Biodiversity Development Assessment Report

WELLINGTON NORTH SOLAR PLANT

MAY 2018

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Document Verification

Project Title: Wellington North Solar Plant

Project Number:	17-382
Project File Name:	Wellington North BDAR Final v2

Revision	Date	Prepared by (name)	Reviewed by (name)	Approved by (name)
Draft v1.0	13/04/18	Julie Gooding (Accreditation BAM Assessor BAAS18074)	Dave Maynard (Accredited BAM Assessor – BAAS17026)	Dave Maynard (Accredited BAM Assessor – BAAS17026)
Final v1.0	28/05/18	Julie Gooding (Accreditation BAM Assessor BAAS18074)	Dave Maynard (Accredited BAM Assessor – BAAS17026)	Dave Maynard (Accredited BAM Assessor – BAAS17026)
Final v2.0	7/06/18	Julie Gooding (Accreditation BAM Assessor BAAS18074) Dave Maynard (Accredited BAM Assessor – BAAS17026) Minor changes	Dave Maynard (Accredited BAM Assessor – BAAS17026)	Dave Maynard (Accredited BAM Assessor – BAAS17026)
Final v2.1	25/06/18	Julie Gooding (Accreditation BAM Assessor BAAS18074)	Dave Maynard (Accredited BAM Assessor – BAAS17026)	Dave Maynard (Accredited BAM Assessor – BAAS17026)

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ACRONYMS AND ABBREVIATIONS

BAM	Biodiversity Assessment Methodology
BC Act	Biodiversity Conservation Act 2016 (NSW)
BDAR	Biodiversity Development Assessment Report
BOM	Australian Bureau of Meteorology
CEMP	Construction environmental management plan
DECCW	Refer to OEH
DPE	(NSW) Department of Planning and Environment
EEC	Endangered Ecological Community
EIA	Environmental impact assessment
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
FM Act	*Fisheries Management Act 1994* (NSW)
ha	hectares
HBT	Hollow-bearing Tree
KFH	Key Fish Habitat
km	kilometres
LRET	Large Scale Renewable Energy Target
m	Metres
MNES	Matters of National environmental significance under the EPBC Act (*c.f.*)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PCT	Plant Community Type
REAP	Regional Environmental Action Plan (NSW)
SSD	State Significant Development
SEARS	Secretary's Environmental Assessment Requirements
SAII	Serious and Irreversible Impact
SEPP	State Environmental Planning Policy (NSW)
sp/spp	Species/multiple species
TEC	Threatened Ecological Community

EXECUTIVE SUMMARY

AGL is planning for the construction and operation of a 300-Megawatt solar photovoltaic plant and associated infrastructure within the Dubbo Local Government area, approximately 7km North East of Wellington. The proposal plans to develop approximately 818ha of the 970ha subject land. Two infrastructure options are being considered, an eastern transmission line option and a Western Transmission line option.

This Biodiversity Development Assessment Report (BDAR) has been prepared by NGH Environmental on behalf of AGL.

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

The Biodiversity Assessment Methodology (BAM) is the current assessment methodology for SSD under the NSW Biodiversity Offsets Scheme prescribed by the NSW *Biodiversity Conservation Act 2016.* The BAM is established for accessing certain impacts on threatened species and threatened ecological communities and their habits. This report follows the BDAR format required by the BAM.

Field Surveys of the development site identified two plant community types (PCTs); White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266) and Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion (437). These vegetation communities are listed as an Endangered Ecological Community (EEC): White Box-Yellow Box-Blakely's Red Gum woodland under the *Biodiversity Conservation Act 2016.* These communities do not meet the criteria for the EPBC listed community.

Consideration has been given to avoid and minimise impacts to EECs where possible. Site design options have been assessed against key environmental, social and economic criteria. Mitigation and management measures will be put in place to adequately address impacts associated with the proposal, both direct and indirect.

For biodiversity impacts that are unavoidable, the proposal would require the removal of native vegetation. Two transmission line options are considered by the proposal, the Eastern Transmission Line Option and the Western Transmission Line option. The vegetation to be removed within each of the two options are:

- 100ha of White Box grassy woodland (comprising 5.7ha of woodland and 91.2ha of derived native grassland), 11.2ha of Yellow Box Grassy Woodland and 50 paddock trees would be removed by the proposal within the Solar array, infrastructure and Eastern Transmission Line Option.
- 97.9ha of White Box grassy woodland (comprising 6.9ha woodland and 91ha of derived native grassland), 13.3ha of Yellow Box Grassy Woodland and 45 paddock trees would be removed by the proposal within the solar array, infrastructure and Western Transmission Line Option.

Two ecosystem credit species, Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis* (Vulnerable, BC Act) and foraging Grey-headed Flying Fox *Pteropus Poliocephalus* (Vulnerable, BC Act) were detected during the site survey. These species are accounted for in the ecosystem credit requirements of the development determined by the PCT and do not require targeted survey.

One species credit species, the Southern Myotis (*Myotis macropus*) was detected within the development site during the site surveys. 0.2ha of habitat for this threatened species (hollow-bearing trees within 200m of a waterway) would be removed. Species credits were calculated from the BAM Calculator for this entity. Two options were considered in the Calculator; the Solar array, Infrastructure and Eastern Transmission Line option and the Solar array, infrastructure and Western Transmission Line option. The following ecosystem credits were generated for each of these two options.

Solar array, associated infrastructure and Eastern Transmission Line

- White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion - **123.5 ecosystem credits required**
- Yellow Box Grassy Woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion –**285.5 ecosystem credits required**
- Southern Myotis (*M. Macropus*) – **6 species credits required**

Solar array, associated infrastructure and Western Transmission Line

- White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion -**132.5 ecosystem credits required**
- Yellow Box Grassy Woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion –**335.75 ecosystem credits required**
- Southern Myotis (*M. Macropus*) – **6 species credits required**

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Proposals.

1 INTRODUCTION

The Wellington North Solar Plant proposal is classified as State Significant Development (SSD) under the State and Regional Development State Environmental Planning Policy (SEPP) and therefore a 'major project'. This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the proposed Wellington North Solar Plant ('the proposal') according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal. NGH Environmental has prepared this report on behalf of the proponent, AGL Pty Ltd.

1.1 THE PROPOSAL

The Wellington North Solar Plant proposal involves the construction, operation and decommissioning of a ground-mounted photovoltaic (PV) solar array which would generate approximately 300 MW (AC) into the national electricity grid. The key infrastructure for the proposal would include:

- Approximately 1.2 million PV modules, spaced 4-8 m and mounted on east-west horizontal tracking systems or north-orientated fixed-tilt structures (both fixed and tracking options are considered viable for the project).
- Up to 155 PV inverter stations to allow conversion of DC module output to AC electricity and transformation to medium voltage for site reticulation (typically 22 kV or 33 kV).
- Underground and overhead electrical conduits and cabling to connect the solar panels, combiner boxes and inverters.
- An onsite substation containing up to two transformers and associated switchgear.
- Up to 7km of 132 kV or 330 kV, overhead or underground transmission line to the existing TransGrid 330 kV substation (an east and west option are being investigated, one of which would be selected).
- Additional electrical transformation equipment to be positioned in close proximity to the existing TransGrid substation, if the 132kV transmission line option is progressed.
- Site access off Campbells Lane, with additional access for mostly light vehicles off Goolma Road.
- Internal access tracks and upgrades to existing access roads, where required;
- Site office and maintenance building with associated car park.
- Space for future energy storage facility. Energy storage is not currently proposed and therefore is not part of this assessment.
- Perimeter security fencing and CCTV.
- Vegetation planting to provide visual screening for specific viewers, as required.

1.2 THE DEVELOPMENT SITE

1.2.1 *Site location*

The Wellington North Solar Plant development site is located approximately 7km north east of Wellington, NSW, within the Dubbo LGA.

The Wellington North proposal would be situated within 970 ha of freehold land, identified as Lots 75-84, 88, and 119-121/DP 2987, Lots 1 and 2 /DP 1104720, Lot 3/DP 976701, Lots 1-3 /DP 808748, Lot 100 /DP 750760, Lot 1/DP 664645 and Lot 1/ DP 1206579. The site is bounded by Campbells Lane to the north,

Goolma Road to the east, private land and Cobbora Road to the west and private agricultural land to the south.

The proposal site is intended to be owned by Wellington North Solar Farm Pty Limited, with the exception of Lot 3 DP 808747 and Lot 88 DP 2987. These two lots will remain under the ownership of the Soil Conservation Service.

Two transmission lines options are considered, an Eastern Transmission Line and a Western Transmission Line to connect with the Wellington Substation, located 3km south of the site on Lot 1 DP 1226751. The western transmission line option would be either an overhead or underground line with a 60m easement. The eastern transmission line option would be overhead with a 60m easement within the solar plant site, and then be underground with a 15m easement from the solar plant site to the substation. Both transmission line options are considered in this report. The location of the development site is shown in Figure 1-1.

1.2.2 *Site description*

The development site comprises of several large paddocks which consist of undulating hills that have been largely cleared for cropping. Remnant vegetation throughout the site is derived from a community of White Box Woodland and Yellow Box Woodland. Some patches of remnant woodland have been fenced from stock and are in a moderate to good condition. The majority of the woodland throughout the site has been highly disturbed and lack native understorey due to heavy grazing and pasture improvement practices. Plantings of native species have been used as wind breaks and for rehabilitation along onsite waterways. Two Farm Forestry plantations, planted as research species trials for dryland salinity by the CSIRO and Dept. Land and Water Conservation occur in the site, one located in the north east of the site and another in the south east. These plantations are a mix of local and non-local Eucalypts, Acacias and Pine Trees planted approximately 30 years ago.

The land immediately surrounding the development site includes cropping and grazing land, the Wellington and Macquarie Correctional Centres, rural residences (including a residential subdivision). A TransGrid 330kV substation occurs approximately 3km south of the proposed solar plant.

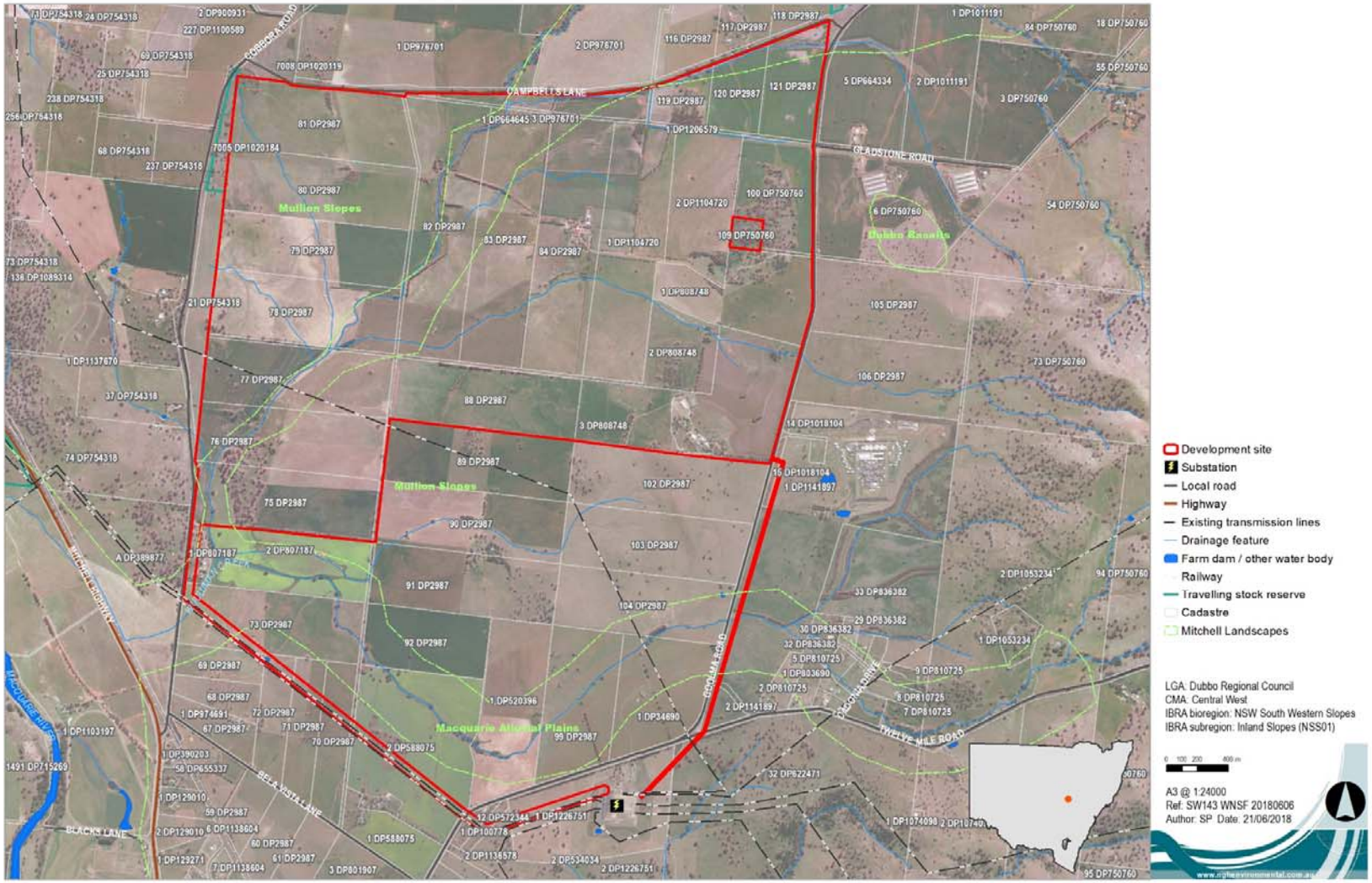

Figure 1-1 Site Map.

1.3 STUDY AIMS

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

The aim of this BDAR is to address the requirements of the BAM, as required in the Secretary's Environmental Assessment Requirements (SEARs) and summarised below.

Secretary's Environmental Assessment Requirement
The EIS must address the following specific issues: **Biodiversity – including an assessment of the biodiversity values and the likely biodiversity impacts of the development in accordance with the *Biodiversity Conservation Act 2016* (NSW), a detailed description of the proposed regime for minimising, managing and reporting on the biodiversity impacts of the development over time, and a strategy to offset any residual impacts of the development in accordance with the *Biodiversity Conservation Act 2016* (NSW);**

Responses from the Office of Environment and Heritage indicated The Biodiversity Assessment Method (BAM) must be used to assess impacts to biodiversity in accordance with the *Biodiversity Conservation Act 2016* (BC Act) and documented in a Biodiversity Development Assessment Report (BDAR).

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

1.4 DEFINITIONS

The Development Footprint

The area of land that is directly impacted on by the proposal including, solar array design, perimeter fence, access roads, transmission line footprint and areas used to store construction materials.

The development footprint is the impact area assessed in this BDAR. The development footprint for the solar array is approximately 806ha. In addition, the development footprint for the Western Transmission line option is 31ha and the development footprint for the Eastern Transmission Line is 7ha.

The Development Site

The area of land within affected lot boundaries that is subject to a proposed development (the proposal as defined above). The development site is the area surveyed for this assessment. The development site is approximately 970ha.

Buffer Area

All land within 1500m of the outside edge of the boundary of the development site.

1.5 SOURCE OF INFORMATION USED IN THE ASSESSMENT

The following information sources were used in the preparation of this report:

- Proposal layers, construction methodology and concept designs provided by AGL
- Commonwealth Department of Environment and Energy (DoEE) Species Profiles and Threats database (SPRAT) http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

- Commonwealth Department of Environment and Energy Protected Matters Search Tool. Accessed online at http://environment.gov.au/epbc/protected-matters-search-tool
- Department of Environment and Climate Change NSW (DECC) (2002). Descriptions for NSW (Mitchell) Landscapes, Version 2
- NSW OEH's Biodiversity Assessment Method (BAM) calculator (http://www.environment.nsw.gov.au/bbccapp/ui/mynews.aspx)
- NSW OEH's BioNet threatened biodiversity database Accessed online via login at http://www.bionet.nsw.gov.au/
- OEH Threatened Species Profiles http://www.environment.nsw.gov.au/threatenedSpeciesApp/ and www.environment.nsw.gov.au/AtlasApp/UI_Modules/
- OEH BioNet Vegetation Classification Database (OEH 2017) Accessed online via login at http://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx
- OEH VIS Mapping Accessed online at http://www.environment.nsw.gov.au/research/VISmap.htm
- Office of Environment and Heritage (OEH) (2017). Biodiversity Assessment Method
- NSW Government SEED Mapping https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU
- NSW Biodiversity Values Map https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

1.6 CONSULTATION

Consultation with relevant departments is shown in Table 1-1 Consultation with relevant departments

Table 1-1 Consultation with relevant departments.

Date	Contact	Reason	Response
22/12/17	Michelle Cox, OEH Regional Operations Group	Mapped Important areas for the Swift Parrot and Regent Honeyeater	The development site does not fall within an area of mapped important areas for these species
31/01/18	Michelle Howarth, OEH Senior Conservation Planning Officer	Confirming offsetting not required for vegetation with a Vegetation Integrity score of less than 15.	Offsetting not required for vegetation with score less than 15.
13/03/18	Michelle Howarth, OEH Senior Conservation Planning Officer	Confirming approach to deal with planted native vegetation in the BAM Calculator.	Supportive of approach that offsetting is not required for planted native vegetation that is not representative of a PCT.
16/03/18	Michelle Howarth, OEH Senior Conservation Planning Officer Michelle Cox, OEH Regional Operations Group	Clarifying definition of the Glossy Black Cockatoo Geographic limitations in the BAM Calculator	The Glossy Black Cockatoo is included the BAM Calculations for this development site.

