthworks for the poultry farms and other infrastructure such as dwellings and roads have the potential to result in erosion and sedimentation particularly after heavy rain.

9.3.4 INCREASE IN NOISE FROM MACHINERY, VEHICLE ETC

Noise from construction machinery and other vehicle has the potential to impact native fauna. Considering the majority of the site is currently used for broad scale cropping requiring large machinery the site would already be subject to a degree of noise. After the construction phase the noise would likely be kept to a minimum to avoid stress to the poultry.

9.3.5 INCREASE IN DUST

Earthworks for the poultry farms and other infrastructure has the potential to increase the level of raised dust.

9.3.6 PEST FAUNA SPECIES

The proposal has the potential to increase the numbers of pest fauna species particularly the European Rabbit and European Red Fox.

9.3.7 INCREASE IN ARTIFICIAL LIGHTING

Artificial lighting used to operate at night or used for security may influence nocturnal fauna.

9.3.8 INCREASED VEHICLE TRAFFIC

The proposal will result in an increase in vehicle traffic within the site. This may result in an increase in collisions with native fauna.

10.0 MITIGATION MEASURES

A number of mitigation measures have been specified to minimise the impact of the loss of habitat. The measures will include:

- Protection of remaining native vegetation during and after construction;
- Prevent weed introduction;
- Erosion and Sediment Control;
- Dust Control;
- Control of fauna pest species;
- Control of artificial lighting;
- Protection of native fauna;
- Enhancement of remaining native vegetation/habitat.

10.1 PROTECTION OF NATIVE VEGETATION/HABITAT DURING AND AFTER CONSTRUCTION

To protect and enhance native vegetation occurring within the site the following measures are required to be implemented:

- The extent of all areas of native vegetation are to be clearly defined on the ground and permanently fenced to ensure they are not subject to disturbance during construction and future land practices within the site. Fence design should allow for the safe and unimpeded movement of native fauna such as Kangaroos. No barbed wire is to be used;
- The individual tree Tree No. 40 (Tag 140) is to be clearly marked prior to removal to avoid additional trees being mistakenly removed;
- Other isolated native tree species occurring within proximity to the development will require temporary fencing around their dripline to avoid disturbances such as compaction.
- Routine weed control is to be undertaken within areas of remnant native vegetation;
- Areas of low quality native vegetation are to undergo regeneration.
- All internal fencing within areas of native vegetation will be required to be removed;
- Any damage or disturbance to the road reserve of the Mid Western Highway is to be restored to match surrounding landform in accordance with Council requirements.

10.2 PREVENT WEED INTRODUCTION

Mulching, planting (trees, shrubs and groundcovers) and weed control will be undertaken on the screening mounds. Plantings are to be native to the local area. Sterile grasses may be used first to help stabilise the mounds. All mulches and hay bales used in planting are to be certified weed free. It is recommended that maintenance of the earth mounds every 6 months over one year then yearly for 5 years. This will include weed control and plant replacements.

10.3 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment controls (e.g. silt fences, sediment traps) should be installed prior to construction. These should conform to the specifications in Soils and Construction 'Blue Book'

(Landcom, 2004) and should be maintained throughout the construction process until soil is successfully stabilised.

10.4 DUST CONTROL

All earth works should cease during dry very windy weather conditions.

10.5 CONTROL OF FAUNA PEST SPECIES

Pest species particularly the European Rabbit and European Red Fox are to be subject to ongoing control activities. Controls will be undertaken with consultation with Local Land Services as part of ongoing management of the site.

10.6 CONTROL OF ARTIFICIAL LIGHTING

Artificial lighting is to be minimised and confined wherever possible.

10.7 PROTECTION OF NATIVE FAUNA

Low speed limits are to be established within internal roads within the site. Signage is to be installed to inform drivers to drive below a maximum low speed and to be vigilant for native fauna particularly Kangaroos. Control of fauna pest species will also aid in the protection of native fauna species within the site.

10.8 ENHANCEMENT OF REMAINING NATIVE VEGETATION/HABITAT

It is recommended that routine weed control be undertaken within all areas of native vegetation within the site. Weed species to target will include weeds such as *Lycium ferocissimum* (African Boxthorn), *Echium plantagineum* (Patterson's Curse), *Heliotropium europaeum* (Common Heliotrope) and *Sisymbrium erysimoides* (Smooth Mustard). Information on the control of these species is contained within the New South Wales Weed Control Handbook – A guide to weed control in non-crop, aquatic and bushland situations (7th Edition) (DPI, 2018).

Areas of low-quality Belah/Black Oak - Western Rosewood - Wilga woodland vegetation are to be enhanced by plantings of shrubs and trees. Areas of dryland cropping within the fenced PVP area are also to be revegetated back to Belah/Black Oak - Western Rosewood - Wilga woodland. A map of the site showing the location of native plantings, revegetation areas and general weed control areas is shown in Figure 10.1.

It is recommended that the following practices are observed within areas of native vegetation to ensure their continued viability:

- No wood/timber is to be removed from the site;
- No nutrient enrichment, for example chicken manure, is to be dumped or allowed to run into areas of native vegetation;
- No deceased chickens are to be discarded into areas of native vegetation;
- No pipes are to drain water or any liquids into areas of native vegetation;
- No grazing by livestock.

Legend

— Site

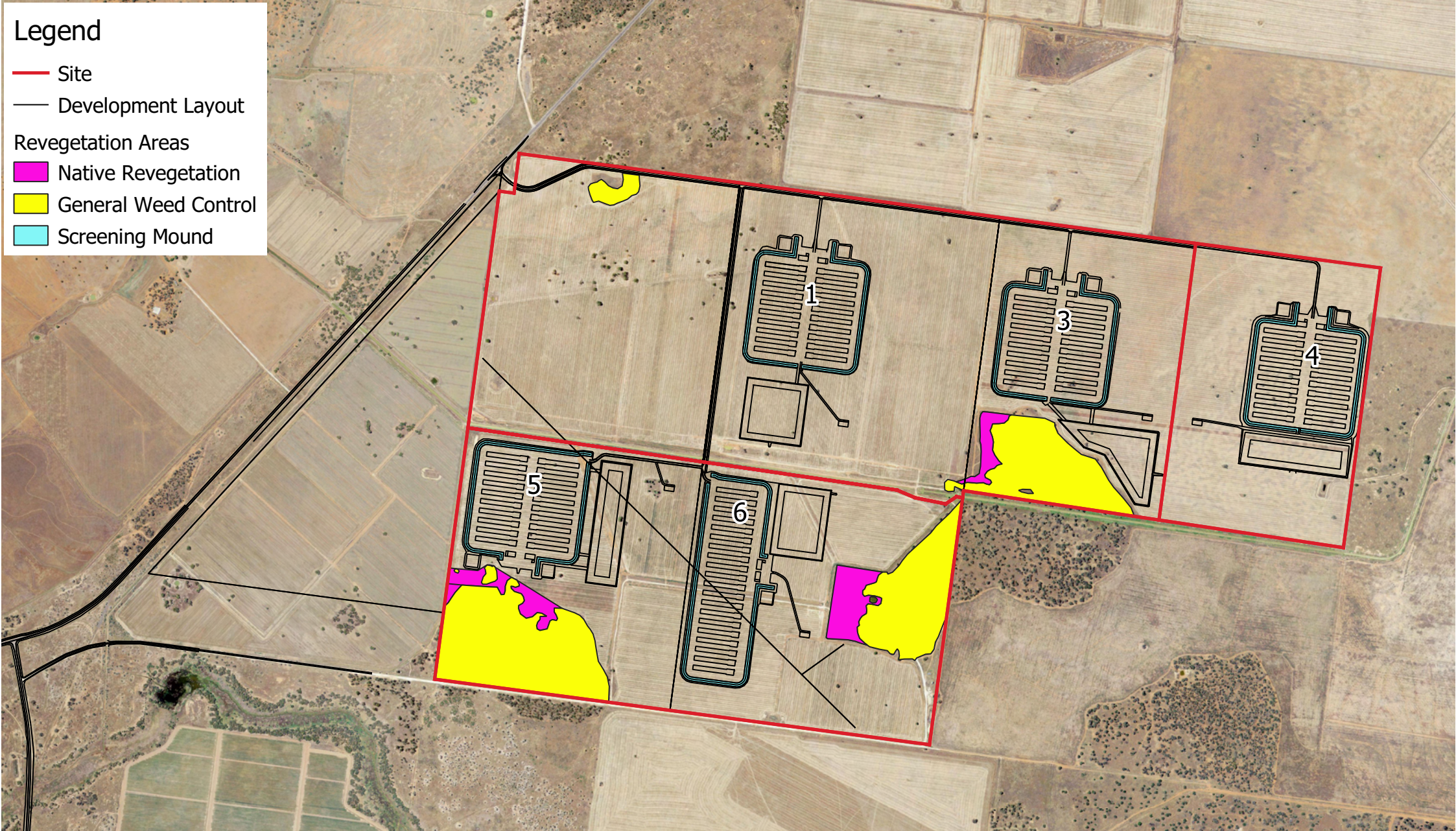
— Development Layout

Revegetation Areas

Native Revegetation

General Weed Control

Screening Mound



Job Ref	12269
A4 Scale	1:20,000

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

0 500 1000 m

Map Projection GDA94 MGA Zone 56

Data Sources: LPI (2018),

Figure 10.1

Planting and Revegetation Map

McRaes Road
Goolgowi, NSW

6 December 2018

WILDTHING
Environmental Consultants
(a Division of Tattersall Lander Pty Ltd)
ABN 41 003 509 215

11.0 IMPLEMENTATION PLAN

The implementation of the mitigation measures for direct, indirect and enhancement of the site are detailed in Tables 11.1, 11.2 and 11.3. The proponent will be responsible for all activities. Inappropriate maintenance techniques and inequitable resource levels can lead to unsustainable management practices within the site. Personnel will be required to be trained in Bush Regeneration techniques and at least hold a Certificate II in Bushland Regeneration or equivalent and possess plant identification skills. Anyone using herbicides will require a minimum - AQF3 Chemical Accreditation course.

Technical advice pertaining to the ongoing management of the vegetation on site can be obtained from a number of agencies and organisations. These providers would include:

- Riverina Local Land Services (Hay): Ph: (02) 6990 1300
- Australian Association of Bush Regenerators: 0407 002 921
- Landcare Australia: 1800 151 105

Table 11.1 – Measures to avoid and minimise direct impacts as a result of the proposal

IMPLEMENTATION PLAN – DIRECT IMPACTS				
Strategy	Action	Timing	Performance Criteria	Responsibility
Site Protection.	The extent of all areas of native vegetation within the site are to be clearly defined on the ground and permanently fenced to ensure they are not subject to disturbance during construction and future land practices within the site.	Pre-construction Phase	All required fencing completed.	Proponent, Ecologist, Fencing contractor.
	The individual tree Tree No. 40 (Tag 140) is to be clearly marked prior to removal to avoid additional trees being mistakenly removed.	Pre-construction Phase	Tree clearly marked.	Proponent, Ecologist
	The extent of the vegetation to be removed for the upgrade of the construction of the intersection with the Mid Western Highway is to be clearly defined to prevent any unnecessary additional clearing.	Pre-construction Phase	Limit of intersection upgrade clearly marked on the ground.	Proponent, Contractor

Table 11.2 – Measures to avoid and minimise indirect impacts as a result of the proposal

IMPLEMENTATION PLAN – INDIRECT IMPACTS				
Strategy	Action	Timing	Performance Criteria	
Prevent weed introduction	Mulching, planting (trees, shrubs and groundcovers) and weed control will be undertaken on the screening mounds. All native plantings will be required to be Plants will be required to be well watered. All mulches and hay bales used in planting are to be certified weed free. It is recommended that maintenance of the earth mounds every 6 months over one year then yearly for 5 years. This will include weed control, watering of plantings if required and replacing plant losses. Only species that are locally native to the immediate area are to be used in revegetation and other plantings such as the screening mounds around the poultry farms.	Construction Phase	No new weed introductions.	Proponent, Ecologist
Erosion and Sedimentation	Silt fences and other erosion control measures are to be installed prior to earthworks.	Construction Phase	Prevent and minimise erosion and sedimentation.	Proponent, Contractor
Prevent vehicle collision with native fauna	Low speed limits are to be established within internal roads within the site. Signage is to be installed to inform drivers to drive below a set low speed and be vigilant for native fauna particularly Kangaroos.	Construction phase	Signage in place and vehicles following set maximum speed.	Proponent, Contractor
Control of fauna pest species	Controls will be undertaken with consultation with Local Land Services as part of ongoing management of the site.	Construction & Operational phase	Pest fauna species subject to routine control.	Proponent, Contractor
Dust Control	All earth works should cease during dry very windy weather conditions.	Construction phase	Dust kept to a minimum.	Proponent, Contractor
Increase in noise from machinery, vehicles	Constructed screening mounds around each of the five farms will reduce the impact of noise on the surrounding environment. Slow internal road speed limits.	Construction phase	Constructed screening mounds in place. Signage in place and vehicles following set maximum speed.	Proponent, Contractor
Control of artificial lighting	Artificial lighting is to be minimised and confined wherever possible.	Construction Phase	Artificial lighting minimised	Proponent, Contractor

Table 11.3 – Measures to enhance native vegetation occurring within the site.

IMPLEMENTATION PLAN – ENHANCEMENT OF NATIVE VEGETATION ON SITE				
Strategy	Action	Timing	Performance Criteria	
Revegetation	Revegetation will be undertaken within more disturbed areas of native vegetation within the site (Figure 10.1). Revegetation will involve site preparation involving primary weed control. Ripping should be used to improve aeration, rainwater infiltration and moisture retention of particular soils to improve the root development of seedlings through faster downward root growth and deeper soil penetration. The rip line should follow the contour of the land to prevent erosion.	Construction & Operational phase	Revegetation completed	Proponent, Contractor
General Weed Control	Annual weeding is required in perpetuity within all areas of native vegetation.	Construction & Operational phase	100% eradication of priority weeds Control of other weed species	Suitably qualified Contractor, Bush Regenerator.
Restoration	Any damage or disturbance to the road reserve of the Mid Western Highway is to be restored to match surrounding landform in accordance with Council requirements.	Construction phase	Any required restoration completed.	Proponent, Contractor

12.0 IMPACT SUMMARY

12.1 AREAS NOT REQUIRING ASSESSMENT

Areas without native vegetation or aquatic features do not need to be assessed further. Within the development site, these included cropping areas and previously disturbed areas with little native vegetation component. The development site was entirely contained within 167ha of cropping areas.

12.2 AREAS NOT REQUIRING AN OFFSET

Wildthing Environmental Consultants notified OEH that the only biodiversity impact as a result of the proposal was the removal of a single tree. In an email advice to Daryl Harman of Wildthing Environmental Consultants on 12 September 2017 OEH advised that: the assessment does not require the use of the credit calculator associated with the FBA to determine whether an offset requirement is necessary, given the impact is a single tree.

12.2.1 IMPACTS ON NATIVE VEGETATION

Direct impacts only involve the removal of a single native remnant tree, a specimen of *Eucalyptus socialis* (Red Mallee) to upgrade of the access road along the northern boundary of the site. All impacts to native vegetation within the development site would have a score of <17 are not Critically Endangered Ecological Communities or Endangered Ecological Communities.

12.2.2 IMPACT ON SPECIES AND POPULATIONS

The BBC found that twelve threatened ecosystem credit species were predicted to occur within PCT's 57 & 193:

<i>Stagonopleura guttata</i>	Diamond Firetail
<i>Pomatostomus temporalis</i> subsp. <i>temporalis</i>	Grey-crowned Babbler (eastern subspecies)
<i>Melanodryas cucullata</i> subsp. <i>cucullata</i>	Hooded Robin (south-eastern form)
<i>Hieraaetus morphnoides</i>	Little Eagle
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo
<i>Grantiella picta</i>	Painted Honeyeater
<i>Certhionyx variegatus</i>	Pied Honeyeater
<i>Circus assimilis</i>	Spotted Harrier
<i>Daphoenositta chrysoptera</i>	Varied Sittella
<i>Climacteris affinis</i> - endangered population	White-browed Treecreeper Endangered Population

Three threatened fauna species listed under the NSW TSC Act 1995 were recorded within the site during the survey:

- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler);
- *Circus assimilis* (Spotted Harrier);
- *Chalinolobus picatus* (Little Pied-bat).

Due to the similarity of calls within the Genus *Nyctophilus*, the precautionary principle has been applied and further consideration has also been given to the threatened *Nyctophilus corbeni* (Corben's Long-eared Bat). No offsets are required for these species.

No species credit species were generated to occur within PCT's 57 & 193.

12.3 PCTS AND SPECIES POLYGONS REQUIRING AN OFFSET

12.3.1 IMPACTS ON NATIVE VEGETATION

No Critically Endangered Ecological Communities or Endangered Ecological Communities occur within the development site. No PCT's require an offset.

12.3.2 IMPACTS ON IMPORTANT WETLANDS

The proposal will not impact upon any important wetland.

12.3.3 IMPACTS ON SPECIES MOVEMENTS ALONG CORRIDORS

The proposal will not impact upon any movement corridor.

12.4 IMPACTS ON EPBC LISTED SPECIES

Due to the similarity of calls within the Genus *Nyctophilus*, the precautionary principle has been applied and further consideration has also been given to the nationally threatened *Nyctophilus corbeni* (Corben's Long-eared Bat). The proposal is not likely to have any significant impact on this microchiropteran bat species or any other species addressed.

13.0 CONCLUSION

The purpose of this BAR was to address the requirements of the FBA, developed for major projects and to address the biodiversity matters contained in the SEARS. The BAR has been assessed through:

- Detailed mapping and assessment in Accordance with the requirements in Appendix 4 of the FBA;
- Mitigation measures which have been outlined in Table 11.1, 11.2 & 11.3 to reduce the impacts on biodiversity.

As the only biodiversity impact was the removal of a single tree OEH advised Wildthing Environmental Consultants that the assessment does not require the use of the credit calculator associated with the FBA to determine whether an offset requirement is necessary, given the impact is a single tree.

Due to the presence of Wah Wah Irrigation Channel flowing through the site considerations have been made to Part 7A of the Fisheries Management Act 1994 (FM Act) in relation to a number of listed threatened aquatic species, populations and endangered ecological communities. No Endangered Aquatic Community was identified on site. The proposal Poultry Farm Complex is not likely to have any significant impact on the waters of Wah Wah Channel therefore effect any nearby threatened aquatic species, populations or endangered ecological communities.

Three largely isolated specimens of *Eucalyptus populnea* (Bimblebox) a 'Koala Feed Tree' under SEPP 44 Koala Habitat Protection were identified within the site, however would not comprise over 15% of the total trees present. Therefore, the site would not be considered to constitute Potential Koala Habitat and accordingly no further provisions of this policy apply to the site.

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act (1999). It was determined that the proposal should have no significant impact on a matter of National Environmental Significance.

In conclusion, it is believed that the BAR has adequately addressed the FBA for the proposed Poultry Farm Complex.

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APPENDIX A

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Secretary's Environmental Assessment Requirements

Section 78A(8A) of the *Environmental Planning and Assessment Act 1979*

State significant development

Application Number	SSD 8036
Development	Intensive Livestock Agriculture – Poultry Farm Complex
Location	375 McRaes Road, Goolgowi, Carrathool Local Government Area (Lot 1 and 2 DP 749831)
Applicant	Muscat Developments Pty Ltd
Date of Issue	November 2016
General Requirements	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 the <i>Environmental Planning and Assessment Regulation 2000</i>. The EIS must include: • a detailed description of the development including: – the full scope of proposed works; – need and justification for the proposed development; – likely staging of the development; – likely interactions between the development and existing, approved and proposed developments in the vicinity of the site; and – plans of any proposed works. • consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments; • risk assessment of the potential environmental impacts of the development; identifying key issues for further assessment; • detailed assessment, where relevant, of the key issues below, and any other potential significant issues identified in the risk assessment, must include: – a description of the existing environment, using adequate baseline data; – consideration of potential cumulative impacts due to other development in the vicinity; and – measures to avoid, minimise and if necessary, offset the predicted impacts, including detailed contingency plans for adaptive management of any significant risks to the environment. • consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS. The EIS must be accompanied by a report from a qualified quantity surveyor providing: • a detailed calculation of the capital investment value (CIV) of the proposal (as defined in clause 3 of the <i>Environmental Planning and Assessment Regulation 2000</i>), including details of all assumptions and components from which the CIV calculation is derived; • an estimate of the jobs that will be created by the development during the construction and operational phases; and • certification that the information provided is accurate at the date of preparation.
Key issues	The EIS must include an assessment of the potential impacts of the proposal (including cumulative impacts) and develop appropriate measures to avoid, mitigate, manage and/or offset these impacts. The EIS must address the

	following specific matters: • strategic context – including: – justification for the proposal and suitability of the site; – demonstration that the proposal is generally consistent with all relevant planning strategies and environmental planning instruments, and justification for any inconsistencies; – details of any proposed consolidation or subdivision of land; and – a land use conflict assessment including reference to separation distances and best management practices. • air quality and odour – including: – a quantitative odour and air quality impact assessment in accordance with the relevant Environment Protection Authority (EPA) guidelines, including appropriate consideration of impacts on nearby residents; – evidence of appropriate meteorological data for use in air dispersion modelling; – a description of all potential air quality impacts (odour and dust) on surrounding receptors including the cumulative impacts from the proposal and other proposed or existing poultry broiler farms in the locality; – inclusion of 'worst case' emission scenarios and sensitivity analyses; – a contingency plan to address unpredicted operational odour impacts; and – a description and appraisal of air quality and odour impact monitoring, emission control techniques and mitigation measures. • transport and road traffic – including: – a quantitative traffic impact assessment prepared in accordance with the relevant Council, Austroads and Roads and Maritime Services guidelines; – details of all daily and peak traffic and transport movement likely to be generated during construction and operation of the proposed development including a description of haul routes, vehicle types, vehicle access routes and impacts on nearby intersections; – an assessment of predicted impacts on road safety and the capacity of the transport network to accommodate the development, including an appraisal of any impact mitigation measures and required infrastructure upgrades and consideration of cumulative impacts using SIDRA or a similar model; – details of access to the site from the road network including intersection location, design and sight distances; and – detailed plans for the layout of the internal roads and parking in accordance with the relevant Australian standards. • soils and water – including: – an accurate description of operational water demands, a breakdown of water supplies (including any water licensing requirements), a description of measures to minimise water use and evidence of an adequate and secure water supply; – a detailed site water balance; – a contingency plan for water supply in the event of drought conditions; – an assessment of the impacts to surface and groundwater resources and impacts to any groundwater dependant ecosystems; – a flood impact assessment of the development as a result of any proposed changes to the landform and building areas; – details of any works proposed to intercept, connect or infiltrate groundwater sources; – a description of surface, groundwater and stormwater management, including on site detention, flood impact mitigation and measures to treat or reuse water; – an assessment of any potential existing soil contamination in
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	accordance with <i>Managing Land Contamination Planning Guidelines: SEPP55 – Remediation of Land</i> (DUAP, 1998); and – a description and appraisal of impact mitigation, management, maintenance and monitoring measures. • waste and wastewater management – including: – identification and classification of waste streams that would be generated at the site in accordance with the <i>Waste Classification Guidelines</i> (EPA, 2014); – a description of waste handling, transport, identification, receipt, processing, stockpiling and quality control; – a description of proposed management and disposal of wastewater, leachate and effluent; – details on containment and monitoring of wastewater and waste streams; – the measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the <i>NSW Waste Avoidance and Resource Recovery Strategy 2014-21</i>; and – a description and appraisal of waste impact mitigation, contingencies and management. • biodiversity – including: – an assessment of biodiversity impacts in accordance with the <i>Framework for Biodiversity Assessment</i> (OEH, 2014) and the <i>NSW Biodiversity Offsets Policy for Major Projects</i> (OEH, 2014), including the GIS data files used in the assessment; and – accurate predictions of any vegetation clearing on or off the site, including buildings, access roads and servicing and support infrastructure. • noise and vibration – including: – a quantitative noise and vibration impact assessment in accordance with the relevant Environment Protection Authority guidelines; – a description of all potential noise and vibration sources during construction and operation, including traffic noise; and – a description of noise and vibration monitoring and mitigation measures. • hazards and risk – including: – a preliminary risk screening completed in accordance with <i>State Environmental Planning Policy No. 33 – Hazardous and Offensive Development</i> and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development; and – should preliminary screening indicate that the project is 'potentially hazardous,' a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011). • animal welfare, bio-security and disease management – including: – details of how the proposed development would comply with relevant codes of practice and guidelines; – a biosecurity assessment between other nearby poultry farms and any potential waterbird habitat(s); – details of all disease control measures; and – a detailed description of the contingency measures that would be implemented for the disposal of livestock during operation and in the event of disease outbreak. • visual impacts – including: – a description of the visual catchment and visual impacts including lighting impacts on surrounding receivers and public areas; and – an appraisal of visual impact mitigation measures.
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	• socio-economic – including: – an analysis of the economic and social impacts of the development, particularly of any benefits to the community. • infrastructure – including details of any upgrades or extension to existing services infrastructure. • contributions – including consideration of relevant Carrathool Contributions Plans and/or details of any Voluntary Planning Agreement. • bushfire and incident management.
Plans and Documents	The EIS must include all plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Environmental Planning and Assessment Regulation 2000. These documents should be included as part of the EIS rather than as separate documents.
Consultation	During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with: • Carrathool Shire Council; • Environment Protection Authority; • Office of Environment and Heritage; • Department of Primary Industries; • Roads and Maritime Services; • Essential Energy; • WaterNSW; • SafeWork; • Riverina Local Land Services; and • Local community and other stakeholders. The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, an explanation should be provided.
Further consultation after 2 years	If you do not lodge a development application and EIS for the development within 2 years, you must consult further with the Secretary in relation to the preparation of the EIS.
References	The assessment of the key issues listed above must take into account relevant guidelines, policies, strategies and plans. While not exhaustive, Attachment 1 contains a list that may be relevant to the assessment of this proposal.

