

Appendix C

BIODIVERSITY ASSESSMENT



Goonumbla Solar Farm, NSW Biodiversity Assessment Report

FINAL REPORT

Prepared for Geolyse on behalf of Renewable Energy Developments

14 September 2016

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Glossary

Assessment circles	Two circles (the inner and outer assessment circle) in which the percent native vegetation cover in the landscape is assessed, taking into account both cover and condition of vegetation (OEH 2014).
BA	Birds Australia
DoEE	Commonwealth Department of the Environment and Energy
DCDB	Land and Property Information(LPI) digital cadastral database
DPE	NSW Department of Planning and Environment
DPI	Department of Primary Industries
DTDB	Digital topographic databases
Ecosystem credit species	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development.
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FBA	NSW Framework for Biodiversity Assessment
GSF	Goonumbla Solar Farm
HBT	Hollow Bearing Tree
LEP	Local Environment Plan
Locality	Area located within 10 kilometres radius from the study area
LPI	NSW Land and Property Information
Matters for further consideration	Impacts that are considered to be complicated or severe that will require further consideration by the consent authority (OEH 2014). The assessment is based on thresholds detailed in Section 9 of the FBA. These can also be included as part of the project SEARs.
Matters of NES	Matters of National Environmental Significance protected by a provision of Part 3 of the EPBC Act
NV Act	NSW <i>Native Vegetation Act 2003</i>
NW Act	NSW <i>Noxious Weed Act 1993</i>
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
PSF	Parkes Solar Farm
PV	Photovoltaic panels

RED	Renewable Energy Developments Pty Ltd
RoTAP	Rare or Threatened Australian Plant
SEARs	Secretary's Environmental Assessment Requirements
SEPP 44	NSW State Environmental Planning Policy No. 44 – Koala Habitat Protection
SIS	Species Impact Statement
SSD	State Significant Development
study area	The broader area in which the subject site is located, including all direct and indirect impacts
subject site	The area of direct impact for the proposed works including some farm dams to be filled
Tg value	The ability of a species to respond to improvement in site value or other habitat improvement at an offset site with management actions.
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i>
VIS	NSW Vegetation Information System
WM Act	Water Management Act 2000

Summary

Biosis Pty Ltd was commissioned by Geolyse to prepare a Biodiversity Assessment Report in support of a proposal for the Goonumbla Solar Farm (the project). The proposed solar farm development will involve the installation of an array of photovoltaic panels (PV) within the subject site. The site is located approximately 10 kilometres west of and is accessible via the Henry Parkes Way, Millers Lookout Road and Pat Meredith Drive (Figure 1). The study area occupies predominately flat, agricultural land with remnant native vegetation restricted to isolated patches within paddocks, along roadsides and farm tracks, and a larger patch associated with Millers Lookout in the east of the study area.

The subject site is defined as the maximum area to be impacted by the proposal. The study area is defined as the subject site plus the immediately surrounding land investigated during the field surveys. Both the subject site and study area are shown in detail on Figure 2.

Ecological values

Key ecological values identified within the study area (Figure 4) include:

- 55.54 hectares of native vegetation identified as LA152 Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion (PCT82).
 - This vegetation equates to Inland Grey Box Woodland listed as an endangered ecological community under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Threatened Species Conservation Act 1995* (TSC Act).
- 72 hollow bearing trees across the study area.

Impact avoidance, minimisation and mitigation

The final footprint of the solar farm infrastructure was refined through consideration of the findings of previous site investigations and identification of constraints and opportunities mapped through the environmental impact assessment process, with the intent of maximising the built footprint over the development site while avoiding impact on the ecological values present on the site (Figure 2).

Measures to avoid and minimise impacts to vegetation were considered during the planning stage of the project. This has resulted in the layout of the GSF avoiding all direct impacts to the identified values. As a result, no removal of native vegetation will be required.

Biodiversity offsets will not be required for this development because the project will not result in any impacts to native vegetation or habitat for threatened species or populations mapped in the subject site.

Stage 1 – Biodiversity assessment

1 Introduction

1.1 Project background

Biosis Pty Ltd was commissioned by Geolyse, on behalf of Renewable Energy Developments (RED), to undertake a biodiversity assessment of the subject site and broader study area for the proposed Goonumbla Solar Farm (Figure 1).

The project will be assessed under Section 89C of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) as State Significant Development (SSD 7532) and Secretary's Environmental Assessment Requirements (SEARs) were issued by the NSW Department of Planning and Environment (DPE) on 16 May 2016, including Agency Comments from the NSW Office of Environment and Heritage (OEH) that are relevant to this assessment. The SEARs require that biodiversity impacts related to the proposed development are to be assessed and documented in accordance with the NSW Biodiversity Offsets Policy for Major Projects (OEH 2014a) and *Framework for Biodiversity Assessment* (FBA) (OEH 2014b) by an appropriately accredited person.

All biodiversity assessment has been undertaken in accordance with the FBA. This report has therefore been prepared by Accredited BioBanking Assessor Nathan Garvey.

1.2 Development proposal

Goonumbla Solar Farm Pty Ltd, a wholly owned subsidiary of RED, is proposing to develop a solar Photovoltaic (PV) farm at Parkes. Hereafter this development is referred to as the Goonumbla Solar Farm (GSF). The proposed GSF will involve the installation of an array of photovoltaic panels (modules) within the site. The PV farm is proposed to include an estimated 214,000 modules, although the precise module count will be dependent upon the specific PV technology selected. The ultimate decision for the module type and racking system will be dependent upon availability and market conditions at the time of procurement (Geolyse 2016b).

A small control room will include facilities and car parking to allow for occasional maintenance staff. Site access tracks will provide all weather access as required. The farm may also include an electrical storage system which would include batteries that would be housed in electrical enclosures approximately the size of a shipping container (Geolyse 2016b).

The construction stage is estimated to take up to 12 months. The site is expected to require minimal preparation in advance of installing the PV panel system as it is flat and largely devoid of vegetation. A security fence will be installed on the site boundary and construction tracks will be laid down if required.

Construction will require the use of bull dozers, water trucks, graders, flatbed trucks, skid steers, front end loaders, roller compactors, trenchers, backhoes, gravel trucks, water tankers, cranes, and aerial lifts. Deliveries of modules and other equipment will be made via flatbed trucks on the approved route and site entrance.

The final footprint of the solar farm infrastructure was refined through consideration of findings as a result of previous site investigations and identification of constraints and opportunities mapped through the environmental impact assessment process, including biodiversity. The intent, however, is to maximise the built footprint over the development site while avoiding impact on the ecological values present on the site (Figure 2).

The subject site is defined as the maximum area to be directly impacted by the proposal. The study area is defined as the subject site plus the immediately surrounding land investigated during the field surveys and potentially impacted by indirect impacts. Both the subject site and study area are shown on Figure 2.

The subject site is zoned RU1 Primary Production in the Parkes Local Environment Plan (LEP). Impacts to biodiversity arising from this development are the subject of this assessment.

1.3 Site description

The 385 hectare site is located approximately 10 kilometres west of Parkes in the Central West Slopes and Plains of NSW. The site is located south of Henry Parkes Way (Condobolin Road) between Pat Meredith Drive (to the west) and Millers Lookout Road (to the east).

TransGrid's Parkes Zone Substation is located immediately adjacent to the north-west corner of the site and the recently (June 2016) approved 65 MW Parkes Solar Farm (PSF) neighbours the site to the south-west. The Parkes National Logistics Hub (Parkes Hub) is located on land immediately to the south-east. The Parkes Hub is a multi-modal transport facility strategically located at the cross roads of the Newell Highway connecting Brisbane and Melbourne, and the transcontinental railway linking the eastern seaboard to Perth (Geolyse 2016b).

The study area consists of predominately flat, agricultural land with remnant native vegetation restricted to isolated patches within paddocks, along roadsides and farm tracks (Figure 2). There are no mapped watercourses or drainage lines located within the study area, although there are a number of farm dams. Ridgey Creek, which flows into Goobang Creek, is located approximately 80 metres from the western boundary of the project area (Figure 2). RED plans to develop as much of the 'buildable' site as possible, with infrastructure proposed across 294.5 hectares of the 385 hectare site.

The study area is within the:

- NSW South Western Slopes IBRA Bioregion
- Lower Slopes IBRA Sub Region
- Lachlan Catchment
- Parkes Local Government Area (LGA).

The site is located predominantly on cleared land used for agricultural purposes, such as cropping and grazing. There are some small areas of native vegetation remaining within the site, and a hill (known as Millers Lookout) at the eastern extent of the site that is not cultivated due to outcropping rock. There is one residential dwelling within the site, located on the eastern side of Millers Lookout (Figure 2).

Currently, vegetation exists as a mix of native remnants and agricultural land as well as cleared land forming exotic grasslands. Vegetation is significantly modified through past and current land practices and weed infestations. Where present, plant communities reflect the underlying geology and soils, with areas of *Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penepplain Bioregion*.