2 LANDSCAPE FEATURES

2.1 IBRA BIOREGIONS AND SUBREGIONS

Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features, and flora and fauna communities. The development site is located within the NSW South Western Slopes Bioregion and the Inland Slopes subregion (DoEE 2012). The geology is characteristic of the eastern Lachlan Fold Belt, comprised of Cambrian to Early Carboniferous sedimentary and volcanic rocks, with characteristic landforms of undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans.

The dominant IBRA subregion impacted by the proposal is the Inland Slopes subregion. This was entered into the BAM Calculator for the proposal.

2.2 NSW LANDSCAPE REGIONS AND AREA

Two Mitchell Landscapes occur within the development site. These are the:

- Mullion Slopes.
- Macquarie Alluvial Plains.

Mullion slopes is the dominant landscape and was entered into the BAM calculator for the proposal.

2.3 NATIVE VEGETATION

As determined by GIS mapping from aerial imagery, approximately 1,071ha of Native Vegetation occurs within the 1,500m buffer area surrounding the site. This vegetation within the buffer area is considered to be predominantly Western Slopes Grassy Woodland comprised of White Box on the Hilltops and Yellow Box along the gullies. Plantings of native vegetation generally occur as linear strips along fence lines or gullies.

2.4 CLEARED AREAS

Cleared areas within the subject land are primarily used for cropping and grazing. These areas have been frequently cultivated and lack any remnant native vegetation. Cleared areas provide very little in terms of native fauna habitat but could provide limited foraging habitat for raptors, parrots, cockatoos and macropods.

Approximately 720ha of cleared land occurs within the boundary of the development site. This is approximately 75% of the development site.

Figure 2-1 Examples of cleared landscapes within the development site.

2.5 RIVER AND STREAMS

Seven unnamed watercourses occur within the development site (Figure 1-1). These facilitate water in the north-south direction and are all tributaries of Wuuluman Creek which is located some 300m south of the Site. These are:

- **Tributary 1.** One unnamed 3rd Order Stream that flows from the North to the Southwestern corner of the site. This tributary is the only waterway onsite that flows. This waterway has mostly been cleared and grazed but some native grasses such as Red Grass (*Bothriochloa macra*), *Austrostipa sp*. and Curly Windmill Grass (*Chloris truncata*) remain on the bank. Native Bulrush (*Typha sp.*) is present within the stream providing aquatic habitat for frogs and birds. Rocks and riffles are also present in some parts of the stream providing aquatic habitat for amphibians.
- **Tributary 2 and 4.** unnamed 2nd Order Streams which are incised waterways. No water flow present at the time of inspection but small pools of water remaining. Vegetation in these waterways is degraded and dominated by exotic grasses that have been grazed by stock.
- **Tributary 3, 5 and 6.** Three unnamed 1st Order Streams which are minor incised drainage lines, flowing only after rain events. Vegetation in these waterways is degraded and dominated by exotic grasses that have been grazed by stock and provide very little aquatic habitat.
- **Tributary 7.** One constructed channel for drainage surrounding cropping land. This channel is cleared with very little vegetation and provides very little aquatic habitat.

These tributaries flow into the Macquarie River, approximately 2.5km downstream.

Figure 2-2 Tributary 1. Unnamed 3rd Order stream within the development site.

Figure 2-3 Tributary 2 Unnamed 2nd order stream within the development site.

Figure 2-4 Tributary 3 Unnamed 1st order drainage line within the development site.

Figure 2-5 Tributary 7 Constructed Channel within the development site.

2.6 WETLANDS

No wetlands occur within or adjacent to the development site. The nearest nationally important wetland downstream from the development site is the Macquarie Marshes located over 150km downstream.

Four man-made dams occur within the development site for stock. These dams lack fringing vegetation or aquatic vegetation.

Figure 2-6 Dam within the development site.

2.7 CONNECTIVITY FEATURES

The landscape within the development site has been heavily cleared and lacks functional connectivity. Remnant vegetation occurs as small isolated patches within the cropped landscapes.

The main connectivity throughout the landscape occurs along the watercourse through the centre of the site. This watercourse supplies permanent water and has a groundcover dominated by native grasses, however the tree cover is scattered and isolated. Other connectivity features would include linear plantings and scattered paddock trees. These provide some habitat connectivity for more disturbance tolerant and mobile species to travel across the landscape.

Large tracts of grassy woodland occur outside the development site to the South and East and would provide better connectivity for movement across the landscape.

2.8 AREAS OF GEOLOGICAL SIGNIFICANCE

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

2.9 AREAS OF OUTSTANDING BIODIVERSITY VALUE

No areas of Outstanding Biodiversity Value occur within the development site.

2.10 SITE CONTEXT COMPONENTS

Method applied

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

Percent Native Vegetation Cover

The Percent Native Vegetation Cover within the 1,500m buffer area surrounding the development site prior to the development was calculated to be approximately 22.5%. This was entered into the BAM calculator for the proposal. This Percent Native Vegetation was calculated by estimating the area of native vegetation (woody and non-woody)within the 1500m buffer area. Areas of native vegetation were calculated using GIS mapping and aerial photography. The total area of the 1500m buffer area is 4779ha. The area of native vegetation within the buffer area is estimated to be 1073ha. This puts the native vegetation cover into the cover class of 10-30%.

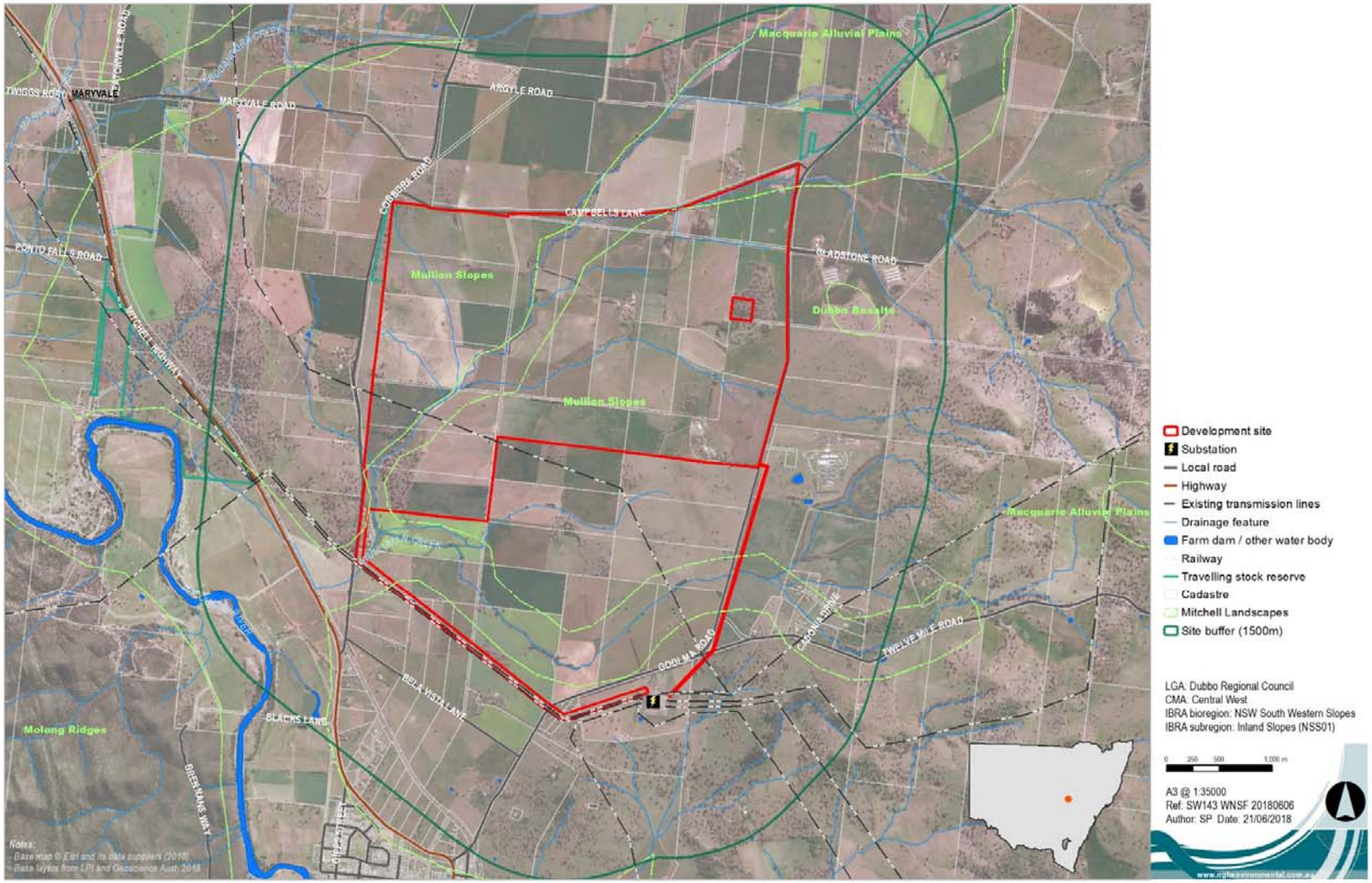

Figure 2-7 Location map.

3 NATIVE VEGETATION

3.1 NATIVE VEGETATION EXTENT

Approximately 204ha of native vegetation occurs within the development site. This occurs as both remnant and planted native vegetation comprising:

- 69ha of remnant vegetation of Yellow Box Woodlands and White Box Woodlands.
- 23ha of planted vegetation in the form of ecological plantings representing the surrounding vegetation communities.
- 94ha of derived native grasslands.

Approximately 720ha of the development site occurs as cropped land. These areas were dominated by exotic vegetation such as Oats (**Avena sativa*) and Barley (**Hordeum distichon*). These areas do not provide any threatened species habitat, and therefore do not require further assessment.

91 scattered paddock trees occur throughout the development site (Figure 3-1). Paddock trees were defined as:

- a tree or a group of up to three trees less than 50m apart from each other, and
- over an exotic groundcover, and
- more than 50m away from any other living tree greater than 20cm DBH, and
- on category 2 land surrounded by category 1 land (as defined by the BAM, 2017).*

*Staged release of the regulatory land mapping is occurring under the new *Local Land Service Act 2016* (LLS Act). Stage 1b has not been yet been published. During the transitional period, land categories are to be determined in accordance with the definitions of regulated land in the LLS Act. In this case, the paddock trees are located on land with native vegetation present since January 1990, surrounded by land that has been cleared of native vegetation since January 1990.

Paddock trees throughout the development site were assessed under the streamlined assessment module – clearing paddock trees (Appendix 1 of the BAM) and incorporated into this report. They are considered both in terms of ecosystem credits and as habitat for threatened species and any credits generated are additional to those created by applying the full BAM.

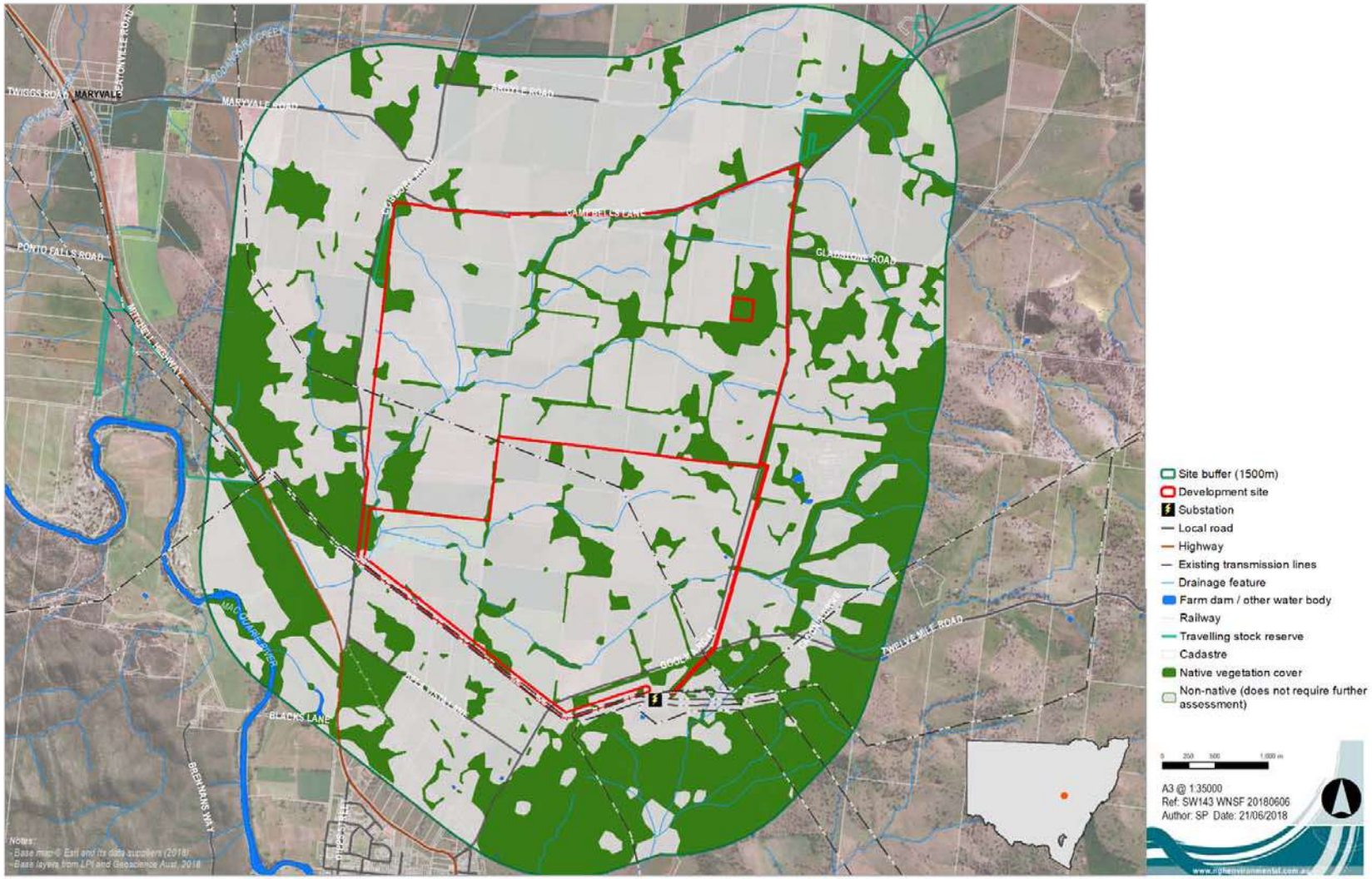

Figure 3-1 Native vegetation extent within the development site

3.2 PLANT COMMUNITY TYPES (PCTS)

3.2.1 *Methods to assess PCTs*

Review of existing information

A search was undertaken of the OEH Vegetation Information System (VIS) database and NSW SEED (Sharing and Enabling Environmental Data) mapping to access existing vegetation mapping information within the study area. Two relevant existing vegetation maps were assessed:

- Central West and Lachlan Catchments Vegetation Mapping by the Department of Environment and Conservation (2017). Small patches of vegetation surrounding or within the development site were mapped as Yellow Box Grassy Woodland or White Box, White Cypress Grassy Woodland.
- NSW Government SEED Mapping (2017). This identified four PCT's surrounding and within the development site. These were:
    - PCT511 – *Queensland Bluegrass – Red-leg Grass – Rat's tail Grass – Speargrass – panic grass derived grassland of the Nandewar Bioregion and Brigalow Belt South Bioregion.*
    - PCT266 – *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slops Bioregion*
    - PCT74 - *Yellow Box – River Red Gum Tall Grassy Riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion.*
    - PCT76 - *Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slops and Riverina Bioregion.*

Floristic survey

Flora surveys were undertaken in October 2017 and February 2018.

The entire subject land was surveyed by car and foot on the 4th– 6th October 2017 by an ecologist from NGH Environmental. The aim of the initial survey was to determine the PCTs on the development site and their condition on site. Random meander searches were conducted in areas of native vegetation to determine the plant species present. PCT's were identified from the native species present, landforms and physiography and location within the IBRA subregion with reference to the BioNet Vegetation Classification Database. The subject land was then stratified into areas of similar condition class to determine vegetation zones for each PCT.

Detailed floristic surveys were undertaken on the 18th - 20th October 2017. Vegetation integrity plots, of 20m by 50m were established in each vegetation zone. Data was collected on the composition, structure and function of the vegetation. Data was collected utilising the methodology presented in the BAM 2017 by persons trained in the BAM and under the directions of persons accredited under the BAM (Appendix B). The number of plots for each zone was based on the area of each zone and the minimum number of plots and transects required per zone area as specified by the BAM.

Further vegetation integrity plots were undertaken on the 14th Feb 2018 to cover additional areas to be impacted by the proposal.

3.2.2 *PCTs identified on the development site*

Two Plant Community Types (PCT) were identified in the development site (Figure 3-2 &

Figure 3-3):

- White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266).
- Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion (437)

A description of each of these PCTs follows in Table 3-1 and Table 3-2.

Table 3-1 Description of PCT 266 in development site.