ATTACHMENT 1 **Technical and Policy Guidelines**

The following guidelines may assist in the preparation of the Environmental Impact Statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:

<http://www.planning.nsw.gov.au>
<http://www.bookshop.nsw.gov.au>
<http://www.publications.gov.au>

Policies, Guidelines and Plans

Plans and Documents

The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Environmental Planning and Assessment Regulation 2000. Provide these as part of the EIS rather than as separate documents.

In addition, the EIS must include the following:

1. An existing site survey plan drawn at an appropriate scale illustrating:
 - the location of the land, boundary measurements, area (sq.m) and north point;
 - the existing levels of the land in relation to buildings and roads;
 - location and height of existing structures on the site;
 - location and height of adjacent buildings and private open space; and
 - all levels to be to Australian Height Datum (AHD).
2. A locality/context plan drawn at an appropriate scale should be submitted indicating:
 - significant local features such as heritage items;
 - the location and uses of existing buildings, shopping and employment areas; and
 - traffic and road patterns, pedestrian routes and public transport nodes.
3. Drawings at an appropriate scale illustrating:
 - detailed plans, sections and elevations of the existing building, which clearly show all proposed internal and external alterations and additions.

Documents to be Submitted

- Documents to submit include:
- 1 hard copy and 1 electronic copy of all the documents and plans for review prior to exhibition; and
 - Other copies as determined by the Department once the development application is lodged

Air Quality

Protection of the Environment Operations (Clean Air) Regulation 2010
 Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2005)
 Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA, 2005)
 Assessment and Management of Odour from Stationary Sources in NSW (EPA, 2006)
 Meat chicken farm calculator (EPA, 2011)

Odour	
	Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW (DEC)
	Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DEC)
Traffic	
	Guide to Traffic Generating Development (RTA)
	Road Design Guide (RTA)
Soil and Water	
Soil	Managing Urban Stormwater: Soils & Construction (Landcom)
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC & NHMRC)
	National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC)
	State Environmental Planning Policy No. 55 – Remediation of Land
Surface Water	Managing Land Contamination - Planning Guidelines SEPP 55 – Remediation of Land (DUAP and EPA)
	National Water Quality Management Strategy: Water quality management - an outline of the policies (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Policies and principles - a reference document (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Implementation guidelines (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (EPA, 2006)
	State Water Management Outcomes Plan
	NSW Government Water Quality and River Flow Environmental Objectives (DECC)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC)
	Sorting and Handling Liquids: Environmental Protection – Participants Manual (DECC)
	Managing Urban Stormwater: Council Handbook. Draft (EPA)
	Managing Urban Stormwater: Treatment Techniques (EPA, 1997)
	Managing Urban Stormwater: Source Control. Draft (EPA)
	Managing Urban Stormwater: Soils & Construction (Landcom, 2004)
	Technical Guidelines: Bunding & Spill Management (DECC)
	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC, 1995)
	NSW State Groundwater Policy Framework Document (DLWC, 1997)
	NSW State Groundwater Quality Protection Policy (DLWC, 1998)
Groundwater	NSW State Groundwater Dependent Ecosystems Policy (DLWC, 2002)
	Managing Urban Stormwater: Soils and Construction (Landcom, 2004)
Stormwater	Managing Urban Stormwater: Treatment Techniques (Draft) (EPA, 1997)
	Environmental Guidelines: Use of Effluent by Irrigation (EPA, 2004)
Wastewater	Environmental Guidelines: Storage and Handling of Liquids (EPA, 2007)
Waste	
	NSW Waste Avoidance and Resource Recovery Strategy 2014-21 (EPA, 2014)
	Waste Classification Guidelines (EPA, 2014)
	Environmental Guidelines: Assessment Classification and Management of Non-Liquid and Liquid Waste (NSW EPA)
	Environmental Guidelines: Use and Disposal of Biosolids Products (EPA, 1997)

Biodiversity	NSW Biodiversity Offsets Policy for Major Projects (OEH, 2014) Framework for Biodiversity Assessment – NSW Biodiversity Offsets Policy for Major Projects (2014, OEH) Principles for the use of Biodiversity Offsets in NSW (DECC, 2008); State Environmental Planning Policy No 44 – Koala Habitat Protection (SEPP 44) The NSW State Groundwater Dependent Ecosystem Policy (DLWC)
Noise and Vibration	NSW Industrial Noise Policy (EPA, 2000) and Industrial Noise Policy Application Notes NSW Road Noise Policy (EPA, 2011) Assessing Vibration: a Technical Guide (EPA, 2006) Interim Construction Noise Guidelines (EPA, 2009)
Hazards and Risk	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP) Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
Animal Welfare and Biosecurity	National Farm Biosecurity Manual – Poultry Production (2009) National Farm Biosecurity Manual for Chicken Growers (Australian Chicken Meat Federation 2009) Best Practice Management for Meat Chicken Production in New South Wales Manual 1 - Site Selection & Development (DPI 2012) Best Practice Management for Meat Chicken Production in New South Wales Manual 2 - Meat Chicken Growing Management (DPI 2012)
Greenhouse Gas	AGO Factors and Methods Workbook (AGO) Guidelines for Energy Savings Action Plans (DEUS, 2005)

ATTACHMENT 2
Public Authority Responses to Request for Key Issues



Department of
Primary Industries

OUT16/18204

Mr Thomas Piovesan
Industry Assessments
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Thomas.piovesan@planning.nsw.gov.au

Dear Mr Piovesan

**Carrathool Intensive Poultry Farm (SSD TBA)
Request for Secretary's Environmental Assessment Requirements**

I thank you for your email of 20 April 2016 to the Department of Primary Industries in respect to the above matter. Comment has been sought from relevant divisions of DPI. Any further referrals to DPI can be sent by email to landuse.enquiries@dpi.nsw.gov.au.

DPI has reviewed the request and recommends that the following matters are also required to be addressed in the SEARs:

- The SEARs should require consideration of the following:
 - NSW Aquifer Interference Policy (2012)
 - Guidelines for controlled activities on waterfront land
 - Relevant water sharing plan(s) under the *Water Management Act 2000*
- The SEARs should require a land use conflict risk assessment particularly relating to separation distances and management practices to minimise odour, dust and noise for sensitive receptors referencing the "Land Use Conflict Risk Assessment Guide":
http://www.dpi.nsw.gov.au/data/assets/pdf_file/0018/412551/Land-use-conflict-risk-assessment-LUCRA-guide.pdf.

It is further recommended that the EIS be required to include:

- Annual volumes of surface water and groundwater proposed to be taken by the activity (including through inflow and seepage) from each surface and groundwater source as defined by the relevant water sharing plan.
- Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project).
- The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.

NSW Department of Primary Industries
Level 11, 323 Castlereagh Street Sydney NSW 2000
Tel: 02 9934 0804 landuse.enquiries@dpi.nsw.gov.au ABN: 72 189 919 072

- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Clear identification of "waterfront land" (as defined in the Water Management Act 2000) and an assessment of impacts of works and activities on waterfront land.
- Full technical details and data of all surface and groundwater modelling required to support the EIS.
- Proposed surface and groundwater monitoring activities and methodologies.
- Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.
- Consideration of relevant policies and guidelines.
- A statement of where each element of the SEARs is addressed in the EIS (i.e. in the form of a table).

Further detailed generic assessment requirements from DPI Water that may assist the proponent are included at Attachment A.

Should you require further information please contact Tim Baker, Senior Water Regulation Officer on (02) 68417403, Tim.Baker@dpi.nsw.gov.au.

Yours sincerely



Mitchell Isaacs
Director, Planning Policy & Assessment Advice
11/5/2016

Attachment A

**Carrathool Intensive Poultry Farm (SSD TBA)
Request for Secretary's Environment Assessment Requirements
Detailed comments – DPI Water**

DPI Water General Assessment Requirements for general projects

The following detailed assessment requirements are provided to assist in adequately addressing the assessment requirements for this proposal.

For further information visit the DPI Water website, www.water.nsw.gov.au

Key Relevant Legislative Instruments

This section provides a basic summary to aid proponents in the development of an Environmental Impact Statement (EIS), and should not be considered a complete list or comprehensive summary of relevant legislative instruments that may apply to the regulation of water resources for a project.

The EIS should take into account the objects and regulatory requirements of the *Water Act 1912* (WA 1912) and *Water Management Act 2000* (WMA 2000), and associated regulations and instruments, as applicable.

Water Management Act 2000 (WMA 2000)

Key points:

- Volumetric licensing in areas covered by water sharing plans
- Works within 40m of waterfront land
- SSD & SSI projects are exempt from requiring water supply work approvals and controlled activity approvals as a result of the *Environmental Planning & Assessment Act 1979* (EP&A Act).
- No exemptions for volumetric licensing apply as a result of the *EP&A Act*.
- Basic landholder rights, including harvestable rights dams
- Aquifer interference activity approval and flood management work approval provisions have not yet commenced and are regulated by the *Water Act 1912*
- Maximum penalties of \$2.2 million plus \$264,000 for each day an offence continues apply under the *WMA 2000*

Water Act 1912 (WA 1912)

Key points:

- Volumetric licensing in areas where no water sharing plan applies
- Monitoring bores
- Aquifer interference activities that are not regulated as a water supply work under the *WMA 2000*.
- Flood management works
- No exemptions apply to licences or permits under the *WA 1912* as a result of the *EP&A Act*.
- Regulation of water bore driller licensing.

Water Management (General) Regulation 2011

Key points:

- Provides various exemptions for volumetric licensing and activity approvals
- Provides further detail on requirements for dealings and applications.

Water Sharing Plans – these are considered regulations under the *WMA 2000*

Access Licence Dealing Principles Order 2004

Harvestable Rights Orders

Water Sharing Plans

It is important that the proponent understands and describes the ground and surface water sharing plans, water sources, and management zones that apply to the project. The relevant water sharing plans can be determined spatially at www.ourwater.nsw.gov.au. Multiple water sharing plans may apply and these must all be described.

The *Water Act 1912* applies to all water sources not yet covered by a commenced water sharing plan.

The EIS is required to:

- Demonstrate how the proposal is consistent with the relevant rules of the Water Sharing Plan including rules for access licences, distance restrictions for water supply works and rules for the management of local impacts in respect of surface water and groundwater sources, ecosystem protection (including groundwater dependent ecosystems), water quality and surface-groundwater connectivity.
- Provide a description of any site water use (amount of water to be taken from each water source) and management including all sediment dams, clear water diversion structures with detail on the location, design specifications and storage capacities for all the existing and proposed water management structures.
- Provide an analysis of the proposed water supply arrangements against the rules for access licences and other applicable requirements of any relevant WSP, including:
 - Sufficient market depth to acquire the necessary entitlements for each water source.
 - Ability to carry out a “dealing” to transfer the water to relevant location under the rules of the WSP.
 - Daily and long-term access rules.
 - Account management and carryover provisions.
- Provide a detailed and consolidated site water balance.
- Further detail on licensing requirements is provided below.

Relevant Policies and Guidelines

The EIS should take into account the following policies (as applicable):

- NSW Guidelines for Controlled Activities on Waterfront Land (NOW, 2012)
- NSW Aquifer Interference Policy (NOW, 2012)
- Risk Assessment Guidelines for Groundwater Dependent Ecosystems (NOW, 2012)
- Australian Groundwater Modelling Guidelines (NWC, 2012)
- NSW State Rivers and Estuary Policy (1993)
- NSW Wetlands Policy (2010)
- NSW State Groundwater Policy Framework Document (1997)
- NSW State Groundwater Quality Protection Policy (1998)
- NSW State Groundwater Dependent Ecosystems Policy (2002)
- NSW Water Extraction Monitoring Policy (2007)

DPI Water policies can be accessed at the following links:

<http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/default.aspx>
<http://www.water.nsw.gov.au/Water-licensing/Approvals/Controlled-activities/default.aspx>

An assessment framework for the NSW Aquifer Interference Policy can be found online at:
<http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference>.

Licensing Considerations

The EIS is required to provide:

- Identification of water requirements for the life of the project in terms of both volume and timing (including predictions of potential ongoing groundwater take following the cessation of operations at the site – such as evaporative loss from open voids or inflows).
- Details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction from each water source as defined in the relevant Water Sharing Plan/s and all water supply works to take water.
- Explanation of how the required water entitlements will be obtained (i.e. through a new or existing licence/s, trading on the water market, controlled allocations etc.).
- Information on the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions, etc).
- Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licensing.
- Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storages
- Details on the location, purpose, size and capacity of any new proposed dams/storages.
- Applicability of any exemptions under the *Water Management (General) Regulation 2011* to the project.

Water allocation account management rules, total daily extraction limits and rules governing environmental protection and access licence dealings also need to be considered.

The Harvestable Right gives landholders the right to capture and use for any purpose 10% of the average annual runoff from their property. The Harvestable Right has been defined in terms of an equivalent dam capacity called the Maximum Harvestable Right Dam Capacity (MHRDC). The MHRDC is determined by the area of the property (in hectares) and a site-specific run-off factor. The MHRDC includes the capacity of all existing dams on the property that do not have a current water licence. Storages capturing up to the harvestable right capacity are not required to be licensed but any capacity of the total of all storages/dams on the property greater than the MHRDC may require a licence.

For more information on Harvestable Right dams, including a calculator, visit:

<http://www.water.nsw.gov.au/Water-licensing/Basic-water-rights/Harvesting-runoff/Harvesting-runoff>

Dam Safety

Where new or modified dams are proposed, or where new development will occur below an existing dam, the NSW Dams Safety Committee should be consulted in relation to any safety issues that may arise. Conditions of approval may be recommended to ensure safety in relation to any new or existing dams.

See www.damsafety.nsw.gov.au for further information.

Surface Water Assessment

The predictive assessment of the impact of the proposed project on surface water sources should include the following:

- Identification of all surface water features including watercourses, wetlands and floodplains transected by or adjacent to the proposed project.
- Identification of all surface water sources as described by the relevant water sharing plan.
- Detailed description of dependent ecosystems and existing surface water users within the area, including basic landholder rights to water and adjacent/downstream licensed water users.
- Description of all works and surface infrastructure that will intercept, store, convey, or otherwise interact with surface water resources.
- Assessment of predicted impacts on the following:
 - flow of surface water, sediment movement, channel stability, and hydraulic regime,
 - water quality,
 - flood regime,
 - dependent ecosystems,
 - existing surface water users, and
 - planned environmental water and water sharing arrangements prescribed in the relevant water sharing plans.

Groundwater Assessment

To ensure the sustainable and integrated management of groundwater sources, the EIS needs to include adequate details to assess the impact of the project on all groundwater sources.

Where it is considered unlikely that groundwater will be intercepted or impacted (for example by infiltration), a brief site assessment and justification for the minimal impacts may be sufficient, accompanied by suitable contingency measures in place in the event that groundwater is intercepted, and appropriate measures to ensure that groundwater is not contaminated.

Where groundwater is expected to be intercepted or impacted, the following requirements should be used to assist the groundwater assessment for the proposal.

- The known or predicted highest groundwater table at the site.
- Works likely to intercept, connect with or infiltrate the groundwater sources.
- Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes.
- Bore construction information is to be supplied to DPI Water by submitting a "Form A" template. DPI Water will supply "GW" registration numbers (and licence/approval numbers if required) which must be used as consistent and unique bore identifiers for all future reporting.

- A description of the watertable and groundwater pressure configuration, flow directions and rates and physical and chemical characteristics of the groundwater source (including connectivity with other groundwater and surface water sources).
- Sufficient baseline monitoring for groundwater quantity and quality for all aquifers and GDEs to establish a baseline incorporating typical temporal and spatial variations.
- The predicted impacts of any final landform on the groundwater regime.
- The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts.
- An assessment of groundwater quality, its beneficial use classification and prediction of any impacts on groundwater quality.
- An assessment of the potential for groundwater contamination (considering both the impacts of the proposal on groundwater contamination and the impacts of contamination on the proposal).
- Measures proposed to protect groundwater quality, both in the short and long term.
- Measures for preventing groundwater pollution so that remediation is not required.
- Protective measures for any groundwater dependent ecosystems (GDEs).
- Proposed methods of the disposal of waste water and approval from the relevant authority.
- The results of any models or predictive tools used.

Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:

- Any proposed monitoring programs, including water levels and quality data.
- Reporting procedures for any monitoring program including mechanism for transfer of information.
- An assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal.
- Identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category).
- Description of the remedial measures or contingency plans proposed.
- Any funding assurances covering the anticipated post development maintenance cost, for example on-going groundwater monitoring for the nominated period.

Groundwater Dependent Ecosystems

The EIS must consider the potential impacts on any Groundwater Dependent Ecosystems (GDEs) at the site and in the vicinity of the site and:

- Identify any potential impacts on GDEs as a result of the proposal including:
 - the effect of the proposal on the recharge to groundwater systems;
 - the potential to adversely affect the water quality of the underlying groundwater system and adjoining groundwater systems in hydraulic connections; and
 - the effect on the function of GDEs (habitat, groundwater levels, connectivity).
- Provide safeguard measures for any GDEs.

Watercourses, Wetlands and Riparian Land

The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal, including:

- Scaled plans showing the location of:
 - wetlands/swamps, watercourses and top of bank;
 - riparian corridor widths to be established along the creeks;
 - existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);
 - the site boundary, the footprint of the proposal in relation to the watercourses and riparian areas; and
 - proposed location of any asset protection zones.
- Photographs of the watercourses/wetlands and a map showing the point from which the photos were taken.
- A detailed description of all potential impacts on the watercourses/riparian land.
- A detailed description of all potential impacts on the wetlands, including potential impacts to the wetlands hydrologic regime; groundwater recharge; habitat and any species that depend on the wetlands.
- A description of the design features and measures to be incorporated to mitigate potential impacts.
- Geomorphic and hydrological assessment of water courses including details of stream order (Strahler System), river style and energy regimes both in channel and on adjacent floodplains.

Landform rehabilitation

Where significant modification to landform is proposed, the EIS must include:

- Justification of the proposed final landform with regard to its impact on local and regional surface and groundwater systems;
- A detailed description of how the site would be progressively rehabilitated and integrated into the surrounding landscape;
- Outline of proposed construction and restoration of topography and surface drainage features if affected by the project; and
- An outline of the measures to be put in place to ensure that sufficient resources are available to implement the proposed rehabilitation.

Consultation and general enquiries

General licensing enquiries can be made to Advisory Services: water.enquiries@dpi.nsw.gov.au, 1800 353 104.

Assessment or state significant development enquiries or requests for review or consultation should be directed to water.referrals@dpi.nsw.gov.au.

A consultation guideline and further information is available online at:
www.water.nsw.gov.au/water-management/law-and-policy/planning-and-assessment

End Attachment A



Department of
Primary Industries
Water

Contact: Tracie Scarfone
Phone: 02 6951 2510
Fax: 02 69512568
Email: tracie.scarfone@dpi.nsw.gov.au

The General Manager
Department of Planning
PO Box 39
Sydney NSW 2000

Our ref: Mx 123
File No:
Your Ref:

Attention: Patrick Copas

2nd May 2016

Dear Thomas,

Re: Request for Secretary's Environmental Assessment Requirements for intensive poultry complex at 375 McRaes Road, Goolgowi, Carrathool LGA.

DPI Water has reviewed the supporting documentation accompanying the request for Secretary's Environmental Assessment Requirements (SEARs) and provides the following comments below, and further detail in **Attachment A**.

It is recommended that the EIS be required to include:

Access to surface and groundwater resources

- Annual volumes of surface water and groundwater proposed to be taken by the activity (including through inflow and seepage) from each surface and groundwater source as defined by the relevant water sharing plan.
- Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project).
- Assessment of the impact and approvals (Works and Use Approvals under the WMA 2000) required for the taking or storage of water.
- The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.
- A detailed assessment against the NSW Aquifer Interference Policy (2012) using DPI Water's assessment framework.

Impact on surface and groundwater resources

- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.

www.water.nsw.gov.au

2198 Irrigation Way, Yanco, PO Box 156 Leeton NSW 2705 Australia t 1800 353 104 | e water.enquiries@dpi.nsw.gov.au

2

- Full technical details and data of all surface and groundwater modelling, and an independent peer review.
- Proposed surface and groundwater monitoring activities and methodologies.
- Proposed management and disposal of produced or incidental water

Flooding

DP Water is responsible for the management and licensing of flood work approvals.

If the proposal is for an earthwork, embankment or levee, wherever situated or proposed to be constructed that is reasonably likely to affect the flow of water to or from a river or lake then the assessment is required to address potential impacts detailed further in attachment A.

Impact on waterfront land and water resource dependents

- Clear identification of "waterfront land" (as defined in the WMA 2000) and an assessment of impacts of works and activities on waterfront land. (Works on waterfront land may be subject to Controlled Activity Approval (CAA) under the *Water Management Act 2000*.)
- Details of the final landform of the site, including final void management (where relevant) and rehabilitation measures.
- Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.
- Consideration of relevant policies and guidelines.
- A statement of where each element of the SEARs is addressed in the EIS (i.e. in the form of a table).