1.4 Information sources

1.4.1 Publications and databases

In order to provide a context for the study area, information about flora and fauna from within 10 kilometres (the 'locality') was obtained from relevant public databases. Records from the following databases were collated and reviewed:

- DoEE Protected Matters Search Tool for matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- NSW BioNet - the database for the Atlas of NSW Wildlife, Office of Environment and Heritage (OEH).
- PlantNET (The Royal Botanic Gardens and Domain Trust) for Rare or Threatened Australian Plants (RoTAP).
- BirdLife Australia, the New Atlas of Australian Birds 1998-2015 (BA).
- Other sources of biodiversity information:
 - The NSW Plant Community Types, as held within the Vegetation Information System (VIS) Classification 2.1 database.
 - Relevant vegetation mapping, accessed through the OEH VIS mapping through the Spatial Information eXchange (SIX) Vegetation Map Viewer.
 - Central West / Lachlan Regional Native Vegetation Map Version 1.0 VIS ID 4358 (OEH 2015).

The following reports were also reviewed:

- Biodiversity Assessment Report: Parkes Solar Farm Biodiversity Assessment Report (NGH 2016).
- Goonumbla Solar Farm Secretary's Environmental Assessment Requirements (Geolyse 2016a.)
- Goonumbla Solar Farm Secretary's Environmental Impact Statement (Geolyse 2016b.)
- NSW Scientific Committee final determinations for threatened biota, including (but not limited to):
 - Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (NSW Scientific Committee 2007).

1.4.2 Spatial data

Aerial photography was supplied by NSW Land and Property Information (LPI) (dated 1/2/2008).

Mapping was conducted using hand-held (uncorrected) GPS units (GDA94), mobile tablet computers running Collector for ArcGIS™ and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration.

Basemap data was obtained from LPI 1:25,000 digital topographic databases (DTDB), with cadastral data obtained from LPI digital cadastral database (DCDB). Mapping of stream order was undertaken manually, using the Hydroline layer within the DTDB.

Site plans were supplied by Geolyse (drawing file 215416_03C_EV03.dwg) on 14 September 2016. Aerial photography was obtained from NearMap (date: February 2008) (Figures 3 & 4) and LPI January 2014 (Figure 2).

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

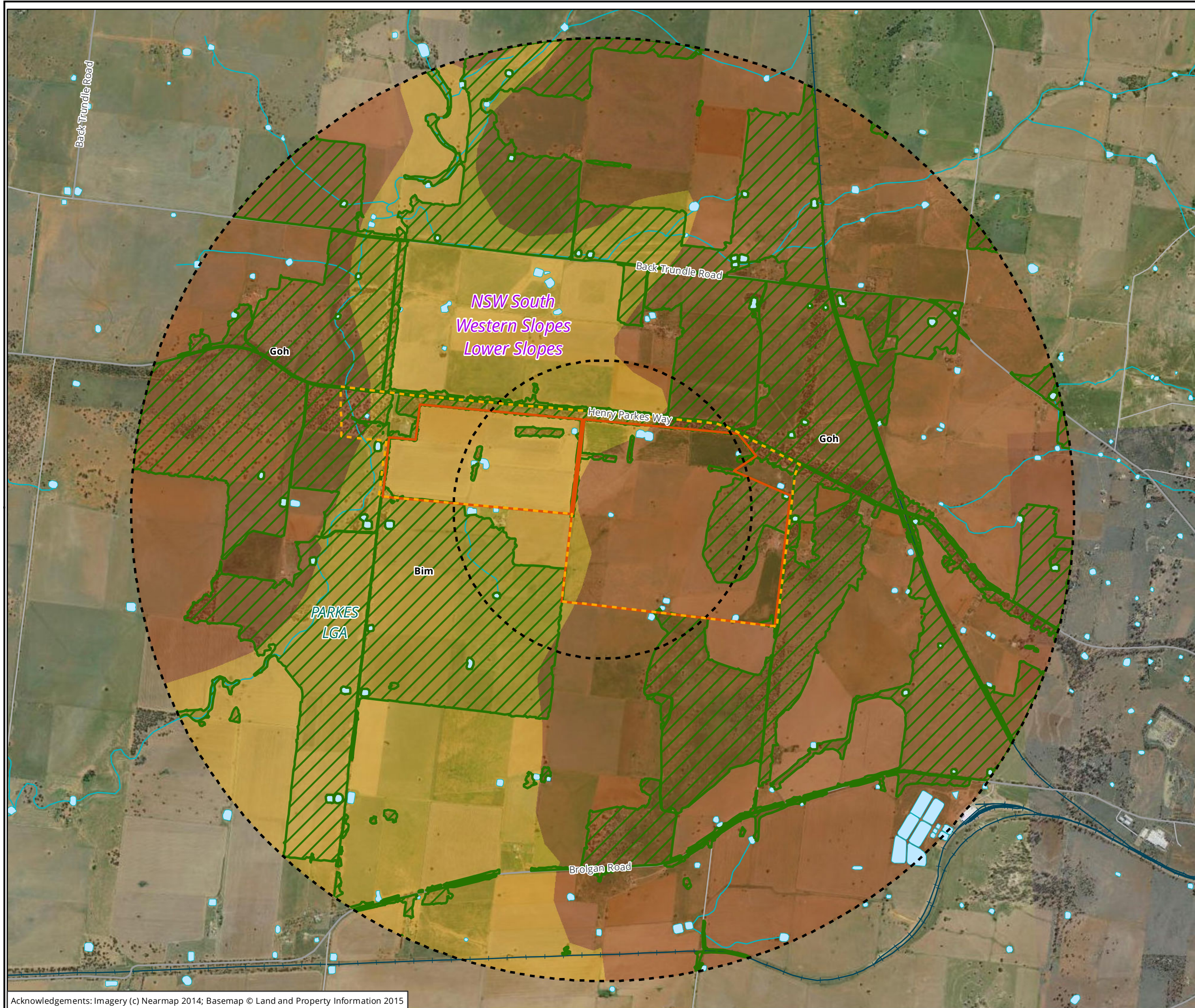
- Catchment data was obtained from the Catchment Boundaries of New South Wales dataset.
- Mitchell Landscapes Version 3.0.
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7.
- Directory of Important Wetlands (DIWA).
- State Environmental Planning Policy (SEPP) 14 Wetlands.
- Spatial data associated with Central West / Lachlan Regional Native Vegetation Map (OEH 2015).
- NSW Soil and Land Information System (SALIS).

Mapping has been produced using a Geographic Information System (GIS).

1.5 Additional legislative requirements

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

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Threatened Species Conservation Act 1995* (TSC Act)
- *Fisheries Management Act 1994* (FM Act)
- *Noxious Weeds Act 1993* (NW Act)
- Parkes Local Environment Plan 2012



- Legend**
- Study area
 - Subject site
 - Assessment circles
 - Local Government Area
 - IBRA Sub-region
 - Native vegetation extent
- Mitchell landscape v3**
- Bim, Bimbi Plains
 - Goh, Goonumbla Hills

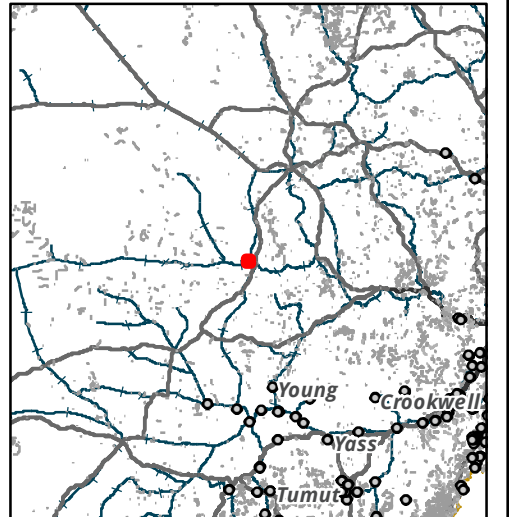
Figure 1: Location map - Goonumbla Solar Farm

0 300 600 900 1,200 1,500
Metres

Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56



Ballarat, Brisbane, Canberra, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong



Legend

- Study area
- Subject site

Strahler stream order


- 1st
- 3rd
- 4th

Stream buffers

**Figure 2: Site map -
Goonumbla Solar Farm**

0 150 300 450 600 750
Metres

Scale: 1:15,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56



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2 Legislative context

This section provides an overview of key biodiversity legislation and government policy considered in this assessment. Where available, links to further information are provided. This section does not describe the legislation and policy in detail and guidance provided here does not constitute legal advice.

2.1 Commonwealth

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (NES) protected under the Act.

Nine Matters of NES are identified under the EPBC Act:

- world heritage properties
- national heritage places
- wetlands of international importance (also known as 'Ramsar' wetlands)
- nationally threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, activities that have potential to result in significant impacts on Matters of NES must be referred to the Commonwealth Minister for the Environment for assessment.

Matters of NES relevant to the current project include nationally threatened species and ecological communities, migratory species and Ramsar wetlands. Threatened species and ecological communities protected by the EPBC Act are outlined in Sections 4.3, 5.4 and 0. An assessment of potential impacts to all Matters of NES under the provisions of the EPBC Act is provided in Section 8.1.

2.2 State

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act was enacted to encourage the proper consideration and management of impacts of proposed development or land-use changes on the environment (both natural and built) and the community. The Act is administered by the NSW Department of Planning and Environment (DPE).

The GSF has been deemed SSD and will be assessed under Section 89C of the EP&A Act. Biodiversity impacts arising from SSD projects are assessed in accordance with the FBA.

The EP&A Act provides the overarching structure for planning in NSW; however is supported by other statutory environmental planning instruments. Sections of the EP&A Act of primary relevance to the natural environment are outlined further below.