White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT266).		
Vegetation formation	Grassy Woodlands	
Vegetation class	Western Slopes Grassy Woodland	
Vegetation type	**PCT ID**	266
	Common Community Name	White Box Grassy woodland
Approximate extent within the development site	40.5ha – Remnant Woodland 3.5ha – Planted Woodland 93.1ha – Derived Grassland	
Species relied upon for PCT identification	***Species name***	***Relative abundance***
	White Box (*Eucalyptus albens*)	*Dominant – 30% Cover*
	White Cypress (*Callitris glaucophylla*)	10%
	Kurrajong (*Brachychiton populneus*)	10%
	Bamboo Grass (*Austrostipa verticillata*)	0.5%
	Tufted Bluebell (*Wahlenbergia communis*)	0.5%
	Fuzzweed (*Vittadinia cuneata*)	0.5%
	Weeping Meadow Grass (*Microlaena stipoides*)	0.1
	Knottybutt Grass (*Paspalidium constrictum*)	0.5%
Justification of evidence used to identify the PCT	The remnant woodland within the development site is very degraded having been extensively cleared and heavily grazed. Scattered paddock trees remain in patches on the rocky hilltops and very little native understorey species remain. The dominant native species on the hilltops are White Box. Some scattered White Cypress and Kurrajong also occur on the hill slopes. An occasional Grey Box (*Eucalyptus microcarpa*) occurred on the lower hillslopes. The understorey is mostly exotic pasture species or bare ground however scattered Austrostipa verticillata, Fuzzweed (*Vittadinia cuneata*) and Knottybutt Grass (*Paspalidium constrictum*) occur in low abundance. Thirteen Floristic 20m x 20m plots were undertaken for this PCT (Appendix D). The results of these surveys were entered into the BioNet Vegetation classification database.	

White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT266).	
	Based on the remnant overstory species, floristic plots, vegetation mapping and the IBRA subregion – three PCT's were shortlisted for consideration. **PCT 266** – White Box Grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion. (Kurrajong is a characteristic species) **PCT 267** – White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion. **PCT 435 -** White Box – White Cypress Pine Shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion. The landscape has been very cleared and grazed with little remaining understorey and the lack of native species made it difficult to distinguish between the three PCTs. Neither PCT 266 and PCT 267 have both Kurrajong and White Cypress as characteristic species for the community. It could be that PCT 266 (White Box and Kurrajong) occurred on the Hilltops and PCT 267 (White Box, White Cypress and Grey Box) or PCT76 (Western Grey Box Tall Grassy Woodland) occurred slightly lower downhill, however within the fragmented landscape it is not clear to determine whether an intergrade of two vegetation communities occurred. Based on the dominance of the White Box in the paddock trees and relevant vegetation mapping surrounding the development site (DEC, 2017, NSW Government, 2017), PCT 266 was selected as the vegetation community within the development site.
TEC Status	This PCT forms part of the EEC; White Box Yellow Box Blakely's Red Gum Woodland.
Estimate of percent cleared in Bioregion	58%
Examples	

White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT266).

Example of White Box Woodland (Plot 15).

Example of White Box Woodland (Plot 9)

White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT266).

Example White Box Woodland derived grassland (Plot 10).

Example of White Box Woodland Planted (Plot 12).

Table 3-2 Description of PCT 437 in the development site.

Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion (437)		
Vegetation formation	Grassy Woodlands	
Vegetation class	Western Slopes Grassy Woodland	
Vegetation type	**PCT ID**	437
	Common Community Name	Yellow Box grassy woodland on lower hillslopes and valley flats
Approximate extent within the development site	29.0ha – Remnant Woodland 19.9ha – Planted Woodland 4.3ha – Derived Grassland	
Species relied upon for PCT identification	***Species name***	***Relative abundance***
	Yellow Box (*Eucalyptus melliodora*)	30%
	Kurrajong Tree (*Brachychiton populneus* subsp. *populneus*)	5%
	Red Grass (*Bothriochloa macra*)	10%
	Sida (*Sida corrugata*)	0.5%
	Speargrass (*Austrostipa scabra*)	8%
	Yellow Burr Daisy (*Calotis lappulacea*)	0.1%
	Creeping Saltbush (*Atriplex semibaccata*)	3%
	Kidney Weed (*Dichondra repens*)	0.1%
	Climbing Saltbush (*Einadia nutans)*	0.1%
	Oxalis *(Oxalis perennans*)	0.5%
Justification of evidence used to identify the PCT	The remnant woodland within the development site is very degraded having been extensively cleared and heavily grazed. Scattered paddock trees remain along the river flats and watercourses. The dominant native species along the flats are Yellow Box with occasional Kurrajong (*Brachychiton populneus*). Understorey species are mostly exotic pasture species however some native species occurred as listed above. Eight Floristic 20m x 20m plots were undertaken for this PCT (Appendix D). The results of these surveys were entered into the BioNet Vegetation classification database. Based on the remnant overstory species, floristic plots, vegetation mapping and the IBRA subregion – three PCT's were shortlisted for consideration. **74** - Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion. **276** – Yellow Box Grassy Tall Woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion.	

Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion (437)	
	437 – Yellow Box Grassy Woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion. Despite there being some mature planted River Red Gum's in woodlots there was no evidence that River Red Gum's had been naturally occurring in the area so PCT 74 was not considered to be a compatible PCT. Based on the location within the landscape and associated understorey species PCT 437 was selected to be the best match for the vegetation community within the development site.
TEC Status	This vegetation community forms part of the listed EEC: White Box Yellow Box Blakely's Red Gum Woodland.
Estimate of percent cleared in Bioregion.	90%
Examples	 Yellow Box Woodland (Plot 11).

Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion (437)	
Examples	 Yellow Box Woodland derived native grassland (Plot 1). Yellow Box Woodland Planted Vegetation (Plot 2).

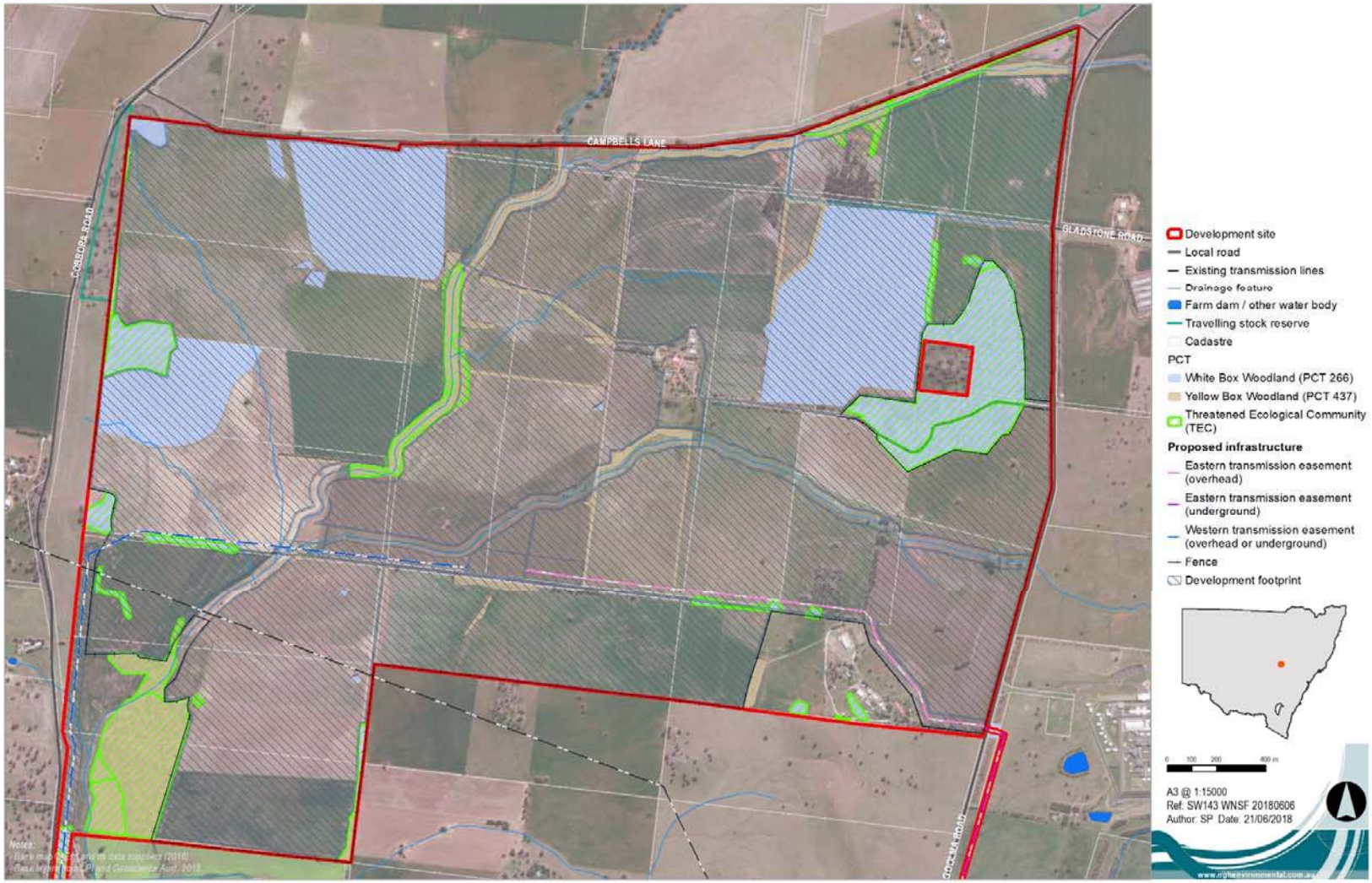

Figure 3-2 PCTs and TECs at the development site (north).

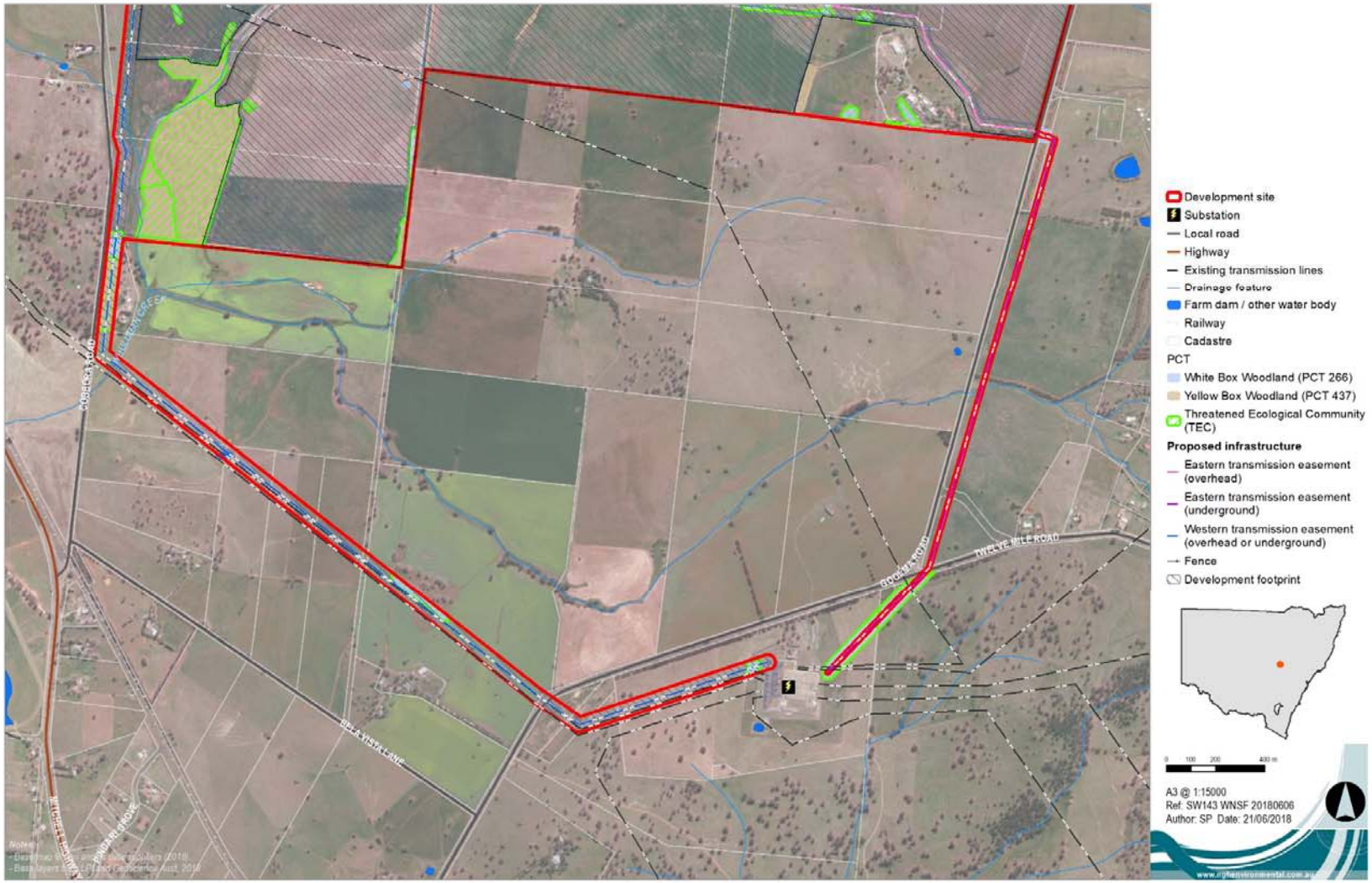

Figure 3-3 PCTs and TECs at the development site (south).

3.3 VEGETATION INTEGRITY ASSESSMENT

3.3.1 *Vegetation zones and survey effort*

The random meander, overview inspection and detailed floristic plots have been used to assist the delineation of zones. Two PCT's were identified in the development site. Each of these PCTS were stratified into zones with a similar broad condition state. These zones were defined based on the overstory condition, understorey condition and observed land management practices and described in Table 3-3. Eleven zones were identified and a further two zones were identified for vegetation not aligning to a locally indigenous PCT. These are mapped in Figure 3-4 and Figure 3-5.

Twenty-three vegetation integrity plots were conducted throughout the thirteen zones. A further five plots were undertaken in areas of exotic dominated vegetation and planted non-local vegetation to determine their condition.

Table 3-3 Vegetation Zones within the development site

Zone ID	PCT ID	Condition	Zone area (ha)	Survey effort (# plots)	Patch size (ha)	Example
1	**266**	**Moderate** Remnant White Box Woodland. Five patches of this woodland occur within the development site all with the same broad condition state. The understorey is heavily grazed and very little native species exist other than a sparse White Box (*Eucalyptus albens*) overstory. This zone is heavily grazed. This woodland is a TEC - White Box Yellow Box Blakely's Red Gum Woodland EEC (Box-Gum Woodland) based on White Box being a dominant overstory species.	11.8	4	550	
2	**266**	**Derived Native Grassland**. Three patches of this grassland occur within the development site all with the same broad condition state. The grassland is comprised of some scattered native grasses and forbs within an exotic dominated pasture. This zone is heavily grazed. This grassland does not form part of the Box-Gum Woodland EEC as there is less than 50% cover of native grasses and due to long term grazing and pasture improvement would be unlikely to respond to natural regeneration (NSW Scientific Committee, 2002).	90.9	6	91	

Zone ID	PCT ID	Condition	Zone area (ha)	Survey effort (# plots)	Patch size (ha)	Example
3	**266**	**Planted** Six patches of these planted woodlots occur within the development site. These plantings occur on hillslopes and are generally comprised of planted White Box, White Cypress and Acacia species that are typical of PCT 4266. Understorey is almost 100% exotic species. This zone is not grazed in the understorey. This zone does not form part of the Box-Gum Woodland EEC as the understorey is dominated by shrubs (NSW Scientific Committee, 2002)	3.5	3	550	
6	**266**	**Good.** Remnant White Box Woodland. This area has been fenced from stock and maintains a native understorey with native forbs, grasses and shrubs. Rocky outcrops and fallen timber are present throughout this zone. This woodland is a TEC - White Box Yellow Box Blakely's Red Gum Woodland EEC (Box-Gum Woodland) based on White Box being a dominant overstory species. *Benchmark data has been used for this vegetation zone	26.5	0*	550	

Zone ID	PCT ID	Condition	Zone area (ha)	Survey effort (# plots)	Patch size (ha)	Example
7	**266**	**Moderate/Good** Remnant White Box Woodland. These woodland patches have been grazed and maintain a grassy understorey comprised of a mixture of native and exotic grasses. This woodland is a TEC – White Box Yellow Box Blakely's Red Gum Woodland EEC (Box-Gum Woodland) based on White Box being a dominant overstory species.	2.3	1	2.8	
4	**437**	**Moderate** Remnant Yellow Box Woodland. Two patches of this woodland occur within the development site. The understorey is heavily grazed and very little native species exist other than a sparse Yellow Box (*Eucalyptus melliodora*) overstory. This zone is heavily grazed. This woodland is a TEC - White Box Yellow Box Blakely's Red Gum Woodland EEC (Box-Gum Woodland) based on Yellow Box being a dominant overstory species.	8.0	2	550	

Zone ID	PCT ID	Condition	Zone area (ha)	Survey effort (# plots)	Patch size (ha)	Example
5	**437**	**Planted** Fifteen patches of these planted woodlots of varying ages occur within the development site. These plantings occur along watercourses or drainage depressions and are generally comprised of planted Yellow Box and mixed Acacia species that could be typical of PCT437. The understorey is exotic dominated with occasional native grasses. These zones are fenced from stock, but grazing has occurred.	19.9	3	550	
8	**437**	**Derived Native Grassland.** One patch of this grassland occurs on the north of the site along a drainage channel and adjoins roadside vegetation along Campbells Lane on the North of the site. This zone has no overstory but has a good coverage of native grasses in the understorey.	4.3	2	4.30	
9	**437**	**Good** Remnant Yellow Box Woodland. Native forbs and grasses and fallen timber are present in the understorey. This woodland is a TEC - White Box Yellow Box Blakely's Red Gum Woodland EEC (Box-Gum Woodland) based on Yellow Box being a dominant overstory species.	14.4	1	550	