Please direct any questions or correspondence to **Tracie Scarfone**,
tracie.scarfone@dpi.nsw.gov.au.

Yours sincerely



Tracie Scarfone
Senior Water Regulation Officer
Water Regulatory Operations, Water Regulatory Operations South
NSW Department of Primary Industries – Water

ATTACHMENT A

DPI Water General Assessment Requirements

The following detailed assessment requirements are provided to assist in adequately addressing the assessment requirements for this proposal.

For further information visit the DPI Water website, www.water.nsw.gov.au

Key Relevant Legislative Instruments

This section provides a basic summary to aid proponents in the development of an Environmental Impact Statement (EIS), and should not be considered a complete list or comprehensive summary of relevant legislative instruments that may apply to the regulation of water resources for a project.

The EIS should take into account the objects and regulatory requirements of the *Water Act 1912* (WA 1912) and *Water Management Act 2000* (WMA 2000), and associated regulations and instruments, as applicable.

Water Management Act 2000 (WMA 2000)

Key points:

- Volumetric licensing in areas covered by water sharing plans
- Works within 40m of waterfront land
- SSD & SSI projects are exempt from requiring water supply work approvals and controlled activity approvals as a result of the *Environmental Planning & Assessment Act 1979* (EP&A Act).
- No exemptions for volumetric licensing apply as a result of the *EP&A Act*.
- Basic landholder rights, including harvestable rights dams
- Aquifer interference activity approval and flood management work approval provisions have not yet commenced and are regulated by the *Water Act 1912*
- Maximum penalties of \$2.2 million plus \$264,000 for each day an offence continues apply under the *WMA 2000*

Water Act 1912 (WA 1912)

Key points:

- Volumetric licensing in areas where no water sharing plan applies
- Monitoring bores
- Aquifer interference activities that are not regulated as a water supply work under the *WMA 2000*.
- Flood management works
- No exemptions apply to licences or permits under the *WA 1912* as a result of the *EP&A Act*.
- Regulation of water bore driller licensing.

Water Management (General) Regulation 2011

Key points:

- Provides various exemptions for volumetric licensing and activity approvals
- Provides further detail on requirements for dealings and applications.

Water Sharing Plans – these are considered regulations under the *WMA 2000*

Access Licence Dealing Principles Order 2004

Harvestable Rights Orders

Water Sharing Plans

It is important that the proponent understands and describes the ground and surface water sharing plans, water sources, and management zones that apply to the project. The relevant water sharing plans can be determined spatially at www.ourwater.nsw.gov.au. Multiple water sharing plans may apply and these must all be described.

The *Water Act 1912* applies to all water sources not yet covered by a commenced water sharing plan.

The EIS is required to:

- Demonstrate how the proposal is consistent with the relevant rules of the Water Sharing Plan including rules for access licences, distance restrictions for water supply works and rules for the management of local impacts in respect of surface water and groundwater sources, ecosystem protection (including groundwater dependent ecosystems), water quality and surface-groundwater connectivity.
- Provide a description of any site water use (amount of water to be taken from each water source) and management including all sediment dams, clear water diversion structures with detail on the location, design specifications and storage capacities for all the existing and proposed water management structures.
- Provide an analysis of the proposed water supply arrangements against the rules for access licences and other applicable requirements of any relevant WSP, including:
 - Sufficient market depth to acquire the necessary entitlements for each water source.
 - Ability to carry out a "dealing" to transfer the water to relevant location under the rules of the WSP.
 - Daily and long-term access rules.
 - Account management and carryover provisions.
- Provide a detailed and consolidated site water balance.
- Further detail on licensing requirements is provided below.

Relevant Policies and Guidelines

The EIS should take into account the following policies (as applicable):

- NSW Guidelines for Controlled Activities on Waterfront Land (NOW, 2012)
- NSW Aquifer Interference Policy (NOW, 2012)
- Risk Assessment Guidelines for Groundwater Dependent Ecosystems (NOW, 2012)
- Australian Groundwater Modelling Guidelines (NWC, 2012)
- NSW State Rivers and Estuary Policy (1993)
- NSW Wetlands Policy (2010)
- NSW State Groundwater Policy Framework Document (1997)
- NSW State Groundwater Quality Protection Policy (1998)
- NSW State Groundwater Dependent Ecosystems Policy (2002)
- NSW Water Extraction Monitoring Policy (2007)

DPI Water policies can be accessed at the following links:

<http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/default.aspx>
<http://www.water.nsw.gov.au/Water-licensing/Approvals/Controlled-activities/default.aspx>

An assessment framework for the NSW Aquifer Interference Policy can be found online at: <http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference>.

Licensing Considerations

The EIS is required to provide:

- Identification of water requirements for the life of the project in terms of both volume and timing (including predictions of potential ongoing groundwater take following the cessation of operations at the site – such as evaporative loss from open voids or inflows).
- Details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction from each water source as defined in the relevant Water Sharing Plan/s and all water supply works to take water.
- Explanation of how the required water entitlements will be obtained (i.e. through a new or existing licence/s, trading on the water market, controlled allocations etc.).
- Information on the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions, etc).
- Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licensing.
- Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storages
- Details on the location, purpose, size and capacity of any new proposed dams/storages.
- Applicability of any exemptions under the *Water Management (General) Regulation 2011* to the project.

Water allocation account management rules, total daily extraction limits and rules governing environmental protection and access licence dealings also need to be considered.

The Harvestable Right gives landholders the right to capture and use for any purpose 10 % of the average annual runoff from their property. The Harvestable Right has been defined in terms of an equivalent dam capacity called the Maximum Harvestable Right Dam Capacity (MHRDC). The MHRDC is determined by the area of the property (in hectares) and a site-specific run-off factor. The MHRDC includes the capacity of all existing dams on the property that do not have a current water licence. Storages capturing up to the harvestable right capacity are not required to be licensed but any capacity of the total of all storages/dams on the property greater than the MHRDC may require a licence.

For more information on Harvestable Right dams, including a calculator, visit:

<http://www.water.nsw.gov.au/Water-licensing/Basic-water-rights/Harvesting-runoff/Harvesting-runoff>

Dam Safety

Where new or modified dams are proposed, or where new development will occur below an existing dam, the NSW Dams Safety Committee should be consulted in relation to any safety issues that may arise. Conditions of approval may be recommended to ensure safety in relation to any new or existing dams.

See www.damsafety.nsw.gov.au for further information.

Surface Water Assessment

The predictive assessment of the impact of the proposed project on surface water sources should include the following:

- Identification of all surface water features including watercourses, wetlands and floodplains transected by or adjacent to the proposed project.
- Identification of all surface water sources as described by the relevant water sharing plan.
- Detailed description of dependent ecosystems and existing surface water users within the area, including basic landholder rights to water and adjacent/downstream licensed water users.
- Description of all works and surface infrastructure that will intercept, store, convey, or otherwise interact with surface water resources.
- Assessment of predicted impacts on the following:
 - flow of surface water, sediment movement, channel stability, and hydraulic regime,
 - water quality,
 - flood regime,
 - dependent ecosystems,
 - existing surface water users, and
 - planned environmental water and water sharing arrangements prescribed in the relevant water sharing plans.

Flooding

If the proposal is for an earthwork, embankment or levee, wherever situated or proposed to be constructed that is reasonably likely to affect the flow of water to or from a river or lake then the assessment is required to address potential impacts detailed below;

- the contents of any relevant floodplain management plan or any other relevant Government policy,
- the need to maintain the natural flood regimes in wetlands and related ecosystems and the preservation of any habitat, animals (including fish) or plants that benefit from periodic flooding,
- the effect or likely effect on water flows in downstream river sections,
- any geographical features, or other matters, of Aboriginal interest that may be affected by a controlled work,
- the effect or likely effect of a controlled work on the passage, flow and distribution of any flood waters,
- the effect or likely effect of a controlled work on existing dominant flood ways or exits from flood ways, rates of flow, flood water levels and the duration of inundation,
- the protection of the environment

Groundwater Assessment

To ensure the sustainable and integrated management of groundwater sources, the EIS needs to include adequate details to assess the impact of the project on all groundwater sources including:

- Works likely to intercept, connect with or infiltrate the groundwater sources.
- Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes.
- Bore construction information is to be supplied to DPI Water by submitting a "Form A" template. DPI Water will supply "GW" registration numbers (and licence/approval numbers if required) which must be used as consistent and unique bore identifiers for all future reporting.
- A description of the watertable and groundwater pressure configuration, flow directions and rates and physical and chemical characteristics of the groundwater source (including connectivity with other groundwater and surface water sources).
- Sufficient baseline monitoring for groundwater quantity and quality for all aquifers and GDEs to establish a baseline incorporating typical temporal and spatial variations.
- The predicted impacts of any final landform on the groundwater regime.
- The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts.
- An assessment of groundwater quality, its beneficial use classification and prediction of any impacts on groundwater quality.
- An assessment of the potential for groundwater contamination (considering both the impacts of the proposal on groundwater contamination and the impacts of contamination on the proposal).
- Measures proposed to protect groundwater quality, both in the short and long term.
- Measures for preventing groundwater pollution so that remediation is not required.
- Protective measures for any groundwater dependent ecosystems (GDEs).
- Proposed methods of the disposal of waste water and approval from the relevant authority.
- The results of any models or predictive tools used.

Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:

- Any proposed monitoring programs, including water levels and quality data.
- Reporting procedures for any monitoring program including mechanism for transfer of information.
- An assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal.
- Identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category).
- Description of the remedial measures or contingency plans proposed.

- Any funding assurances covering the anticipated post development maintenance cost, for example on-going groundwater monitoring for the nominated period.

Groundwater Dependent Ecosystems

The EIS must consider the potential impacts on any Groundwater Dependent Ecosystems (GDEs) at the site and in the vicinity of the site and:

- Identify any potential impacts on GDEs as a result of the proposal including:
 - the effect of the proposal on the recharge to groundwater systems;
 - the potential to adversely affect the water quality of the underlying groundwater system and adjoining groundwater systems in hydraulic connections; and
 - the effect on the function of GDEs (habitat, groundwater levels, connectivity).
- Provide safeguard measures for any GDEs.

Watercourses, Wetlands and Riparian Land

The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal, including:

- Scaled plans showing the location of:
 - wetlands/swamps, watercourses and top of bank;
 - riparian corridor widths to be established along the creeks;
 - existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);
 - the site boundary, the footprint of the proposal in relation to the watercourses and riparian areas; and
 - proposed location of any asset protection zones.
- Photographs of the watercourses/wetlands and a map showing the point from which the photos were taken.
- A detailed description of all potential impacts on the watercourses/riparian land.
- A detailed description of all potential impacts on the wetlands, including potential impacts to the wetlands hydrologic regime; groundwater recharge; habitat and any species that depend on the wetlands.
- A description of the design features and measures to be incorporated to mitigate potential impacts.
- Geomorphic and hydrological assessment of water courses including details of stream order (Strahler System), river style and energy regimes both in channel and on adjacent floodplains.
- Works on waterfront land may be subject to Controlled Activity Approval (CAA) under the *Water Management Act 2000*. Further information can be obtained from the Office of Water's website:
www.water.nsw.gov.au Water licensing > Approvals > Controlled activities

Drill Pad, Well and Access Road Construction

- Any construction activity within 40m of a watercourse, should be designed by a suitably qualified person, consistent with the NSW *Guidelines for Controlled Activities on Waterfront Land* (July 2012).
- Construction of all wells must be undertaken in accordance with the *Minimum Construction Requirements for Water Bores in Australia* (3rd edition 2012) by a driller holding a bore drillers' licence valid in New South Wales.
- The length of time that a core hole is maintained as an open hole should be minimised.

Landform rehabilitation (including final void management)

Where significant modification to landform is proposed, the EIS must include:

- Justification of the proposed final landform with regard to its impact on local and regional surface and groundwater systems;
- A detailed description of how the site would be progressively rehabilitated and integrated into the surrounding landscape;
- Outline of proposed construction and restoration of topography and surface drainage features if affected by the project;
- Detailed modelling of potential groundwater volume, flow and quality impacts of the presence of an inundated final void (where relevant) on identified receptors specifically considering those environmental systems that are likely to be groundwater dependent;
- An outline of the measures to be put in place to ensure that sufficient resources are available to implement the proposed rehabilitation; and
- The measures that would be established for the long-term protection of local and regional aquifer systems and for the ongoing management of the site following the cessation of the project.

Consultation and general enquiries

General licensing enquiries can be made to Advisory
Services: water.enquiries@dpi.nsw.gov.au, 1800 353 104.

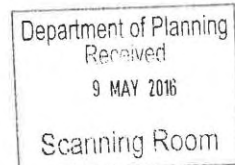
Assessment or state significant development enquiries, or requests for review or consultation should be directed to the Strategic Stakeholder Liaison Unit, water.referrals@dpi.nsw.gov.au.

A consultation guideline and further information is available online at:
www.water.nsw.gov.au/water-management/law-and-policy/planning-and-assessment

End Attachment A



Our reference: EF13/5557; DOC16/192967-0101
Contact: Jason Price 02 6969 0700



The Planning Officer
Industry Assessments
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Piovesan

Re Proposed poultry farm at 375 McRaes Road Goolgowi

Thank you for your electronic mail dated 20 April 2016 to the Environment Protection Authority (EPA) requesting our information requirements for the Environmental Impact Statement (EIS) to be prepared for the proposed poultry broiler farm located within Lot 1 & 2 DP 749831 McRaes Road Goolgowi.

We have considered the details of the proposal as described in the information supplied by the proponent and have identified the information required by the EPA to be included in the EIS, which is detailed at Attachment 'A'.

The key information requirement for the project is to identify the potential air quality impacts (odour and dust) from this proposal on surrounding receptors, including the cumulative impacts from this proposal and other proposed or existing poultry broiler farms in the Goolgowi area and where necessary detail satisfactory management and mitigation measures for potential adverse air quality impacts.

In carrying out the assessment the proponent should refer to the relevant guidelines identified at Attachment 'B'.

If you have any further enquiries about this matter please contact Jason Price by telephoning 02 6969 0700.

Yours sincerely

DARREN WALLETT
Head, Griffith Unit
Environment Protection Authority

PO BOX 397 Griffith NSW 2680
Suite 7, 130-140 Banna Avenue Griffith NSW
Tel: (02) 6969 0700 Fax: (02) 6969 0710
ABN 30 841 387 271
www.epa.nsw.gov.au

ATTACHMENT 'A'

Potential environmental impacts of the project

The following potential environmental impacts of the project need to be assessed, quantified and reported on.

- (a) Air;
- (b) Noise;
- (c) Water;
- (d) Land; and
- (e) Waste and chemicals.

The Environmental Impact Statement (EIS) should address how the required environmental goals outlined below will be met for each potential impact.

The EIS should describe mitigation and management options that will be used to prevent, control, abate or mitigate identified potential environmental impacts associated with the project and to reduce risks to human health and prevent the degradation of the environment.

This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

Potential impacts on air quality

The goal of the project in relation to air quality should be to ensure sensitive receptors are protected from any adverse impacts from odour and airborne particulate matter.

Odour is the primary concern for the proposed development and the potential emissions from (but not necessarily limited to) aged birds and bedding material. Details would need to be provided on the proposed measures to manage odour and dust from all sources.

The Environment Protection Authority (EPA) expects that a cumulative assessment for dust and odour, that includes the all proposed broiler farms around Goolgowi that model as having an odour impact on sensitive receptors, is undertaken in accordance with our guideline the "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales" (EPA, 2005), in conjunction with analyses of local meteorologic and terrain data in order to make informed decisions about design and management options for the proposed development.

This assessment should also identify all existing and potential sensitive receptors in proximity to the proposed development. Their location can be relevant to the level of assessment.

The EPA has developed a Level 1 odour assessment calculator (in Excel format) to assist poultry growers and their consultants to plan for meat chicken (broiler) farm developments. The calculator uses the formulae defined in section 5 of the Technical Notes in the "Assessment and management of odour from stationary sources in NSW" to calculate required setback distances for a particular site. If a site cannot accommodate the calculated setback distance, Level 2 or 3 assessments may be required. The calculator can found on the EPA website at - <http://www.environment.nsw.gov.au/resources/air/PoultryOdourCalcualtor.xls>.

Emissions from any plant must meet the design criteria detailed in the *Protection of the Environment Operations (Clean Air) Regulation 2010*. Details need to be provided on the proposed air pollution control techniques from any air emission points, including proposed measures to manage and monitor efficiency and performance.

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Emissions from any plant must meet the design criteria detailed in the *Protection of the Environment Operations (Clean Air) Regulation 2010*. Details need to be provided on the proposed air pollution control techniques from any air emission points, including proposed measures to manage and monitor efficiency and performance.

Potential impacts of noise

The goals of the project should include design, construction, operation and maintenance of the facility in accordance with relevant EPA policy, guidelines and criteria, and in order to minimise potential impacts from noise.

We expect that potential noise sources are assessed in accordance with the "NSW Industrial Noise Policy" (EPA, 2000), and where required mitigation measures are proposed (e.g. appropriate equipment chosen to minimise noise levels). All residential or noise sensitive premises likely to be impacted by the development must be identified and included in the assessment.

The proposed development will result in increased traffic movements. The potential noise impacts associated with any traffic increases need to be assessed in accordance with the "NSW Road Noise Policy" (EPA, 2011).

Potential impacts on water quantity and quality

The goals of the project should include the following.

- No pollution of waters (including surface and groundwater), except to the extent authorised by the EPA (i.e. in accordance with an Environment Protection Licence) and appropriate consideration should be given to a flood risk assessment.
- Polluted water (including process waters, wash down waters, polluted stormwater or sewage) must be captured and retained on the site through an appropriate collection and storage system. Where it is safe and practicable to do so, the polluted water should be treated and beneficially reused; and
- It is acceptable in terms of the achievement or protection of the NSW Water Quality and River Flow Objectives.

The EIS should document the measures that will achieve the above goals.

Details of the site drainage and any natural or artificial waters within or adjacent to the development must be identified and where applicable measures proposed to mitigate potential impacts of the development on these waters. The EIS should provide details of the proposed design and construction of water management systems for the proposal to ensure surface and ground waters are protected from contaminants.

Potential impacts on land

The goals of the project should include the following.

- No pollution of land, except to the extent authorised by the EPA (ie in accordance with an Environment Protection Licence); and
- The potential impact of land erosion from the development is mitigated.

The EIS should document the measures that will achieve the above goals.

Waste and chemicals

The goals of the project should include the following.

- It is in accordance with the principles of the waste hierarchy and cleaner production;
- Where potential impacts associated with the handling, processing and storage of all materials used at the premises are identified, these be mitigated by the development;
- The beneficial reuse of all wastes generated at the premises are maximised where it is safe and practical to do so; and

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- No waste disposal occurs on site except in accordance with an Environment Protection Licence; and
- Environmental risks from hazardous chemicals and chemical waste are minimised.

The EIS needs to identify the proposed type, quantity and location of waste and chemicals to be stored on site. Spill management measures, including items such as bunding, and emergency procedures should be clearly outlined.

ATTACHMENT 'B'

Guidance Material

Air quality

- Protection of the Environment Operations (Clean Air) Regulation 2010
- Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (EPA, 2005)
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA, 2005)
- Assessment and Management of Odour from Stationery Sources in NSW (EPA, 2006)
- Meat chicken farm calculator (EPA, 2011);
<http://www.environment.nsw.gov.au/resources/air/PoultryOdourCalcualtor.xls>

Noise and vibration

- NSW Industrial Noise Policy (EPA, 2000)
- NSW Road Noise Policy (EPA, 2011)
- Assessing Vibration: a technical guideline (EPA, 2006)
- Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC, 1990)
- Interim Construction Noise Guidelines (EPA, 2009)

Water quality

- National Water Quality Management Strategy: Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000)
- National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000)
- Using the ANZECC Guidelines and Water Quality Objectives in NSW (EPA, 2006)

Groundwater

- The NSW State Groundwater Policy Framework Document (DLWC, 1997)
- The NSW State Groundwater Quality Protection Policy (DLWC, 1998)
- The NSW State Groundwater Dependent Ecosystems Policy (DLWC, 2002)
- National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC, 1995)

Stormwater

- Managing Urban Stormwater: Soils and Construction (Landcom, 2004)
- Managing Urban Stormwater: Treatment Techniques (Draft) (EPA, 1997)

Wastewater

- Environmental Guidelines: Use of Effluent by Irrigation (EPA, 2004)
- Environmental Guidelines: Storage and Handling of Liquids (EPA, 2007)

Waste

- Waste Classification Guidelines (EPA, 2008)
- Environmental Guidelines: Use and Disposal of Biosolids Products (EPA, 1997)
- Environmental Guidelines: Composting and Related Organics Processing Facilities (EPA, 2004)
- Environmental Guidelines: Solid Waste Landfills (EPA, 1996)
- Storing and Handling Liquids: Environmental Protection (EPA, 2007)



Office of
Environment
& Heritage

Your reference
Our reference: DOC16/196688
Contact: Michael Todd (03) 5021 8915

Mr Thomas Piovesan
Industry Assessments
Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001



Dear Mr Piovesan

**RE: SEARs for Proposed Intensive Livestock Agriculture – Poultry Farm, 375 McRaes Road-
Goolgowi, Carrathool LGA (Lot 1 and 2 DP 749831)**

I refer to your email dated 20 April 2016 seeking input into the Department of Planning and Environment Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the proposed Intensive Livestock Agriculture- Poultry Farm at 375 MacRaes Road, Goolgowi, within Carrathool Shire.

OEH has reviewed the available supporting documentation and provides SEARs for the proposed development in Attachments A and B and guidance material in Attachment C (please note that both Attachments A and B include biodiversity matters that will need to be addressed). The assessment must include all ancillary infrastructure, water storage areas, new vehicle tracks, and access to the Mid Western Highway.

OEH recommends the EIS needs to appropriately address the following:

1. Biodiversity and offsetting
2. Aboriginal cultural heritage
3. Water and soils
4. Cumulative impact



Please note that the NSW Biodiversity Offsets Policy for Major Projects www.environment.nsw.gov.au/resources/biodiversity/140672biopolicy.pdf is now being implemented. The policy provides a standard method for assessing impacts of major projects on biodiversity and determining offsetting arrangements. The policy is underpinned by the Framework for Biodiversity Assessment (FBA) www.environment.nsw.gov.au/resources/biodiversity/140675fba.pdf which contains the assessment methodology that is adopted by the policy to quantify and describe the impact assessment requirements and offset guidance that applies to Major Projects. The FBA must be used by a proponent to assess all biodiversity values on the development site.

Based on the information provided, the proposed site appears to contain scattered trees within cultivation but some areas where the understorey has not been ploughed may occur. In these areas it is important to consider whether the vegetation meets the definition of woodland or open woodland communities that occur in the vicinity. Trees in an open woodland may be up to 100 metres apart, and still meet the definition of native vegetation that can be allocated to a NSW Plant Community Type (PCT). PCT boundaries mapped for the assessment must include the understorey and trees. Maps containing separate polygons for trees and understorey within an area of woodland or open woodland are not correct.