Local Environment Plans (Part 3 Division 4)

Local Environment Plans (LEP) apply either to the whole, or part of, a local government area and make provision for the protection or utilisation of the environment through zoning of land.

The study area is subject to the Parkes Local Environment Plan and is zoned RU1 Primary Production. This zoning provides for:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To encourage eco-tourism enterprises that minimise any adverse effect on primary industry production.
- To permit non-agricultural uses that supports the primary production purposes of the zone.
- To permit small scale rural tourism uses associated with primary production and environmental conservation with minimal impact on primary production and the scenic amenity of the area.
- To encourage the provision of tourist accommodation in association with agricultural activities.
- To provide opportunities for employment-generating development that adds value to local agricultural production and integrates with tourism.

Elements of the LEP objectives are relevant to this assessment and are discussed further in Section 0.

State Environmental Planning Policies (Part 3 Division 2)

State Environmental Planning Policies (SEPPs) outline policy objectives relevant to state wide issues. The SEPP relevant to the current development is:

SEPP No. 44 Koala Habitat Protection

SEPP 44 aims to encourage the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range and to reverse the current trend of koala-population decline. It applies to areas of native vegetation greater than one hectare and in councils listed in Schedule 1 to the SEPP.

The study area is located in the Parkes LGA, a Schedule 1 listed Council. Therefore SEPP 44 is relevant to the current assessment and is discussed further in Section 8.2.2.

2.2.2 Threatened Species Conservation Act 1995

The TSC Act is the key piece of legislation providing for the protection and conservation of biodiversity in NSW through the listing of threatened species, populations and ecological communities and the declaration and mapping of their critical habitats, as well as the identification of key threatening processes.

The TSC Act also establishes a system for biodiversity certification and establishes the Biodiversity Banking and Offsets Scheme. For all major projects, impacts to biodiversity are assessed in accordance with the FBA.

2.2.3 Fisheries Management Act 1994

The FM Act provides for the protection and conservation of aquatic species and their habitat throughout NSW. Impacts to threatened species, populations and communities, and critical habitats listed under the FM Act must be assessed through the Assessment of Significance process under Section 220ZZ of the FM Act and Section 5A of the EP&A Act.

Two key objectives of the FM Act are to; conserve fish stocks and key fish habitats, and conserve threatened species, populations and ecological communities of fish and marine vegetation. When reviewing applications the Department of Primary Industries (DPI) will assess the likelihoods of impacts to waterways in relation to their sensitivity (TYPE) and waterway class (CLASS).

Ridgey Creek, to the west of the study area, is mapped as Key Fish Habitat by DPI. A drainage line mapped by NSW LPI flows towards a dam adjacent to the southern boundary of the site.

However, as no impacts to this waterway will result from the GSF, no further consideration is required.

2.2.4 Noxious Weeds Act 1993

The NW Act was enacted to provide for the identification, classification and control of noxious weeds. The NW Act aims to reduce the negative impact of weeds on the economy, community and environment of NSW by:

- Establishing control mechanisms to prevent the establishment of significant new weeds in NSW.
- Preventing, eliminating or restricting the spread of particular significant weeds in NSW.
- Effectively managing widespread significant weeds in NSW.

Plants declared as noxious weeds are currently listed under *Noxious Weeds (Weed Control) Order 2014* published in the NSW Government Gazette No. 23. The NW Act is supported by a number of regulations and is administered by the DPI.

Noxious weeds are discussed further in Section 8.3.

3 Landscape

3.1 Bioregions and landscapes regions

The study area occurs within the NSW South Western Slopes IBRA bioregion and the Lower Slopes IBRA subregion. The Lower Slopes IBRA subregion covers the entire study area and is the subregion used in this assessment. Both the inner and outer assessment circles (Figure 3) are also located entirely within this subregion.

The study area occurs within the Bimbi Plains and Goonumbla Hills Mitchell Landscape (Figure 1). The Goonumbla Hills Mitchell Landscape was used in this assessment as it covers the majority of the study area.

3.2 Waterways and wetlands

The study area is located within the Lachlan catchment, in central NSW and west of the Great Dividing Range. The Lachlan catchment borders the Murrumbidgee catchment to the south and the Darling catchment to the north.

There are no mapped watercourses or drainage lines within the subject site (Figure 2). The closest mapped watercourse (non-perennial) is Ridgely Creek, located (at its closest point) approximately 80 metres from the western boundary of the study area. Ridgely Creek flows south-west into Goobang Creek, a tributary of the Lachlan River.

Ridgely Creek is mapped as Key Fish Habitat by the NSW Department of Primary Industries. A drainage line mapped by NSW LPI flows towards a dam adjacent to the southern boundary of the site.

The study area does contain several farm dams.

3.3 Native vegetation extent

The smallest inner and outer assessment circles (500 hectare and 5000 hectare) were used, as the 500 hectare assessment circle was sufficient to fit the study area (Figure 3). The inner assessment circle is amended to fit the study area, while the outer assessment circle has been centred on the centre of the subject site.

Mapping of vegetation within the inner and outer assessment circles was undertaken using the *Central West / Lachlan Regional Native Vegetation Map Version 1.0* (OEH 2015), which is considered the most reliable and comprehensive local vegetation mapping study. This mapping was modified using vegetation extent as assessed by Biosis (see Section 4). Vegetation in the inner and outer assessment circles is shown in Figure 3.

OEH (2015) map seven native vegetation communities within the outer assessment circle, including:

- LA145 Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion (PCT201).
- LA138 Derived tussock grassland of the central western plains and lower slopes of NSW (PCT250).
- LA218 White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion (PCT267).

- LA174 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT45).
- LA223 White Cypress Pine woodland on sandy loams in central NSW wheatbelt (PCT70).
- LA154 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PCT76).
- LA338 Derived grassland of the NSW South Western Slopes (PCT796).

3.4 Assessment of landscape value

Landscape value has been calculated using the method for site-based developments, outlined in Appendix 4 of the FBA (OEH 2014).

3.4.1 Assessment of the current extent of native vegetation cover

The extent of native vegetation cover before development for both outer and inner assessment circles was determined as the sum of areas of each of the native vegetation map units listed above.

To determine the extent of native vegetation cover after development, the extent of vegetation required for removal is subtracted from the extent of native vegetation cover before development. Table 1 provides a summary of the extent of native vegetation cover within the inner and outer assessments circles, before and after development.

Table 1 Extent of native vegetation cover before and after development.

Assessment circle	Before development		After development	
	Area (ha)	%	Area (ha)	%
Outer assessment circle	2021	40	2021	40
Inner assessment circle	127	25	127	25

Since no native vegetation will be removed, the values before and after development are the same.

3.4.2 Assessment of connectivity value

The study area does not support any of the following:

- An area identified as being part of a state significant biodiversity link.
- A riparian buffer 50 metres either side of a 6th order stream.
- A riparian buffer 50 metres around an important wetland or estuarine area.
- An area identified as being part of a regionally significant biodiversity link.
- A riparian buffer 20 metres either side of a 4th or 5th order stream,

Therefore, the proposed development will not impact on any state significant biodiversity links or regionally significant biodiversity links.

The study area was assessed as being part of four connective links (Figure 3). Native vegetation in the Henry Parkes Way road reserve provides an east-west connective link along the northern boundary of the study area. Native vegetation in the Pat Meredith Drive road reserve, a crown road in the centre of the site and in the eastern section of the study area provide north-south connective links through and along the edges of the

study area. The centre connective link terminates in the centre of the study area, while connective links along Pat Meredith Drive and in the east provide connectivity beyond the study area.

These connective links will be unaffected by the GSF, and no change in linkage will occur, therefore, the connectivity width category before and after development will be maintained at >5 metres to 30 metres.