Zone ID	PCT ID	Condition	Zone area (ha)	Survey effort (# plots)	Patch size (ha)	Example
10	-	**Planted non-local Vegetation (No PCT)** This zone comprised three separate patches of planted vegetation. These woodlots have been planted in neat rows of evenly spaced trees and do not resemble a natural ecosystem. Trees are a mix of endemic Eucalypts such as Yellow Box (*E. melliodora*) and Mugga Ironbark (*E. sideroxylon*) and non-local species such Spotted Gum (*E. maculata*), & Monkey Grey Gum (*E. cypellocarpa*). The plantations lack any understorey species and only have a very sparse groundcover due to the dense plantings of overstory species. These plantings were planted 30-40 years ago for dryland salinity control. No hollows are yet present in any of the trees. Whilst comprised of native species these patches were not considered to represent a TEC.	18.3	3	550	
11	-	**Exotic Vegetation and cleared areas** Exotic vegetation dominated by crops such as Oats (**Avena sativa*), Lucerne (**Medicago sativa*) and Barley (**Hordeum sp.*) Some exotic patches also occur as planted Pepper Tree (*Schinus molle*) groves with an exotic understorey.	797.3	2	-	

Zone ID	PCT ID	Condition	Zone area (ha)	Survey effort (# plots)	Patch size (ha)	Example
12	**266**	**Derived Native Grassland Good** This zone surrounds the Wellington Substation 3km south of the development site. The understory is dominated by native grasses such as Red-leg Grass (*Bothriochloa macra*), Spring grass (*Eriochloa pseudoacrotricha*), Cotton Panic grass (*Digitaria brownii*) and Curly Windmill Grass (*Enteropogon acicularis*). This grassland is a TEC - White Box Yellow Box Blakely's Red Gum Woodland EEC (Box-Gum Woodland) based on the dominance of native species. *This plot was undertaken during the field work for an adjacent solar farm.	2.2	1*	2.2	
13	**437**	**Low** This zone occurs along the 3rd order stream in the centre of the site. Some scattered Yellow Box, planted *Casuarina Cunninghamiana* and native shrubs and juvenile Eucalypts occur along the creek. These trees occur in low density, occupying less than 1% of the zone. Some occasional exotic species such as Pepper Tree (*Schinus molle*) are also present. Native grass species such as Red-leg Grass (*Bothriochloa macra*), and Spear Grass (Austrostipa sp.) are present in low abundance in the understory. High threat exotic species such as Khaki Weed (*Alternanthera pungens*) and Bathurst Burr (*Xanthium spinosum*) are also present. This zone forms part of the Box-Gum Woodland EEC as although the site is highly disturbed, the soil has not been cultivated and the vegetation would likely response to assisted natural regeneration(NSW Scientific Committee, 2002).	6.6	2	550	

3.3.2 *Paddock Trees*

91 paddock trees occur throughout the development site. Paddock Trees are a mixture of White Box (*Eucalyptus albens*), Kurrajong (*Brachychiton populneus*), Yellow Box (*Eucalyptus melliodora*), White Cypress (*Callitris glaucophylla*) Mugga Ironbark (*Eucalyptus sideroxylon*) and the exotic Pepper Tree (*Schinus molle* var. *areira*). The paddock trees are most likely remnant of the surrounding PCT's identified in the development site. These are:

PCT266 – White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.

PCT437 – Yellow Box Grassy Woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion.

Paddock trees have been assigned to the above PCTs based on the following assumptions:

- White Box, White Cypress and Kurrajong on the hills most likely formed part of PCT266.
- Yellow Box, White Cypress and Kurrajong on the flats most likely formed part of PCT437.

Threatened species that would use the paddock trees are assumed to be the same ecosystem credit species that are returned by the BAM Calculator for the two vegetation zones. Where targeted fauna surveys for species credit species were required for the BAM Calculations, paddock trees were also included in the surveys. Assessments of threatened species that would use the paddock trees as habitat has been incorporated into this BDAR under Section 4 and 5.

All paddock trees were mapped in the field using GIS software on a handheld GPS enabled Tablet (Appendix A). Trees were identified to genus and species. The Diameter at Breast Height (DBH) of the tree was assessed and assigned a class relevant to the large tree benchmark. The Large tree benchmark for PCT266 and PCT437 is 50cm DBH. The trees were visually assessed to determine whether any hollows were present. The classes of the paddock trees occurring in the development site are shown in Figure 3-4 & Figure 3-5.

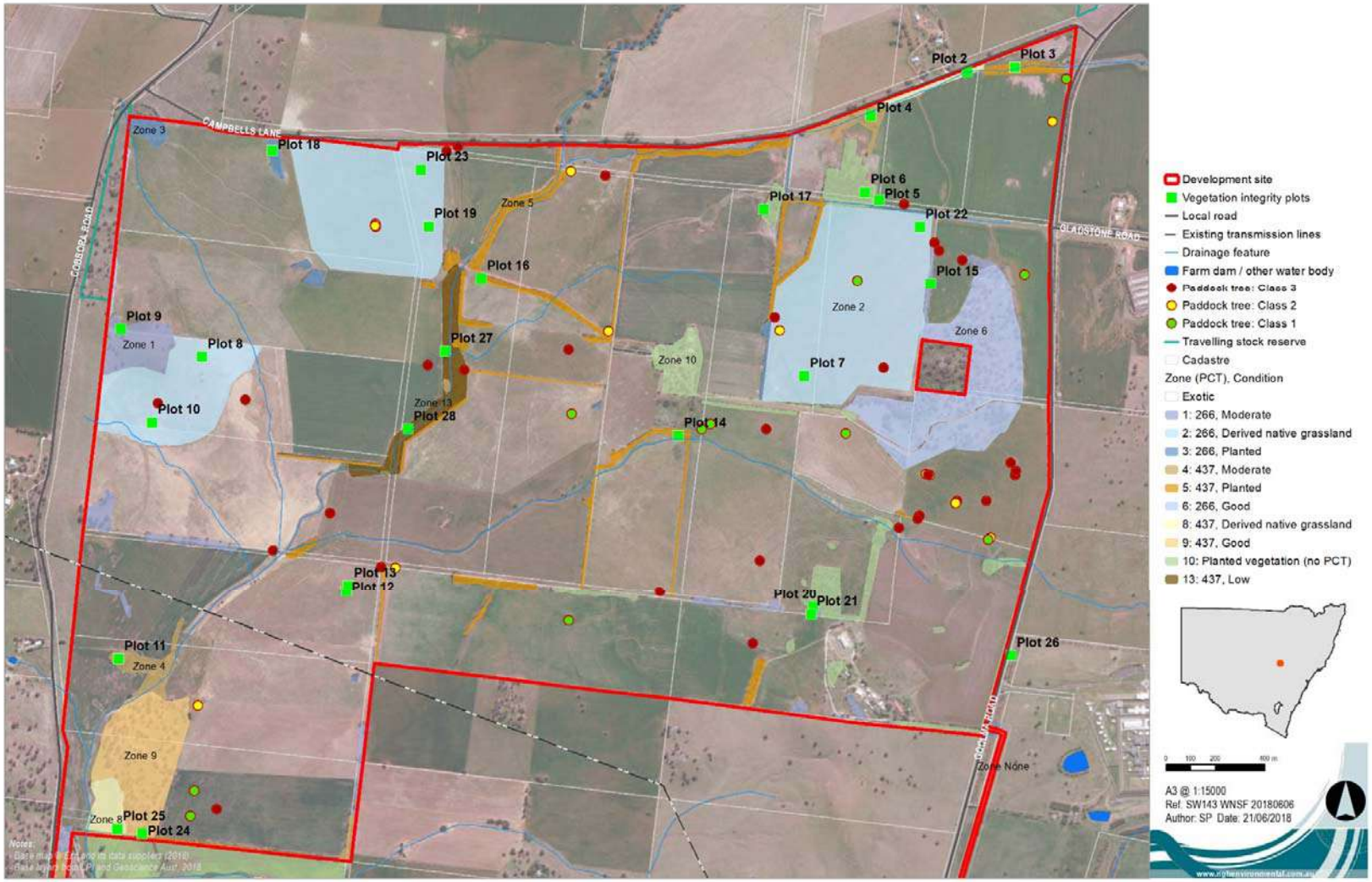

Figure 3-4 Vegetation zones in the development site (north).

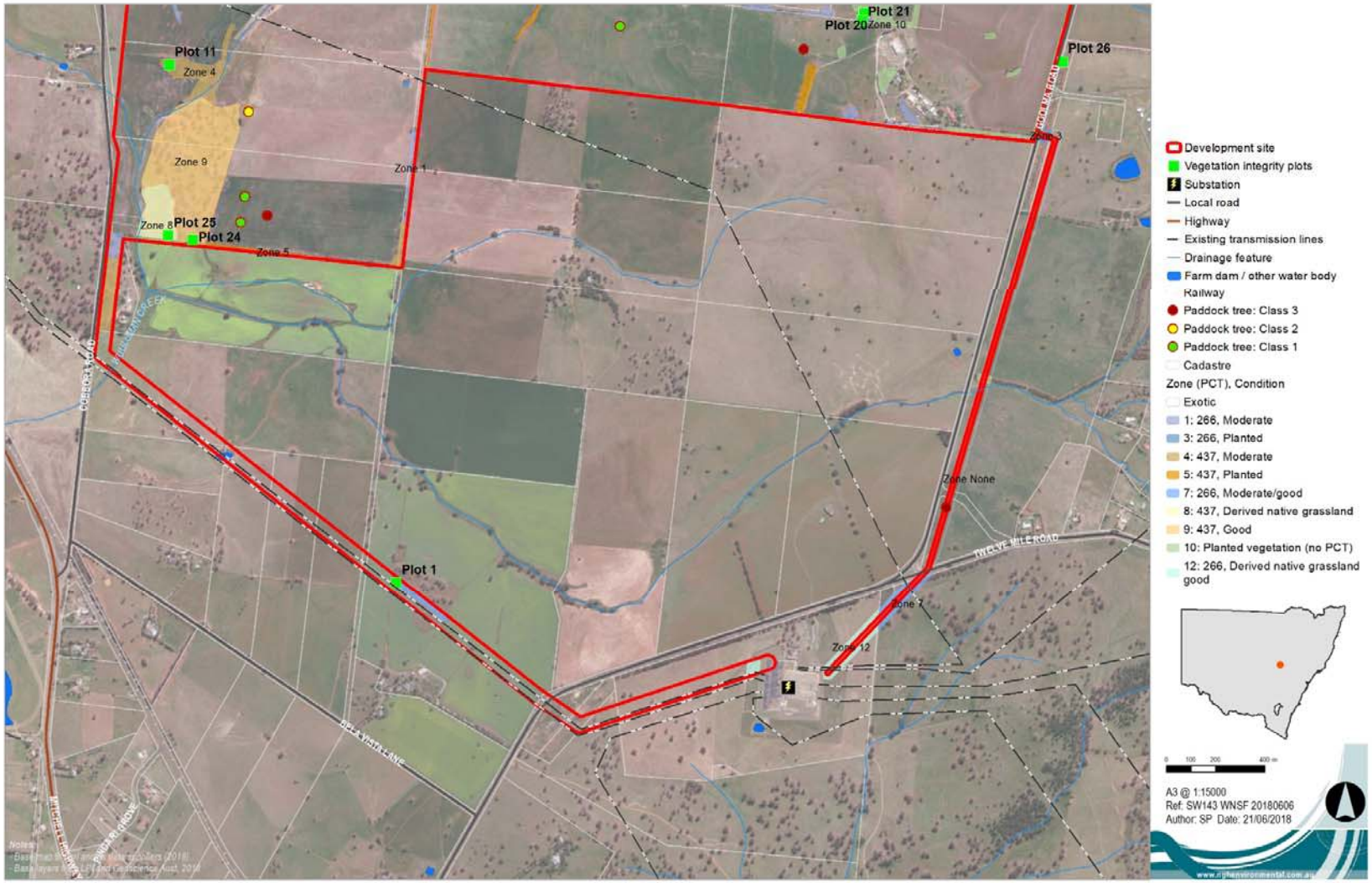

Figure 3-5 Vegetation zones in the development site (south).

3.3.3 *Vegetation integrity assessment results*

124 plant species were identified within the 21 vegetation integrity survey plots. 55 of these were exotic species. The results of the plot field data can be found in Appendix D. Photos of each plot are shown in Appendix E.

The plot data from the Vegetation integrity survey plots were entered into the BAM calculator by an accredited assessor (Dave Maynard - BAAS17026).

The results of the vegetation integrity assessment are provided in Table 3-4.

Table 3-4 Table of current vegetation integrity scores for each vegetation zone within the development site.

Zone ID	Composition score	Structure score	Function score	Vegetation Integrity Score
1 PCT266_Moderate	6.9	32.7	53.5	**23**
2 PCT266_DGL	23.1	0.5	15.6	**5.8**
3 PCT266_planted	46.4	77.5	43.2	**53.7**
4 PCT437_Moderate	39.5	61.1	49.9	**49.4**
5 PCT437_Planted	45.6	46.2	44.1	**45.3**
6 PCT266_Good	100	100	100	**100***
7 PCT 266_ Mod/Good	34.4	54.4	54.6	**46.7**
8 PCT 437_Good	36.2	68.9	70	**55.9**
9 PCT 437_DGL	37.8	55	14.6	**31.2**
12 PCT266_DGL_Good	65.4	65.5	15.0	**40**
13 PCT437_Low	7.9	3.8	18.9	**8.3**

***Based on benchmark data**

4 THREATENED SPECIES

4.1 ECOSYSTEM CREDIT SPECIES

Ecosystem credit species returned by the calculator as being associated with the PCTs present on the development site are shown in Table 4-1. Ecosystem credits apply to these species.

Table 4-1 Ecosystem credit species

Common name	Scientific name	NSW Listing Status
Barking Owl	*Ninox connivens*	Vulnerable
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis subsp. gularis*	Vulnerable
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus subsp. victoriae*	Vulnerable
Corben's Long-eared Bat	*Nyctophilus corbeni*	Vulnerable
Diamond Firetail	*Stagonopleura guttata*	Vulnerable
Dusky Woodswallow	*Artamus cyanopterus*	Vulnerable
Eastern Bent-wing Bat	*Miniopterus schreibersii oceanensis*	Vulnerable
Flame Robin	*Petroica phoenicea*	Vulnerable
Gang-gang Cockatoo	*Callocephalon fimbriatum*	Vulnerable
Glossy Black-Cockatoo (Foraging)	*Calyptorhynchus lathami*	Vulnerable
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis subsp. temporalis*	Vulnerable
Grey-headed Flying Fox	*Pteropus poliocephalus*	Vulnerable
Hooded Robin (south-eastern form)	*Melanodryas cucullata subsp. cucullata*	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable
Little Eagle	*Hieraaetus morphnoides*	Vulnerable
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable
Masked Owl	*Tyto novaehollandiae*	Vulnerable
Painted Honeyeater	*Grantiella picta*	Vulnerable
Regent Honeyeater (Foraging)	*Anthochaera phrygia*	Critically Endangered
Purple-crowned lorikeet	*Glossopsitta porphyrocephala*	
Scarlet Robin	*Petroica boodang*	Vulnerable
Speckled Warbler	*Chthonicola sagittata*	Vulnerable

Common name	Scientific name	NSW Listing Status
Spotted Harrier	*Circus assimilis*	Vulnerable
Spotted-tailed Quoll	*Dasyurus maculatus*	Vulnerable
Square-tailed Kite	*Lophoictinia isura*	Vulnerable
Superb Parrot	*Polytelis swainsona*	Vulnerable
Swift Parrot	*Lathamus discolor*	Endangered
Turquoise Parrot	*Neophema pulchella*	Vulnerable
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Vulnerable
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Vulnerable

4.1.1 *Species excluded from the assessment*

Based on habitat constraints, one ecosystem species was considered to have no suitable habitat for these species to occur within the development site. This is the:

- Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*).

The habitat constraint for this species is listed in the BioNet Threatened Biodiversity Data Collection as:

'*Currently only recorded from vicinity of Murray River, but potentially anywhere downstream of Hume Dam*'

The development site is not in the vicinity of the Murray River and as such, the Purple-crowned Lorikeet has been excluded from the assessment.

4.2 SPECIES CREDIT SPECIES

4.2.1 *Candidate species to be assessed*

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

Table 4-2 Candidate species credit species requiring assessment.

Species Credit Species	NSW listing status	National listing status	Habitat components and geographic restrictions	Sensitivity to gain class	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
FAUNA							
Pink-tailed Legless Lizard *Aprasia parapulchella*	Vulnerable	Vulnerable	Within 50m of Rocky Areas	High	22 rocky outcrops present within the development site	Included	Habitat components on site
Bush Stone-curlew *Burhinus grallarius*	Endangered	-	Fallen/standing dead timber including logs	High	No fallen/standing dead timber on site	Excluded	Habitat components absent from the site
Gang-Gang Cockatoo *Callocephalon fimbriatum*	Vulnerable	-	Breeding Eucalypt tree species with hollows greater than 9 cm diameter	High	21 suitable hollow bearing trees present within the development site.	Included	Habitat components on site
Glossy Black Cockatoo *Calyptorhynchus lathami*	Vulnerable	Vulnerable	Breeding Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground. Foraging Presence of Allocasuarina and casuarina species	High	21 HBTs with hollows greater than 15cm and over 5m above the ground. Some planted Allocasuarina or Casuarina species within the development site or surrounding area	Included	Some planted Allocasuarina species on site. Hollow Bearing Trees present on site.
Large-eared Pied Bat *Chalinolobus dwyeri*	Vulnerable	Vulnerable	Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within	Very High	Small Caves or mines may occur within 2km.	Included	Habitat constraints may occur surrounding the development site.