At this point in time, there is no appropriate regional-scale map that shows all vegetation communities within the area of the proposal. The M305 (VIS 917) dataset maps woody vegetation while not considering shrublands, grasslands or wetlands, and so may give some indication of vegetation present. Vegetation data and NPWS estate boundaries suitable for use in geographic information systems can be downloaded from OEHS Spatial Data Online <http://mapdata.environment.nsw.gov.au/geonetwork/srv/en/main.home>

PO Box 544 Albury NSW 2640
Second Floor, Government Offices
512 Dean Street Albury NSW 2640
Tel: (02) 6022 0624 Fax: (02) 6022 0610
ABN 30 841 387 271
www.environment.nsw.gov.au

Page 2

Please note that we make the following recommended amendments to the Policies, Guidelines and Plans listed in the draft SEARs provided with the application:

- Delete reference to the document titled '*Principles for the use of Biodiversity Offsets in NSW (DECC, 2008)*' – these have been replaced by the NSW Biodiversity Offsets Policy for Major Projects.
- No documents are listed in relation to Aboriginal cultural heritage – Attachment C includes a number that may be required to address this component of the assessment.

If you have any questions regarding this matter please contact Michael Todd on (03) 5021 8915 or at michael.todd@environment.nsw.gov.au.

Yours sincerely

 3/5/16

PETER EWIN
Senior Team Leader Planning
South West Region
Regional Operations
Office of Environment and Heritage

ATTACHMENT A - Environmental Assessment Requirements
ATTACHMENT B - Project specific Environmental Assessment Requirements
ATTACHMENT C - Guidance Material

Attachment A – Standard Environmental Assessment Requirements

Biodiversity	
1.	Biodiversity impacts related to the proposed Poultry Farm are to be assessed and documented in accordance with the <u>Framework for Biodiversity Assessment</u> , unless otherwise agreed by OEH, by a person accredited in accordance with s142B(1)(c) of the <i>Threatened Species Conservation Act 1995</i> .
Aboriginal cultural heritage	
2.	The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the Poultry Farm and document these in the EIS. This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the <u>Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011)</u> and consultation with OEH regional officers.
3.	Where Aboriginal cultural heritage values are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the <u>Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW)</u> . The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the EIS.
4.	Impacts on Aboriginal cultural heritage values are to be assessed and documented in the EIS. The EIS must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.
Historic heritage	
5.	The EIS must provide a heritage assessment including but not limited to an assessment of impacts to <i>State and local heritage</i> including conservation areas, natural heritage areas, places of Aboriginal heritage value, buildings, works, relics, gardens, landscapes, views, trees should be assessed. Where impacts to State or locally significant heritage items are identified, the assessment shall: - outline the proposed mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the mitigation measures) generally consistent with the NSW Heritage Manual (1996), - be undertaken by a suitably qualified heritage consultant(s) (note: where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria), - include a statement of heritage impact for all heritage items (including significance assessment), - consider impacts including, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, landscape and vistas, and architectural noise treatment (as relevant), and - where potential archaeological impacts have been identified develop an appropriate archaeological assessment methodology, including research design, to guide physical

archaeological test excavations (terrestrial and maritime as relevant) and include the results of these test excavations.
Water and soils
6. The EIS must map the following features relevant to water and soils including: a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map). b. Rivers, streams, wetlands, estuaries (as described in Appendix 2 of the <u>Framework for Biodiversity Assessment</u>). c. Groundwater. d. Groundwater dependent ecosystems. e. Proposed intake and discharge locations.
7. The EIS must describe background conditions for any water resource likely to be affected by the Poultry Farm, including: a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters. d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the <u>ANZECC (2000) Guidelines for Fresh and Marine Water Quality</u> and/or local objectives, criteria or targets endorsed by the NSW Government.
8. The EIS must assess the impacts of the Poultry Farm on water quality, including: a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction. b. Identification of proposed monitoring of water quality.
9. The EIS must assess the impact of the Poultry Farm on hydrology, including: a. Water balance including quantity, quality and source. b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas. c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems. d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (eg river benches). e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.

f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options. g. Identification of proposed monitoring of hydrological attributes.
Flooding and coastal erosion
10. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including: a. Flood prone land b. Flood planning area, the area below the flood planning level. c. Hydraulic categorisation (floodways and flood storage areas).
11. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.
12. The EIS must model the effect of the proposed Poultry Farm (including fill) on the flood behaviour under the following scenarios: a. Current flood behaviour for a range of design events as identified in 11 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.
13. Modelling in the EIS must consider and document: a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood. b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affectation of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories. c. Relevant provisions of the NSW Floodplain Development Manual 2005.
14. The EIS must assess the impacts on the proposed Poultry Farm on flood behaviour, including: a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure. b. Consistency with Council floodplain risk management plans. c. Compatibility with the flood hazard of the land. d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land. e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site. f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses. g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council. h. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council.

- i. Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES.
- j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

Attachment B – Project specific Environmental Assessment Requirements

Biodiversity
15. Impacts on the following species, populations and ecological communities will require further consideration and provision of the information specified in s9.2 of the Framework for Biodiversity Assessment: • <i>Falco subniger</i> (Black Falcon) – nest trees only • <i>Falco hypoleucos</i> (Grey Falcon)– nest trees only • <i>Hamirostra melanosternon</i> (Black-breasted Buzzard) – nest trees only • <i>Calyptorhynchus lathami</i> (Glossy Black-cockatoo Riverina population) • <i>Climacteris affinis</i> (White-browed Treecreeper Population in Carrathool local government area south of the Lachlan River and Griffith local government area) • Myall woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregion

Attachment C – Guidance material

Title	Web address
Relevant Legislation	
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
Marine Parks Act 1997	www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
National Parks and Wildlife Act 1974	www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Protection of the Environment Operations Act 1997	www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Threatened Species Conservation Act 1995	www.legislation.nsw.gov.au/maintop/view/inforce/act+101+1995+cd+0+N
Water Management Act 2000	www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Wilderness Act 1987	www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
Biodiversity	
NSW Biodiversity Offsets Policy for Major Projects (OEH 2013)	www.environment.nsw.gov.au/resources/biodiversity/140672biopoly.pdf
Framework for Biodiversity Assessment (OEH 2013)	www.environment.nsw.gov.au/resources/biodiversity/140675fba.pdf
OEH Threatened Species Website	www.environment.nsw.gov.au/threatenedspecies/
NSW BioNet (Atlas of NSW Wildlife)	www.bionet.nsw.gov.au/
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DEC 2004)	www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna - Amphibians (DECCW 2009)	www.environment.nsw.gov.au/resources/threatenedspecies/09213amphibians.pdf
NSW guide to surveying threatened plants (OEH 2016)	www.environment.nsw.gov.au/resources/threatenedspecies/160129-threatened-plants-survey-guide.pdf
OEH threatened species survey and assessment guideline information	www.environment.nsw.gov.au/threatenedspecies/surveyassessmentguidelines.htm
Fisheries NSW policies and guidelines	www.dpi.nsw.gov.au/fisheries/habitat/publications/policies-guidelines-and-manuals/fish-habitat-conservation
List of national parks	www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx

Title	Web address
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW 2010)	www.environment.nsw.gov.au/resources/protectedareas/080290devadjoindecc.pdf
VIS Classification - NSW Plant Community Type (PCT) database	www.environment.nsw.gov.au/research/Vegetationinformationsystem.htm
Interim Vegetation Mapping Standard and VIS Plot	www.environment.nsw.gov.au/research/VISplot.htm
OEH Spatial Data Online Access	mapdata.environment.nsw.gov.au/geonetwork/srv/en/main.home
Heritage	
The Burra Charter (The Australia ICOMOS charter for places of cultural significance)	australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf
Statements of Heritage Impact 2002 (HO & DUAP)	www.environment.nsw.gov.au/resources/heritagebranch/heritage/hmstatementsofhi.pdf
NSW Heritage Manual (DUAP) (scroll through alphabetical list to 'N')	www.environment.nsw.gov.au/Heritage/publications/index.htm#MQ
Aboriginal Cultural Heritage	
Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)	www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010)	www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf
Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)	www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf
Aboriginal Site Recording Form	www.environment.nsw.gov.au/resources/parks/SiteCardMainV1_1.pdf
Aboriginal Site Impact Recording Form	www.environment.nsw.gov.au/resources/cultureheritage/120558asirf.pdf
Aboriginal Heritage Information Management System (AHIMS) Registrar	www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm
Care Agreement Application form	www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf
Water and Soils	
Acid sulphate soils	
Acid Sulfate Soils Planning Maps via 'The NSW Natural Resource Atlas'	www.nratlas.nsw.gov.au/

Title	Web address
Acid Sulfate Soils Manual (Stone et al. 1998)	Manual available for purchase from: www.landcom.com.au/whats-new/the-blue-book.aspx Chapters 1 and 2 are on DPI's Guidelines Register at: Chapter 1 Acid Sulfate Soils Planning Guidelines: www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Planning%20Guidelines.pdf Chapter 2 Acid Sulfate Soils Assessment Guidelines: www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Assessment%20Guidelines.pdf
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	www.advancedenvironmentalmanagement.com/Reports/Savannah/Appendix%2015.pdf This replaces Chapter 4 of the Acid Sulfate Soils Manual above.
Flooding	
Floodplain development manual	www.environment.nsw.gov.au/floodplains/manual.htm
NSW Climate Impact Profile	NSW Climate Impact Profile
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation
Water	
Water Quality Objectives	www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	www.environment.gov.au/water/publications/quality/australian-and-new-zealand-guidelines-fresh-marine-water-quality-volume-1
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

Thomas Piovesan

From: Shane Wilson <SWilson@carrathool.nsw.gov.au>
Sent: Tuesday, 8 November 2016 1:48 PM
To: Thomas Piovesan
Cc: records
Subject: RE: SSD 8036 - Request for Input on Secretary's Environmental Assessment Requirements - Intensive Poultry Farm - 375 McReas Road, Goolgowi

Hi Thomas

Council has no specific requests that will need to be included within the SEAR's.

Regards

Shane Wilson

Director Development Services
Carrathool Shire Council
Phone 02 6965 1900
Mobile 0429 651 306
Fax 02 6965 1379

From: Julia Fielder
Sent: Tuesday, 8 November 2016 1:05 PM
To: Shane Wilson
Subject: FW: SSD 8036 - Request for Input on Secretary's Environmental Assessment Requirements - Intensive Poultry Farm - 375 McReas Road, Goolgowi

From: thomas.piovesan@planning.nsw.gov.au [mailto:thomas.piovesan@planning.nsw.gov.au]
Sent: Tuesday, 8 November 2016 1:04 PM
To: Mail
Subject: FW: SSD 8036 - Request for Input on Secretary's Environmental Assessment Requirements - Intensive Poultry Farm - 375 McReas Road, Goolgowi

Good afternoon

I refer to my earlier email below. Would it be possible to receive an update on the request for input into these SEARs or the details of the officer they have been allocated to?

Any questions, please contact me.

Kind regards

Thomas Piovesan
Planning Officer (Industry)
Industry Assessments
NSW Department of Planning and Environment
Level 22, 320 Pitt Street | GPO Box 39 | SYDNEY NSW 2001
T: 02 9274 6356 E: thomas.piovesan@planning.nsw.gov.au





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From: Thomas Piovesan
Sent: Friday, 28 October 2016 12:10 PM
To: 'council@carrathool.nsw.gov.au' <council@carrathool.nsw.gov.au>
Subject: SSD 8036 - Request for Input on Secretary's Environmental Assessment Requirements - Intensive Poultry Farm - 375 McRaes Road, Goolgowi

Good afternoon

The Department of Planning and Environment has received a request for Secretary's Environmental Assessment Requirements (SEARs) for a State significant development application (**SSD 8036**).

The project site is located at 375 McRaes Road, Goolgowi. The proposal is State significant development as it meets the criteria under Clause 1 of *State Environmental Planning Policy (State and Regional Development) 2011* as it is an intensive livestock agriculture facility with a Capital Investment Value of over \$30 million. Consequently, the Minister for Planning is the consent authority.

The proposed development involves the construction and operation of an intensive poultry farm comprising of:
- five farms each with:

- storage dams with a 300ML capacity each;
- bulk earthworks;
- landscaping mounds;
- machinery and supply sheds;
- water storage reservoirs;
- two dwellings;
- gas tanks, feed silos and exhaust stacks; and
- associated infrastructure.

Please find attached a copy of the SEARs request received for the application.

The files can also be viewed on the Departments website at the link below.

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8036

It would be greatly appreciated if the Department can receive your input for the SEARs for the preparation of an Environmental Impact Statement by close of business **Wednesday 9 November 2016**.

If you have any questions, or have any difficulty in viewing the attached documents, please contact me on the details below.

Kind regards

Thomas Piovesan
Planning Officer (Industry)
Industry Assessments
NSW Department of Planning and Environment
Level 22, 320 Pitt Street | GPO Box 39 | SYDNEY NSW 2001
T: 02 9274 6356 E: thomas.piovesan@planning.nsw.gov.au



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Transport
Roads & Maritime
Services

3 May 2016

SWT16/00040
SF2016/060936
MM

The Manager
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Thomas Piovesan

SEAR-375 - PROPOSED INTENSIVE LIVESTOCK DEVELOPMENT, GOOLGOWI POULTRY FARM, - LOT 1 DP749831 LOT 2 DP749831, MID WESTERN HIGHWAY (HW6) AND MCRAES ROAD, GOOLGOWI.

I refer to the Department's correspondence forwarded to Roads and Maritime Services requesting the provision of key issues and assessment requirements to be included in the Environmental Assessment Requirements for the subject development.

From review of the information provided it is understood that the proposal is for the establishment of an intensive poultry production complex on the subject site with a capacity to house up to approximately 7 million birds, plus ancillary infrastructure. It is noted that the development is to be arranged into 6 Poultry Production Units (PPUs), each with 20 sheds. The subject site is located with frontage to the Mid Western Highway (HW6) which is a Classified Regional Road and McRaes Road. The frontage of the subject site to the Mid Western Highway is located within a 110 km/h speed zone. The Mid Western Highway is an approved Road Train Route.

Roads and Maritime is interested in the characteristics of the cumulative traffic generation resultant from the total development, including the peak traffic volumes, and in the potential impact of the development on the safety and efficiency of the road network, particularly intersections with the Mid Western Highway. Given the scale of the development proposal a Traffic Impact Assessment is required to be submitted with the Development Application. In particular the TIA shall address the impacts of traffic generated by this development upon the surrounding road network, particularly any proposed access connection to the public road network, during the lifetime of the project.

The development site has frontage to both the Mid Western Highway, which is a Classified Road & McRaes Road which is a local road. It is noted that access is proposed directly to the Mid Western Highway. In this regard the provisions of Clause 101 of State Environmental Planning Policy (Infrastructure) need to be addressed. The reasoning and justification for access directly to the highway and not via McRaes Road is to be addressed in the submitted documentation.

The draft Secretary's Environmental Assessment Requirements attached to the referral refers to "The Guide to Traffic Generating Development (RTA)" and the "Road Design Guide (RTA)" as reference documents. This should be updated. For guidance in the preparation of the Traffic

Impact Assessment the applicant is referred to the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development and the "Guide to Traffic Generating Developments" prepared by the RTA. Roads and Maritime notes the items to be addressed in the draft Secretary's Environmental Assessment Requirements however highlights the need to consider the peak traffic volumes and the need for a transport management plan to address the movement of vehicles, particularly heavy vehicles, during the various stages of the growing process for each of the 6 PPUs.

Roads and Maritime emphasises the need appropriately consider and minimise the impacts of the development on the existing road infrastructure and maintain the safety, efficiency and standard of maintenance along the existing road network through the design, construction and operation of the development.

Any enquiries regarding this correspondence may be referred to the Manager, Land Use for Roads and Maritime Services (South West Region), Maurice Morgan, phone (02) 69371611.

Yours faithfully



Per:
Mr Lindsay Tanner
Regional Manager
South West Region

APPENDIX B

FLORA LIST

Introduced species are indicated by an asterisk (“*”).

The following standard abbreviations are used to indicate subspecific taxa:

- ssp.** - subspecies
- var.**- variety
- x** - hybrid between the two indicated species

Threatened Species Conservation Act 1995 (TSC Act)

- V** Vulnerable
- E1** Endangered
- E2** Endangered Population
- E4A** Critically Endangered Population

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

- V** Vulnerable
- E** Endangered
- CE** Critically Endangered

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	NPW ACT
CONIFEROPSIDA (Conifers)					
Cupressaceae					
<i>Calitris glaucophylla</i>	White Cypress Pine				
MAGNOLIOPSIDA: Magnoliidae					
LILOPSIDA: (Monocotyledons)					
Cyperaceae					
* <i>Cyperus eragrostis</i>	Umbrella Sedge				
Juncaceae					
<i>Juncus usitatus</i>	Common Rush				
Poaceae					
<i>Austrostipa pubescens</i>					
<i>Austrostipa ramosissima</i>	Stout Bamboo Grass				
<i>Austrostipa scabra</i> subsp. <i>scabra</i>					
* <i>Avena fatua</i>	Wild Oats				
* <i>Avena sativa</i>	Oats				
* <i>Bromus catharticus</i>	Prairie Grass				
* <i>Bromus diandrus</i>	Great Brome				
* <i>Bromus hordeaceus</i>	Soft Brome				
<i>Chloris truncata</i>	Windmill Grass				
<i>Cynodon dactylon</i>	Common Couch				
<i>Dichanthium sericeum</i>	Queensland Bluegrass				
<i>Elymus scaber</i>					
<i>Enteropogon acicularis</i>					
* <i>Hordeum leporinum</i>	Barley Grass				
<i>Lachnagrostis filiformis</i>					
* <i>Lolium perenne</i>	Perennial Ryegrass				
* <i>Paspalum dilatatum</i>	Paspalum				
<i>Paspalum distichum</i>	Water Couch				
* <i>Pennisetum clandestinum</i>	Kikuyu				
<i>Phragmites australis</i>	Native Reed				
* <i>Phalaris aquatica</i>	Phalaris				
* <i>Polypogon monspeliensis</i>	Annual Beardgrass				
<i>Rytidosperma</i> sp.	Wallaby Grass				
<i>Triticum</i> sp.	Wheat				

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	NPW ACT
Potamogetonaceae					
<i>Potamogeton tricarlinatus</i>	Floating Pondweed				
Typhaceae					
<i>Typha domingensis</i>	Narrow-leaf Cumbungi				
Xanthorrhoeaceae					
* <i>Asphodelus fistulosus</i>	Onion Weed				
MAGNOLIIDAE (Dicotyledons)					
Aizoaceae					
* <i>Aptenia cordifolia</i>	Heart-leaved Ice Plant				
Amaranthaceae					
<i>Alternanthera denticulata</i>	Lesser Joyweed				
Apiaceae					
* <i>Foeniculum vulgare</i>	Fennel				
Asteraceae					
<i>Calotis cuneifolia</i>	Blue Burr-daisy				
* <i>Carthamus lanatus</i>	Saffron Thistle				
* <i>Centaurea solstitialis</i>	St Barnaby's thistle				
* <i>Cirsium vulgare</i>	Spear Thistle				
* <i>Conyza bonariensis</i>	Flax-leaved Fleabane				
<i>Euchiton sphaericus</i>	Common Cudweed				
* <i>Hypochaeris radicata</i>	Catsear, Flatweed				
* <i>Lactuca serriola</i>	Prickly Lettuce				
<i>Rhodanthe floribunda</i>	Common White Sunray				
* <i>Silybum marianum</i>	Variegated Thistle				
* <i>Sonchus aspera</i>	Prickly Sowthistle				
* <i>Sonchus oleraceus</i>	Common Sow Thistle				
* <i>Taraxacum officinale</i>	Dandelion				
<i>Vittadinia cuneata</i> var. <i>cuneata</i>	Fuzzweed				
* <i>Xanthium spinosum</i>	Bathurst Burr				
<i>Xerochrysum viscosum</i>	Sticky Everlasting				

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	NPW ACT
Boraginaceae					
* <i>Echium plantagineum</i>	Paterson's Curse				
* <i>Heliotropium europaeum</i>	Common Heliotrope				
Brassicaceae					
<i>Sisymbrium</i> sp.					
<i>Sisymbrium erysimoides</i>	Smooth Mustard				
<i>Sisymbrium orientale</i>	Indian Hedge Mustard				
Capparaceae					
<i>Apophyllum anomalum</i>	Warrior Bush				
Casuarinaceae					
<i>Casuarina cristata</i>	Belah				
<i>Casuarina pauper</i>	Black Oak				
Chenopodiaceae					
<i>Atriplex nummularia</i>	Old Man Saltbush				
<i>Atriplex semibaccata</i>	Creeping Saltbush				
<i>Atriplex stipitata</i>	Mallee Saltbush				
<i>Enchylaena tomentosa</i>	Ruby Saltbush				
<i>Maireana decalvans</i>	Black Cotton Bush				
<i>Maireana enchylaenoides</i>					
<i>Maireana pyramidata</i>	Black Bluebush				
<i>Rhagodia spinescens</i>	Spiny Saltbush				
<i>Salsola australis</i>	Prickly Saltwort				
<i>Sclerolaena birchii</i>	Galvanised Burr				
<i>Sclerolaena diacantha</i>	Grey Copperburr				
<i>Sclerolaena muricata</i>	Black Roly Poly				
Crassulaceae					
<i>Crassula sieberana</i>	Australian Stonecrop				
Cucurbitaceae					
* <i>Citrullus lanatus</i>	Bitter Melon				
Euphorbiaceae					
* <i>Euphorbia peplus</i>	Petty Spurge				

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	NPW ACT
Fabaceae Subfamily (Faboideae)					
* <i>Medicago polymorpha</i>	Burr Medic				
* <i>Medicago sativa</i>	Lucerne				
* <i>Trifolium angustifolium</i>	Narrow-leaf Clover				
Fabaceae (Subfamily Mimosoideae)					
<i>Acacia deanei</i>	Green Wattle				
Geraniaceae					
<i>Erodium cicutarium</i>	Common Stocks-bill				
<i>Erodium crinitum</i>	Blue Heronsbill				
<i>Geranium homeanum</i>	Cranesbill				
Lamiaceae					
* <i>Marrubium vulgare</i>	Horehound				
Lobeliaceae					
<i>Pratia concolor</i>	Poison Pratia				
Loranthaceae					
<i>Amyema cambagei</i>	Needle-leaved Mistletoe				
<i>Amyema linophylla</i>	Buloke Mistletoe				
Malvaceae					
<i>Brachychiton populneus</i> subsp. <i>populneus</i>	Kurrajong				
* <i>Malva parviflora</i>	Small-flowered Mallow				
<i>Malva preissiana</i>	Australian Hollyhock				
<i>Sida corrugata</i>	Corrugated Sida				
Myrtaceae					
<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	Bimble Box				
<i>Eucalyptus socialis</i>	Red Mallee				
<i>Eucalyptus</i> sp. (planted around dwelling)					
<i>Melaleuca</i> sp.		V			
Nyctaginaceae					
<i>Boerhavia dominii</i>	Tarvine				

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	ROTAP	NPW ACT
Oxalidaceae					
<i>Oxalis perennans</i>	Wood-sorrel				
Pittosporaceae					
<i>Pittosporum angustifolium</i>	Butterbush				
Plantaginaceae					
* <i>Plantago lanceolata</i>	Plantain				
Plumbaginaceae					
* <i>Limonium lobatum</i>	Winged Sea Lavender				
Polygonaceae					
* <i>Polygonum aviculare</i>	Wireweed				
<i>Rumex brownii</i>	Swamp Dock				
* <i>Rumex crispus</i>	Curled Dock				
Rutaceae					
<i>Geijera parviflora</i>	Wilga				
Sapindaceae					
<i>Alectryon oleifolius</i>	Western Rosewood				
<i>Dodonaea viscosa</i> subsp. <i>angustissima</i>	Narrow-leaved Hopbush				
Solanaceae					
* <i>Lycium ferocissimum</i>	African Boxthorn				
* <i>Solanum nigrum</i>	Blackberry Nightshade				
Viscaceae					
<i>Korthalsella rubra</i> subsp. <i>geijericola</i>	Wilga Mistletoe				
Zygophyllaceae					
<i>Tribulus</i> sp.	Caltrop				

APPENDIX C

VEGETATION PLOT DATA

1.0 PLOT METHODOLOGY

Four quantitative (plot/transect) site surveys were completed within the study area as outlined in the methodology contained in the BioBanking Assessment Methodology (Office of Environment and Heritage 2014a) and described below. The location of the plot/transects are shown in Figure 4.2.