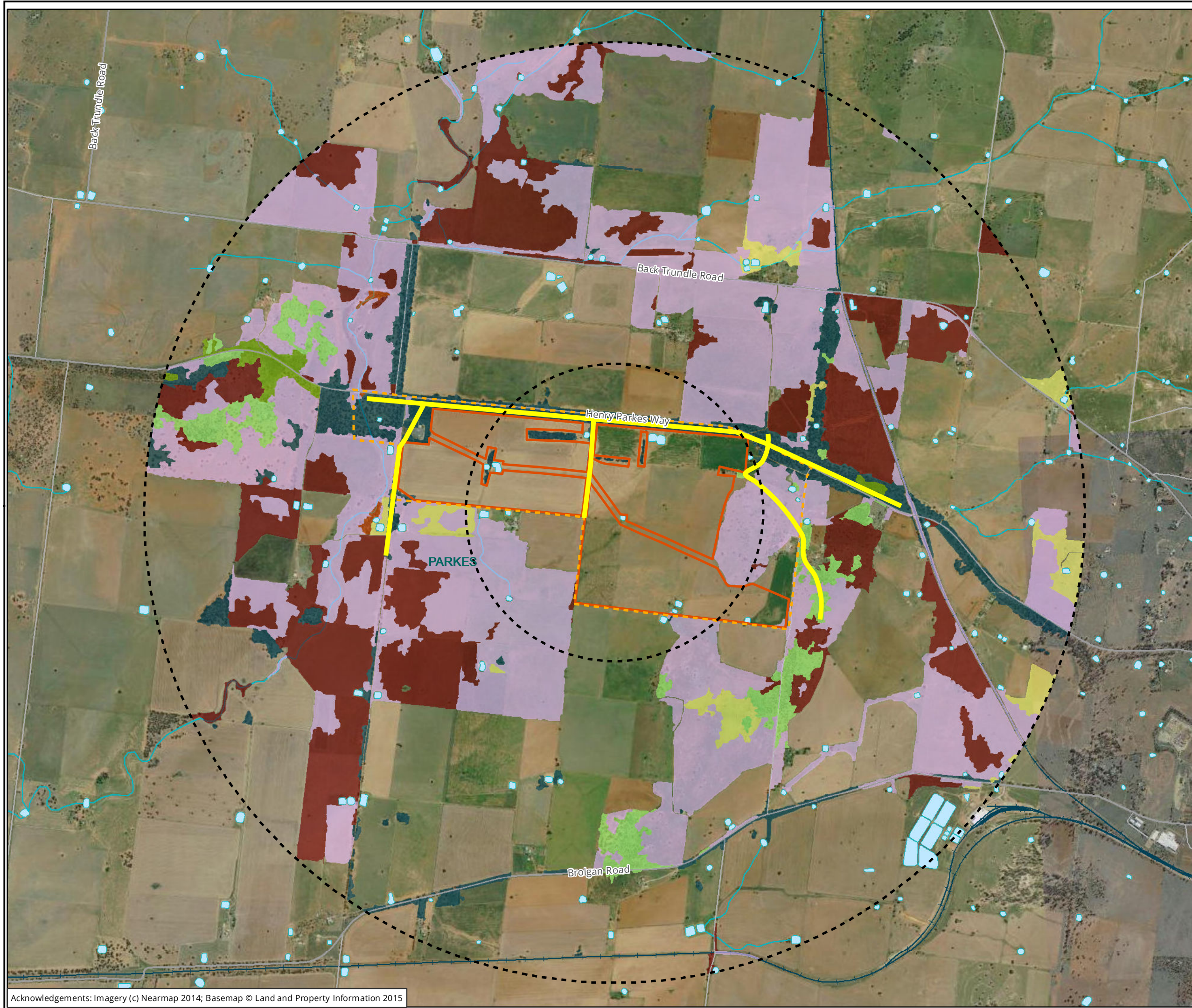
Overstorey condition for the inner and outer assessments circles was assessed based on aerial photo interpretation and on-ground assessment. Overstorey vegetation within these links was assessed as being in benchmark condition. No change in overstorey condition will result from the GSF. Midstorey/groundcover condition was assessed based on a rapid assessment of vegetation within the locality, with vegetation reviewed from roadsides. Midstorey/ groundcover vegetation adjacent to the study area is also largely intact, with a moderate to high diversity in most areas. No change to Midstorey/groundcover condition will result from the GSF.

The proposed development will not result in any change in linkage condition classes.

3.4.3 Assessment of patch size

Patch size was assessed using a select process in ArcGIS. All vegetation not defined as low condition and separated by a distance of less than 100 metres (woody vegetation types) and 30 metres (non-woody vegetation types) was mapped sequentially. Using this method, the vegetation within the study area forms part of a relatively large patch of connecting vegetation with a patch size larger than 1000 hectares.

Regardless of the estimated level of clearing within the Goonumbla Hills Mitchell Landscape, at this patch size the study area fits into the 'Extra Large' patch size class.



Legend


- Study area
- Subject site
- Assessment circles
- Local Government Area
- Connective links

Plant Community Types

- PCT201 Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
- PCT250 Derived tussock grassland of the central western plains and lower slopes of NSW
- PCT267 White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion
- PCT45 Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion
- PCT70 White Cypress Pine woodland on sandy loams in central NSW wheatbelt
- PCT76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions
- PCT796 Derived grassland of the NSW South Western Slopes

Figure 3: Vegetation (OEH 2015) within the inner and outer assessment circle including connective links

0 300 600 900 1,200 1,500
Metres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 56



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4 Native vegetation

The extent of native vegetation within the study area was determined using Section 5 of the FBA.

4.1 Background review

A review of regional vegetation mapping by OEH (2015) was undertaken to inform the site investigation. The OEH (2015) mapping project identifies the vegetation within the study area as Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (LA154).

Detailed mapping of vegetation within the study area was undertaken for this assessment (Figure 4). The methodology is outlined in Section 4.2 and results presented in Section 4.3.

4.2 Methods

4.2.1 Site investigation

An assessment of the study area was undertaken by Biosis in June 2016. The purpose of this assessment was to undertake detailed vegetation mapping and a preliminary assessment of vegetation condition of all vegetation in accordance with the requirements of the FBA.

Detailed mapping of vegetation communities was conducted using hand-held (uncorrected) tablet units (Samsung Galaxy Tab 3) using the ArcGIS Collector application and aerial photo interpretation. Areas of native vegetation for which a Plant Community Type (PCT) could validly be assigned were identified and delineated in the field, and their condition determined. Identification of PCTs within the study area was confirmed with reference to the community profile descriptors (and diagnostic species tests) held within the OEH (2015) mapping project and NSW Vegetation Information System (VIS): Classification Version 2.1.

General classification of native vegetation in NSW used in this report is based on the classification system in Keith (2004) which uses three groupings of vegetation: vegetation formation, vegetation class and vegetation type (or PCT), with vegetation type the finest grouping. The grouping referred to in this report is PCT. PCTs were stratified into Vegetation Zones based on condition (low or moderate/good) and ancillary code.

Following stratification of Vegetation Zones, site value was assessed using data obtained via a series of plots and transects, as per the methodology outlined in Section 5 of the FBA. Plot and transect data was collected from the study area in June 2016 and included:

- A 20 metre x 50 metre quadrat and 50 metre transect for assessment of site attributes.
- A 20 metre x 20 metre quadrat, nested within the quadrat outlined above, for full floristic survey to determine native plant species richness.

The minimum number of plots/transects per Vegetation Zone was determined using Table 3 of the FBA. A total of seven plots/transects were completed within the study area, with three plots/transects completed in the subject site (Figure 4).

A list of flora species was compiled for each vegetation type. Records of all flora species will be submitted to OEH for incorporation into the Atlas of NSW Wildlife.

4.3 Results

4.3.1 Vegetation description

The study area supports 55.54 hectares of native vegetation patches with varying levels of disturbance (Figure 3). Across the study area, ongoing cropping and grazing activities were noted.

Native vegetation within the subject site is composed of isolated patches of vegetation in an agricultural matrix. These isolated patches have heavy weed infestations, with most patches subject to ongoing grazing. This has prevented recruitment of native shrubs and eucalypts. The vegetation is therefore characterised by a canopy of mature and semi mature native trees over an understorey of mostly exotic herbs and grasses. Resilience in the understorey was low, with a low diversity of native grasses.

Areas of native vegetation outside the subject site but within the study area are in better condition, with a relatively high diversity of native species and much lower levels of disturbance evident. This includes areas of native vegetation along Henry Parkes way and in the south-west corner of the study area.

A rapid vegetation assessment identified approximately 42 hectares of a potentially derived grassland community located in the eastern area of the study area, associated with rocky ground on Millers Lookout. The canopy is mainly dominated by a very sparse layer of White Box *Eucalyptus albens* with some occurrence of White Cypress Pine *Callitris glaucophylla*. Shrubs are very sparse and limited to the top of the hill. Due to heavy grazing the groundcover vegetation could not be reliably identified. This vegetation community may potentially align with the *White Box Yellow Box Blakely's Red Gum Woodland* endangered ecological community. This area is not going to be impacted by the project; therefore, it was not assessed further in this report.

Two plots/transects (Q2 and Q6) showed very low levels of native species cover, with no native overstorey or midstorey cover and less than 50 per cent cover of native groundcover. These areas meet the definition of cleared land and were not mapped as native vegetation.

4.3.2 Plant community types

Site investigations, including determination of vegetation communities using the methodology outlined in Section 4.2.1, identified the presence of one PCT within the study area. The PCT, vegetation formation and vegetation class (Keith 2004) are described in Table 2.

Table 2 Plant community types of the study area and corresponding formation and class (Keith 2004).

Plant community type	Vegetation formation	Vegetation class
LA152 Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penepplain Bioregion (PCT 82)	Grassy Woodland	Floodplain Transition Woodlands

The vegetation of the study area was assessed as being in moderate/good condition. Vegetation was stratified using three ancillary codes to identify areas of the same broad condition state, in accordance with the FBA. Vegetation was stratified based on the level of disturbance and resultant condition. This resulted in three vegetation zones being identified (Table 3 and Figure 4).

Table 3 Vegetation zones mapped within the study area

Vegetation zone (VZ)	Plant community type	Condition	Ancillary code	Area (ha)	
				Subject site	Road reserve
VZ1	LA152 Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion (PCT82)	Moderate/ Good	-	7.57	6.15
VZ2			Medium	0.00	14.53
VZ3			High	0.00	28.47

Vegetation within the subject site shows high levels of disturbance and was assigned no ancillary code. Vegetation along Henry Parks Way, immediately north of the subject site, shows low levels of disturbance and higher species diversity. These areas were assigned an ancillary code of High. Vegetation west of Pat Meredith Drive showed moderate levels of disturbance and was assigned an ancillary code of Medium.