Species Credit Species	NSW listing status	National listing status	Habitat components and geographic restrictions	Sensitivity to gain class	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
			two kilometres of old mines or tunnels.				
Eastern Pygmy Possum *Cercartetus nanus*	Vulnerable	-	None	High	NA	Included	No Habitat constraints
Sloane's Froglet *Crinia sloanei*	Vulnerable	-	Containing relatively shallow sections with submergent and emergent vegetation, or within 500 m of wet area Within 500 m of swamps Within 500 m of waterbody	Moderate	Four dams present within the development site	Included	Habitat components on site
Little Eagle *Hieraaetus morphnoides*	Vulnerable	-	Breeding Nest trees - live (occasionally dead) large old trees within vegetation.	Moderate	Large Paddock trees present within the development site.	Included	Habitat components on site
White Bellied Sea-Eagle *Haliaeetus leucogaster*	Vulnerable	–	Breeding Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Moderate	Mature trees within 1km of creeks present within the development site.	Included	Habitat components on site.
Swift Parrot *Lathamus discolor*	Endangered	Critically Endangered	Breeding Mapped Important Areas (OEH)	Moderate	Outside Mapped Areas (As per OEH draft habitat mapping)	Excluded	Development site occurs outside mapped important areas.

Species Credit Species	NSW listing status	National listing status	Habitat components and geographic restrictions	Sensitivity to gain class	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
Square-tailed Kite *Lophoictinia isura*	Vulnerable	-	Breeding Nest Trees	Moderate	Large trees present within the development site	Included	Habitat components on site
Superb Parrot *Polytelis swainsonii*	Vulnerable	Vulnerable	Breeding Living or dead E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa & E. polyanthemos with hollows greater than 5cm diameter; greater than 4m above ground or trees with a DBH of greater than 30cm.	High – (breeding) Moderate – (Foraging)	*E. Melliodora* and *E. Albens* present within the development site with hollows	Included	Habitat components on site
Eastern Bent-wing-bat *Miniopterus schreibersii oceanis*	Vulnerable	-	Breeding Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	Very High (Breeding) High (Foraging)	Two man made bridge culverts present within the development site	Included	Habitat components on site
Southern Myotis *Myotis macropus*	Vulnerable	-	Within 200 m of riparian zone Bridges, caves or artificial structures within 200 m of riparian zone	High	Two man made bridge culverts over waterways present within the development site One flowing watercourse within the development site	Included	Habitat components on site

Species Credit Species	NSW listing status	National listing status	Habitat components and geographic restrictions	Sensitivity to gain class	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
Barking Owl *Ninox connivens*	Vulnerable	-	Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	High	8 suitable hollow bearing trees with hollows greater than 20cm present in development site.	Included	Habitat components on site
Squirrel Glider *Petaurus norfolcensis*	Vulnerable	-	Relies on large old trees with hollows for breeding and nesting. These trees are also critical for movement and typically need to be closely-connected (i.e. no more than 50 m apart).	High	Suitable Hollow Bearing Trees present within the development site	Included	Habitat components on site
Brush-tailed Rock Wallaby *Petrogale penicillata*	Endangered	Vulnerable	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines rocky outcrops/cliffs	Very High	Habitat components absent	Excluded	Specific habitat components absent from the site
Brush-tailed Phascogale *Phascogale tapoatafa*	Vulnerable	-	During breeding season, males may seek temporal refuge points in paddock trees with hollows.	High	Suitable Hollow Bearing Trees present within the development site	Included	Habitat components on site
Koala *Phascolarctos cinereus*	Vulnerable	Vulnerable	Areas identified via survey as important habitat based on density of Koalas and quality of habitat	High	Survey required to identify	Included	Survey Required

Species Credit Species	NSW listing status	National listing status	Habitat components and geographic restrictions	Sensitivity to gain class	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
Grey-headed Flying Fox *Pteropus poliocephalus*	Vulnerable	Vulnerable	Breeding Camps	High	Survey required to identify	Included	Survey Required
Masked Owl *Tyto novaehollandiae*	Vulnerable	-	Breeding Habitat Living or dead trees with hollows greater than 20cm diameter.	High	8 trees with hollows greater than 20cm present within the development site	Included	Habitat components on site
Regent Honeyeater *Anthochaera phrygia*	Critically Endangered	Critically Endangered	Mapped Areas (as per OEH)	High	Outside Mapped Areas (As per OEH draft habitat mapping)	Excluded	Developments site occurs outside mapped important areas
Golden Sun Moth *Synemon plana*	Endangered	Critically Endangered	Specific grass species A radius west 15km west of Binalong A radius of 15km from Tumut	High	Specific grass species absent	Excluded	Specific habitat components absent from the site and outside of the geographic restrictions for the species.
FLORA							
Ausfeld's Wattle *Acacia ausfeldii*	Vulnerable	-	None	High	NA	Included	BAM Calculator Species
Yass Daisy *Ammobium craspedioides*	Vulnerable	Vulnerable	South of Cowra	High	NA	Excluded	Development site north of Cowra
Bluegrass *Dichanthium setosum*	Vulnerable	Vulnerable	None	High	NA	Included	BAM Calculator Species

Species Credit Species	NSW listing status	National listing status	Habitat components and geographic restrictions	Sensitivity to gain class	Habitat components and abundance on site	Included or excluded	Reason for inclusion or exclusion
Euphrasia *Euphrasia arguta*	Critically Endangered	Critically Endangered	None	High	NA	Included	BAM Calculator Species
Tumut Grevillea *Grevillea wilkinsonii*	Endangered	Endangered	Eastern part of sub-region from 10 km west of the Hume Highway and north of the Snowy Mountains Highway	High	NA	Excluded	Development site outside of geographic constraint area
Small Purple-pea *Swainsona recta*	Endangered	Endangered	None	NA	NA	Included	BAM Calculator Species
Silky Swainson-Pea *Swainsona sericea*	Vulnerable	-	None	High	NA	Included	BAM Calculator Species
Zieria obcordata *Zieria obcordata*	Endangered	Endangered	Land containing granite boulders on rocky outcrops.	High	Granite boulders and rocky outcrops present within the development site	Included	Habitat components present on site

4.2.2 *Exclusions based on habitat quality*

Under Section 6.4.1.17 of the BAM, a species credit species can be considered unlikely to occur on a development site (or within specific vegetation zones) if following field assessment, it is determined that the habitat is substantially degraded such that the species is unlikely to utilise the development site (or specific vegetation zones).

Flora

Table 4-3 identifies the flora species and zones excluded on the basis of habitat quality. The habitats in these zones were no longer representative of the habitats in which these species could occur.

Table 4-3 Exclusions based on habitat quality.

Species Credit Species	Zones Excluded	Reason for exclusion
Acacia ausfeldii Ausfeld's Wattle	Zone 3, 5 & 10.	Planted Vegetation – no suitable habitat
Swainsona recta Small Purple-pea	Zone 3, 5, 10	Planted Vegetation – no suitable habitat
Swainsona sericea Silky Swainson-Pea	Zone 3, 5 10	Planted Vegetation – no suitable habitat
Zieria obcordata Zieria obcordata	Zone 3, 5, 10	Planted Vegetation – no suitable habitat

Fauna

One species, the Masked Owl, although known to occur in the area, is considered unlikely to breed on the development site given the highly cleared and fragmented context and absence of specific habitat resources. Although habitat is present on site that meets the breeding habitat constraint for this species (Living or dead trees with hollows greater than 20cm diameter), it is considered unlikely that the Masked Owl would use these habitat features given the context in which theses habitat features occur.

The Masked Owl is a large forest owl, it prefers uncleared or lightly cleared areas with high densities of old hollow-bearing trees (DEC 2006). Studies of woodland fragments on privately-owned and unprotected lands in south-eastern New South Wales showed that virtually all records of the Masked Owl were associated with extensively forested areas or occurred within one kilometre of the boundary of these areas (Kavanagh and Stanton, 2002). The development site is highly cleared and fragmented with the nearest densely forested area over 2.5 kilometres to the south-west. As such, the development site is unlikely to be preferred habitat for this species. Further, breeding usually occurs in close proximity to foraging areas. Common Ringtail Possum, Greater Glider and the Sugar Glider are important prey species for large forest owls (Kavanagh and Stanton, 2002), none of which were recorded at the development site during nocturnal surveys. The development site is therefore unlikely to provide preferred foraging habitat for the Masked Owl. The NSW Recovery Plan for large forest owls (DEC 2006) states that the Masked Owl requires old hollow eucalypts with hollows greater than 40cm wide and greater than 100cm deep for nesting. No hollows within the development site were recorded as likely to have these attributes. Based on the above it is considered unlikely that the Masked Owl would utilise the hollows within the development site for nesting. As such, no breeding resources would be impacted by the proposal and species credits are not considered to be generated for this species. Given the species has been recorded just to the south of the

site, it is likely that the species may travel through and occasionally forage. Being a dual credit species, these habitat resources are accounted for in the ecosystem credits generated.

4.2.3 *Candidate species requiring confirmation of presence or absence*

The species listed in Table 4-4 are those that are considered to have habitats present at the development site. Surveys have been conducted for these species. The results are summarised in Table 4-4. Details of the survey methodologies and results are provided for each surveyed species are provided below. Targeted survey locations are mapped on Figure 4-2.

Species polygons have been defined for the species present on the site as mapped on Figure 4-2.

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

Species Credit Species	Biodiversity risk weighting	Survey Time	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
FAUNA					
Pink-tailed Legless Lizard *Aprasia parapulchella*	2.00	September - November	Surveyed Oct 2017	No	-
Glossy Black Cockatoo *Calyptorhynchus lathami*	2.00	May - August	Surveyed May 2018	No	
Gang-Gang Cockatoo *Callocephalon fimbriatum*	2.00	October - January	Surveyed Oct 2017	No	-
Large-eared Pied Bat *Chalinolobus dwyeri*	3.00	September - March	Surveyed December 2017	No	
Eastern Pygmy Possum *Cercartetus nanus*	2.00	October - March	Surveyed Oct 2017	No	
Little Eagle *Hieraaetus morphnoides*	1.5	August - October	Surveyed Oct 2017	No	
White Bellied Sea-Eagle *Haliaeetus leucogaster*	2.00	July-December	Surveyed Oct 2017	No	
Swift Parrot *Lathamus discolor*	3.00	May - August	Surveyed Oct 2017	No	
Square-tailed Kite *Lophoictinia isura*	1.5	September-January	Surveyed Oct 2017	No	-

Species Credit Species	Biodiversity risk weighting	Survey Time	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Superb Parrot *Polytelis swainsonii*	2.00	September - November	Surveyed Oct 2017	No	
Eastern Bent-wing-bat *Miniopterus schreibersii oceanis*	3.00	November - February	Surveyed Dec 2017	Yes. Foraging only. No Breeding Habitat	-
Southern Myotis *Myotis macropus*	2.00	November – March	Surveyed December 2017	Yes	0.23ha – (Combined area of hollow bearing trees within 200m of watercourse)
Barking Owl *Ninox connivens*	2.00	May - December	Surveyed Oct 2017	No	-
Squirrel Glider *Petaurus norfolcensis*	2.00	All Year	Surveyed Oct 2017	No	-
Brush-tailed Phascogale *Phascogale tapoatafa*	2.00	All Year	Surveyed Oct 2017	No	-
Koala *Phascolarctos cinereus*	2.00	All Year	Surveyed Oct 2017	No	-
Grey-headed Flying Fox *Pteropus Poliocephalus* (Breeding camps)	2.00	October - December	Surveyed Oct 2017	Foraging only. No Breeding Camps.	-
Regent Honeyeater *Anthochaera phrygia*	3.00	September - December	Surveyed Oct 2017	No	-
FLORA					
Ausfeld's Wattle *Acacia ausfeldii*	2.00	Any	Surveyed Oct 2017	No	
Bluegrass *Dichanthium setosum*	2.00	December – May	Surveyed Feb 2018	No	
Euphrasia *Euphrasia arguta*	3.00	-	Surveyed Oct 2017	No	
Small Purple-pea *Swainsona recta*	1.00	September - October	Surveyed Oct 2017	No	

Species Credit Species	Biodiversity risk weighting	Survey Time	Assumed to occur/survey/ expert report	Present on site?	Species polygon area or count
Silky Swainson-Pea *Swainsona sericea*	2.00	September - October	Surveyed Oct 2017	No	
Zieria obcordata *Zieria obcordata*	3.00	All	Surveyed Oct 2017	No	

TARGETED SPECIES SURVEYS

The majority of the targeted surveys were completed between the 18th and 20th October 2017. Further fauna surveys were undertaken on the 11th -12th December 2017 and 30-31st May, 1st June 2018 and further flora surveys on the 14th February 2018. Weather conditions recorded for these dates at the Wellington Weather Station are as follows:

Date	Maximum Temperature (°C)	Minimum Temperature (°C)	Rainfall (mm)
18th October 17	No data	No data	0
19th October 17	30.2	No data	0
20th October 17	23.2	18.6	21.6
11th December 17	33.1	15.2	0
12th December 17	35.0	16.6	0
14th February 18	36.6	16.0	0
30th May 2018	13.5	7.0	10.6
31st May 2018	15.0	2.0	0
1st June 2018	17.3	0.5	0

Pink tailed Legless Lizard

SURVEY EFFORT

A targeted search was completed on the 19th and 20th October 2017 for a total of approximately 4 hours each day.

All rocky outcrops within the development site were surveyed. The location of these are shown in Figure 4-2. A survey of an outcrop consisted of rolling appropriately sized and shaped rocks that could be rolled, up to a maximum of 30minutes/outcrop. Surveys were conducted between sunrise and 11:30am as the temperature then rose beyond 25 degrees which is not appropriate for detecting Aprasia (TTSC, 2015). Due to rain on the following day, the sites could not be repeated.

SURVEY RESULTS

22 rocky outcrops were surveyed. No Aprasia or no sloughed skins of Aprasia were detected during the survey. Aprasia feed on the larvae and eggs of ants and there were very few colonies of appropriately sized

ants (small species) for Aprasia to feed on. Results of other species found under or amongst rocks are shown in Appendix C

Woodland Birds – Gang-Gang Cockatoo, Little Eagle, White- Bellied Sea Eagle, Square-tailed Kite, Superb Parrot, Regent Honeyeater.

SURVEY EFFORT

Targeted surveys were undertaken on the 18th-20th October 2017. Four twenty minute point count surveys were conducted after sunrise in areas of woodland. The locations of these point surveys are shown in Figure 4-2. Hollow bearing trees were assessed for suitability for the Gang-Gang Cockatoo. Trees with suitable hollows for the Gang-Gang cockatoo were observed for signs of activity during dawn and dusk. Paddock trees and remnant trees were surveyed for evidence of stick nests used by raptors. Opportunistic bird surveys were also recorded throughout the three days spent on site.

SURVEY RESULTS

No target threatened birds were detected over the duration of the surveys. The site also was noted to lack many Honeyeater species (despite a lot of flowering blossom) and small canopy feeders (e.g. Thornbills/Weebills). No evidence of nesting material for raptors was observed in remnant trees. 21 HBT were considered suitable for the Gang-Gang Cockatoo, however it was not detected within the development site. Results of other birds detected are shown in Appendix C.

Glossy Black Cockatoo.

SURVEY EFFORT

Targeted surveys were undertaken on the 30th -31st May and 1st June 2018. Hollow bearing trees were assessed for suitability for the Glossy Black Cockatoo. Trees with suitable hollows for the Glossy Black cockatoo were observed for signs of activity during dawn and dusk. Surveys were undertaken for 2 hours before sunset on the 30th and 31st May (3:30pm – 5:30pm) and 1.5 hours on the morning (7:30 -9:00am) of the 31st May and 1st June. Hollow bearing trees surveyed were located near patches of remnant woodland. Isolated paddock trees were not surveyed for Glossy Black Cockatoo, as this species needs larger patches and more intact landscape for breeding (BioNet, 2018).

SURVEY RESULTS

No Glossy Black Cockatoos were observed during the surveys.

Nocturnal Birds – Barking Owl and Masked Owl.

SURVEY EFFORT

Targeted surveys were undertaken on the evenings of 18th and 19th October 2017 by two consultants for a total of approximately three hours each night. A 100-watt spotlight was used in both a slow moving vehicle within planted vegetation, remnant vegetation, and isolated paddock trees. Call playback of the Masked Owl and Barking Owl was undertaken at four separate locations within the development site at the locations shown in Figure 4-2. Call playback was undertaken for each species for a period of 5 minutes with a ten minute listening period following.

SURVEY RESULTS

No target threatened birds were detected over the duration of the surveys. Two common nocturnal birds were detected – The Southern Boobook (*Ninox novaeseelandiae*) and the Tawny Frogmouth (*Podargus strigoides*).

Nocturnal Mammals – Eastern Pygmy Possum, Squirrel Glider, Brush-tailed Phascogale and Koala.

SURVEY EFFORT

Targeted surveys were undertaken on the evenings of 18th and 19th October 2017 by two consultants for a total of approximately three hours each night. A 100-watt spotlight was used in both vehicle-based and foot surveys within planted vegetation, remnant vegetation, and isolated paddock trees.

SURVEY RESULTS

No target threatened mammals were detected over the duration of the surveys. Only the common brushtail possum was detected within the woodlands (Zone PCT 266_good) of the development site.

Frogs – Booroolong Frog

SURVEY EFFORT

Frog surveys were undertaken on the evenings of the 11th and 12th December 2017. 200m transects and call playbacks were undertaken along the open water points in the creek line of tributary 1. Four transects were undertaken in total. These are shown in Figure 4-2.

SURVEY RESULTS

Almost all areas of the creeks were clogged with rushes to the point of not being able to see water. This is not typical habitat for this species with prefers more open rocky areas for basking. No Booroolong Frogs were detected and this species is considered unlikely to occur within the development site.