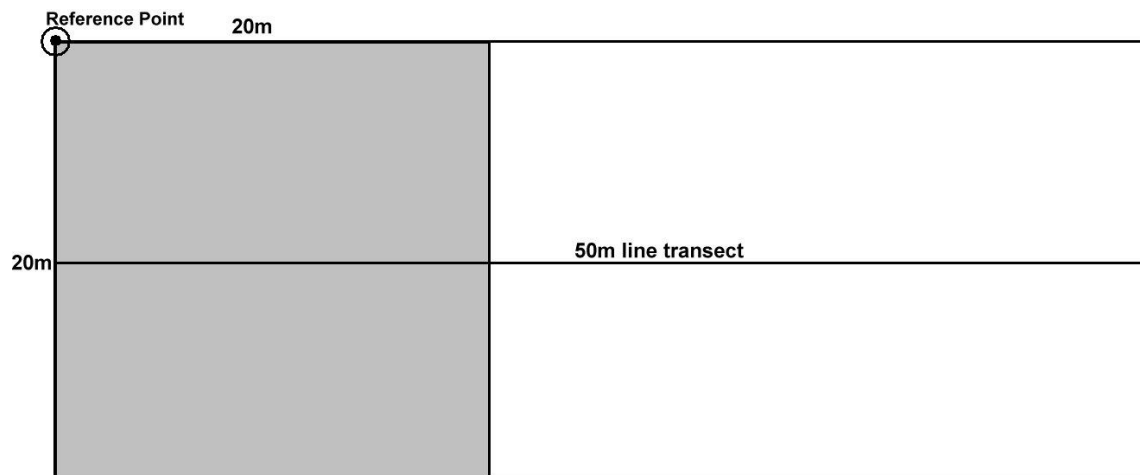


Plate 19: Diagram illustrating the layout of the nested 20 m x 50 m and 20 m x 20 m quadrats used for the assessment of condition attributes at each site

The following site attributes were recorded at each site:

- Location (easting – northing grid type MGA 94, Zone 55).
- Vegetation structure and dominant species and vegetation condition.
- Native and exotic species richness (within a 400 m² quadrat): this consisted of recording all species by systematically walking through each 20 m x 20 m quadrat. The cover abundance of each species was estimated.
- Number of trees with hollows (1,000 m² quadrat): this was the frequency of hollows within living and dead trees within each 50 m x 20 m quadrat. A hollow was only recorded if:
 - the entrance could be seen;
 - the estimated entrance width was at least 5 cm across;
 - the hollow appeared to have depth;
 - the centre of the tree was located within the sampled quadrat.
- Total length of fallen logs (1,000 m² quadrat): this was the cumulative total of logs within each 50 m x 20 m quadrat with a diameter of at least 10 cm and a length of at least 0.5 m.
- Native over-storey cover: this consisted of estimating the percentage cover of the tallest woody stratum present (>1 m and including emergents). The woody stratum included species that were native to NSW and not necessarily those that were locally endemic;
- Native mid-storey cover: this involved estimating the cover of vegetation between the over-storey stratum and a height of one m (i.e. tall shrubs, under-storey trees and tree regeneration).
- Ground cover: this comprised estimating the cover of plants below 1 m in height. The following categories of plants were recorded:
 - native ground cover (grasses): native grasses (Poaceae family native to NSW);
 - native ground cover (shrubs): all woody vegetation below one m in height and native to NSW
 - native ground cover (other): non-woody vegetation (i.e. vascular plants–ferns and herbs) below one m in height and native to NSW
 - exotic plant cover: vascular plants not native to Australia.
- Evaluation of regeneration: this was estimated as the proportion of over-storey species present at the site that was regenerating (i.e. saplings with a diameter at breast height ≤5 cm). The maximum value for this measure was one.

Plot/Transect 1

Red Mallee Woodland

PCT - 193

Biometric Type – CW199; LA209; WE147.

Name - (most similar) - Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW

Vegetation Formation – Semi-arid Woodlands (Shrubby sub-formation)

Vegetation Class – Sand Plain Mallee Woodlands

Date: 13 December 2016

Plot Size - 20 × 20m.

Location North- corner: E – 366492, N – 6234332

Aspect: Level

Soil: Alkaline brown calcareous.

Litter: 5%

Rock: 0%

Lichen: <5%



Native Over-storey

Eucalyptus socialis

Red Mallee

Native Mid-storey (>1m)

Alectryon oleifolius

Geijera parviflora

Western Rosewood

Wilga

Native Ground Cover (Shrubs <1m)

Native Grasses

Enteropogon acicularis
Austrodanthonia sp.

Native Ground Cover (Other)

Rhodanthe floribunda
Enchylaena tomentosa
Malva preissiana
Salsola australis

Common White Sunray
Ruby Saltbush
Australian Hollyhock
Prickly Saltwort

Exotic Plant Cover

Sisymbrium sp.
Lolium perenne
Hordeum leporinum
Avena fatua
Centaurea solstitialis
Bromus diandrus
Polygonum aviculare

Mustard
Perennial Ryegrass
Barley Grass
Wild Oats
St Barnaby's Thistle
Great brome
Wireweed

Native Species No. 9

Plot 2

Belah Woodland

PCT - 57

Biometric Type – CW105; LA106; MR515; WE124.

Name - (most similar) - Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion

Vegetation Formation – Semi-arid Woodlands (Shrubby sub-formation);

Vegetation Class – Semi-arid Sand Plain Woodlands.

Date: 14 December 2016

Plot Size - 20 × 20m.

Location North- corner: E – 366492, N – 6234332

Aspect: Level

Soil: Alkaline brown calcareous.

Litter: 10%

Rock: 0%

Lichen: <5%



Native Over-storey

Casuarina cristata

Belah

Native Mid-storey (>1m)

Alectryon oleifolius

Geijera parviflora

Western Rosewood

Wilga

Native Ground Cover (Shrubs <1m)

Native Grasses

Austrostipa scabra subsp. *scabra*
Austrodanthonia sp.
Chloris truncata

Windmill Grass

Native Ground Cover (Other)

Enchylaena tomentosa
Sida corrugata
Sclerolaena birchii
Salsola australis
Maireana pyramidata

Ruby Saltbush
Corrugated Sida
Galvanised Burr
Prickly Saltwort
Black Bluebush

Exotic Plant Cover

Sisymbrium sp.
Lycium ferocissimum
Avena fatua
Echium plantagineum
Sonchus aspera

Mustard
African Boxthorn
Wild Oats
Patterson's Curse
Prickly Sowthistle

Native Species No. 11

Plot 3

Belah Woodland

PCT - 57

Biometric Type – CW105; LA106; MR515; WE124.

Name - (most similar) - Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Penneplain Bioregion

Vegetation Formation – Semi-arid Woodlands (Shrubby sub-formation);

Vegetation Class – Semi-arid Sand Plain Woodlands.

Date: 14 December 2016

Plot Size - 20 × 20m.

Location North- corner: E – 368315, N – 6233201

Aspect: Level

Soil: Alkaline brown calcareous.

Litter: 10%

Rock: 0%

Lichen: <5%



Native Over-storey

Casuarina cristata

Belah

Native Mid-storey (>1m)

Geijera parviflora

Wilga

Native Ground Cover (Shrubs <1m)

Native Grasses

Chloris truncata

Windmill Grass

Austrodanthonia sp.
Austrostipa scabra subsp. *scabra*

Native Ground Cover (Other)

Enchylaena tomentosa
Sclerolaena birchii
Sida corrugata
Salsola australis

Ruby Saltbush
Galvanised Burr
Corrugated Sida
Prickly Saltwort

Exotic Plant Cover

Sisymbrium sp.
Echium plantagineum
Lycium ferocissimum
Avena fatua
Sonchus aspera

Mustard
Patterson's Curse
African Boxthorn
Wild Oats
Prickly Sowthistle

Native Species No. 10

Plot 4

Belah Woodland

PCT - 57

Biometric Type – CW105; LA106; MR515; WE124.

Name - (most similar) - Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Penneplain Bioregion

Vegetation Formation – Semi-arid Woodlands (Shrubby sub-formation);

Vegetation Class – Semi-arid Sand Plain Woodlands.

Date: 14 December 2016

Plot Size - 20 × 20m.

Location North- corner: E – 368315, N – 6233201

Aspect: Level

Soil: Alkaline brown calcareous.

Litter: 10%

Rock: 0%

Lichen: <5%



Native Over-storey

Casuarina cristata

Belah

Native Mid-storey (>1m)

Alectryon oleifolius

Western Rosewood

Apophyllum anomalum

Warrior Bush

Native Ground Cover (Shrubs <1m)

Native Grasses

Austrostipa scabra subsp. *scabra*
Austrodanthonia sp.
Chloris truncata

Windmill Grass

Native Ground Cover (Other)

Enchylaena tomentosa
Sclerolaena birchii
Sclerolaena muricata
Rhodanthe floribunda
Vittadinia cuneata var. *cuneata*
Sida corrugata
Salsola australis

Ruby Saltbush
Galvanised Burr
Black Roly Poly
Common White Sunray
Fuzzweed
Corrugated Sida
Prickly Saltwort

Exotic Plant Cover

Centaurea solstitialis
Sisymbrium sp.
Sonchus aspera
Avena fatua

St Barnaby's Thistle
Mustard
Prickly Sowthistle
Wild Oats

Native Species No. 13

APPENDIX D

BIOBANKING FIELD DATA SHEETS

Biobank / development landscape value assessment

Goodgame

BioBanking
Biodiversity Banking and Offsets Scheme

CMA Riverina	CMA subregion 	Mitchell Landscape Hsp Hillston sand plains	Date 13/12/16
Proposal ID 7	Proposal name 	Landscape assessment circle no 1	Recorder DARYL

LANDSCAPE VALUE (Use a new sheet for each 1000-ha landscape assessment circle, using GIS mapping)

Landscape assessment circles	Before BioBanking / development		After BioBanking / development	
% cover within 1784-m radius 1000 ha (circle one level)	<10%	11–20%	<10%	11–20%
	21–30%	31–40%	21–30%	31–40%
	41–50%	51–60%	41–50%	51–60%
	61–70%	71–80%	61–70%	71–80%
	81–90%	91–100%	81–90%	91–100%
% cover within 564-m radius 100 ha (circle one level)	<10%	11–20%	<10%	11–20%
	21–30%	31–40%	21–30%	31–40%
	41–50%	51–60%	41–50%	51–60%
	61–70%	71–80%	61–70%	71–80%
	81–90%	91–100%	81–90%	91–100%

Connectivity value	Before BioBanking / development		After BioBanking / development	
Width (circle one level)	0–5 m	>5–30 m	0–5 m	>5–30 m
	>30–100 m	>100–500 m	>30–100 m	>100–500 m
	>500m		>500m	
Over-storey condition (highlight one of the four options)	No native over-storey cover		No native over-storey cover	
	PFC <50% of lower BM		PFC <50% of lower BM	
	PFC >50% of lower BM		PFC >50% of lower BM	
	PFC at BM		PFC at BM	
Mid-storey / ground cover condition (highlight one of the four options)	No native over-storey cover		No native over-storey cover	
	PFC <50% of lower BM		PFC <50% of lower BM	
	PFC >50% of lower BM		PFC >50% of lower BM	
	PFC at BM		PFC at BM	
Grassland vegetation condition (highlight one of the four options)	None of the following		None of the following	
	PFC <50% of lower BM		PFC <50% of lower BM	
	PFC >50% of lower BM		PFC >50% of lower BM	
	PFC at BM		PFC at BM	

PFC: percent foliage cover

BM: benchmark

VEGETATION TYPES (used to determine zone numbers)

Zone no	Vegetation formation	Vegetation type	EEC	Condition class
1	Mallee Woodlands	PCT 193	no	Moderate
2	Casuarina Woodlands	PCT 57	no	Moderate/good

Notes:

Site value:
Transect plot data sheet
 (Start a new sheet for each vegetation zone)

BioBanking
 Biodiversity Banking and Offsets Scheme

Red Mallee - white Mallee Extremely
 Tall Mallee on silty loam clay of Central
 SW
 NSW

CMA area Riverina	CMA subregion Western	Recorder DARYL	Date 13/12/16
Proposal ID ①	Proposal name	Zone ID ①	
Vegetation formation Mallee Woodlands and Shrublands			
Vegetation class Sand Plain Mallee woodlands			
Vegetation type PCT 193			
Condition (low or mod/good) Moderate	Zone descriptor (optional)		Geographic/habitat features (tick after printing step 2 of Credit Calculator) ☐

Coordinates (GPS datum GDA94: _____)

Transect / plot number	1	2	3	4	5	6	7	8	9	10
Easting	366									
Northing	6234									
Zone AMG	55									

Transect 10 points along 50-m transect (see transect tally table for % foliage cover variables)

Native over-storey cover (%)	6									
Native mid-storey cover (%)	5									
Native ground cover (grasses) (%)	10									
Native ground cover (shrubs) (%)	14									
Native ground cover (other) (%)	4									
Exotic plant cover	64									

Larger sampling area

Native plant species richness ¹	9									
Number of trees with hollows ²	2									
Over-storey regeneration ³	1.0									
Total length of fallen logs (m) ²	3.5									

Comments/additional conservation values (riparian areas, special features, geology, etc.):

¹ 20 x 20 m plot ² 20 x 50 m plot ³ whole zone

1

Site value: Transect tally table

BioBanking
Biodiversity Banking and Offsets Scheme

CMA area CMA subregion Recorder Date

Proposal ID Proposal name Zone ID

Vegetation formation Vegetation class Vegetation type

Condition (low or mod/good) Zone descriptor (optional) Geographic/habitat features (tick after printing step 2 of Credit Calculator) ☐

Transect number	Number of hits (tally)	%
Native over-storey cover (%)	0, 15, 15, 5, 10, 5, 0, 10, 0, 0	6
Native mid-storey cover (%)	0, 0, 20, 15, 10, 5, 0, 0, 0, 0	5
Native ground cover (grasses) (%)		10
Native ground cover (shrubs) (%)		14
Native ground cover (other) (%)		4
Exotic plant cover (%)		69

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrubs) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover (grasses) (%)		
Native ground cover (shrub) (%)		
Native ground cover (other) (%)		
Exotic plant cover (%)		

Transect number	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover grasses (%)		
Native ground cover shrubs (%)		
Native ground cover other (%)		
Exotic plant cover (%)		

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

Recorder(s)

RG / AWRTC

2/62

Native over-storey species list	Regeneration (v) (zone)	Native mid-storey species list (>1m to <over-storey) At 10 points along the 50-m transect	Native ground cover (grasses) species list (ground stratum <1m) At 50 points along the 50-m transect	Native ground cover (shrubs) species list (ground stratum <1m) At 50 points along the 50-m transect	Native ground cover (other) species list (ground stratum <1m) At 50 points along the 50-m transect	Exotic plants species list At 50 points along the 50-m transect	Fallen logs (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
E-socialis		Alectryon oleifolius		Malva preissiana	Salsola australis	Sisymbrium sp.	20
		Malva preissiana			Enchylacna tomentosa	Lolium sp.	1-5
						Bromus diandrus	
						Centaurea solstitialis	
						Sorghum asperum	
						Avena sp.	
Total number of species = 9							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area =							
Whole zone							
Number of trees with hollows = 2							
Sample area =							
Benchmark value =							
Total no of species =							Total (n) = 3-5
Foliage cover (%) =							Benchmark (m) =

SITE AND OTHER NOTES:

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Field data sheets for BioBanking : Biobank site proposal package February 2009

(Start a new sheet for each vegetation zone)

Biodiversity Banking and Offsets Scheme

Proposal ID	Proposal name	Zone ID

Casuarina woodlands of inland slopes and Plains

Semi arid Woodlands (Shrubby Formation)

PCT 57- Belah/Black Oak - Western Rosewood

W. Iga wood
land

Transect / plot number	1	2	3	4	5	6	7	8	9	10
Easting		368 213	368 315	366 243						
Northing		6233 219	623320	6232 473						
Zone AMG		55	55	55						

Native over-storey cover (%)		3	3.5	11					
Native mid-storey cover (%)		1	0	2.5					
Native ground cover (grasses) (%)		22	46	30					
Native ground cover (shrubs) (%)		4	14	2					
Native ground cover (other) (%)		28	2	32					
Exotic plant cover		79	72	28					

Native plant species richness ¹		11	14	13					
Number of trees with hollows ²		5	3	5					
Over-storey regeneration ³		0.5	1.0	0.7					
Total length of fallen logs (m) ²		31.3	41.6	37.5					

Comments/additional conservation values (riparian areas, special features, geology, etc.):

³ whole zone

234

Site value: Transect tally table

BioBanking
Biodiversity Banking and Offsets Scheme

CMA area Riverina CMA subregion Riverina Recorder DARYL/MIKE Date 19/12/18

Proposal ID 23 Proposal name Zone ID

Vegetation formation Casuarina Woodlands of Inland Slopes and Plains
Vegetation class Semi arid Woodlands (shrubby subformation)
Vegetation type PCT 57 Belah / Black Oak - Western Riverina
Condition (low or mod/good) Moderate/Good Zone descriptor (optional) Geographic/habitat features (tick after printing step 2 of Credit Calculator) ☐ Willow woodland.

Transect number <u>2</u>	Number of hits (tally)	%
Native over-storey cover (%)	0,0,0,0,0,0,0,0,5,10,15	3
Native mid-storey cover (%)	0,10,0,0,0,0,0,0,0,0,0	1
Native ground cover (grasses) (%)		22
Native ground cover (shrubs) (%)		4
Native ground cover (other) (%)		28
Exotic plant cover (%)		74

Transect number <u>3</u>	Number of hits (tally)	%
Native over-storey cover (%)	5,5,10,5,0,0,0,0,0,10	3.5
Native mid-storey cover (%)	0,0,0,0,0,0,0,0,0,0,0	0
Native ground cover (grasses) (%)		46
Native ground cover (shrubs) (%)		14
Native ground cover (other) (%)		2
Exotic plant cover (%)		72

Transect number <u>4</u>	Number of hits (tally)	%
Native over-storey cover (%)	10,15,5,15,20,15,10,15,5,0	11
Native mid-storey cover (%)	0,10,15,0,0,0,0,0,0,0,0	2.5
Native ground cover (grasses) (%)		30
Native ground cover (shrub) (%)		2
Native ground cover (other) (%)		32
Exotic plant cover (%)		28

Transect number <u></u>	Number of hits (tally)	%
Native over-storey cover (%)		
Native mid-storey cover (%)		
Native ground cover grasses (%)		
Native ground cover shrubs (%)		
Native ground cover other (%)		
Exotic plant cover (%)		

BioBanking
Biodiversity Banking and Offsets Scheme

Site type: PCT 57- Balah/Black Oak-western Rosewood
Development / BioBank: (S)
Proposal ID: 308213/6233319
Recorder(s): DARYL / MIKE
Vegetation type: Wulga woodland of Central AMG Zone 55
Date: 14 DEC 2016
Easting/Northing: 668
Photos: 668
NSW including the Cobar Penplain Bioregion

Native over-storey species list At 10 points along the 50-m transect	Regeneration (v) (zone)	Native mid-storey species list (>1m to <over-storey) At 10 points along the 50-m transect	Native ground cover (grasses) species list (ground stratum <1m) At 50 points along the 50-m transect	Native ground cover (shrubs) species list (ground stratum <1m) At 50 points along the 50-m transect	Native ground cover (other) species list (ground stratum <1m) At 50 points along the 50-m transect	Exotic plants species list At 50 points along the 50-m transect	Fallen logs (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
	Q.S	wilga	Austrostipis scabra Chloris truncata	Scaevola bicornis	Sida corrugata Eriochloa tenax	Sisymbrium sp.	3.0
	Q.S					Echinoplantaginem	2.5
							7.4
						Bromus diandrus	4.5
						Sonchus aspera	2-4
							4-2
							3
							1.8
							0.5
							2.0
Total number of species = 11							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area =							
Whole zone							
Number of trees with hollows = 5							
Sample area =							
Benchmark value =							
Total no of species =						Total no of species =	Total (m) = 3 / 3
Foliage cover (%) =						Foliage cover (%) =	Benchmark (m) =

SITE AND OTHER NOTES:

NB: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Field data sheets for BioBanking : Biobank site proposal package February 2009

Full species IDs are not required for BioBanking, but may be useful for identification of correct vegetation type and for monitoring and audit purposes.

1

Easting/Northing:

2475_p

photos:

245

Native over-storey species list	Regeneration (v)	Native mid-storey species list (>1m to <over-storey) At 10 points along the 50-m transect	Native ground cover (grasses) species list (ground stratum <1m) At 50 points along the 50-m transect	Native ground cover (shrubs) species list (ground stratum <1m) At 50 points along the 50-m transect	Native ground cover (other) species list (ground stratum <1m) At 50 points along the 50-m transect	Exotic plants species list At 50 points along the 50-m transect	Fallen logs (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
Betah	0-7	Rosewood	Austrostipa sabulosa	Sclerolaena muricata	Eucalyptus tomentosa	Silvanium sp.	10-5
					Atriplex stipitata	Pithecellobium dulce	3-2
					Salicoba australis		9-0
					Rhodanthe floribunda		1-0
							5-0
							3-1
							4-5
							6-2
Total number of species = 13							
Foliage cover (%) =							
Benchmark value (%FC) =							
Average crown diameter =							
Average foliage cover (%) =							
Number of trees =							
Sample area =							
Whole zone							
Number of trees with hollows = 5							
Sample area =							
Benchmark value =							
Total no of species =							
Foliage cover (%) =							
Total no of species =							
Foliage cover (%) =							
Total (m) = 37.5							
Benchmark (m) =							

SITE AND OTHER NOTES:

NP: Transects / plots should be placed randomly with the minimum number required for the zone in accordance with Table 4 of the Operational Manual.

Field data sheets for BioBanking : Biobank site proposal package February 2009

APPENDIX E

TREE DATA

Tree Data Key for Table D1.