A detailed description of the Vegetation Zones is provided in Table 4

Table 4: Vegetation zones description

Vegetation zone 1-3 – Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion	
PCT ID	82
Biometric vegetation type ID	LA152
Common name	<i>Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion</i>
Condition	Moderate/good (subject site) Moderate/good – Medium (Road reserve) Moderate/good – High (Road reserve)
Extent within study area	Subject site – 7.57 ha of this PCT was recorded and mapped in seven isolated patches of varying size, the largest patch is located less than 100 m from to the larger vegetation patch along Henry Parkes Way along the northern boundary and the other six scattered within the study area (Figure 4). These areas show high levels of exotic species and low species diversity. Road reserve – 55.29 ha of this PCT was recorded and mapped in four patches of varying size, the largest patch (Moderate/Good High condition) is located along Henry Parkes Way in the northern boundary. There is one patch in the centre of the study area along an existing track and the other two located outside the western boundary of the study area (Figure 4).
Description	The canopy is mainly dominated by Western Grey Box <i>Eucalyptus microcarpa</i> with some occurrence of White Cypress Pine <i>Callitris glaucophylla</i> , and Yellow Box <i>Eucalyptus melliodora</i> with some occurrence of Poplar Box <i>Eucalyptus populnea</i> subsp. <i>bimbil</i> and Kurrajong <i>Brachychiton populneus</i> in road reserves. Within the subject site, the midstorey is largely absent due to ongoing grazing preventing recruitment. In Road Reserves, shrubs are sparse, composed entirely of Deane's Wattle <i>Acacia deanei</i> and Wilga <i>Geijera parviflora</i> . In the subject

Vegetation zone 1-3 – Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penneplain Bioregion

	<p>site, the ground cover is highly modified and dominated by crop grasses such as Barley Grass <i>Hordeum spp</i> and Wheat <i>Triticum sp</i>. Native grass species are mainly restricted to the southwestern corner of the study area and include Slender Bamboo Grass <i>Austrostipa verticillata</i>, Common Wheatgrass <i>Elymus scaber</i>, <i>Rytidosperma spp</i>, Curly Windmill Grass <i>Enteropogon acicularis</i> and Purple Wiregrass <i>Aristida ramosa</i>. In road reserves, the ground cover is sparse and contains forbs such as Purple Burr Daisy <i>Calotis cuneifolia</i> and native grasses including Common Wheatgrass,, <i>Rytidosperma spp</i>, Curly Windmill Grass and Purple Wiregrass.</p> <p>This PCT occurs on red-brown earths soils comprising Quaternary alluvium often as terraces on old alluvial plains or undulating penneplain landforms sandstone.</p>
Survey effort	<p>Subject site -Two plots/transects (Q1 and Q3) were undertaken in this PCT (Figure 4).</p> <p>Road reserve - Three plots/transects (Q4, Q5 and Q7) were undertaken in this PCT (Figure 4).</p>
Condition	<p>In the subject site, this PCT shows very high levels of modification, fragmentation and disturbance in, with minimal levels of shrub cover, and ground cover mostly dominated by exotic species. Disturbance is primarily the result of surrounding agricultural activity, grazing and past clearing. Regeneration is severely inhibited by the constant grazing and crop grass germination. In adjacent sections of the study area, particularly along Henry Parkes Way, the condition of this PCT is generally much higher with a higher structural integrity and species diversity with some exotic species encroachment due to tracks disturbance and edge effect.</p> <p>No declared noxious weeds were identified in the study area. However, several exotic species dominated the ground cover layer including Wheat , Rape <i>Brassica napus</i>, Barley Grass, Smooth Catsear <i>Hypochaeris glabra</i>, Small Nettle <i>Urtica urens</i>, Vervain <i>Salvia verbenaca</i>, <i>Oxalis corniculata</i>.</p>
Characteristic species used for identification of PCT	<p>Since the vegetation community is so modified and reduced in terms of species diversity within the subject site, adjoining patches of this PCT in the road reserve with similar overstorey composition in the subject site were used as the source of species considered for identification of the PCT in the study area.</p> <p>According with the NSW VIS: Classification Version 2.1, the overstorey species recorded within the study area that align with the dominant species listed as characterizing for this PCT include Western Grey Box, Kurrajong, Poplar Box and , White Cypress Pine. Aligning mid-storey and ground layer species species recorded include Deanes Wattle, Rough Speargrass <i>Austrostipa scabra</i>, Climbing Saltbush <i>Einadia nutans</i>, Curly Windmill Grass and Slender Bamboo Grass.</p>
Justification of evidence used to identify the PCT	<p>Apart from species composition, the stated distribution in central western NSW mostly in the eastern section of the Cobar Penneplain Bioregion and the occurrence on red-brown earths soils (OEH 2016) is consistent with that of the study area. Other diagnostic features are stated as tall woodland between 12 and 15m with a canopy dominated by Western Grey Box, Poplar Box and White Cypress, where Kurrajong may be present. The mid-storey is typically sparse and commonly includes Deanes Wattle and Wilga. The ground layer is sparse and contains forbs such as Purple Burr daisy, Yellow Burr Daisy <i>Calotis lappulacea</i>, Oxalis perennans, and Kidney Weed <i>Dicohndra repens</i>. Grass species include Slender Bamboo Grass, Rough Speargrass and Common Wheatgrass. These features are highly consistent with the structure and growth forms of dominant species particularly within the less disturbed and modified parts of the community adjacent to the study area.</p> <p>Previous mapping in the area (OEH 2015) identified the vegetation in the study area as LA154</p>

Vegetation zone 1-3 – Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penneplain Bioregion

	<p>Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (PTC 76). However, the presence of Kurrajong, Poplar Box, Deanes Wattle and Wilga in the study area are more consistent with LA152 Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penneplain Bioregion (PCT82).</p>
<p>Status</p>	<p>Commonwealth EPBC Act: Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia endangered ecological community. NSW TSC Act: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregions endangered ecological community .</p>
<p>Estimate of percent cleared value of PCT in the major catchment area</p>	<p>75%</p>
<p>Plate 1: Western Grey Box - Poplar Box - White Cypress Pine tall woodland in the subject site (plot Q1)</p>	

Vegetation zone 1-3 – Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penneplain Bioregion

Plate 2: Western Grey Box - Poplar Box - White Cypress Pine tall woodland in Henry Parkes Way road reserve (plot Q7)

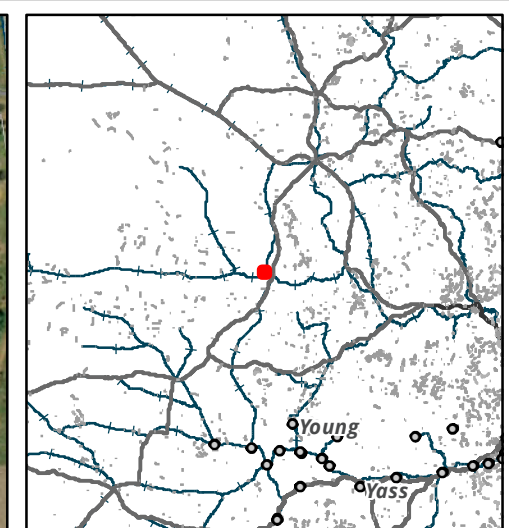
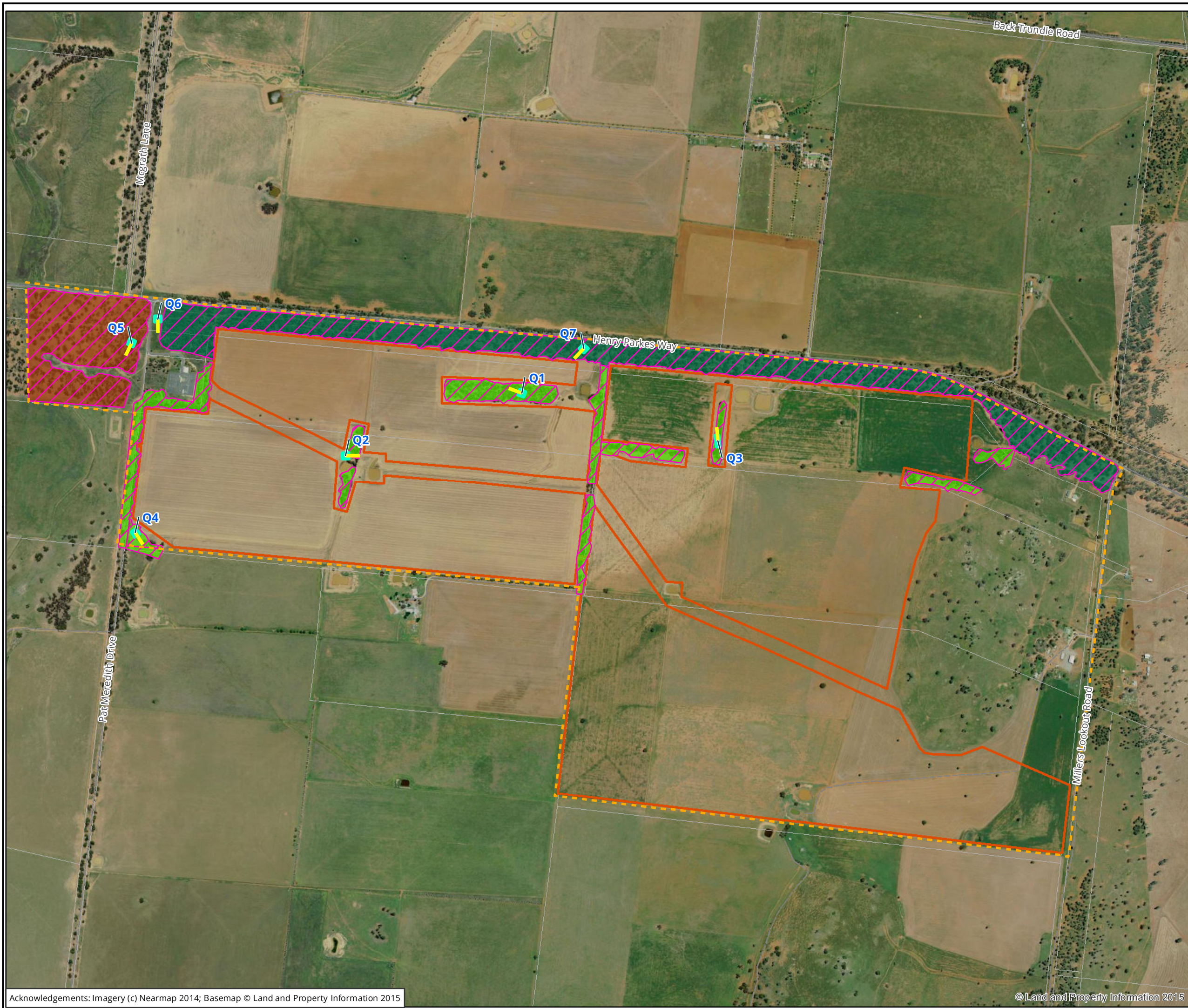