Microbats – Large-eared Pied Bat, Eastern Bent-wing Bat and Southern Myotis

SURVEY EFFORT

Surveys were undertaken on the evenings of the 11th and 12th December 2017. Three ANABAT units were deployed on both nights. ANABATS were set up in trees or on posts facing either open water representing potential foraging habitat for Myotis and nearby Hollow-bearing trees, or, facing Hollow-bearing trees within 200m of running creeks. One was set up facing a culvert. The location of the ANABAT is shown in Figure 4-2 and Figure 4-1 shows the habitat the ANABAT microphones were facing. ANABATS acquired a GPS signal and were all set to record for the entire night. Recordings were then sent for expert analysis.

Two nights of stag watching were also undertaken on the 11th and 12th December 2017.

Figure 4-1 Example of habitat from location of ANABAT.

SURVEY RESULTS

No threatened bats were observed during the stagwatch. The creek line was filled with rushes with very little open water present along the creek. No open water reduces the foraging habitat for the Southern Myotis. The ANABAT data was analysed specifically for the three threatened microbat species by Fly by Night Bat Surveys PL (2018).

Thirteen recorded echolocation calls of the Eastern Bent-wing Bat were identified from two different locations – along the Creek line at ANABAT 1 and by the Culvert along Campbells Lane. (Figure 4-2). No breeding or roosting Eastern Bent-wing Bats were detected and potential roosting habitat within the culverts would not be impacted. This species is a dual credit species. Species credit only apply to breeding habitat. Foraging habitat is considered as part of the ecosystem credit species calculations.

Two recorded echolocation calls of the Southern Myotis were identified from one ANABAT on the evening of the 11th December 2017. This was at ANABAT 1 along the creek line. (Figure 4-2)

No ANABAT records of the Large-eared Pied Bat were detected.

Grey-Headed Flying Fox

SURVEY EFFORT

Two nights of stag watching were undertaken on the 11th and 12th December 2017. Stag watching was undertaken along the creek line shown in Figure 4-2. The development site was surveyed for breeding camps.

SURVEY RESULTS

No Breeding camps were detected within the development site.

Several grey headed flying foxes were seen flying overhead or in a tree foraging along the creek line in the centre of the site.

Ausfeld's Wattle

SURVEY EFFORT

Suitable habitat for these species could occur in areas of remnant woodland vegetation. Surveys were undertaken for these species between the 4th and 5th October and 18th and 20th of October 2017. This is within the optimal detection period for this species. Within the woodland areas, very few midstorey species were present and any individuals would have been easily detected.

SURVEY RESULTS

Ausfeld's Wattle was not detected during the site surveys. It is a conspicuous shrub 2-4m tall. Very few understorey shrubs were detected within the development site. It is considered unlikely that the species would have been overlooked if present and as such it is not considered to occur at the development site

Blue Grass (*Dichanthium setosum*)

SURVEY EFFORT

Surveys were undertaken for this species on the 14th February 2018 for a period of 5 hours. Surveys were undertaken in areas where suitable habitat was considered to occur. This included the low condition native grassland and areas of remnant woodland vegetation. Areas of suitable habitat were surveyed using the

parallel field traverse survey technique in the accordance with the NSW Guide to Surveying Threatened Plants (OEH, 2016). Targeted Survey areas are shown in Figure 4-2.

SURVEY RESULTS

Dichanthium setosum was not detected during the targeted surveys. A common bluegrass (*Dichanthium sericeum*) was detected scattered throughout the low condition grassland. Dichanthium setosum is not considered to occur within the development site.

Euphrasia arguta

SURVEY EFFORT

Euphrasia arguta is an erect annual herb up to 35cm tall. This species is semi-parasitic and it is found in Eucalypt forests with a mixed grass and shrub understorey. Surveys were undertaken for this species between the 18th and 20th October 2017. This is within the optimal detection period for this species. Areas of suitable habitat were surveyed using the parallel field traverse survey method. This included the areas of remnant woodland with native understorey and moderate condition derived native grasslands. Targeted Survey areas are shown in Figure 4-2.

SURVEY RESULTS

Euphrasia arguta was not detected during the surveys and is not considered to occur within the development site.

Small Purple Pea and Silky Swainson-Pea

SURVEY EFFORT

Silky Swainson-Pea (*Swainsona sericea*) is a prostrate or erect perennial up to 10cm tall (OEH, 2016). It is found in Box Gum Woodland in the Southern Tablelands and the South West Slopes. Small Purple Pea (*Swainsona recta*) is an erect perennial herb growing to 30cm tall. It occurs in the grassy understorey of woodland and open forests (OEH, 2017). Surveys were undertaken for these species between the 18th and 20th October 2017 during the optimal detection period. Areas of suitable habitat were surveyed using the parallel field traverse survey method. This included the areas of remnant woodland with native understorey and moderate condition derived native grasslands. Targeted Survey areas are shown in Figure 4-2.

SURVEY RESULTS

Small Purple Pea and Silky Swainson-Pea were not detected during the surveys. As such, they are not considered to occur within the development site.

Zieria obcordata

SURVEY EFFORT

Suitable habitat for these species could occur in areas of White Box woodland on the rocky hill slopes. Surveys were undertaken for these species in areas of remnant woodland and rocky outcrops. Within the woodland areas, very few midstorey species were present and any individuals would have been easily detected. Surveys were undertaken within the appropriate detection period for this species between the 4th and 5th October and 18th and 20th of October 2017.

SURVEY RESULTS

Zieria obcordata was not detected during the site surveys. It is a conspicuous perennial shrub. Very few understorey shrubs were detected within the development site. It is considered unlikely that the species would have been overlooked if present and as such it is not considered to occur at the development site.

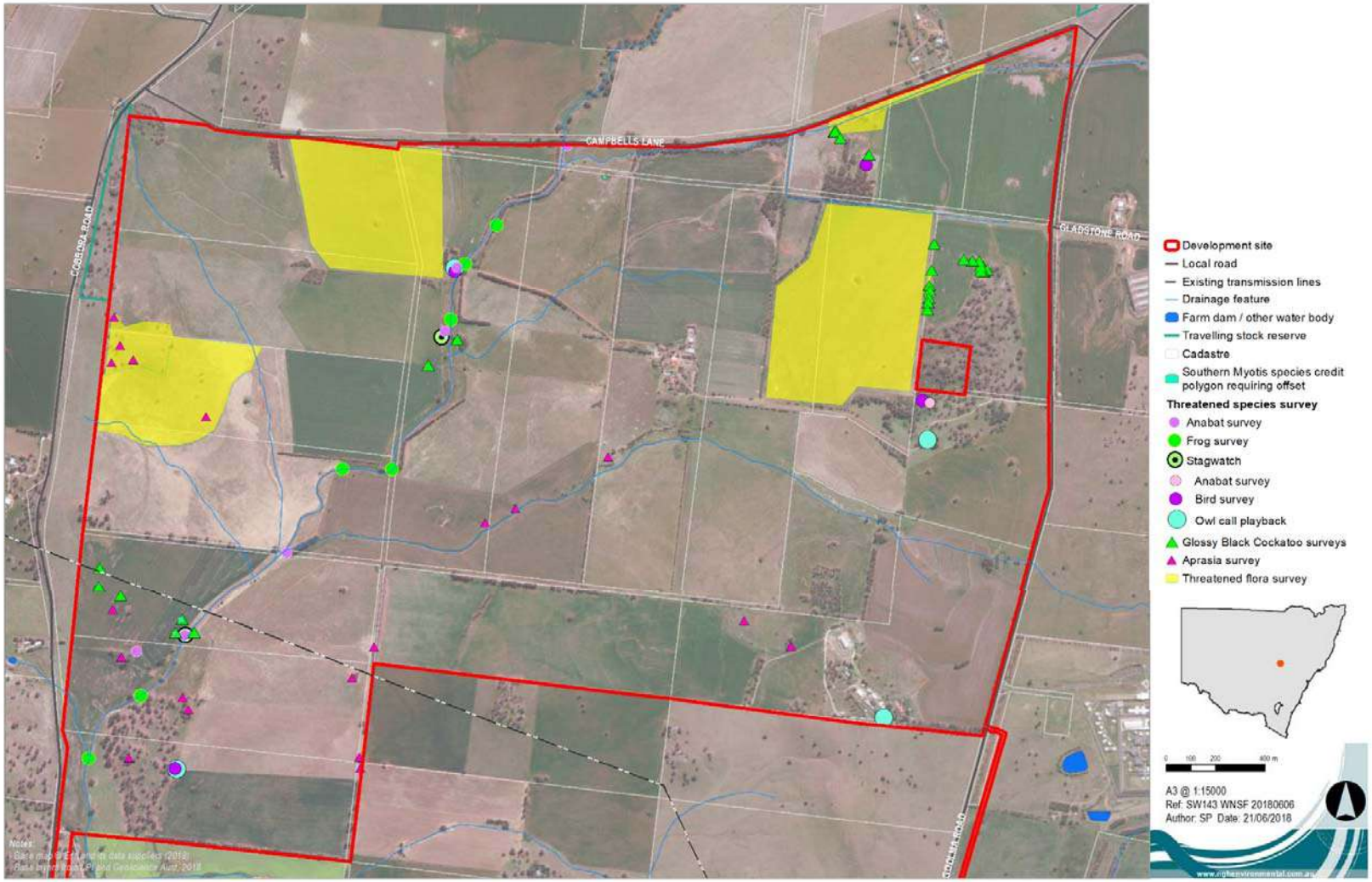

Figure 4-2 Threatened species polygons and targeted survey locations (north).

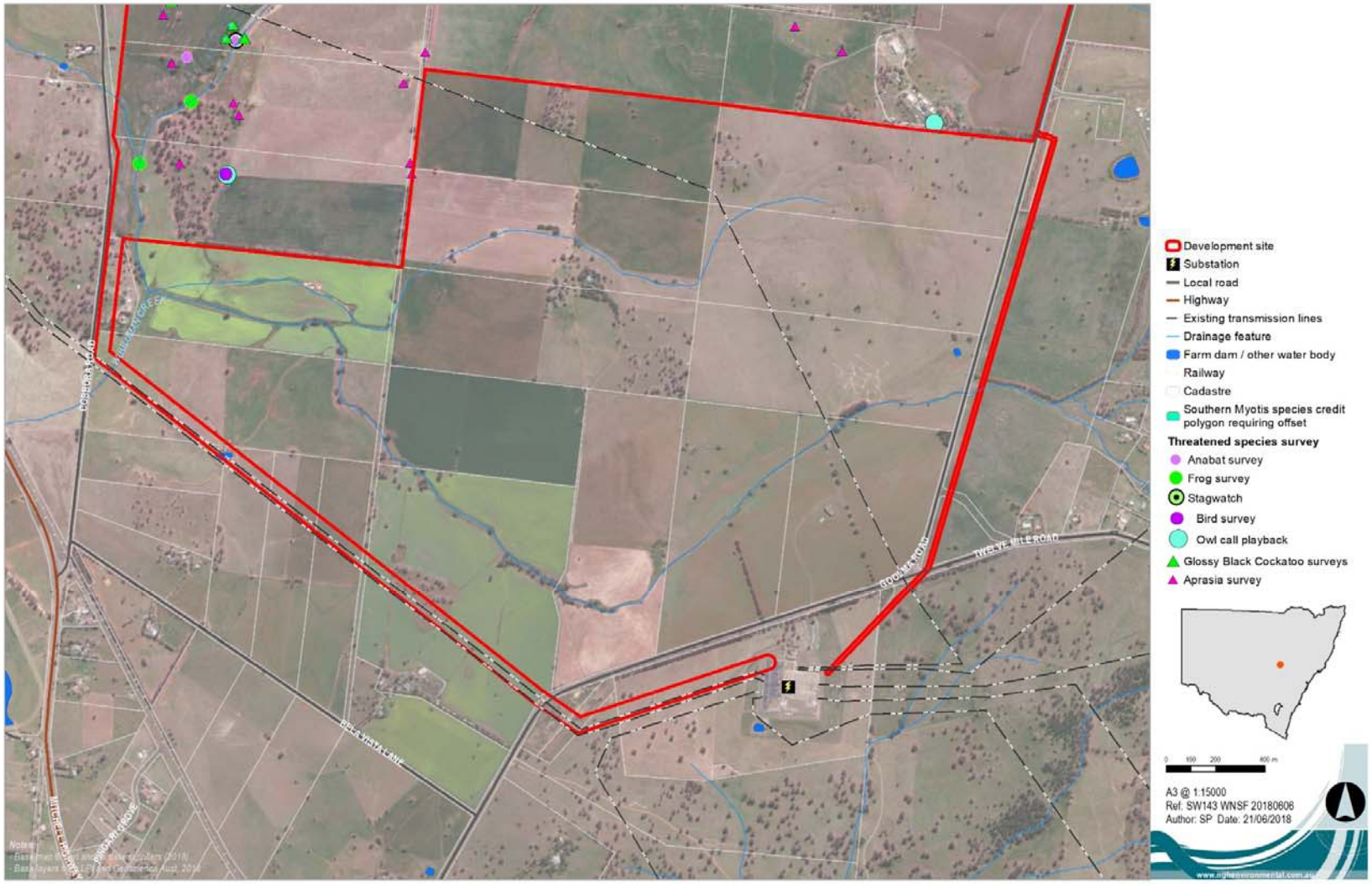

Figure 4-3 Threatened species polygons and targeted survey locations (south).

4.3 ADDITIONAL HABITAT FEATURES RELEVANT TO PRESCRIBED BIODIVERSITY IMPACTS

4.3.1 *Occurrences of karst, caves, crevices and cliffs*

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

4.3.2 *Occurrences of rock*

Twenty-two rocky outcrops occur throughout the development site.

Geology mapping shows the rocky hills are Basalt, Basaltic andesite and latite intrusions from the Ordovician period, while along the creek line rock units are described as alluvial silt, clay and sand with pebble to cobble-sized conglomeratic lenses from the Quaternary period. (Scott et al, 2000 and Colquhoun et al, 1999).

Rocky outcrops are present in a number of forms. Outcrops on hilltops are exposed igneous intrusions ranging in size from 10-80cm in diameter (Figure 4-4). Some rocks have been manually placed in piles along fence lines after being exposed from ploughing paddocks (Figure 4-5). These are generally smaller ranging from 5 – 30cm in diameter.

Smaller rocks occur along and surrounding the creek lines with some larger exposed rocks through the middle of the creek creating a small cascade (Figure 4-6).

Threatened species that could occur in these rocky outcrops are the:

- Pink-tailed Legless Lizard (*Aprasia parapulchella*). Surveys were undertaken for this species in rocky outcrops and were not detected (Figure 4-2).
- Booroolong Frog (*Litoria booroolongensis*). Booroolong Frog breeds in rocky habitats along the creek lines. Surveys were undertaken for the Booroolong Frog along the creek and were not detected.

As these species were not detected, the rocky outcrops were considered unlikely to provide habitat for threatened species.

Figure 4-4 Example of Rocky outcrop on hill top.

Figure 4-5 Example of manually piled rocky outcrop.

Figure 4-6 Example of rocky outcrops along the 3rd order stream.

4.3.3 *Occurrences of human made structures and non-native vegetation*

MAN-MADE CULVERTS

One man made earth culvert occurs within the development site underneath a track over a creek crossing (Figure 4-7). Another concrete culvert occurs outside the development site on Campbells Lane, just north of the development site. Threatened species that could use this habitat could also forage onto the development site.

Threatened species that can use small culverts are the:

- Eastern Bent-wing-Bat (*Miniopterus schreibersii oceanensis).*
- Southern Myotis (*Myotis Macropus*).

Both these species were detected within the development site under analysis of ANABAT recordings. These microbats could use the manmade culverts as roosting habitat. The man-made culverts would not be impacted on by the proposal.

Figure 4-7 Man-made Culvert within the development site.

NON-NATIVE VEGETATION

Eighteen exotic pepper trees (Schinus molle var. areira) occur as paddock trees and 0.5ha occur as planted windbreaks throughout the development site. No threatened species are known to rely on the Pepper Tree for habitat however it is likely some threatened bird species could utilise the Pepper Trees for foraging or nesting on occasion or use as stepping stones for connectivity across the landscape.

Planted vegetation that is not representative of a PCT is not considered to be native vegetation and is not required to be offset. Planted vegetation however, may still provide habitat for threatened species. Vegetation that does not form part of PCT is considered as non-native vegetation for this assessment.

18.1ha of vegetation occurs as farm forestry plantations of Mixed Eucalypts species such as Long Leaved Box (*Eucalyptus goniocalyx*), Mugga Ironbark (*Eucalyptus sideroxylon*), Monkey grey Gum (*Eucalyptus cypellocarpa*), mixed Acacias and exotic Pinus species. These plantations are in neat rows of evenly spaced trees and do not resemble a natural ecosystem. The plantations lack any understorey species and only have a very sparse groundcover due to the dense plantings of overstorey species. These plantings were planted 30-40 years ago for farm forestry as trial species for dryland salinity control. No hollows are yet present in any of the trees. Threatened bird and mammal species could use these plantations for foraging or nesting habitat.

Fauna surveys were undertaken within the planted woodlots and no threatened species were detected.

Figure 4-8 Example of planted vegetation within the development site.

Figure 4-9 Exotic vegetation within the development site.

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

Seven tributaries throughout the development site facilitate water flow to the south of the site. These tributaries flow into Wuuluman Creek 300m South of the Site, which flows into the Macquarie River at Wellington. Four dams are present within the development site in the south that provide a catchment for overland flow.

The main creek line, Tributary 1, is fringed with native vegetation of sedges and rushes. Some rocky outcrops and pebbles are also present along this creek. It could provide habitat for the threatened Booroolong Frog (*Litoria booroolongensis*). Surveys were undertaken for this species along Tributary 1 and it was not detected within the waterway.