- **DBH** – Diameter at Breast Height. Tree trunk diameter measured at breast height (1.4 metres above ground level). Fabric diameter tape used which assumes a circular cross section.
- **Tree Height** – Estimated with the use of an inclinometer and rangefinder (metres).
- **Coordinates - GDA - 1994**
- **Habitat/Hollows** –
 - Class 1** – very large sized hollow openings (i.e. >20cm) suitable for species such as Owls
 - Class 2** – large sized hollow openings (i.e. 15-20cm) suitable for species such as Owls and Possums
 - Class 3** – medium sized hollow-openings (i.e. 5-15cm) suitable for species such as Gliders and Possums
 - Class 4** – small sized hollow openings (i.e. <5cm) suitable for species such as microchiropteran bats.
 - Spout** - Hollow opening towards sky offering little protection from the weather
 - Arboreal Termite Nest** – provides potential nesting opportunities for hollow-dependent birds, such as kingfishers and kookaburras
- **Removal required** –
 - Y** – Yes
 - N** – No

Table D1: Details of trees within the site

Tree No.	Tag No.	Species	Easting GDA – 94	Northing GDA – 94	DBH (M)	Height (M)	Habitat/Hollows Present/Comments	Removal Required Y/N
1.	101	<i>Apophyllum anomalum</i> Warrior Bush	365780	6232768	0.35	6	1 x Class 3 1 x Class 4	N
2.	102	<i>Eucalyptus populnea</i> Bimblebox	365911	6233708	0.5	11		N
3.	103	<i>Geijera parviflora</i> Wilga	365907	6232780	2 x 0.4	10		N
4.	104	<i>Casuarina cristata</i> Belah	365928	6232773	0.55	13	1 x Class 3 1 x Class 4	N
5.	105	<i>C. cristata</i>	366011	6232722	0.5	12		N
6.	106	<i>C. cristata</i>	366010	6232724	0.35	12		N
7.	107	<i>G. parviflora</i>	366012	6232721	0.5	12		N
8.	108	Dead	366009	6232720	0.4	10		N
9.	109	<i>C. cristata</i>	366026	6232708	0.7	14	1 x Class 2 1 x Class 4 Hollow down middle	N
10.	110	<i>G. parviflora</i>	366024	6232641	0.5	7		N
11.	111	<i>G. parviflora</i>	366051	6232605	2x0.4	8	1 x Class 3	N
12.	112	<i>C. cristata</i>	366182	6232605	0.55	8		N
13.	113	<i>C. cristata</i>	366194	6232609	0.6	14		N
14.	114	<i>A. anomalum</i>	366220	6232609	0.18	4		N
15.	115	<i>A. anomalum</i>	366245	6232596	0.2	5		N
16.	116	<i>C. cristata</i>	366275	6232581	2x0.45	13	1 x Class 4	N
17.	117	<i>C. cristata</i>	366291	6232577	0.5	14		N
18.	118	<i>C. cristata</i>	366300	6232533	2x0.5	17	2 x Class 4	N
19.	119	<i>C. cristata</i>	366314	6232509	0.4	14	Bird of prey nest	N
20.	120	Dead	366340	6232480	0.8	10	2 x Class 4	N
21.	121	<i>C. cristata</i>	366365	6232377	0.4	11	1 x Class 4	N
22.	122	Dead	366371	6232362	0.35	10	1 x Class 3	N
23.	123	<i>C. cristata</i>	366373	6232356	0.5	15		N
24.	124	No. not found						N
25.	125	<i>C. cristata</i>	366389	6232307	0.4	13		N

Tree No.	Tag No.	Species	Easting GDA – 94	Northing GDA – 94	DBH (M)	Height (M)	Habitat/Hollows Present/Comments	Removal Required Y/N
26.	126	<i>C. cristata</i>	366395	6232258	0.5	13		N
27.	127	<i>Callitris glaucophylla</i> White Cyprus	367655	6232152	0.5	12	Crested pigeon nest	N
28.	128	<i>C. glaucophylla</i>	367664	6232302	0.6	12		N
29.	129	<i>C. cristata</i>	367830	6233018	0.7	17	3 x Class 4	N
30.	130	<i>C. cristata</i>	367833	6233036	0.6	16		N
31.	131	<i>C. cristata</i>	367838	6233046	0.7	16	1 x Class 3 in trunk crack	N
32.	132	<i>C. cristata</i>	367787	6233071	0.7	13	1 x Class 3	N
33.	133	<i>C. cristata</i>	367779	6233108	0.65	13	1 x Class 3 going up trunk	N
34.	134	<i>C. cristata</i>	367801	6233097	0.6	12		N
35.	135	<i>C. cristata</i>	367799	6233109	0.7	13	2 x Class 4	N
36.	136	<i>C. cristata</i>	367809	6233125	0.6	12	2 x Class 3 2 x Class 4	N
37.	137	<i>C. cristata</i>	367789	6233130	0.8	11	2 x Class 2 up from base Long hollow scar	N
38.	138	<i>Eucalyptus socialis</i> Red Mallee	366355	6234428	0.3	10		N
39.	139	<i>E. socialis</i>	366345	6234415	2 x 0.2	8		N
40.	140	<i>E. socialis</i>	366417	6234408	2 x 0.25	7		Y
41.	141	<i>E. socialis</i>	366459	6234393	3 x 0.15	7		N
42.	142	<i>Alectryon oleifolius</i> subsp. <i>canescens</i> Rosewood	366466	6234371	0.3	5		N
43.	143	<i>A. oleifolius</i> subsp. <i>canescens</i>	366470	6234373	0.18	5		N
44.	144	<i>E. socialis</i>	366476	6234374	0.15	6		N
45.	145	<i>A. oleifolius</i> subsp. <i>canescens</i>	366487	6234381	0.2	4		N
46.	146	<i>A. oleifolius</i> subsp.	366502	6234382	0.15	4		N

Tree No.	Tag No.	Species	Easting GDA – 94	Northing GDA – 94	DBH (M)	Height (M)	Habitat/Hollows Present/Comments	Removal Required Y/N
		<i>canescens</i>						
47.	147	<i>A. oleifolius</i> subsp. <i>canescens</i>	366504	6234381	0.15	4		N
48.	148	<i>A. oleifolius</i> subsp. <i>canescens</i>	366507	6234390	0.1	4		N
49.	149	<i>A. oleifolius</i> subsp. <i>canescens</i>	36650	6234382	0.15	4		N
50.	150	<i>A. oleifolius</i> subsp. <i>canescens</i>	366509	6234386	0.15	4		N
51.	151	<i>A. oleifolius</i> subsp. <i>canescens</i>	366504	6234380	0.1	5		N
52.	152	<i>E. socialis</i>	366506	6234366	0.15	7		N
53.	153							N
54.	154	<i>E. socialis</i>	366504	6234350	0.18	8	1 x Class 3	N
55.	155	<i>E. socialis</i>	366489	6234348	0.2	7	1 x Class 3	N
56.	156	<i>E. socialis</i>	366471	6234354	0.25	10		N
57.	157	<i>E. socialis</i>	366473	6234351	0.3	10		N
58.	158	<i>A. oleifolius</i> subsp. <i>canescens</i>	366470	6234342	0.2	6		N
59.	159	<i>E. socialis</i>	366465	6234335	0.3	12		N
60.	160	<i>E. socialis</i>	366472	6234329	0.25	9		N
61.	161	<i>E. socialis</i>	366469	6234328	0.25	11		N
62.	162	<i>E. socialis</i>	366475	6234320	0.3	8		N
63.	163	<i>E. socialis</i>	366462	6234314	0.3	8		N
64.	164	<i>E. socialis</i>	366477	6234305	0.3	10	1 x Class 3 near base	N
65.	165	<i>E. socialis</i>	366445	6234314	0.25	9		N
66.	166	<i>E. socialis</i>	366468	6234313	0.2	5		N
67.	167	<i>E. socialis</i>	366472	6234296	0.25	8		N
68.	168	<i>E. socialis</i>	366467	6234293	0.25	9	2 x Class 3 1 x Class 4	N
69.	169	<i>E. socialis</i>	366459	6234314	0.2	9		N
70.	170	<i>E. socialis</i>	366439	6234314	0.2	7		N

Tree No.	Tag No.	Species	Easting GDA – 94	Northing GDA – 94	DBH (M)	Height (M)	Habitat/Hollows Present/Comments	Removal Required Y/N
71.	171	<i>E. socialis</i>	366439	6234310	0.3	10		N
72.	172	<i>E. socialis</i>	366438	6234308	0.25	10	1 x Class 3	N
73.	173	<i>A. oleifolius</i> subsp. <i>canescens</i>	366443	6234307	0.25	10		N
74.	174	<i>E. socialis</i>	366444	6234305	0.2	9		N
75.	175	<i>E. socialis</i>	366439	6234303	0.25	9		N
76.	176	<i>E. socialis</i>	366430	6234295	0.3	9		N
77.	177	<i>E. socialis</i>	366430	6234291	0.25	11		N
78.	178	<i>E. socialis</i>	366431	6234283	0.3	10		N
79.	179	<i>E. socialis</i>	366431	6237272	0.2	9		N
80.	180	<i>E. socialis</i>	366422	6234283	0.15	8		N
81.	181	<i>E. socialis</i>	366419	6234290	0.18	8		N
82.	182	<i>E. socialis</i>	366421	6234304	0.15	9		N
83.	183	<i>E. socialis</i>	366411	6234326	0.25	7		N
84.	184	<i>E. socialis</i>	366411	6234302	0.3	6		N
85.	185	<i>E. socialis</i>	366414	6234285	0.28	8		N
86.	186	<i>E. socialis</i>	366407	6234268	0.3	8	1 x Class 3 spout	N
87.	187	<i>E. socialis</i>	366402	6234283	0.3	9		N
88.	188	<i>E. socialis</i>	366401	6234293	0.2	7	Birds nest	N
89.	189	<i>E. socialis</i>	366398	6234291	0.25	10		N
90.	190	<i>E. socialis</i>	366395	6234283	0.25	8	1 x Class 4	N
91.	191	<i>E. socialis</i>	366380	6234282	0.3	10		N
92.	192	<i>E. socialis</i>	366374	6234283	0.18	7		N
93.	193	<i>E. socialis</i>	366370	6234282	0.2	7		N
94.	194	<i>E. socialis</i>	366379	6234292	0.15	8		N
95.	195	<i>E. socialis</i>	366385	6234296	0.3	9		N
96.	196	<i>E. socialis</i>	366394	6234314	0.3	8		N
97.	197	<i>E. socialis</i>	366386	6234317	0.35	12		N
98.	198	<i>E. socialis</i>	366382	6234307	0.3	14		N
99.	199	<i>E. socialis</i>	366484	6234307	0.3	12	1 x Class 3 spout	N
100.	200	<i>E. socialis</i>	366491	6234306	0.25	8		N

Tree No.	Tag No.	Species	Easting GDA – 94	Northing GDA – 94	DBH (M)	Height (M)	Habitat/Hollows Present/Comments	Removal Required Y/N
101.	201	<i>A. oleifolius</i> subsp. <i>canescens</i>	366494	6234319	0.2	4		N
102.	202	<i>E. socialis</i>	366494	6234320	0.25	8		N
103.	203	<i>E. socialis</i>	366506	6234324	0.2	7		N
104.	204	<i>E. socialis</i>	366516	6234339	0.3	7		N
105.	205	<i>E. socialis</i>	366380	6234316	0.35	10		N
106.	206	<i>E. socialis</i>	366377	6234335	0.4	10		N
107.	207	<i>E. socialis</i>	366380	6234309	0.2	8	1 x Class 4	N
108.	208	<i>E. socialis</i>	366378	6234353	0.18	7		N
109.	209	<i>E. socialis</i>	366371	6234360	0.15	8		N
110.	210	<i>E. socialis</i>	366370	6234365	0.3	10		N
111.	211	<i>E. socialis</i>	366371	6234298	0.18	8	1 x Class 3	N
112.	212	<i>E. socialis</i>	366350	6234348	0.2	8		N
113.	213	<i>E. socialis</i>	366335	6234344	0.3	12		N
114.	214	<i>E. socialis</i>	366333	6234346	0.2	8		N
115.	215	<i>E. socialis</i>	366324	6234335	0.25	10		N
116.	216	<i>E. socialis</i>	366331	623430	0.2	8	1 x Class 3	N
117.	217	<i>E. socialis</i>	366342	6234303	0.3	9	1 x Class 3	N
118.	218	<i>E. socialis</i>	366336	6234283	0.2	8		N
119.	219	<i>E. populnea</i>	368053	6234200	0.5	14		N
120.	220	<i>Acacia pendula</i>	368092	6234198	0.25	8		N
121.	250	<i>A. oleifolius</i> subsp. <i>canescens</i>	368130	6233384	0.4	10		N
122.	253	<i>G. parviflora</i>	367945	6233159	0.4	8	1 x Class 3 1 x Class 4	N
123.	254	<i>C. pauper</i>	367860	6233111	0.7	9		N
124.	255	<i>G. parviflora</i>	367850	6233112	0.45	8		N
125.	256	<i>C. cristata</i>	367730	6232955	0.65	17		N
126.	257	<i>C. cristata</i>	367572	6232744	0.7	14	1 x Class 3	N
127.	258	<i>C. cristata</i>	367476	6232744	0.6	10		N
128.	259	<i>A. oleifolius</i> subsp. <i>canescens</i>	367392	6232672	0.4	8		N

Tree No.	Tag No.	Species	Easting GDA – 94	Northing GDA – 94	DBH (M)	Height (M)	Habitat/Hollows Present/Comments	Removal Required Y/N
129.	260	<i>C. cristata</i>	367400	6232650	0.75	16	1 x Class 4	N
130.	261	<i>C. cristata</i>	367423	6232624	0.55	14		N
131.	262	<i>A. oleifolius subsp. canescens</i>	367360	6232661	0.45	7	5 x Class 3 1 x Class 4	N
132.	270	<i>Geijera parviflora</i>	366390	6232260	0.5	9	1 x Class 3	N
133.	271	<i>C. cristata</i>	366387	6232341	0.5	14	2 x Class 3 2 x Class 4	N
134.	272	Dead	366364	6232374	0.7	15		N
135.	273	<i>A. anomalum</i>	266134	6232537	0.2	4	3 x Class 4	N
136.	274	<i>G. parviflora</i>	366115	6232574	0.4	7	1 x Class 4	N
137.	275	<i>A. anomalum</i>	366055	6232589	0.3	5	1 x Class 4	N
138.	277	<i>A. anomalum</i>	365846	6232691	0.3	5	1 x Class 3 2 x Class 4	N
139.	500	<i>E. populnea</i>	367272	6234306	0.6	12		N

APPENDIX F

VERTEBRATE FAUNA LIST

FAUNA LIST

Family sequencing and taxonomy follow for each fauna class:

Herpetofauna

Cogger (2000), Ehmann (Ed) (1997) and Barker, Grigg and Tyler (1995).

Birds

Pizzey and Knight (2012)(9th edn).

Mammals - Van Dyck & Strahan (Ed) (2008) and Churchill (2008).

Churchill, S. (2008). *Australian Bats*. (2nd edn.). Allen & Unwin Australia.

(?) - Indicates a species identified without certainty or to a Genus level only.

* - Indicates an introduced species.

The following symbols are used to indicate species recorded during previous surveys.

@ - Previous record (Wildthing Environmental Consultants, 2008a)

Threatened species addressed within this assessment appear in **bold** font.

Introduced species are indicated by an asterisk (“*”).

The following standard abbreviations are used to indicate subspecific taxa:

subsp. -subspecies

var.- variety

x - hybrid between the two indicated species

Threatened Species Conservation Act 1995 (TSC Act)

V Vulnerable

E1 Endangered

E2 Endangered Population

E4A Critically Endangered Population

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

V Vulnerable

E Endangered

CE Critically Endangered Population

M Migratory

Observation Type

O - Observed (sighted)

W - Heard call

OW - Observed and heard call

X - In scat

P - Scat

T - Trapped or netted

H - Hair, feathers or skin

A - Stranded/Beached

G - Crushed cones

R - Road Kill

D - Dog Kill

Q - Camera

C - Cat Kill

V - Fox Kill

K - Dead

S - Shot

I - Fossil/subfossil

FB - Burrow

F - Tracks, scratching

Z - In raptor/owl Pellet

U - Ultrasonic recording

M - Miscellaneous

E - Nest/roost

B - Burnt

Y - Bones, teeth or shell

N - Not located

AR - Acoustic Recording

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	OBSERVATION TYPE
Phylum - Chordata				
Subphylum - Vertebrata				
Class - Actinopterygii				
Order Cypriniformes				
Family Cyprinidae				
<i>*Cyprinus carpio</i>	Carp			O
Order Cyprinodontiformes				
Family Poeciliidae				
<i>Gambusia holbrooki</i>	Mosquitofish			O
Class Amphibia - Amphibians				
Order Salientia - Frogs				
Family Myobatrachidae - 'Southern Frogs'				
<i>Limnodynastes fletcheri</i>	Barking Frog			W
Class Reptilia - Reptiles				
Order Squamata – Lizards and Snakes				
Suborder Sauria - Lizards				
Family Gekkonidae - Geckoes				
<i>Gehyra variegata</i>	Common Dtella			O
Family Agamidae - Dragons				
<i>Pogona barbata</i>	Eastern Bearded Dragon			O

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	OBSERVATION TYPE
Family Scinidae - Skinks				
<i>Cryptoblepharus pannosus</i>	Ragged Snake-eyed Skink			O
<i>Egernia striolata</i>	Tree Skink			O
<i>Morethia boulengeri</i>	Boulenger's Skink			O
Class Aves - Birds				
Family Phasianidae				
<i>Coturnix pectoralis</i>	Stubble Quail			O
Family Anatidae - Ducks, Swans and Geese				
<i>Anas superciliosa</i>	Pacific Black Duck			O
Family Columbidae - Pigeons, Doves				
<i>Ocyphaps lophotes</i>	Crested Pigeon			O
Family Podargidae - Frogmouths				
<i>Podargus strigoides</i>	Tawny Frogmouth			O
Family Aegothelidae - Owlet Nightjars				
<i>Aegotheles cristatus</i>	Australian Owlet Nightjar			O
Family Ardeidae - Herons, Egrets and Bitterns				
<i>Egretta novaehollandiae</i>	White-faced Heron			
Family Accipitridae - Osprey, Hawks, Eagles and Harriers				
<i>Circus assimilis</i>	Spotted Harrier	V		O
<i>Elanus axillaris</i>	Black-shouldered Kite			O
<i>Haliastur sphenurus</i>	Whistling Kite			O
Family Falconidae - Falcons				
<i>Falco cenchroides</i>	Australian Kestrel			O

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	OBSERVATION TYPE
Family Charadriidae Plover, Dotterels, Lapwings				
<i>Vanellus miles</i>	Masked Lapwing			OW
Family Cacatuidae - Cockatoos and Corellas				
<i>Eolophus roseicapillus</i>	Galah			OW
Family Psittacidae - Parrots, Rosellas and Lorikeets				
<i>Barnardius zonarius</i>	Australian Ringneck			O
<i>Northiella haematogaster</i>	Blue Bonnet			O
<i>Nymphicus hollandicus</i>	Cockatiel			O
<i>Psephotus haematonotus</i>	Red-rumped Parrot			O
Family Halcyonidae - Tree Kingfishers				
<i>Dacelo novaeguineae</i>	Laughing Kookaburra			OW
<i>Todiramphus sanctus</i>	Sacred Kingfisher			OW
Motacillidae – Pipits & Wagtails				
<i>Anthus novaeseelandiae</i>	Australasian Pipit			O
Family Maluridae				
<i>Malurus cyaneus</i>	Superb Fairy-wren			OW
Family Pardalotidae - Pardalotes, Gerygones, Scrubwrens, Heathwrens and Thornbills				
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill			O
<i>Hylacola pyrrhopygia</i>	Chestnut-rumped Heathwren			O
Family Meliphagidae - Honeyeaters				
<i>Lichenostomus virescens</i>	Singing Honeyeater			O
<i>Manorina melanocephala</i>	Noisy Miner			O
Family Pomatostomidae Australian Babblers				
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	V		OW

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	OBSERVATION TYPE
Family Monarchidae - Monarchs, Flycatchers and Magpie-Lark				
<i>Myiagra inquieta</i>	Restless Flycatcher			O
<i>Grallina cyanoleuca</i>	Magpie-lark			OW
Family Rhipiduridae - Fantails				
<i>Rhipidura leucophrys</i>	Willie Wagtail			OW
Family Campephagidae - Cuckoo-shrikes and Trillers				
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike			OW
Family Hirundinidae - Swallows and Martins				
<i>Cecropis ariel</i>	Fairy Martin			O
<i>Hirundo neoxena</i>	Welcome Swallow			O
Family Sylviidae - Old World Warblers				
<i>Acrocephalus stentoreus</i>	Clamorous Reed Warbler			OW
Family Artamidae - Wood-swallows, Butcherbirds, Magpie and Currawongs				
<i>Cracticus nigrogularis</i>	Pied Butcherbird			OW
<i>Cracticus tibicen</i>	Australian Magpie			OW
Family Corvidae - Crows, Raven				
<i>Corvus coronoides</i>	Australian Raven			OW
Corcoracidae - Chough and Apostlebird				
<i>Corcorax melanorhamphos</i>	White-winged Chough			OW
Family Estrildidae - Grassfinches				
<i>Neochima temporalis</i>	Red-browed Finch			O
<i>Taeniopygia bichenovii</i>	Double-barred Finch			O
<i>Taeniopygia guttata</i>	Zebra Finch			O

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	OBSERVATION TYPE
Family Sturnidae - Starlings and Mynas				
<i>*Sturnus vulgaris</i>	Common Starling			OW
Class Mammalia - Mammals				
Subclass Prototheria - Monotremes				
Order Monotremata				
Family Tachyglossidae - Echidna				
<i>Tachyglossus aculeatus</i>	Echidna			F
Subclass Marsupialia - Marsupials				
Order Dasyuromorphia – Carnivorous Marsupials				
Order Diprotodontia				
Suborder Phalangerida				
Superfamily - Phalangerioidea				
Family Phalangeridae - Brushtail Possums				
<i>Trichosurus vulpecula</i>	Common Brushtail Possum			O
Superfamily - Macropodoidae				
Family Macropodidae - Kangaroos, Wallabies				
<i>Macropus fuliginosus</i>	Western Grey Kangaroo			O
<i>Macropus giganteus</i>	Eastern Grey Kangaroo			O

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	OBSERVATION TYPE
Subclass Eutheria - Eutherian Mammals				
Order Chiroptera				
Suborder Microchiroptera				
Family Vespertilionidae - Plain-nosed Bats				
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat			U
<i>Chalinolobus picatus</i>	Little Pied Bat	V		U
<i>Nyctophilus corbeni?</i>	Corben's Long-eared Bat	V		U
<i>Nyctophilus geoffroyi?</i>	Lesser Long-eared Bat			U
<i>Nyctophilus gouldi?</i>	Gould's Long-eared Bat			U
<i>Scotorepens balstoni</i>	Inland Broad-nosed Bat			U
<i>Vespadelus darlingtoni?</i>	Large Forest Bat			U
<i>Vespadelus regulus?</i>	Southern Forest Bat			U
<i>Vespadelus vulturnus?</i>	Little Forest Bat			U
Order Rodentia				
Family Muridae - Rodents				
<i>*Mus musculus</i>	House Mouse			T
Order Lagomorpha				
Family Leporidae				
<i>*Lepus capensis</i>	European Hare			O
<i>*Oryctolagus cuniculus</i>	European Rabbit			O
Order Carnivora				
Family Canidae				
<i>*Vulpes vulpes</i>	Red Fox			O

SCIENTIFIC NAME	COMMON NAME	TSC ACT	EPBC ACT	OBSERVATION TYPE
Family Felidae				
* <i>Felis catus</i>	Cat			O
Order Artiodactyla				
Family Bovidae				
* <i>Bos taurus</i>	Cattle			Y
* <i>Ovis aries</i>	Sheep			Y

APPENDIX G

PROTECTED MATTERS SEARCH EPBC ACT



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: 19/09/17 09:55:52

[Summary](#)

[Details](#)