4.3.3 Site value scores

Plots and transect survey data was entered into the Biobanking credit calculator for major projects to determine site value scores. Plot and transect survey data is presented in Table 12 of Appendix 2. Current site value for each Vegetation Zone is outlined in Table 5.

Table 5: Site value score for theVegetation Zone.

Vegetation zone	Plant community type	Area (ha)	Site value score
01	LA152 Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penneplain Bioregion (PCT82)	13.72	45.31
02		14.53	19.27
03		28.47	65.62



- Legend**
- Study area
 - Subject site
 - Quadrats
 - Transects
 - Inland Grey Box Woodland EEC
- Plant Community Types**
- PCT82, Moderate/good
 - PCT82, Moderate/good, Medium
 - PCT82, Moderate/good, High

Figure 4: Native vegetation within the study area, including flora survey effort

0 125 250 375 500 625
Metres
Scale: 1:12,500 @ A3
Coordinate System: GDA 1994 MGA Zone 56

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5 Threatened species

5.1 Methods

Flora and fauna assessments of the study area were undertaken from 7 to 10 June 2016. Weather observations for each survey date are shown in Table 6.

Table 6: Weather observations during flora and fauna surveys (Goonumbla, Parkes NSW).

Survey date	Temperature (°C)		Rain (mm)
	Minimum	Maximum	
07 June 2016	7.9	13.3	1.8
08 June 2016	8.2	15.4	0.8
09 June 2016	10.6	17.2	11.4
10 June 2016	10.6	13.4	0.6

Flora survey methodology is outlined above, and was limited to mapping of vegetation and condition assessment.

Fauna assessment was habitat-based, seeking to identify the following fauna habitat features of the study area:

- Habitat trees including large hollow-bearing trees, availability of flowering shrubs and feed tree species.
- Creekline condition.
- Quantity of ground litter and logs.
- Searches for indirect evidence.

Indirect evidence, including chew marks and scratches on trees, chewed cones of *Allocasuarina* spp., diggings, burrows, dens, and tracks in wet mud on access tracks, nests and signs of wear around tree-hollows were also recorded during the habitat assessment.

The proposed development will avoid all impacts within the study area. Therefore, no Targeted threatened flora or fauna surveys were undertaken.

5.2 Fauna habitat assessment results

The study area has an extensive history of use for agricultural purposes, and has recently been used for extensive cropping and grazing. As a result, the study area provides limited refuge or habitat for fauna.

Fauna habitat features were limited to areas of remnant vegetation, as outlined above, and scattered trees. No wet areas other than barren farm dams, mistletoe, large she-oaks, dense canopy foliage or dense understorey vegetation were present in the subject site. However, some of the remnants of native vegetation contain a moderate level of fallen timber and rocky outcrops are present in the south-eastern boundary of the study area. The subject site contains 15 hollow-bearing trees, holding small to medium sized hollows to

be removed. Trees within the subject site were found to contain small to medium hollows. A few trees contained dead sections of the trunk. Trees of a range of sizes were present and comprised remnant native species scattered within the subject site and adjacent road reserves. Some winter flowering tree species were present, comprising mostly of Western Grey Box. Yellow Box and Dean's Wattle provide additional foraging resources on the site for nectivorous species throughout the year.

5.3 Geographic /habitat features

An assessment of the occurrence of geographic habitat features, in accordance with Section 6.3 of the FBA was undertaken, along with a determination of whether impacts to these habitat features will result from the proposed GSF. The results of this assessment, along with the species generated by the calculator associated with the FBA are outlined in Table 7.

Table 7 Assessment of geographic habitat features within the study area

Feature	Common name	Scientific name	Present in study area	Impact?	Justification
Land within 50 meters of identified breeding habitat.	Sloanes Froglet	<i>Crinia sloanei</i>	No	N/A	No suitable breeding habitat for Sloane's Froglet occurs in or adjacent to the study area.
land containing seasonally damp or waterlogged sites	Winged Peppergrass	<i>Lepidium monoplacoides</i>	Yes	No	Land that may be waterlogged occurs in the study area, but is largely subject to cropping. No impact will result from the development of the project. Areas of impact will be restricted to cropland within the study area.
land within the southern half of subregion in Murrumbateman CMA subregion	Silky Swainson-Pea	<i>Swainsona sericea</i>	No	N/A	The study area is not within the Murrumbateman CMA.
land containing within 100 m of riparian woodland on inland rivers containing mature living eucalypts or isolated paddock trees overhanging water or dry watercourses	Grey Falcon	<i>Falco hypoleucos</i>	No	N/A	The study area is not within 100m of riparian woodland in an inland river.
land west of Cowra in Upper Slopes CMA subregion	A spear-grass	<i>Austrostipa wakoolica</i>	No	N/A	The study area is not within the Upper Slopes CMA subregion.

5.4 Ecosystem credit species

A list of ecosystem credit species predicted to occur within the study area, based on the PCTs present and generated by the calculator associated with the FBA, along with an assessment of whether they occur within the study area, is provided in Table 8. The potential for these species to occur within the study area was assessed in accordance with Section 6.3 of the FBA.

Table 8 Assessment of ecosystem credit species within the study area.

Scientific name	Common name	TS offset multiplier	Habitat on site
Grey-crowned Babbler	<i>Pomatostomus temporalis subsp. temporalis</i>	1.3	Yes
Little Pied Bat	<i>Chalinolobus picatus</i>	2.1	Yes
Major Mitchells Cockatoo	<i>Lophochroa leadbeateri</i>	1.9	Yes
Swift Parrot	<i>Lathamus discolor</i>	1.3	Yes

The presence of these species could not be discounted using the methodology outlined in Section 6.3 of the FBA. It was therefore assumed that these species may occur within the study area.

The Little Pied Bat has the lowest Tg value and therefore the highest threatened species offset multiplier. However, as the vegetation in the study area is part of an endangered ecological community all vegetation has an automatic threatened species offset multiplier of 3.

5.5 Species credit species

A list of species credit species predicted to occur within the study area, based on the PCTs present, along with an assessment of whether the study area provides suitable habitat and whether the species will be impacted by the development is provided in Table 9. The potential for a species to occur within the study area was assessed in accordance with Section 6.5 of the FBA).

Table 9 Species credit species and status within the study area

Scientific name	Common name	Habitat present in the study area	Justification	Recorded during targeted surveys	Impacted by development
Flora					
<i>Acacia ausfeldii</i>	Ausfelds Wattle	No	Associated with grassy woodlands dominated by White Box or Callitris Pine. The species is recorded from the IBRA region; however, there are no records in relation to study area and if the species was present it would have been observed during surveys.	N/A	No
<i>Austrostipa metatoris</i>	A spear-grass	No	Grows on sandhills, sandridges, undulating plains and mallee country. Habitat not present in the study area.	N/A	No
<i>Diuris tricolor</i>	Pine Donkey Orchid	Yes	Grows in sclerophyll forest among grass, often with native Cypress Pine <i>Callitris spp.</i> Suitable habitat is present, with marginal habitat in the subject site and better quality habitat along road reserves.	N/A	No
<i>Eleocharis obicis</i>	Spike-Rush	No	Grows in ephemerally wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands. There are two records west of Condoblin in the IBRA region. No <i>Eleocharis</i> species were observed on site.	N/A	No
<i>Goodenia macbarronii</i>	Narrow Goodenia	Yes	Occurs in forests and woodlands and is generally associated with seasonally wet sites (including table drains). Suitable	N/A	No
<i>Lepidium monolocoides</i>	Winged Peppergrass	Yes	Occurs in seasonally damp or waterlogged sites. Land that may be waterlogged occurs in the study area, but is largely subject to cropping.	N/A	No
<i>Pilularia novae-hollandiae</i>	Austral Pillwort	No	The species grows in shallow swamps and waterways, often among grasses and sedges. All records are to the south-west of the study area. Suitable habitat is not present in study area.	N/A	No
<i>Swainsona</i>	Slender Darling Pea	Yes	Grows in a variety of vegetation types and red-brown earths and loams.	N/A	No