The internal access tracks would require approximately five waterway crossings within the two main waterways onsite. The design of the waterway crossings would be in accordance with the following publications, to minimise erosion and protect the waterway function:

- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings (Fairfull & Witheridge, 2003).*
- *Policy and Guidelines for Fish Friendly Waterway Crossings (NSW DPI, 2003).*
- *Guidelines for Watercourse Crossings on Waterfront Land (NSW DPI, 2012).*

5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

An EPBC protected matters report was undertaken on the 12 September 2017 (10km buffer of the development site) to identify Matters of National Environmental Significance (MNES) that have the potential to occur within the development site (refer to 0). Relevant to Biodiversity these include:

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

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

5.1 WETLANDS OF INTERNATIONAL IMPORTANCE

Four wetlands of international importance were returned from the protected matters report. The nearest of these (within 200km of the development site) is the Macquarie Marshes. All other wetlands returned from the search are over 500km away. The Macquarie Marshes occurs approximately 150km northwest of the development site and is fed by flooding of the lower Macquarie River. The 1st to 3rd order watercourses within the development site eventually feed into the Macquarie River however, based on the minor nature of these streams and the distance from these wetlands, the proposal is unlikely to impact on any Wetland of International Importance.

5.2 THREATENED ECOLOGICAL COMMUNITIES

Two threatened ecological communities were returned from the protected matters report. These are:

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

White Box and Yellow Box Grassy woodlands are present within the development site in varying condition.

However, the White Box and Yellow Box Woodland within the development site is degraded in the understorey and less than 50% of the groundcover is native. It does not meet the condition threshold for the EPBC listed community and so does not form part of the EPBC listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland Critically Endangered Ecological Community (CEEC). The derived native grassland within the development site, similarly has less than 50% native groundcover (ranging from 0.4% - 14% native ground cover from plot data collected) and does not form part of the EPBC listed White Box-Yellow Box-Blakely's Red Gum Grassy Woodland CEEC.

5.3 THREATENED SPECIES

Twenty-nine threatened species were returned from the protected matters report, comprising nine birds, four fish, six mammals, eight plants and two reptile species. Based on a habitat assessment (Appendix H), 11 of these species are considered to have the potential to use the habitats at the development site. These are the:

- Regent Honeyeater (*Anthochaera phrygia*).
- Painted Honeyeater (*Grantiella picta*).
- Swift Parrot (*Lathamus discolor*).
- Superb Parrot (*Polytelis swainsonii*).
- Large-eared Pied Bat (*Chalinolobus dwyeri*).
- Corben's Long-eared Bat (*Nyctophilus corbeni*).
- Koala (*Phascolarctos cinereus*).
- Grey-headed Flying Fox (*Pteropus Poliocephalus*).
- Pink-tailed Worm-lizard (*Aprasia parapulchella*).
- Striped Legless Lizard (*Delmar impa*r).
- Small Purple-pea (*Swainsona recta*).

These species were surveyed for during the site surveys.

One species, the Grey-headed Flying Fox, was observed within the development site. Several Grey-headed Flying Foxes were seen flying overhead along the creek line. An assessment of significance was undertaken for this species (refer Appendix I).

Based on the comprehensive mammal and bird surveys undertaken and evaluation of habitat, no other EPBC listed species are considered likely to occur in the development site regularly or rely on the habitats present.

5.4 MIGRATORY SPECIES

Eleven listed migratory species were returned from the protected matters report. Two of these species could occur on the site on occasion – the Fork-tailed Swift and the White-throated Needletail. As these species are almost exclusively aerial (DoE, 2015) impacts to these species are however considered unlikely.

The proposal is unlikely to impact on any EPBC listed Migratory Species.

6 AVOID AND MINIMISE IMPACTS

6.1 AVOIDING AND MINIMISING IMPACTS ON NATIVE VEGETATION AND HABITAT

6.1.1 *Site selection*

AGL has reviewed numerous sites within NSW for the solar plant proposal. Various options relating to location, technology and scale of the project were evaluated in developing the proposal. The site was selected as being a suitable site for a solar plant based on;

- A mostly cleared landscape with minimal vegetation removal required.
- Low environmental constraints (predominantly cleared cropping land with minimal vegetation removal).
- Compatible land use zoning of the land.
- Proximity to the transmission network.

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

6.1.2 *Proposal components – consideration of alternate modes or technologies*

The Large-scale renewable energy target (LRET) and Regional Environmental Action Plan (REAP) outline the commitment by both Australia and NSW to reduce Greenhouse Gas emissions and set targets for increasing the supply of renewable energy. Other forms of largescale renewable energy accounted for in the LRET include wind, hydro, biomass, and tidal energy. The feasibility of wind, solar, biomass, hydro and tidal projects depend on the availability of energy resources and grid capacity.

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

The Wellington North site represents an opportunity for PV development that could contribute to meeting the federal Renewable Energy Target of 23.5% by 2020.

6.1.3 *Proposal planning phase – detailed design*

A preliminary constraints analysis was conducted by NGH Environmental on the 5th and 6th October 2017. This constraints analysis informed the site layout design by avoiding areas of high biodiversity value. Vegetation constituting the highest ecological constraint, such as forming components of TEC were avoided and minimised as far as practical by:

- Avoiding areas of good condition remnant vegetation that formed part of an EEC (Zone 6, zone 8 and zone 9) – These were areas of White Box Grassy Woodland and Yellow Box Woodland that had minimal grazing (Table 6-1).
- Minimising the impact to areas of moderate condition remnant vegetation (TEC's). These were areas of White Box Grassy Woodland and Yellow Box Woodland with a grazed understorey.

- Locating the project away from the 3rd order stream that may provide foraging habitat for threatened species such as the Southern Myotis, Eastern Bent-wing Bat and Grey-headed Flying Fox.
- Buffering waterways in accordance with their classifications and the "Guidelines for Riparian Corridors on Waterfront Land" (NSW office of Water, 2012) to minimise impacts on hydrology and water quality.
- Avoiding impacts to Rocky Outcrops where possible.
- Avoiding impacts to Hollow-bearing trees where possible.
- Locating ancillary facilities in areas where there are no biodiversity values.
- Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on the development site.

The final site layout and location has not been able to completely avoid all areas of biodiversity value because the length and size of the solar panels means it is difficult to avoid small patches of vegetation such as planted woodlots and isolated paddock trees.

Table 6-1 Vegetation zones avoided by the proposal

Zone ID	PCT	Zone Name	TEC	Zone Area (ha)
6	266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	PCT266_Good	EEC	30.9
8	437 - Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion	PCT437_Derived Native Grassland	EEC	4.3
9	437 - Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion	PCT437_Good	EEC	14.4

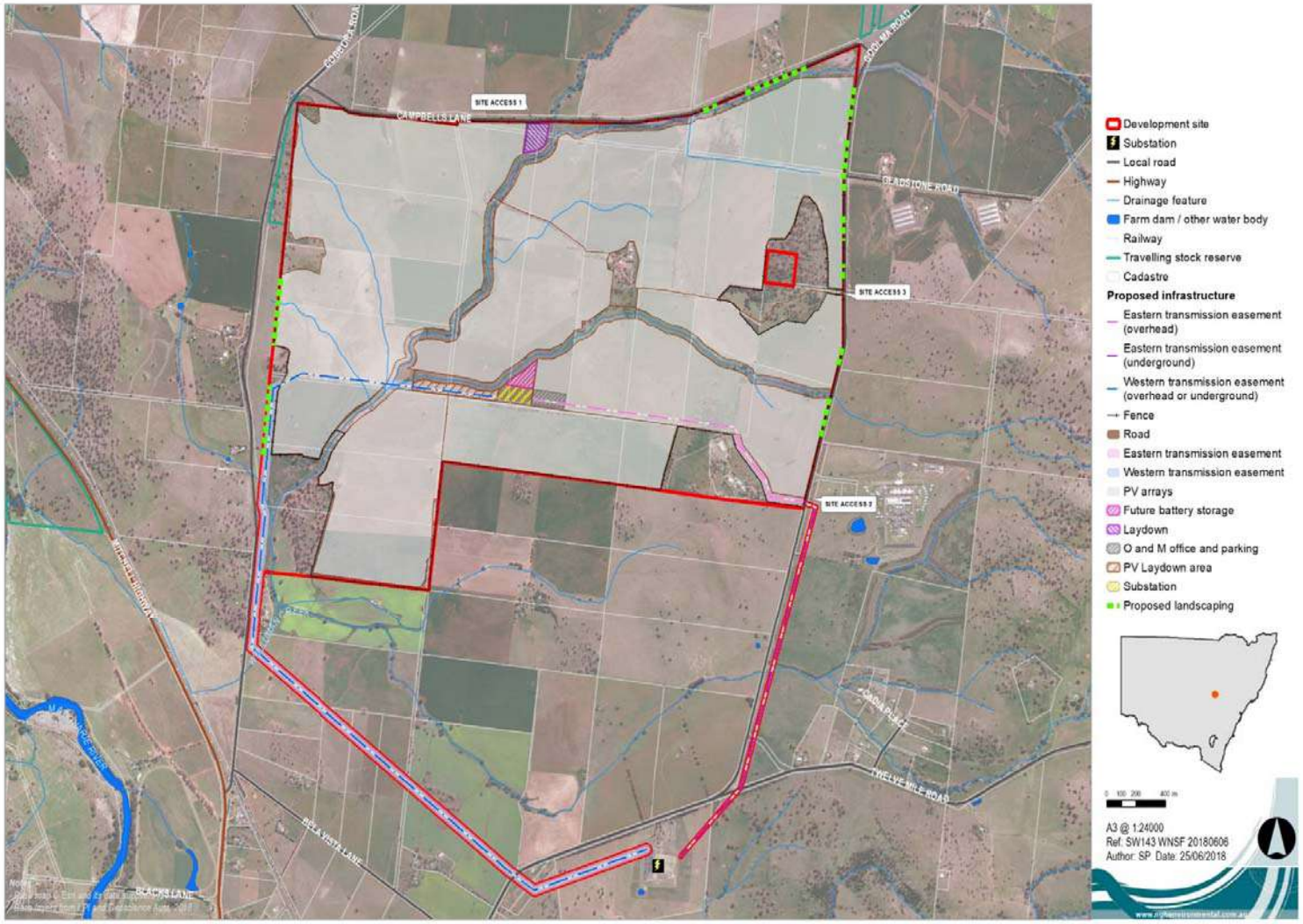

Figure 6-1 Final project footprint.

6.2 AVOIDING AND MINIMISING PRESCRIBED BIODIVERSITY IMPACTS

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

Prescribed Biodiversity impacts relevant to the proposal are:

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

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

6.2.1 *Impacts of development on the habitat of threatened species associated with rocks.*

Twenty-two rocky outcrops occur within the development site. The majority of these have been avoided by the proposal. Five rocky outcrops occurring in the middle of the cleared paddocks were unable to be avoided by the development footprint due to the size constraints of the individual solar panels. These rocky outcrops would be removed through construction of the solar farm.

6.2.2 *Impacts of development on the habitat of threatened species associated with human made structures.*

Two man-made culverts occur within the development site that may provide habitat for threatened bats such as the Eastern Bent-wing Bat (*Miniopterus schreibersii*). The development footprint of the proposal was designed to avoid impacts to this man-made habitat.

6.2.3 *Impacts of development on the habitat of threatened species associated with non-native vegetation.*

18.1ha of planted vegetation occurs within the development site that does not conform to a plant community type. 6.3ha would be avoided by the proposal, however 11.8ha of planted vegetation is unable to be avoided due to solar panel design constraints. These areas were selected to be removed as they are areas where biodiversity value are lowest.

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

The predominantly cleared landscape provides low quality connectivity across the development site. The main creek line (tributary 1) and planted vegetation along the riparian zone provides some connectivity across the landscape for highly mobile threatened species such as the Southern Myotis (*Myotis Macropus*) and Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*) that were observed on site.

The development footprint of the proposal was designed to avoid impacts to the main creek line (tributary 1) and adjacent planted vegetation as well as tributary 2 running in an east-west direction where defined embankments are present. These areas are being considered as offset sites for the development and would allow for connectivity to be maintained through the solar plant in a north-south and east-west direction.

6.2.5 *Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of threatened species that maintain their lifecycles.*

The predominantly cleared landscape provides low quality connectivity across the development site. The main creek line (tributary 1) and planted vegetation along the riparian zone provides some connectivity across the landscape. The remnant Yellow Box Woodland and White Box woodland provides habitat for threatened species in the form of Hollow Bearing Trees and flowering Eucalypts. These features may provide habitat for threatened bats such as the Southern Myotis that was detected on site. These remnant woodlands would be largely avoided by the development, however some scattered paddock trees with suitable hollows would be removed. The Southern Myotis is a highly mobile aerial species and could continue to utilise the habitats surrounding the solar plant.

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

Seven watercourses occur within the development site. The development footprint was selected to avoid impacts to the two main tributaries – Tributary 1 and Tributary 2. The planted vegetation surrounding tributary 1 was also avoided, leaving a 30m buffer around the watercourse.

Although no solar infrastructure would occur along Tributary 1, the final site layout could not completely avoid all impacts to this creek line. Approximately five waterway crossings would occur across the two main creek lines. The design of the waterway crossings would be in accordance with the following publications, to minimise erosion and protect the waterway function:

- *Why do fish need to cross the road? Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge, 2003).
- *Policy and Guidelines for Fish Friendly Waterway Crossings* (NSW DPI, 2003).
- *Guidelines for Watercourse Crossings on Waterfront Land* (NSW DPI, 2012).

The Western transmission line option will also cross Tributary 1. Transmission line poles would be placed on either side of the creek and not within the creek bed or banks reducing any impacts to water quality, flow or hydrological processes.

Solar panels would be installed over some sections of the other five minor tributaries. These drainage lines would remain, and the proposal would not likely change the hydrology of the site.

Four farm dams are present within the development site. These farm dams could not be avoided due to the size constraints of the solar panels. These farm dams would be filled in during construction of the solar farm. The impacts proposed to these dams are not anticipated to have any broader impacts for environments that sustain and interact with the rivers, streams and wetlands either on or offsite.

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

The proposal would not directly increase impacts of vehicle strikes on threatened species. Threatened species would not be funnelled into transport corridors. It is estimated the proposal would generate up 138 extra vehicles per day during peak construction periods. (GHD, 2018). Currently, traffic volume studies

show 1000-1200 vehicles use Goolma Rd per day, 200-250 Vehicles per day on Cobbora Rd vehicles per day and around 30 vehicles per day on Campbells Lane (GHD, 2018). An increase in vehicle traffic may indirectly increase vehicle strikes on native fauna. Site design would be unlikely to reduce impacts to vehicle strikes as these species generally fly above the canopy. Site management to enforce and reduce site speed limits would minimise impacts of vehicle strikes.

7 IMPACTS UNABLE TO BE AVOIDED

7.1 DIRECT IMPACTS

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

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

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Direct impacts				
Habitat clearance for permanent and temporary construction facilities.	108ha – (development footprint). 1ha – (eastern transmission line option). 3.8ha – western transmission line option.	One-off	Construction Phase: Long-term.	• Direct loss of native flora and fauna habitat. • Potential over-clearing of habitat outside proposed development footprint. • Injury and mortality of fauna during clearing of fauna habitat and habitat trees. • Disturbance to stags, fallen timber, and bush rock.
Displacement of resident fauna.	Unknown	One-off	Construction & Operational Phase: Long-term.	• Direct loss of native fauna. • Decline in local fauna populations.
Injury or death of fauna.	Unknown	Irregular	Construction Phase: Short-term.	• Direct loss of native fauna. • Decline in local fauna populations.
Removal of habitat features e.g. Hollow-bearing trees (HBTs).	35 HBT's 5 rocky outcrops	One-off	Construction Phase: long-term.	• Direct loss of native fauna habitat. • Injury and mortality of fauna during clearing of habitat features.
Bush Rock removal and disturbance.	5 rocky outcrops	One-off	Construction Phase: long-term.	• Direct loss of native fauna habitat. • Injury and mortality of fauna during clearing of habitat features.

Nature of impact	Extent	Frequency	Duration and timing	Consequence
Shading by solar infrastructure.	365ha	Constant	Operational Phase: Long-term.	• Modification of native fauna habitat.
Existence of permanent solar infrastructure.	730Ha	Constant	Operational Phase: long-term.	• Modification of native fauna habitat. • Reduced fauna movements across landscape.

7.1.1 *Impacts to Native Vegetation*

The changes in vegetation integrity scores as a result of clearing for the solar array, laydown areas and access roads are documented for each vegetation zone in Table 7-2. Table 7-3 and Table 7-4 show the changes in vegetation scores from the two transmission line options.

Table 7-2 Table of current and future vegetation integrity scores for each vegetation zone within the development footprint (solar arrays, laydown area, roads infrastructure).

Zone ID	PCT	TEC and/or threatened species habitat?	Area of impact (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
1	266_Moderate	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	3.1	23	0
2	266_DerivedGrassland	-	90.7	5.8	0
3	266_Planted	-	2.1	53.7	0
4	437_Moderate	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	1.0	49.4	0
5	437_Planted	-	10.2	45.3	0
13	437_Low	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	1.1	8.3	0
TOTAL:			**108ha**		

Table 7-3 Table of current and future vegetation integrity scores for each vegetation zone within the Western Transmission Line Option.

Zone ID	PCT	TEC and/or threatened species habitat?	Area of impact (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
1	266_Moderate	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	0.6	23	0
4	437_Moderate	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	1.8	49.4	0
5	437_Planted	-	0.3	45.3	0
7	266_Mod/Good	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	0.8	46.7	0
12	266_DNG_good	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	0.3	40	0

Table 7-4 Table of current and future vegetation integrity scores for each vegetation zone within the Eastern Transmission Line Option.