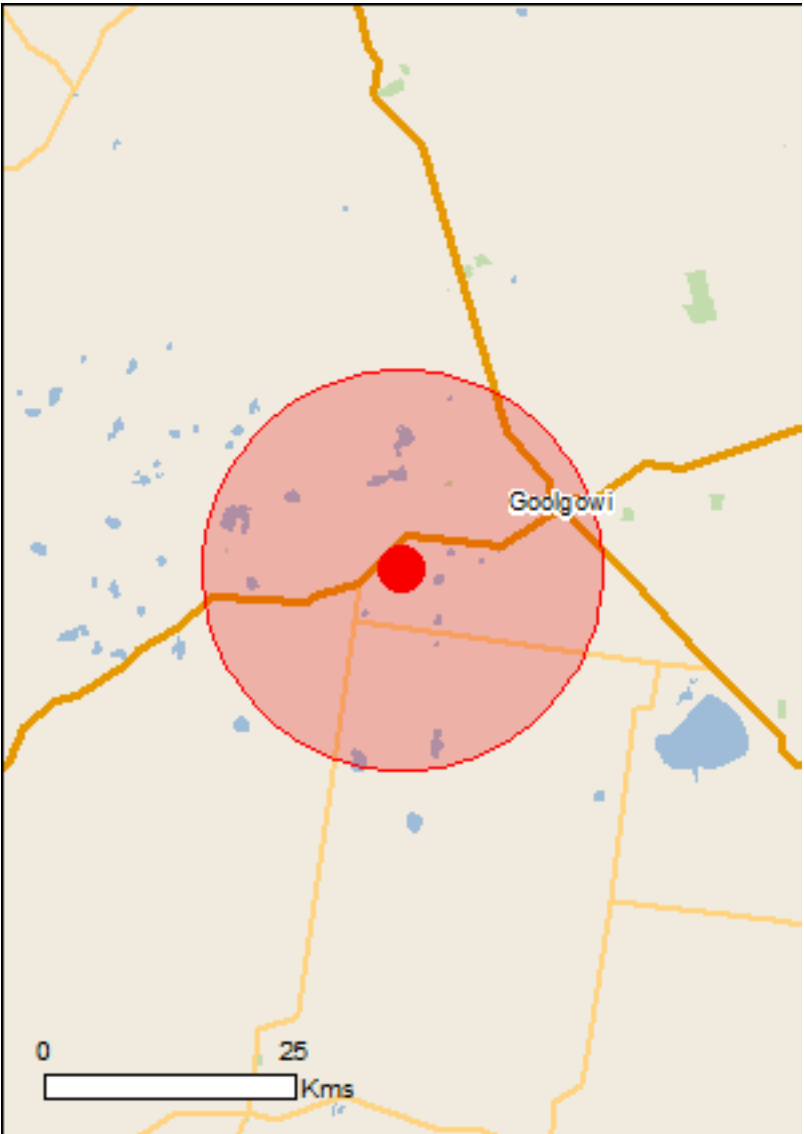
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

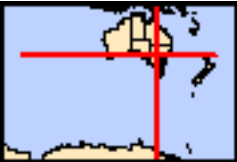
[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 20.0Km](#)



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:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	21
Listed Migratory Species:	11

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:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	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:	None
Regional Forest Agreements:	None
Invasive Species:	20
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	400 - 500km upstream	
Hattah-kulkyne lakes	200 - 300km upstream	
Riverland	400 - 500km upstream	
The coorong, and lakes alexandrina and albert wetland	500 - 600km upstream	

Listed Threatened Ecological Communities	[Resource Information]
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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

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 likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
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 likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Extinct within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species

Name	Status	Type of Presence
habitat may 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 may 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 likely to 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 may occur within area
Plants		
Austrostipa metatoris [66704]	Vulnerable	Species or species habitat may occur within area
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area
Brachyscome papillosa Mossgiel Daisy [6625]	Vulnerable	Species or species habitat likely to occur within area
Lepidium monoplocoides Winged Pepper-cress [9190]	Endangered	Species or species habitat likely to occur within area
Solanum karsense Menindee Nightshade [7776]	Vulnerable	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		
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

Name	Threatened	Type of Presence
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land	[Resource Information]
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 - Australian Telecommunications Commission	
Commonwealth Land - Australian Telecommunications Corporation	

Listed Marine Species		[Resource Information]
* 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
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		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]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

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		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
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		
Canis lupus familiaris Domestic Dog [82654]		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
Sus scrofa Pig [6]		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		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur

Name		Status	Type of Presence
Sagittaria platyphylla			within area
Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]			Species or species habitat likely to occur within area
Nationally Important Wetlands			[Resource Information]
Name			State
Lower Mirrool Creek Floodplain			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

-34.029 145.566

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.

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1.0 FLORA AND FAUNA SURVEYS

1.1 IDENTIFYING SUBJECT SPECIES AND ENDANGERED ECOLOGICAL COMMUNITIES

The following threatened species, endangered populations and communities listed in Table 1.1 were listed in the SEARS or have been recorded on the Atlas of NSW Wildlife (OEH, 2017) and the Department of Environment and Energy (DoEE) databases for within 10km of the study area.

Table 1.1: Threatened species, endangered populations and ecological communities considered.

Scientific Name	Common Name	TSC Act 1995	EPBC Act 1999
Flora			
<i>Leptorhynchus orientalis</i>	Lanky Buttons	E1	
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V
* <i>Austrostipa metatoris</i>	A spear-grass	V	V
* <i>Austrostipa wakoolica</i>	A spear-grass	E1	E
* <i>Brachsycome papillosa</i>	Mossiel Daisy	V	V
* <i>Lepidium monolocoides</i>	Winged Pepper-cress	E	E
* <i>Solanum karsense</i>	Menindee Nightshade	V	V
* <i>Swainsona murrayana</i>	Slender Darling-pea	V	V
Fish			
* <i>Galaxias rostratus</i>	Flathead Galaxias	CE	CE
* <i>Maccullochella peelii</i>	Murray Cod		V
* <i>Macquaria australasica</i>	Macquarie Perch	E1	E
Amphibians			
<i>Crinia sloanei</i>	Sloane's Froglet	V	
* <i>Litoria raniformis</i>	Southern Bell Frog	E1	V
Birds			
* <i>Actitis hypoleucos</i>	Common Sandpiper		M
* <i>Calidris acuminata</i>	Sharp-tailed Sandpiper		M
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1	CE & M
* <i>Calidris melanotos</i>	Pectoral Sandpiper		M
* <i>Pandion haliaetus</i>	Osprey		M
* <i>Gallinago hardwickii</i>	Latham's Snipe		M
* <i>Tringa nebularia</i>	Common Greenshank		M
* <i>Rostratula benghalensis australis</i>	Australian Painted Snipe	E1	V & M
* <i>Numenius madagascariensis</i>	Eastern Curlew		CE & M
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1	E
<i>Grus rubicunda</i>	Brolga	V	
<i>Ardeotis australis</i>	Australian Bustard	E1	
<i>Stictonetta naevosa</i>	Freckled Duck	V	
<i>Burhinus grallarius</i>	Bush Stone-curlew	E1	
<i>Pedionomus torquatus</i>	Plains-wanderer	E1	CE
* <i>Leipoa ocellata</i>	Malleefowl	E1	V
<i>Polytelis swainsonii</i>	Superb Parrot	V	V
* <i>Pezoporus occidentalis</i>	Night Parrot	Presumed extinct	E
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	E1	V
<i>Epthianura albifrons</i>	White-fronted Chat	V	
<i>Grantiella picta</i>	Painted Honeyeater	V	V
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	V	
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler	V	
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V	
<i>Falco hypoleucos</i>	Grey Falcon	E1	
<i>Falco subniger</i>	Black Falcon	V	
<i>Circus assimilis</i>	Spotted Harrier	V	
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	
<i>Hieraaetus morphnoides</i>	Little Eagle	V	
<i>Tyto novaehollandiae</i>	Masked Owl	V	
<i>Stagonopleura guttata</i>	Diamond Firetail	V	
* <i>Motacilla flava</i>	Yellow Wagtail		M

Scientific Name	Common Name	TSC Act 1995	EPBC Act 1999
* <i>Apus pacificus</i>	Fork-tailed Swift		M
Mammals			
* <i>Phascolarctos cinereus</i>	Koala	V	V
<i>Chalinolobus picatus</i>	Little Pied Bat	V	
<i>Myotis macropus</i>	Southern Myotis	V	
* <i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V
Endangered Populations			
<i>Climacteris affinis</i> White-browed Treecreeper population in Carrathool local government area south of the Lachlan River and Griffith local government area			
Endangered/Threatened Ecological Communities			
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions EPBC Act (Endangered)			
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EPBC Act (Endangered)			
<i>Allocasuarina luehmannii</i> Woodland in the Riverina and Murray-Darling Depression bioregions (Endangered Ecological Community – TSC Act)			
Weeping Myall Woodlands EPBC Act (Endangered)			
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Endangered Ecological Community – TSC Act)			
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes Bioregions (Endangered Ecological Community – TSC Act).			
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Endangered Ecological Community – TSC Act).			
E1/E=Endangered Species V=Vulnerable Species E4A=Critically Endangered M=Migratory Species			

1.2 FLORA SURVEYS

Surveys were conducted in December 2016. The initial determination of the basic vegetation community boundaries was undertaken through the review of an orthophoto covering the study area. Random meander searches were conducted in areas of native vegetation to determine the plant species present. Data on geology, dominant canopy species, native diversity, vegetation structure and condition were collected across the study area to determine the classification as Plant Community Types (PCTs) required to be used by BioBanking Assessment Methodology (BBAM). The plot/transect based surveys were conducted in accordance with the BioBanking Assessment Methodology (BBAM) (Office of Environment and Heritage 2014).

1.2.1 TARGETED THREATENED FLORA SURVEYS

The objective of the targeted threatened-flora surveys is to establish, with a high level of confidence, the presence or absence of a threatened flora species within the study area. If any threatened flora species are recorded then data including number of individuals and the habitat area is also to be determined. Flora species targeted included those threatened species identified in Table 1.

Targeted surveys were used in accordance with the NSW Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft) (Department of Environment and Conservation 2004). Each target threatened flora species was allocated areas of potential habitat. All vegetation communities considered to be habitat for the target species were searched. Due to the relatively large size of the study area, areas of potential habitat were broken up into smaller sections such as the internal network of vehicle tracks. A parallel field traverse (i.e. parallel transects, as used by Cropper 1993) was undertaken within each of these smaller sections. Surveys

were conducted along parallel line transects approximately 15 metres apart. Transects were conducted along a straight path using the tracks on a GPS to guide the surveyors.

Threatened flora species such as trees and shrubs that could be identified by for example from their leaves were not subject to specific survey timings. The survey effort and times of the targeted threatened flora species are shown in Table 2. Remaining threatened flora species were also surveyed opportunistically during incidental and targeted and surveys within the study area.

1.3 FAUNA APPRAISAL METHODOLOGY

The fauna survey was initiated with the production of a Fauna Species List and an assessment of the potential use of the study area by any threatened species identified in the OEH and DoEE database searches. Subsequently, the confirmation and supplementation of the Fauna Species List, by way of on-site observation, trapping and recording, was carried out as described below. The survey was carried out using the Department of Environment and Conservation's (NSW) Threatened Biodiversity Survey and Assessment Guidelines – Working Draft (Department of Environment and Conservation, 2004).

1.3.1 SMALL TERRESTRIAL MAMMAL TRAPPING

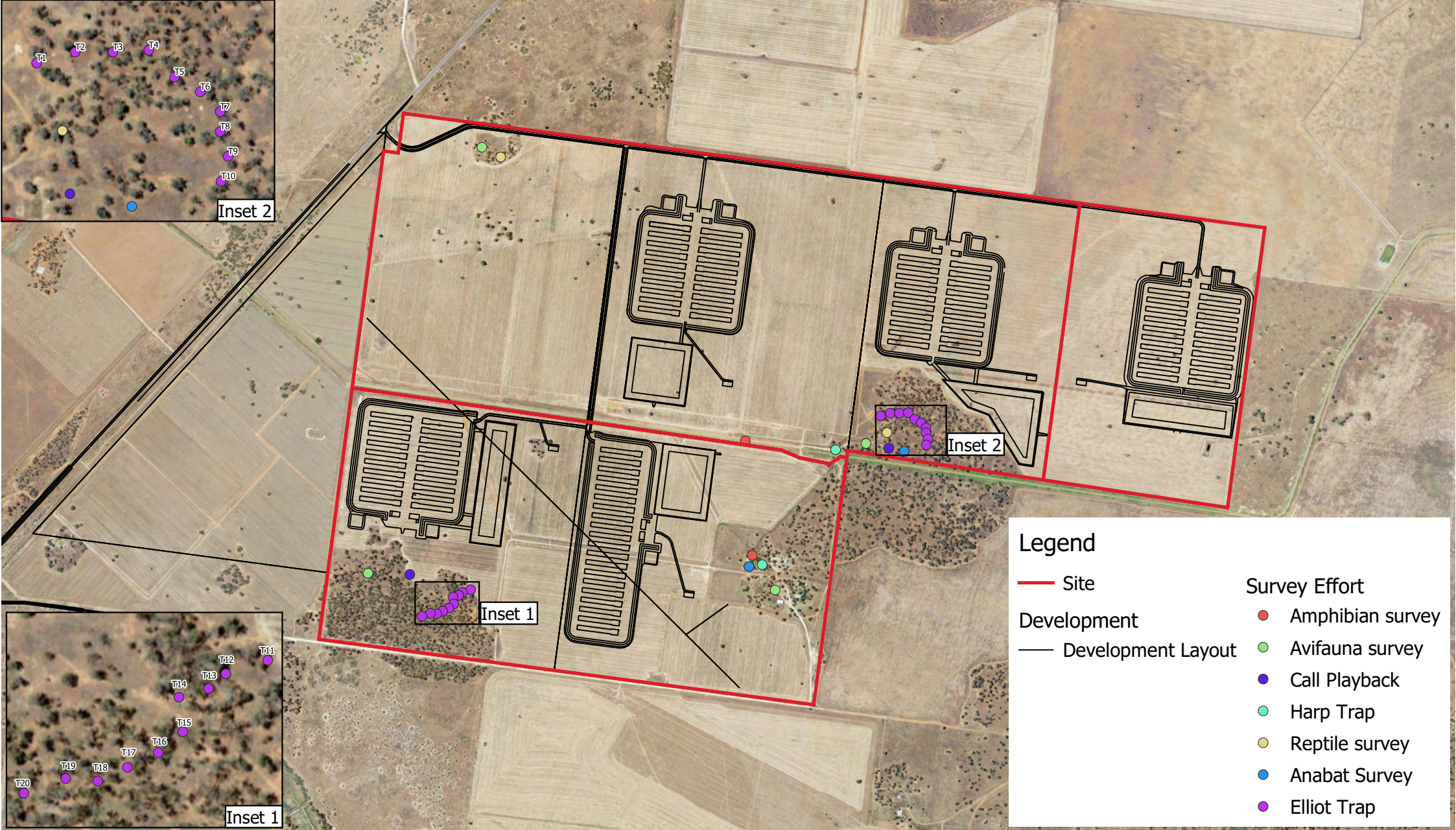
Terrestrial mammal trapping was undertaken using 20 Elliott Type A traps (8x10x33cm). The traps were left in place for three consecutive nights giving a total of 60 small terrestrial trap nights. The traps were hidden in thick grass, under shrubs or and around trees and were camouflaged with vegetation where the ground cover was sparse. The baits used for the traps were a mixture of rolled oats, peanut butter and honey mixture, and Good-O's (dry dog food). The traps were checked early each morning and, where necessary, reset and rebaited. The location of the small terrestrial traps is shown in Figure I.1.

1.3.2 HARP TRAPPING

Two monofilament harp traps were set for two nights giving a total of 4 harp trap nights within the site. The harp trapping was undertaken in order to sample the use of the site by sub-canopy microchiropteran bat species, such as *Nyctophilus corbeni* (Corben's Long-eared Bat). The traps were positioned in a potential flyway and were checked early each morning. The location of harp traps is shown in Figure I.1.

1.3.3 MICROCHIROPTERAN BAT CALL SURVEY

Bat echo-location calls were recorded using an Anabat detector in areas which were considered likely to be used by bats. These positions were selected to sample potential hunting sites for bats, including flyways, clearings and ecotones. Echolocation surveys used a combination of set point and hand-held mobile surveys. Mobile Surveys were conducted for 2.5 hours (150 minutes) over two nights. Stationary call activated microchiropteran bat detection were also undertaken from dawn to dusk for two nights. The transformed calls were analysed using an Anabat V Zero Crossing Analysis Interface feeding into a computer and identified by comparison with sample bat calls. The bat calls



Job Ref	12269
A4 Scale	1:20,000

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

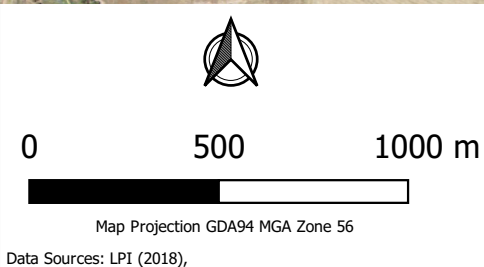


Figure: I.1

Survey Effort Map

McRaes Road
Goolgowi, NSW

6 December 2018

WILDTHING
Environmental Consultants
(a Division of Tattersall Lander Pty Ltd)
ABN 41 003 509 215

recorded by Wildthing Environmental Consultants were analysed in-house by Mungo Worth. The location of the bat call surveys is shown in Figure I.1.

1.3.4 AMPHIBIAN SURVEY

The amphibian survey included a combination of diurnal and nocturnal census methods. Diurnal searches were undertaken for two half-person hour periods. Systematic searches involved searches within appropriate habitat for basking or sheltering individuals. Appropriate cover such as logs was turned over for resting individuals. Nocturnal surveys were undertaken for two person hours. The surveys were undertaken in suitable habitat and involved listening for the characteristic call of male frogs. Playback of frog calls was undertaken in an attempt to elicit a response from threatened amphibian species in particular *Litoria raniformis* (Southern Bell Frog) and *Crinia sloanei* (Sloane's Froglet). Frog searches were also augmented by recording any frog calls heard within the site. The location of the amphibian surveys is shown in Figure I.1.

1.3.5 REPTILE SURVEY

Searches for reptiles involved a combination of diurnal and nocturnal searches. Diurnal searches for reptiles involved searching in likely habitat (i.e. leaf litter, dead logs and long grass) during the morning and afternoon survey period. Nocturnal searches were conducted for reptile species active at night such as geckos and some species of snakes and involved searching in likely habitats with the aid of a spotlight. The location of the reptile surveys is shown in Figure I.1.

1.3.6 DIURNAL AVIFAUNA SURVEY

The diurnal avifauna survey involved transects targeting potential habitat within the site for species such as *Daphoenositta chrysoptera* (Varied Sittella), *Pomatostomus temporalis temporalis* (Grey-crowned Babbler) and *Climacteris picumnus victoriae* (Brown Treecreeper). Surveys were conducted at peak activity periods (i.e. dawn and dusk) for three periods for half an hour. A total of 2.0 hours of targeted diurnal bird surveys were undertaken. Incidental observations and secondary indications (i.e. distinctive feathers and nests) of avifauna were also recorded. The location of the diurnal avifauna surveys is shown in Figure I.1.

1.3.7 NOCTURNAL AVIFAUNA AND MAMMAL CALL PLAYBACK SURVEY

During the nocturnal avifauna and mammal survey pre-recorded calls of *Ninox connivens* (Barking Owl), *Tyto novaehollandiae* (Masked Owl), *Burhinus grallarius* (Bush Stone-curlew) and *Pedionomus torquatus* (Plains Wanderer) were broadcast through an amplification system designed to project the sound for at least 1km under still night conditions. An initial listening period of 10 minutes was undertaken, followed by 5 minutes of calls (repeated in four different directions). A period of two minutes of quiet listening was then employed after each 5-minute bracket of calls. At the conclusion of the call playback survey, spotlighting was carried out in the vicinity of the call playback site. The location of the nocturnal avifauna and mammal call playback surveys is shown in Figure I.1.

1.3.8 SPOTLIGHTING SURVEY

Spotlighting was undertaken over two nights on foot and by vehicle using 100watt hand-held spotlights. The spotlighting undertaken was completed by two persons and involved moving at a slow pace around the study area and stopping every 2 minutes, allowing the observer to hear movements of animals. A total of 8-person hours of spotlighting was conducted during the survey. The location of the spotlighting surveys is shown in Figure I.1.

1.4 DATE, TIMES, ACTIVITIES & WEATHER CONDITIONS

A summary of the time spent on site during fieldwork and the prevailing weather conditions at the time is contained below in Table 1.2.

Table 1.2: Date, time, activities and weather conditions of the survey.

DATE	TIME (24HR)	SURVEY EFFORT (EXPRESSED IN PERSON HOURS)	ACTIVITY	WEATHER
Monday 12/12/16	1630-1815	3.5 (two persons)	Site inspection Tree survey Incidental observations	1/8 cloud, 34°C, WSW 13km/h
	2000-2230	6 (two persons)	Elliott trap deployment Set harp trap Bat call survey (dawn – dusk) Spotlighting survey Amphibian Survey	1/8 cloud, 25°C, Calm, 7/8 moon
Tuesday 13/12/16	0530-0630	2 (two persons)	Check traps Harp trap and Anabat retrieval Avifauna survey	0/8 cloud, 14°C, Calm
	0745-1230	4 (two persons)	Reptile survey Tree survey & vegetation surveys Vegetation survey Water quality measurements	1/8 cloud, 23 °C, N 7km/h
	1545-1745	4	Set harp trap Avifauna survey Amphibian Survey Bat call survey	7/8 cloud, 35°C, WNW 37km/h
	1900-2200	4	Spotlighting survey	6/8 cloud, 35°C, WNW 24km/h
14/12/16	0520-1850	3 (two persons)	Check traps Harp trap and Anabat retrieval Avifauna survey	8/8 cloud, 20°C, Calm
	0830-1200	7	Vegetation survey and mapping Reptile survey Water quality measurements and surveys within Channel	8/8 cloud, Light rain, 21°C, WSW 20km/h
	1530-1845	6.5	Vegetation survey and mapping	7/8 cloud, 27°C, NNW 22km/h
15/12/16	0500-0800	3.0	Check traps and trap retrieval Avifauna survey Vegetation survey	4/8 cloud, 21°C, Calm

2.0 RESULTS

2.1 FLORA SURVEY

The majority of the site has been developed for agricultural purposes with approximately 560ha of the 615ha site was found to be utilised for broad scale cropping. Despite the disturbance remnant patches of native vegetation were present around parts of the periphery of the site. A total of two Plant Community Types (PCT's) were delineated on site. The delineation of these vegetation communities was based on structure and flora species composition. PCT's present within the site:

- PCT 57 - Belah/Black Oak - Western Rosewood - Wilga woodland of central NSW including the Cobar Peneplain Bioregion (approximately 51ha intact & 6.5ha derived);
- PCT 193 - Red Mallee - White Mallee extremely tall tree mallee on silty-loam-clay soils of central south-western NSW:

Other Vegetation that was not given a PCT consisted of areas that were dominated by non-indigenous vegetation. The Wah Wah Irrigation Channel and small man-made dams were also not assigned a PCT. Other vegetation assemblages were:

- Cultivated Crops (560ha);
- Aquatic Vegetation;
- Disturbed Roadside Vegetation.

A total list of flora species recorded within the site is contained in Appendix B.

2.2 FAUNA APPRAISAL RESULTS

A full list of fauna species observed during the survey is contained in Appendix F.