Scientific name	Common name	Habitat present in the study area	Justification	Recorded during targeted surveys	Impacted by development
<i>murrayana</i>			Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. Suitable habitat is present in the study area.		
Fauna					
<i>Anthochaera phrygia</i>	Regent Honeyeater	Yes	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes, including species present in the study area. There are records to the east of Parkes. The species may forage in the study area as a vagrant species.	N/A	No
<i>Petaurus norfolcensis</i>	Squirrel Glider	Yes	The Squirrel Glider inhabits stands of mature Box or Box Ironbark forest with a shrubby understorey. The species feeds on variety of nectar producing species, including <i>Acacia</i> spp., as well as manna and invertebrates. The nearest records are in the Goobang National Park, east of Parkes. Suitable Grey Box habitat is present.	N/A	No
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	No	The species inhabits dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. There is a single record from the IBRA region dating to 1919. There are no recent records in relation to the study area.	N/A	No
<i>Phascolarctos cinereus</i>	Koala	Yes	The Koala inhabits a wide variety of eucalypt woodlands and forests. Areas west of Parkes are considered to have a low likelihood of Koalas (OEH 2014). However, the potential for the Koala to occur cannot be discounted.	N/A	No

The Project will not result in any removal of native vegetation, other than paddock trees and some trimming of vegetation for site access. Therefore no species credits are required and no threatened species surveys were undertaken. No impacts to threatened species will result from the GSF.

Stage 2 – Impact assessment (biodiversity values)

6 Impact assessment (biodiversity values)

This section identifies the potential impacts of proposed GSF on the biodiversity values of the study area and includes measures taken to date and additional recommendations to assist Geolyse and RED to design a development that avoids and minimises impacts on biodiversity within and surrounding the study area.

6.1 Impact summary

6.1.1 Potential impacts

Potential direct and indirect impacts arising from the development are outlined below. Potential direct impacts arising from the project include:

- Removal of all native vegetation within the subject site, including 7.57 hectares of an endangered ecological community listed under the EPBC Act and TSC Act.
- Removal of native vegetation for site access.
- Removal of all paddock trees.
- Impacts to connectivity values due to removal of vegetation.

Potential indirect impacts arising from the project include:

- Decreased viability of retained vegetation due to edge effects and use of retained areas of native vegetation due to disturbance and degradation of habitat, including erosion and/or compaction of soils, as well as damage to seedlings and new growth.
- Encroachment of invasive exotic weeds species, leading to loss of habitat and suppression of native seedling establishment resulting in changes to vegetation communities over time.
- Temporary increased noise levels from construction equipment, leading to disturbance of fauna, especially during breeding seasons.

6.1.2 Recommendations to avoid, minimise and mitigate impacts

The principal means to reduce impacts on biodiversity values within the study area will be to avoid and minimise removal of native vegetation and fauna habitat. Additional recommendations may include measures to mitigate residual impacts after all measures to avoid and minimise impacts have been considered.

Recommendations are broken down into site selection and planning, construction and operation.

Site selection and planning

The site has been selected due to its suitability, previous disturbance and location adjacent to the Transgrid substation.

During the design of the GSF, Geolyse and RED have considered all biodiversity values identified by Biosis and have designed the layout of the GSF to avoid all direct impacts to the identified values. As a result, no removal of native vegetation will be required. The footprint of the GSF will be restricted to the subject site identified in Figure 4.

Site access for construction and operation will be undertaken off Pat Meredith Drive. In identifying access points, consideration has been given to ensuring they result in the least amount of vegetation trimming possible. Two access points have been identified; one through the existing Transgrid substation and one further south of the substation along Pat Meredith Drive... Access through the substation may require trimming of two trees or removal of a single tree, depending on a final agreement with Transgrid. For the other site access option, no removal of vegetation will be required, with only minor branch trimming required.

Construction

No additional direct impacts are expected to occur as a result of the construction phase. However, indirect impacts may result to retained biodiversity values. Additional mitigation measures recommended to avoid and minimise impacts include:

- Installation of appropriate exclusion fencing around trees and vegetation to be retained in the study area.
 - The radius of the tree protection zone (TPZ) is calculated for each tree by multiplying its diameter at breast height (DBH) by 12. ($TPZ = DBH \times 12$) in accordance with the Standards Australia Committee (2009).
 - A TPZ should not be less than 2 metres nor did greater than 15 metres, except where crown protection is required (Standards Australia Committee 2009).
 - This would include appropriate signage such as 'No Go Zone' or 'Environmental Protection Area'.
 - Identify the location of any 'No Go Zones' in site inductions and a Construction Environmental Management Plan.
- All material stockpiles, vehicle parking and machinery storage will be located within cleared areas proposed for clearing, and not in areas of native vegetation that are to be retained.
- All scattered hollow-bearing trees to be removed should be placed in areas of retained vegetation to provide additional fauna habitat.
- Where appropriate native vegetation cleared from the study area should be mulched for re-use on the site, to stabilise bare ground.
- Wet down areas to reduce dust generation during construction.
- Implementation of temporary stormwater controls during construction an to ensure that discharges to the drainage channels are consistent with existing conditions.
- Sediment and erosion control measures should be implemented prior to construction works commencing (e.g. silt fences, sediment traps), to protect the drainage channels to the west and to the south. These should conform to relevant guidelines, should be maintained throughout the construction period and should be carefully removed following the completion of works.

Prescriptions for mitigation of potential impacts of construction activities on retained native vegetation and habitat should be addressed in a site-specific Construction Environmental Management Plan (CEMP). The CEMP should include all measures outlined above.

Operation

The impacts arising from the operation of the GSF are expected to be negligible. As a result, no additional mitigation measures are recommended.

6.1.3 Residual impacts

As a result of the avoidance, minimisation and mitigation measures outlined above, residual impacts arising from the GSF are restricted to removal of scattered trees and trimming of trees to facilitate site access.

6.2 Thresholds for assessment and offsetting

This section outlines the thresholds for assessment and offsetting in accordance with Section 9 of the FBA.

6.2.1 Impacts requiring further consideration

This section provides an assessment of impacts requiring further consideration in accordance with Section 9.2 of the FBA.

Landscape features

The study area does not support any 4th, 5th or 6th order streams, estuarine areas, important wetlands, or state or regional biodiversity links. The study area does not support any important wetlands.

There are no impacts to landscape features requiring further consideration.

Native vegetation

No critically endangered ecological communities have been mapped in the study area.

A rapid vegetation assessment identified approximately 42 hectares of a potentially derived grassland community aligning with the *White Box Yellow Box Blakely's Red Gum Woodland* endangered ecological community. This community was nominated in the SARS. However, no impacts to this community will result from the proposed GSF. No other endangered ecological communities' nominated in the SEARs were mapped in the study area. No impacts to any endangered ecological community will result from the proposed GSF.

There are no impacts to native vegetation requiring further consideration.

Species and populations

The study area does not include any areas of critical habitat.

No impacts to critically endangered or endangered species will result from the proposed GSF.

There are no impacts to species or populations requiring further consideration.

6.2.2 Impacts requiring offsets

Impacts native vegetation

This section provides an assessment of the impacts to native vegetation requiring offset in accordance with Section 9.3.1 of the FBA.

Since the GSF will not result in the removal of native vegetation, no offsets for native vegetation will be required.

Impacts to species and populations

This section provides an assessment of the impacts to species and populations requiring offsets in accordance with Section 9.3.2 of the FBA.

The GSF will not result in removal of habitat for threatened species and populations. No offsets for species or populations are required.

7 Biodiversity credits

As the GSF will not result in the removal of native vegetation or habitat for threatened species or populations no biodiversity credits are required to offset the impacts to the GSF.

8 Assessment of biodiversity legislation

8.1 Environment Protection and Biodiversity Conservation Act 1999

An assessment of the impacts of the proposed development on Matters of NES, against heads of consideration outlined in Commonwealth of Australia (2013) was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required. Matters of NES relevant to the project are summarised in Table 10.

Table 10 Assessment of the project against the EPBC Act.

Matter of NES	Project specifics	Potential for significant impact
Threatened species	Three flora species and 14 fauna species have been recorded or are predicted to occur in the locality. As no impacts to native vegetation or fauna habitat will result from the proposed GSF no impacts to threatened species will result from the project.	Significant impact unlikely to result from the proposed development.
Threatened ecological communities	<i>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia</i> endangered ecological community mapped within the study area. The proposed development will not result in any impacts to this community.	Significant impact unlikely to result from the proposed development.
Migratory species	Four migratory species have been recorded or are predicted to occur in the locality. The study area does not provide important habitat for an ecologically significant proportion of any of these species.	Significant impact unlikely to result from the proposed development.
Wetlands of international importance (Ramsar sites)	The study area does not flow directly into a Ramsar site and the development is not likely to result in a significant impact.	Significant impact unlikely to result from the proposed development.

On this basis, the EPBC Act is unlikely to be triggered and referral of the Project to the Australian Government Minister for the Environment will not be required.

8.2 Environmental Planning and Assessment Act 1979

8.2.1 Parkes LEP

The project will not result in the removal of native vegetation and is therefore consistent with the biodiversity related objectives of the RU1 Primary Production zoning in the Parkes LEP.