2.2.1 SMALL TERRESTRIAL MAMMAL TRAPPING

During this component of the survey one species of mammal, the introduced *Mus musculus* (House Mouse) was captured. The results of the small terrestrial mammal survey are shown in Table 2.1.

Table 2.1: Small Terrestrial Mammal Trapping Results.

DATE	TRAP NO	SPECIES	SEX
Trapping period 12 – 15 April 2013			
Wednesday 14/12/16	T7	<i>Mus musculus</i> (House Mouse)	Female
Thursday 15/12/16	T15	<i>M. musculus</i>	Male

2.2.2 HARP TRAPPING

During the harp trapping component of the survey no specimens were captured.

2.2.3 MICROCHIROPTERAN BAT CALL DETECTION

Three species of microchiropteran bat, *Chalinolobus gouldii* (Gould's Wattled Bat), *Chalinolobus picatus* (Little Pied-bat) and *Scotorepens balstoni* (Inland Broad-nosed Bat) were positively identified during the bat call survey. A number of calls attributed to the Genus *Nyctophilus* were likely to be either

N. geoffroyi (Lesser Long-eared Bat), *N. gouldi* (Gould's Long-eared Bat) or the threatened *Nyctophilus corbeni* (Corben's Long-eared Bat). Calls attributed to the Genus *Vespadaus* were likely to be either *Vespadelus darlingtoni* (Large Forest Bat), *Vespadelus regulus* (Southern Forest Bat) or *Vespadelus vulturnus* (Little Forest Bat).

Chalinolobus picatus is listed as vulnerable under the TSC Act (1995).

2.2.4 AMPHIBIAN SURVEY

Only one species of frog *Limnodynastes fletcheri* (Barking Frog) was recorded within the site during the survey. The species was recorded within Wah Wah Channel.

This amphibian species is not listed as threatened according to State or National legislation.

2.2.5 REPTILE SURVEY

Five species of reptile were identified within the study area during targeted and incidental surveys: *Gehyra variegata* (Common Dtella), *Pogona barbata* (Bearded Dragon), *Cryptoblepharus pannosus* (Ragged Snake-eyed Skink), *Egernia striolata* (Tree Skink) and *Morethia boulengeri* (Boulenger's

Skink). Specimens of *C. pannosus* and *E. striolata* were observed on a number of trees containing hollows or cracks. One specimen of *P. barbata* was observed in the north of the site within the area of Red Mallee Woodland. Specimens of *M. boulengeri* were found to be common within the understorey within areas of woodland. A number of specimens of *G. variegata* were recorded on trees during the spotlighting survey.

None of these reptile species are regarded as threatened according to State or National legislation.

2.2.6 DIURNAL AVIFAUNA SURVEY

An array of avifauna species was found to be present within the various habitats across site.

Within the Woodland areas avifauna species commonly encountered included *Malurus cyaneus* (Superb Fairy-wren), *Corcorax melanorhamphos* (White-winged Chough), *Todiramphus sancta* (Sacred Kingfisher), *Nymphicus hollandicus* (Cockatiel), *Philemon corniculatus* (Noisy Miner) and *Myiagra inquieta* (Restless Flycatcher).

Common species observed within the cropping/grassland areas included *Rhipidura leucophrys* (Willy Wagtail), *Grallina cyanoleuca* (Magpie Lark), *Vanellus miles* (Masked Lapwing), *Anthus novaeseelandiae* (Australasian Pipit) and *Ocyphaps lophotes* (Crested Pigeon).

Species encountered along the Wah Wah Channel included *Anas superciliosa* (Pacific Black Duck), *Egretta novaehollandiae* (White-faced Heron) and *Acrocephalus stentoreus* (Clamorous Reed Warbler).

Birds of prey recorded included *Haliastur sphenurus* (Whistling Kite), *Elanus axillaris* (Black-shouldered Kite), *Falco cenchroides* (Australian Kestrel) and *Circus assimilis* (Spotted Harrier).

Two threatened avifauna species *Circus assimilis* (Spotted Harrier) and *Pomatostomus temporalis* (Grey-crowned Babbler) are listed as vulnerable under the state legislation.

All birds observed within the study area during this and the previous surveys are indicated in the Vertebrate Species List contained in Appendix F.

2.2.7 NOCTURNAL AVIFAUNA SURVEY

Podargus strigoides (Tawny Frogmouth) was spotlight and also observed and heard calling from within the site. *Aegotheles cristatus* (Australian Owlet Nightjar) was also recorded within woodland habitat during the spotlighting survey.

None of these nocturnal avifauna species are regarded as threatened according to State or National legislation.

2.2.8 SPOTLIGHTING SURVEY

A small number of *Trichosurus vulpecula* (Common Brushtail Possum) were recorded within Belah Woodland in the far south-west corner of the site. *Macropus giganteus* (Eastern Grey Kangaroo) was also observed during spotlighting. The introduced species *Oryctolagus cuniculus* (European Rabbit), *Lepus capensis* (European Hare) and *Vulpes vulpes* (Red Fox) were also recorded during the spotlighting survey.

No listed threatened mammal species were recorded during the survey.

2.2.9 INCIDENTAL OBSERVATIONS AND SECONDARY INDICATIONS

A number of incidental observations and secondary indications of fauna were observed during the survey and included:

- A small number of diggings attributed to *Tachyglossus aculeatus* (Echidna) were found on the side of some ant nests within woodland areas.
- A number of specimens of *Macropus giganteus* (Eastern Grey Kangaroo) and likely *Macropus fuliginosus* (Western Grey Kangaroo) were observed within the site;
- *Vulpes vulpes* (Red Fox) was observed within the site on a number of occasions;
- Diggings and scats belonging to *Oryctolagus cuniculus* (European Rabbit) were common within the site.

The occurrence of the Red Fox and European Rabbit are listed as a Key threatening processes under the NSW Threatened Species Conservation Act, 1995.

2.2.10 SURVEY LIMITATIONS

As with all reports of this type the main survey limitation is considered to be the short period of time in which the fieldwork was carried out during one season. Limitations to the likelihood of detecting certain subject species were also encountered during this survey. Such limitations were generally related to the seasonal detectability of species, be it as a result of known flowering periods for flora or migratory movements by fauna. Another pertinent limitation was the dry hot weather experienced at

the time of the survey, which may have had an impact on the diversity of species recorded within the site.

These limitations have been overcome by applying the precautionary principle in all cases where the survey methodology may have given a false negative result. This precautionary principle was achieved by recognising that most threatened species are rare and therefore unlikely to be encountered during a survey even if they may utilise the site at other times. These species have been assessed on the basis of the presence of their habitat and the likely significance of that habitat to a viable local population.

3.0 BIBLIOGRAPHY

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- Triggs, B. (1996). *Mammal Tracks and Signs-A Field Guide for South-eastern Australia*. Oxford University Press, Melbourne.
- Tyler, M.J. (1992). *Encyclopedia of Australian Animals-Frogs*. Angus & Robertson, Sydney.
- Van Dyck, S. & Strahan, R. (Ed) (2008). *The Mammals of Australia* (3rd edn). Reed New Holland, Australia.

APPENDIX J

EXPERIENCE AND QUALIFICATIONS

Since its inception in 1993, **WILDTHING Environmental Consultants** have undertaken a diverse range of studies over a wide geographic range from southern Sydney through to south-eastern Queensland and the western plains of New South Wales. All of these studies have satisfied the relevant Local Council, State Government and Commonwealth Government legislation and assessment guidelines in accordance with the project specifications.

Curriculum Vitae

Name: Daryl Harman

Position: Senior Ecologist

Qualifications: **Bachelor of Applied Science, (Environmental Science).** Charles Sturt University Wagga Wagga. 1994-1997.
Certificate II in Bushland Regeneration, North Wagga TAFE, 1998.
Accredited BioBanking Assessor under the NSW Threatened Species Conservation Act 1995.

Fields of Competence:

- Flora and Fauna Impact Assessments
- Field Surveys involving Flora, Fauna and Habitat identification
- Ecological Constraints Assessments
- Environmental Management Plans
- Habitat Tree Identification and Clearance Supervision
- Nest Box Management Plans, Installation and Monitoring
- Geographic Information System Mapping
- Aquatic Fauna Surveys
- Plant identification.
- Fauna identification including invertebrates

Licences and other

- Scientific Investigation Licence, NSW National Parks and Wildlife Service.
- NSW Drivers Licence, Class C.
- Current with Lyssa virus injections.
- Current Whitecard to work on construction sites.
- Working at Heights card.

PROFESSIONAL EMPLOYMENT AND EXPERIENCE

Wildthing Environmental Consultants, Newcastle (2002–Present) -Ecologist

Details of work carried out:

- Assessments on Flora and Fauna including invertebrates
- Species Impact Statements
- Biobanking Reports
- Seven Part Test Assessments for Flora and Fauna.
- Environmental Management Plans.
- Environmental Mine Monitoring.
- Bushfire Protection and Attack Assessments.
- Habitat Tree Felling Supervision
- Nest Box installation, monitoring & maintenance.
- Aquatic Fauna Surveys

Total Earth Care Pty. Ltd Warriewood NSW (2001 – 2002) - Bush Regenerator. Working around various sites in the Greater Sydney area.

Johnstone Centre, Charles Sturt University, Wagga Wagga, NSW - August & October 2001
Casual Technician (Flora and fauna surveys)

Charles Sturt University, Wagga Wagga NSW, Science and Technology (April 1999 – March 2001) Casual Technical Officer.

NSW Department of Agriculture, Wagga Wagga - Casual Regulatory Officer/Casual Farm Assistant (1998).

Greening Australia, Wagga Wagga, NSW (November/December 1998) Casual Technical Officer (Roadside Flora Surveys).

Charles Sturt University, Wagga Wagga NSW, Science and Technology (November/December 1997) - Casual Technical Officer

Australian Army (1992 – 1997) - Infantry Soldier, Ready Reserve Scheme

Certificates/Short Courses

- Threatened Invertebrate Workshop (Snails, Dragonflies, Beetle, Moths & Butterflies. Dr Chris Reid & Dr Frank Koehler - Australian Museum, Sydney. Ecological Consultants Association of NSW. 22 June 2017.
- Shorebird Identification and Assessment Workshop. Ecological Consultants Association of NSW. Course Leader - Phil Straw. 20 April 2015.
- BioBanking & Biodiversity Certification Assessor Accreditation Training Course 4 - 8 August 2014.
- Snail Workshop - Australian Botanic Garden, Mount Annan. Presented by Dr Stephanie Clark, Director of Invertebrate Identification Australia. 24 January 2013.
- Statement of Attainment - Apply First Aid (HLTFA311A - Allens Training 28 September 2012.
- Eucalypts of the Sydney Region. Eucalypt identification workshop with Van Klaphake. CECAL Hall, Earlwood. (10 & 11 July 2010).
- HLTFA301B Apply First Aid (17 September 2009).
- Safe Working at Heights Statement of Attainment (August 2008) Combined Safety Services, Adamstown NSW. BCPRF2001A.
- Sedges and Rushes of Sydney and the Blue Mountains –Van Klaphake. Marrickville, Sydney. (21 & 22 May 2005).
- Workshop on the Translocation of Threatened Plants. June 2004 - Royal Botanic Gardens Sydney.
- Community Greening Volunteer. – Newcastle City Council. 30 August 2003 - Induction Training Module.
- 25 March 2002 – Occupational Health and Safety, Induction Training for Construction Work. General course under the Occupational Health and Safety Regulation 2001. Work Cover NSW. Course completed to work on worksites.
- Identification of Coleoptera from the Australo-Pacific Region - CSIRO Canberra. (10 - 16 December 2001).
- 13th Taxonomic Workshop: Hirudinea, Lepidoptera, Mollusca, Nematoda, Odonata and Plecoptera. Lake Hume Resort. 12 – 13 February 2001.
- Certificate II in Bushland Weed Control, North Wagga TAFE, 1998.
- Chainsaw Operations - North Wagga TAFE - 1998.
- Wildlife Management – A subject through Charles Sturt University, Thurgoona Campus, Albury NSW. Summer Break 1997.
- Shearing Shed Hand - College Statement Wagga Wagga TAFE 1989.

Memberships

- Australian Association of Bush Regenerators. - Accredited Member
- Ecological Consultants Association of NSW - Full Practicing Member

Name: Mungo Worth

Position: Manager/Ecologist

Qualifications: BioBanking & Biodiversity Certification Assessor
Accreditation Training Course 4 - 8 August 2014.

Fields of Competence:

- Flora and Fauna Impact Assessments
- Field Surveys involving Flora, Fauna and Habitat identification
- Ecological Constraints Assessments
- Environmental Management Plans
- Bushfire Protection and Attack Assessments
- Habitat Tree Identification and Clearance Supervision
- Nest Box Management Plans, Installation and Monitoring
- Plant identification
- Fauna identification

Licences and other:

- Scientific Investigation Licence, NSW National Parks and Wildlife Service
- NSW Drivers Licence, Class C
- Current with Lyssa virus injections
- Current Whitecard to work on construction sites

Professional Employment and Experience:

Wildthing Environmental Consultants:

- Salt Ash, NSW (1995 – 2001, 2003 – 2004)
- Burleigh Heads, QLD (2002 – 2003)
- Wallsend, NSW (2005 – Present)

(1995 – Present) – Bat call analyst

(1995 – 1997) – Technical Assistant / Junior Ecologist

(1997 – 2004) - Ecologist

(1999 – 2001) – Training Officer

(2002 – 2003) – Queensland Projects Manager

(2004) –IT officer

(2005 – Present) – Manager / Ecologist

Details of work carried out:

- Assessments on Threatened Flora and Fauna
- Species Impact Statements – Fieldwork, Report Writing
- Seven Part Test Assessments for Flora and Fauna
- Environmental Management Plans
- Environmental monitoring
- Bushfire Protection and Attack Assessments
- Habitat tree clearance supervision and fauna rescue
- Nest Box installation, monitoring & maintenance
- Plant identification
- Fauna identification

Certificates/Short Courses:

- HLTFA301B Apply First Aid (17 September 2009).
- Safe Working at Heights Statement of Attainment (August 2008) Combined Safety Services, Adamstown NSW. BCPRF2001A.
- 25 March 2002 – Occupational Health and Safety, Induction Training for Construction Work. General course under the Occupational Health and Safety Regulation 2001. Work Cover NSW. Course completed to work on worksites.

Memberships:

- Australasian Bat Society.

RESUME – KYLIE BRIDGES

Personal details

FULL NAME: Dr. Kylie Louise Bridges (nee Dixon) B Env Sc, PhD
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DATE OF BIRTH: 03/02/1985

Employment History Summary

Employer: **Wildthing Environmental Consultants**
2014-Present Marine and Terrestrial Ecologist

Employer: **University of Technology, Sydney**
2010-2014 PhD scholarship student in Marine Biology.
See Education Highlights for further information

Employer: **Umwelt Environmental Consultants**
2010 Contractor – *Polychaete taxonomist*

Employer: **University of Newcastle**
2009-2010 Laboratory demonstrator – *Teaching 2nd Year course 'Ecology'*

Employer: **University of Newcastle**
2009 Laboratory demonstrator – *Teaching 3rd Year course 'Environmental Biology'*

Employer: **University of Newcastle - Ecotoxicology and Ecology Laboratory**
2008-2009 Research Officer and Benthic Ecologist - *specialising in polychaete and other benthic fauna identification and ecology*

Employer: **Australian Museum – Marine Invertebrates Department**
2008 Technical Officer – *Assisted in the review of the polychaete family Ampharetidae for scientific publication*

Employer: **Hunter- Central Rivers Catchment Management Authority (HCRCMA)**
2005 – 2006 Assistant WaterWatch Coordinator – *Teaching water quality testing protocol and freshwater ecology*

Employer: **University of Newcastle - Microbiology Laboratory**
2005 Laboratory technician – *Bluescope Steel Water Tank Project*

Education Highlights

- 2014 Publication: Dixon-Bridges, K.; Gladstone, W. & Hutchings, P. (2014). One new species of *Micronephthys* Friedrich, 1939 and one new species of *Nephtys* Cuvier, 1817 (Polychaeta: Phyllodocida: Nephtyidae) from eastern Australia with notes on *Aglaophamus australiensis* (Fauchald, 1965) and a key to all Australian species. *Zootaxa*, **3872**(5): 513-540.
- 2014 Publication: Dixon-Bridges, K., Hutchings, P. & Gladstone, W. (2014) Effectiveness of habitat classes as surrogates for biodiversity in marine reserve planning. *Aquatic Conservation: Marine and Freshwater Ecosystems*, **24**(4): 463-477.
- 2010-2014 PhD in Marine Biology at the University of Technology, Sydney in association with the Marine Parks Authority, Fisheries and the Australian Museum. My thesis examined the effectiveness of the current conservation zoning system of the Port Stephens-Great Lakes Marine Park (PSGLMP) and devised a more efficient and cost effective protocol for future use, examined polychaete biodiversity associated with a rare soft-coral habitat within the PSGLMP in order to employ a no-anchor zone for conservational purposes, discovered and described three new species of polychaete, and examined conservation value on a temporal scale within the estuarine environment
- 2010 Presented at the International Polychaete Conference, Lecce, Italy
- 2009 Various public seminars at the Australian Museum detailing my PhD project
- 2007 Honours work featured in the FRDC (Fisheries Research and Development) Magazine and AMSA (Australian Marine Science) Bulletin
- 2007 Won Fisheries Research Development Corporation Best Poster Presentation Prize at the Australian Marine Science Association Conference
- 2006-2007 1st Class Honours in Biology assessing polychaete assemblage condition below pearl farms on the Kimberley coast in Western Australia in association with Paspaley Pearls, Cygnet Bay Pearls, Fisheries Research Development Corporation and Pearl Producers Association

Referees

Professor William Gladstone
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Education

Macquarie University

Master of Environment
Specialisation in Environmental Science
Commenced 2014

University of Newcastle

Bachelor of Environmental Science and Management
Major in Physical Systems
2009 – 2011

Professional Development

December 2014 - Present Ecologist - Wildthing Environmental Consultants

- Environmental consulting and flora/fauna surveys.
- Preparation of reports including Flora and Fauna Assessment on a variety of projects electricity, infrastructure and residential projects.
- Preparation of Koala Plan of Management reports.
- Using a number of animal traps including Elliott traps, harp traps, pitfalls, hair tubes, Anabats, camera traps and glider tubes.
- Performing hollow-bearing tree assessments.
- Vegetation and habitat mapping.
- Supervision of tree clearings.

April 2013 – January 2015 Ecologist - SLR Consulting

- Environmental consulting and flora/fauna surveys.
- Using a number of animal traps including Elliott traps, harp traps, pitfalls, hair tubes, Anabats, camera traps and glider tubes.
- Vegetation and habitat mapping
- Preparing reports including Flora and Fauna Assessment and Koala Plan of Management reports.

September 2014 – December 2014 Environmental Scientist - Hazchem Pty Ltd

- Investigation of contaminated sites including Phase 1 and Phase 2 assessments
- Field work investigating contaminated sites including soil and water sampling.
- Data analysis and preparation of reports for contaminated sites.

October 2013 – October 2014 Environmental Scientist - Tom Farrell Institute for the Environment

- Assisting with research, compiling environmental information and reporting on a variety of projects.
- Use of GIS programs for analysis of data.
- Involved in water quality monitoring projects for Port Stephens Council, Newcastle City Council and Caring for Our Country.
- Taking measurements for surface water and groundwater flow and testing water quality.

October 2010 – June 2014 Surveyor's Assistant - Richard Hutchison Surveying

- Assisting the surveyor set up technical equipment and taking measurements using a theodolite and manual measuring devices.
- Assessing land features, marking boundaries using pegs, stakes and strings and clearing vegetation and obstructing features.

Additional Qualifications

- NSW Construction Induction card
- Apply First Aid certificate
- NSW Driver's Licence

Referees

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Ben Ellis
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0428679134

Employment History

Ecologist (Accredited BAM Assessor)/GIS Technician Wildthing Environmental Consultants, Newcastle NSW (April 2018 - present)

- Biodiversity offset strategies
- BDAR & BSSAR assessments under the BAM methodology
- Flora and fauna identification
- Ecological assessments – small site and major infrastructure:
- Field survey design
- Vegetation mapping
- Scoping and proposals
- Ecological monitoring
- Data management
- GIS analysis and figure preparation
- Supplying strategic ecological advice for a range of stakeholders

Ecologist ERM Pty Ltd, Newcastle NSW (August 2017 - March 2017)

- Rapid Field Surveys
- Flora and fauna identification
- Vegetation mapping
- Ecological assessment: small sites and major infrastructure: NSW
- Client communication and correspondence

Ecologist Wildthing Environmental Consultants, Newcastle NSW (February 2012–March 2015)

- Ecological assessment: small sites and medium sized infrastructure: NSW
- Flora and fauna identification
- Fauna sampling techniques including, harp traps, pitfall traps, Elliot trapping
- Habitat tree identification and clearance supervision: small sites and medium sized infrastructure
- Client communication and correspondence

Education

- **Newcastle University** (2008-2011) – Bachelor of Environmental Science and Management (Living Systems)

Key Skills

Environmental Management, Planning and Legislation

- Demonstrated knowledge of relevant conservation and planning legislation:
 - *Environmental Planning and Assessment Act 1979* (EP&A Act)
 - *Biodiversity Conservation Act 2016* (BC Act) and regulations
 - *Biodiversity Assessment Method* (2017) and ancillary rules
 - *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
 - *Local Land Services Amendment Act 2016* (LLS Act) and regulations
 - *Vegetation in non-rural areas SEPP* and other SEPPs relating to impacts on environmental matters i.e. SEPP 14, SEPP 44, SEPP 26
- Effective communication, liaison and project management skills with respect to environmental planning, impact assessment, management and site activities.

Flora & Fauna Sampling

- Experienced in the ecology of flora and fauna including threatened species, communities and their habitat
- Skilled in the survey and identification of a wide range of flora and fauna, particularly in NSW

- Demonstrated use of sampling methods for fauna: Elliott traps, cage traps, pitfall traps, harp traps, spotlighting, playback for nocturnal avifauna, active searches for frogs and reptiles, mist nets, hair tubes and the use of Anabat and SongMeter bat detectors.

Information Technology

- Trained in the use of the BAM tools and software including interpretation of Biodiversity Values Map (BVM), Native Vegetation Regulatory Map (NVRM), BAM Calculator and BioNet Power Queries
- Demonstrated use of in-house and field sampling/analysis tools
- Skilled use of GIS Software including MapInfo, ArcGIS & QGIS
- Skilled in a range of literature search engines (internet, catalogues, libraries and databases)
- Fast and accurate keyboard skills, data input, report formatting and data analysis

Project Management, Reporting and Peer Review

- Demonstrated ability to prepare and review reports
- Excellent written and verbal communication skills: report writing, presentations and client liaison
- Highly developed critical and analytical abilities
- Experienced at quoting for large and small scale projects including budgeting, preparing delivery timelines and managing resourcing
- Experienced at using project management tools and software including Gantt Charts, Smartsheet and Microsoft Project
- Ability to work unsupervised, as part of a team and as a project leader
- High skilled in providing strategic advice and effective communication of project details
- High level organisational and time-management skills

Certifications and Other

- Current Lyssa virus and tetanus inoculations
- CU19958886 WH&S white card (Construction Sites)
- HLTFA301B senior first aid certificate (2017).
- BCPRF2001A safe working at heights certificate (2013)
- Drive and recover a 4WD vehicle certified (2017)
- Baseline defence clearance for Australian military sites (2018)
- Venomous snake rescuer certified (2018)