8.2.2 SEPP No. 44

White Box and Bimble Box, feed tree species as defined in Schedule 1 of the SEPP, were both identified within the study area. However, these feed tree species do not make up 15 per cent of the total number of trees in the upper or lower strata of the tree component.

Therefore the vegetation within the study area would not be considered potential Koala habitat as defined under the SEPP.

8.3 Noxious Weeds Act 1993

The NW Act was enacted to provide for the identification, classification and control of noxious weeds. Plants declared as noxious weeds are currently listed under Weed Control Order No. 28 Declaring Certain Plants to be Noxious Weeds published in the New South Wales Government Gazette No. 97 (Department of Premier and Cabinet 2011).

No declared noxious weeds were identified in the study area.

9 Conclusion

This assessment has been completed in accordance with the FBA (OEH 2014a) on behalf of Geolyse and their client, RED.

The proposed development will limit its impacts to the removal of paddock trees and trimming of vegetation for site access and will not result in losses of native vegetation and fauna habitat. This includes the avoidance of impacts to 7.57 hectares of the LA152 Western Grey Box - Poplar Box - White Cypress Pine tall woodland (PCT82) within the study area. This PCT aligns with Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions listed as an endangered under NSW TSC Act and endangered under the Commonwealth EPBC Act.

Measures to avoid and minimise impacts to vegetation were considered during the planning stage of the project, resulting in complete avoidance of impacts on native vegetation. Additional recommendations to mitigate any minor residual impacts are provided.

Since the Project will not result in impacts to native vegetation or habitat for threatened species or populations, there will be no biodiversity credits required.

No additional approvals will be required.

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Appendices

Appendix 1 Survey methods

A.1 Nomenclature

The flora taxonomy (classification) used in this report follows the most recent Flora of NSW (Harden 1992, Harden 1993, Harden 2002). All doubtful species names were verified with the on-line Australian Plant Name Index (Australian National Botanic Gardens 2007). Flora species, including threatened species and introduced flora species, are referred to by both their common and then scientific names when first mentioned. Subsequent references to flora species cite the common names only, unless there is no common name, for which scientific name will be used. Common names, where available, have been included in threatened species tables and the complete flora list in Appendix 2.

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

A.2 Permits and licences

The flora and fauna assessment was conducted under the terms of Biosis' Scientific Licence issued by the Office of Environment and Heritage under the National Parks and Wildlife Act 1974 (SL100758, expiry date 31 March 2017). Fauna survey was conducted under approval 11/355 from the NSW Animal Care and Ethics Committee (expiry date 31 January 2017). The BioBanking Assessment was carried out by Accredited BioBanking Assessor Nathan Garvey (No. 0103).

A.3 Limitations

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as species dormancy, seasonal conditions, ephemeral status of waterbodies and migration and breeding behaviours of some fauna. In many cases these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

The current flora and fauna assessment was conducted in winter during cool and rainy weather, which is not suitable time to determine the presence of most threatened species. However, since the project will not impact on any mapped native vegetation a desktop and habitat based surveys were sufficient to assess the general values of the study area and inform likelihood of occurrence for threatened species.

There are other external factors which limit the results.

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

Appendix 2 Native vegetation data (BioBanking)

A.4 Plot and transect field data

Table 11 Flora species recorded from the study area and BioBanking plot.

Family	Scientific name	Common Name	Stratum	Growth Form	BioBanking Plot	Cover %	Count
Fabaceae (Mimosoideae)	Acacia deanei subsp. deanei	Deane's Wattle	Mid-storey	Shrub	4	25	5
					5	2	1
					7	5	6
Poaceae	Aristida ramosa	Purple Wiregrass	Ground Cover	Grass	4	5	20
Poaceae	Austrostipa scabra	Speargrass	Ground Cover	Grass	4	40	100
Poaceae	Austrostipa verticillata	Slender Bamboo Grass	Ground Cover	Grass	2	30	100
					5	1	1
					6	3	5
					7	1	2
Brassicaceae	Brassica napus	Canola	Ground Cover	Herbaceous	1	30	1000
					3	2	50
					5	10	100
Cupressaceae	Callitris glaucophylla	White Cypress Pine	Overstorey	Tree	1	5	1
					5	30	4
					7	25	8
Asteraceae	Calotis cuneifolia	Purple Burr-Daisy	Ground Cover	Herbaceous	5	2	10
					7	1	4
Cyperaceae	Carex inversa	Knob Sedge	Ground Cover	Sedge	2	1	1
Phormiaceae	Dianella revoluta	Blueberry Lily	Ground Cover	Fern	5	1	3
					7	1	2
Convolvulaceae	Dichondra repens	Kidney Weed	Ground Cover	Herbaceous	1	2	50
					2	1	50
					4	10	100
					5	3	100
					7	30	1000
Chenopodiaceae	Einadia nutans	Climbing Saltbush	Ground Cover	Chenopod shrub	1	2	20
					7	3	10

Family	Scientific name	Common Name	Stratum	Growth Form	BioBanking Plot	Cover %	Count
Poaceae	Elymus scaber	Common Wheatgrass	Ground Cover	Sod grass	2	1	2
					5	10	20
					7	1	5
Poaceae	Enteropogon acicularis	Curly Windmill Grass	Ground Cover	Grass	1	2	5
					5	15	10
					7	5	20
Poaceae	Eragrostis curvula	African Lovegrass	Ground Cover	Grass	5	5	20
					6	60	1000
					7	5	20
Myrtaceae	Eucalyptus melliodora	Yellow Box	Overstorey	Tree	4	60	6
					7	25	2
Myrtaceae	Eucalyptus microcarpa	Western Grey Box	Overstorey	Tree	1	30	20
					2	15	1
					3	60	50
					4	25	5
					5	40	10
					7	50	2
Rutaceae	Geijera parviflora	Wilga	Mid-storey	Shrub	7	5	1
Fabaceae (Faboideae)	Glycine clandestina	Twining glycine	Ground Cover	Herbaceous	4	1	3
Poaceae	Hordeum spp.	A Barley Grass	Ground Cover	Sod grass	1	60	1000
					2	65	1000
					4	15	100
					6	10	100
					7	40	1000
Asteraceae	Hypochaeris glabra	Smooth Catsear	Ground Cover	Herbaceous	4	1	1
					6	25	1000
Chenopodiaceae	Maireana enchylaenoides	Wingless Fissure-weed	Ground Cover	Chenopod shrub	1	1	2
					4	1	2

Family	Scientific name	Common Name	Stratum	Growth Form	BioBanking Plot	Cover %	Count
					7	1	3
Chenopodiaceae	Maireana microphylla	Small-leaf Bluebush	Ground Cover	Shrub	1	2	2
					5	1	1
					6	1	1
					7	5	10
Malvaceae	Malva parviflora	Small-flowered Mallow	Ground Cover	Herbaceous	3	5	50
Hyacinthaceae	Muscari sp	Common Grape Hyacinth	Ground Cover	Herbaceous	2	5	50
Oxalidaceae	Oxalis corniculata	Creeping Oxalis	Ground Cover	Herbaceous	1	1	5
					3	1	20
					4	1	50
					6	2	100
Plantaginaceae	Plantago lanceolata	Lamb's Tongues	Ground Cover	Herbaceous	6	1	20
Poaceae	Rytidosperma spp.	A Wallaby Grass	Ground Cover	Grass	1	2	10
					4	15	100
Lamiaceae	Salvia verbenaca	Vervain	Ground Cover	Herbaceous	2	5	50
					4	3	50
					6	4	20
Malvaceae	Sida corrugata	Corrugated Sida	Ground Cover	Shrub	4	1	5
					7	5	50
Poaceae	Triticum sp	Wheat	Ground Cover	Sod grass	2	2	50
					3	60	1000
Urticaceae	Urtica urens	Small Nettle	Ground Cover	Herbaceous	2	1	10
					3	90	1000

A.5 Plot and transect summary

Table 12 Plot scores for each vegetation zone within the development site

Benchmark details	Site value score	Site attributes									
		Native plant species	Native over-storey cover	Native mid-storey cover	Native ground cover (grass)	Native ground cover (shrubs)	Native ground cover (other)	Exotic plant cover	Number of trees with hollows	Over-storey regen	Total length of fallen logs
Benchmark	N/A	>=25	8.0 to 35.0	3.0 to 10.0	13.0 to 50.0	3.0 to 5.0	3.0 to 15.0	N/A	>=1	1.00	>=75
Transect/Plot											
Plot 1	45.31	8	28	10	8	0	2	60	0	0	50
Plot 3		1	36	8	0	2	4	68	3	0	4
Plot 4		10	7	0.4	20	2	0	2	0	0	10
Plot 5	19.27	10	20	0	6	4	8	46	0	0	10
Plot 7	65.62	15	27	10	30	18	16	68	1	1	25
Plot 2	N/A	5	0	0	14	0	6	84	0	0	0
Plot 6		2	0	0	0	0	4	100	0	0	2

Red cells indicate the site attributes that are below 50% of the benchmark, while blue cells represent those site attributes that are greater than 150% of the benchmark. Plot and transect number 2 and 6 are considered non-native vegetation because more than 50 per cent of the vegetation cover consist of exotic species, therefore it was not included in the BioBanking calculations.