Zone ID	PCT	TEC and/or threatened species habitat?	Area of impact (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
3	266_Planted	-	0.1	53.7	0
7	266_Mod/Good	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	0.4	46.7	0
12	266_DNG_good	EEC – White Box-Yellow Box-Blakely's Red Gum Woodland	0.5	40	0

7.1.2 *Loss of species credit species habitat or individuals*

The loss of species credit species habitat or individuals as a result of clearing is documented in Table 7-5 below.

Table 7-5 Summary of species credit species loss at the development site

Species Credit Species	Biodiversity risk weighting	Area of habitat lost (ha)
Southern Myotis (*Myotis Macropus*)	2	0.2

7.1.3 *Loss of hollow-bearing trees*

99 Hollow-bearing trees were recorded within the development site. 35 of these Hollow-bearing trees occur within the development footprint and would be removed by the proposal. The number of hollow bearing trees in each zone are shown in Table 7-6.

Table 7-6 Hollow bearing trees impacted by the proposal

Zone	Description	HBTs within zone	HBTs impacted
1	**266_Moderate**	54	18
2	**266_DerivedNativeGrassland**	0	0
3	**266_Planted**	0	0
7	**266_Moderate/good**	1	1
4	**437_Moderate**	35	7
8	**437_DerivedNativeGrassland**	0	0
5	**437_Planted**	0	0
	Paddock Trees	9	9
TOTAL		**99**	**35**

7.2 INDIRECT IMPACTS

Indirect impacts of the proposal include soil and water contamination, creation of barriers to fauna movement, or the generation of excessive dust, light or noise. Section 9.1.4.2 of the BAM identifies the specific indirect impacts that must be considered. Table 7-7 below details the type, frequency, intensity, duration and consequence of the indirect impacts that may occur as a consequence of the proposal as identified by Section 9.1.4.2 of the BAM. Given the current land management practices and degraded nature of the development site, indirect impacts that are unlikely to occur or be exacerbated as a result of the proposal include:

- Trampling of threatened flora species.
- Inhibition of nitrogen fixation.
- Fertiliser drift.
- Rubbish dumping.
- Wood collection.
- Bush rock removal and disturbance.
- Increase in predatory species populations.
- Increase in pest animal populations.
- Increased risk of fire.

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

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts					
Inadvertent impacts on adjacent habitat or vegetation.	Unknown	Rare	Construction Phase: Short-term.	• White Box – Yellow Box – Blakely's Red Gum Woodland EEC. • Southern Myotis (*Myotis Macropus*).	• Direct loss of native flora and fauna habitat. • Injury and mortality of fauna during clearing of fauna habitat and habitat trees. • Disturbance to stags, fallen timber, and bush rock. • Increased edge effects.
Reduced viability of adjacent habitat due to edge effects.	Unknown	Constant	Operational Phase: Long-term.	• White Box – Yellow Box – Blakely's Red Gum Woodland EEC.	• Degradation of White Box – Yellow Box – Blakely's Red Gum Woodland EEC. • Loss of native flora and fauna habitat.
Reduced viability of adjacent habitat due to noise, dust or light spill.	Unknown	Rare	Operational Phase: Short-term.	• Southern Myotis (*Myotis Macropus*).	• Loss of Foraging habitat.
Transport of weeds and pathogens from the site to adjacent vegetation.	Unknown	Irregular	Construction & Operational Phase: Long-term.	• White Box – Yellow Box – Blakely's Red Gum Woodland EEC.	• Degradation of White Box – Yellow Box – Blakely's Red Gum Woodland EEC. • Loss of native flora and fauna habitat.
Increased risk of starvation, exposure and loss of shade or shelter.	Unknown	Constant	Construction & Operational Phase: Long-term.	• Southern Myotis (*Myotis Macropus*).	• Loss of Foraging habitat.
Loss of Breeding Habitats.	35 HBT	Constant	Construction Phase: Long-Term.	• Southern Myotis (*Myotis Macropus*).	• Loss of Breeding Habitat.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Increased soil salinity.	Unknown	Irregular	Operational Phase: Long-Term.	• White Box – Yellow Box – Blakely's Red Gum Woodland EEC.	• Degradation of White Box – Yellow Box – Blakely's Red Gum Woodland EEC.

7.3 PRESCRIBED IMPACTS

The following prescribed biodiversity impacts are relevant to the proposal:

- Impacts of development on the habitat of threatened species or ecological communities associated with rocks.
- Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation.
- Impacts of development on connectivity of different areas of habitat of threatened species that facilitate the movement of those species across their range.
- Impacts of the development on the movement of threatened species that maintain their lifecycle.
- Impacts of development on water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities.
- Impacts of vehicle strikes on threatened species of animals or animals that are part of a TEC.

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

7.3.1 *Impacts of development on the habitat of threatened species or ecological communities associated with rocks*

Five rocky outcrops would be impacted by the proposal. Surveys for reptiles were undertaken within the rocky outcrops. No threatened species were observed, and no threatened species or communities are considered likely to use the habitat.

7.3.2 *Impacts of development on the habitat of threatened species or ecological communities associated with non-native vegetation*

Surveys of the planted vegetation (no PCT) were undertaken for threatened fauna. No threatened birds or mammals were observed within these areas and no threatened species or communities are considered likely to use the habitat.

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

Three threatened bats were detected utilising the development site, The Southern Myotis, Grey-headed Flying Fox and Eastern Bent-wing Bat. The predominantly cleared landscape provides low quality connectivity across the development site. The main creek line (tributary 1) and planted vegetation along the riparian zone provides some connectivity across the landscape for threatened species such as the Southern Myotis (*Myotis Macropus*), Grey-headed Flying Fox (*Pteropus poliocephalus*) and Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*) that were observed on site. This creek line would remain within the development site.

These bat species are highly mobile and can travel large distances (Churchill, 2009). They can fly high above the canopy and would still be able to utilise the solar plant for movement across the landscape. The proposal would not impact on movement of these species across their range.

The development site is not a known major connectivity link for any other threatened species. Due to the highly cleared and fragmented landscape within the development site the proposal is not likely to disrupt the movement of any other threatened species across their range.

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

Three threatened bats were detected utilising the development site, The Southern Myotis, Grey-headed Flying Fox and Eastern Bent-wing Bat.

The Grey-headed flying fox and Eastern Bentwing-bat are highly mobile and wide-ranging species, travelling up 60km from their roosts to forage (Churchill, 2009). No breeding habitat is present within the development footprint and no impacts to breeding would occur. The area of foraging habitat (21ha) to be removed is relatively small within their foraging range. These species fly high above the canopy and would still be able to utilise the solar plant for movement across the landscape. The proposal is unlikely to impact on the lifecycle of these species.

The Southern Myotis (*M. macropus*) roosts in hollow bearing trees within 200m from riparian zones. They forage over streams and pools (OEH, 2017). 22 Hollow Bearing Trees (HBTs) occur within 200m of the main creek line (tributary 1) within the development site. 10 of these trees would be impacted by the proposal. The majority of the trees to be impacted are isolated paddock trees. A large number of HBTs would remain in the adjacent Yellow Box Woodland that provides better quality roosting habitat. Impacts could occur to the Southern Myotis if the species is roosting in a HBT that would be cleared by the proposal. The Southern Myotis breeds in November and December (OEH, 2017). Mitigation measures to time works to avoid clearing during the breeding season and hibernation season would minimise impacts to the life cycle of this species. Movement and foraging habitat would still be maintained within the development site. The Creek line and adjacent Yellow Box woodland would not be developed by the proposal. Southern Myotis are highly mobile aerial species and would still be able to utilise the solar plant for movement across the landscape. Mitigation measures to improve and enhance the Creek line and adjacent remnant Yellow Box Woodland would enhance the quality of foraging and roosting habitat for these species. With these mitigation measures the development is unlikely to impact on the bioregional persistence of these threatened species.

The development site is not a known migratory path for any other threatened species. Due to the highly cleared and fragmented landscape within the development site the proposal is not likely to disrupt the movement of any other threatened species that maintains their lifecycle.

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

The main creek line (Tributary 1) in the development site could provide habitat for the Booroolong Frog. Surveys were undertaken for the Booroolong Frog and they were not detected and are not considered to occur in the waterways.

The Construction of the proposal would not directly affect surface water quality. Indirectly, the proposed works would involve a range of activities that would disturb soils and potentially lead to sediment laden runoff, affecting local water ways during rainfall events. These potential impacts are unlikely to significantly impact water quality with the recommended mitigation measures to implement sediment control procedures. The use of fuels and other chemicals on site pose a risk of surface water contamination in the event of a spill. Mitigation measures to implement spill management procedures would minimise impacts to waterways and hydrological processes.

Operation of the proposal would have minimal potential for any impact to surface water quality. Appropriate drainage features would be constructed along internal access roads to minimise the risk of dirty water leaving the site or entering waterways. With the exception of internal roads, parking areas and

areas around site offices, the site would be largely vegetated with grass cover (specifically, ground cover would be maintained beneath the solar array). There would be a low risk of contamination in the event of a chemical spill (fuels, lubricants, herbicides etc.) as storage and emergency handling protocols would be implemented.

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

A consideration of threatened species that were observed on site is shown in Table 7-8. Mitigation measures will be implemented to enforce a site speed. With the recommended mitigation measures, it is therefore not likely that vehicles associated with the proposal will have a substantive impact on these species and the risk of vehicle collision is considered to be low.

Table 7-8 Impacts by vehicle strikes.

Species	Likelihood of vehicle strike	Predicted Impacts
Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*)	Low – Flies high above canopy.	Unlikely to be impacted by vehicle strikes.
Grey-headed Flying Fox (*Pteropus poliocephalus*)	Low – Flies high above canopy.	Unlikely to be impacted by vehicle strikes.
Southern Myotis (*Myotis Macropus*)	Low – Flies high above canopy.	Unlikely to be impacted by vehicle strikes.

7.4 IMPACTS TO MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Twelve EPBC listed species were considered to have the potential to occur within the development site (Section 5.3). Surveys were undertaken for these species and only one of these species was detected.

The Grey-headed Flying Fox was observed foraging along tributary 1 and flying overhead. An assessment of significance has been completed for the Grey-headed Flying-fox (Appendix J) and concluded that a significant impact was unlikely on the basis that the proposal would not:

- Lead to a reduction of the size or area of occupancy of an important population, or fragment or disrupt the breeding cycle of an important population.
- Affect habitat critical to the survival of the species.
- Affect habitat or introduce disease such that the species would decline.
- Introduce invasive species harmful to the Grey-headed Flying Fox.
- Interfere with the recovery of the species.

An EPBC referral is not considered necessary for this species.

The EPBC Referral Guidelines for the Koala (DoE, 2014) documents the 'Koala habitat assessment tool' to assist proponents in determining if a proposal may impact on habitat critical to the survival of the Koala. The tool is provided as Table 7-9 below as it applies to the proposal. Impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the Koala. The assessment in Table 7-9 resulted in a score of 4 and as such habitat within the study area is not considered to be critical to the survival of the Koala. An assessment of significant impact is not required for the Koala.

Table 7-9: Koala habitat assessment tool for inland areas (DoE, 2014).

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

Attribute	Score	Inland	Applicable to the proposal?
		koala occurrence, **OR** Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	✓ Study area is not considered a habitat refuge nor does it provide important connectivity to large areas surrounding a habitat refuge.
Total	**4**	**Decision: Habitat not critical to the survival of the Koala—assessment of significance not required**	

7.5 LIMITATIONS TO DATA, ASSUMPTIONS AND PREDICTIONS

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

The calculation of hollow-bearings trees, in particular the size and number of hollows, was made from ground level. It is possible that some hollows are present that were not visible from ground level, which may result in underestimates of the number of hollows (Gibbons and Lindenmayer, 2000). However, it was noted where it was considered likely that hollows were present but not visible from ground level.

The site is subject to grazing pressures and sheep and cattle are rotated around the different paddocks. The impacts of grazing may alter the visible foliage cover of native grasses, forbs and high threat exotic

species. Plot data was collected in zones that had been subject to heavy grazing. Some native grasses or forbs may have been heavily chewed to the ground and would not have been visible during the time of survey. Likewise, some heavily grazed grasses were unidentifiable to species level. Where chewed stubs of perennial grasses were visible, they were assumed to be native grasses and identified to the most likely genus, based on habit and surrounding intact grasses. Native Forbs and Grasses may rejuvenate when grazing pressure is taken off the vegetation zones. mitigating and managing impacts

7.6 MITIGATION MEASURES

A general summary of the key measures required to mitigate the impacts of the proposal is provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure and an analysis of the consequences of any residual impacts are provided in Table 7-10.

7.6.1 *Impacts from the clearing of vegetation and habitats*

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

7.6.2 *Indirect impacts*

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

7.6.3 *Prescribed impacts*

- Sediment barriers or sedimentation barriers to control the quality of water runoff from the site into the receiving environment.
- Implement Emergency Spill Management procedures.
- Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development site.
- Enforce site speed limits to reduce impacts of vehicle strikes on threatened fauna.

Table 7-10 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Time works to avoid critical life cycle events such as breeding or nursing.	• Hollow-bearing trees would not be removed during breeding season or hibernation period (Winter to early summer) to mitigate impacts on Southern Myotis. • If clearing outside of this period cannot be achieved, pre-clearing surveys would be undertaken to ensure no impacts to fauna would occur.	Construction Phase	Regular	Contractor	Low	Species not detected during pre-clearing surveys may be impacted.
Implement clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events.	• Pre-clearing checklist. • Tree clearing procedure.	Construction Phase	Regular	Contractor	Low	Species not detected during pre-clearing surveys may be impacted.
Relocate habitat features (fallen timber, hollow logs, rocks) from within the development site.	• Tree-clearing procedure including relocation of habitat features to adjacent area for habitat enhancement.	Construction Phase	Regular	Contractor	Low	None
Indirect impacts on native vegetation and habitat						
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example,	• Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing.	Construction Phase	Regular	Contractor	Low	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed.	• No stockpiling or storage within dripline of any mature trees. • In areas to clear adjacent to areas to be retained, chainsaws would be used rather than heavy machinery to minimise risk of unauthorised disturbance.					
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise.	• Construction Environmental Management Plan will include measures to avoid noise encroachment on adjacent habitats such as avoiding night works as much as possible.	Construction	Regular	Contractor	Low	None
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill.	• Avoid Night Works. • Direct lights away from native vegetation.	Construction/ Operation	Regular	Contractor	Low	None
Adaptive dust monitoring programs to control air quality.	• Daily monitoring of dust generated by construction activities. • Construction would cease if dust observed being blown from site until control measures were implemented. • All activities relating to the proposal would be undertaken with the objective of preventing visible dust emissions from the development site.	Construction	Regularly	Contractor	Moderate	Sedimentation in ephemeral waterways and dams.
Temporary fencing to protect significant environmental	• Prior to construction commencing, exclusion fencing	Construction	Constant	Constructor	Low	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
features such as riparian zones.	and signage would be installed around habitat to be retained.					
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas.	• A Weed Management procedure would be developed for the proposal to prevent and minimise the spread of weeds. This would include: o Management protocol for declared priority weeds under the *Biosecurity Act 2015* during and after construction. o Weed hygiene protocol in relation to plant, machinery, and fill. • Any occurrences of pathogens such as Myrtle Rust and Phytophthora would be monitored, treated, and reported.	Construction, Operation	Regular	Contractor	Moderate	Weed encroachment.
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented.	• Site induction. • Toolbox talks.	Construction	Regular	Contractor	Moderate	Impacts to native vegetation or threatened species for Staff training not being followed.
Preparation of a vegetation management plan to regulate activity in vegetation and habitat adjacent to residential development. The vegetation management plan may include controls on pet ownership, rubbish disposal,	• Preparation of a Biodiversity management plan that would include protocols for: o Protection of native vegetation to be retained. o Best practice removal and disposal of vegetation.	Construction	One-off	Contractor	Moderate	Impacts to native vegetation or threatened species for Biodiversity Management Plan not being followed.

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
wood collection, fire management and disturbance to nests and other niche habitats.	o Staged removal of hollow-bearing trees and other habitat features such as fallen logs with attendance by an ecologist. o Weed management. o Unexpected threatened species finds. o Rehabilitation of disturbed areas.					
Prescribed biodiversity impacts						
Erosion and sediment controls	• An erosion and sediment control plan would be prepared in conjunction with the final design and implemented. • Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment.	Construction	Regular	Contractor	Moderate	Impacts may occur if erosion and sedimentation control plan not implemented.
Implement Emergency Spill procedures.	• A Spill and Contamination Response Plan would be developed as part of the overall Emergency Response Plan to prevent contaminants affecting adjacent surrounding waterways.	Construction	Regular	Contractor	Moderate	Impacts may occur in spill management procedures are not implemented.
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on	• Retained native vegetation would be considered as an offset site.	Operation	Regular	Client	Low	None

Mitigation measure	Proposed techniques	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
or adjacent to the development site.						
Staff training and site briefing to communicate impacts of traffic strikes on native fauna.	• Awareness training during site inductions regarding enforcing site speed limits. • Site speed limits to be enforced to minimise fauna strike.	Construction and Operation	Regular	Contractor	Moderate	Fauna strikes from vehicles.

7.7 ADAPTIVE MANAGEMENT STRATEGY

No adaptive management strategies are proposed for the development.

8 SERIOUS AND IRREVERSIBLE IMPACTS (SAII)

8.1 POTENTIAL SERIOUS AND IRREVERSIBLE IMPACT ENTITIES

Two potential SAII entities that are listed in the *Guidance to assist a decision-maker to determine a serious and irreversible impact* could be impacted by the proposal. These are discussed below.

8.1.1 *Threatened ecological communities*

One threatened ecological community will be impacted on by the proposal that is listed as a potential SAII entity in the *Guidance to assist a decision-maker to determine a serious and irreversible impact*. This is the White Box Yellow Box Blakely's Red Gum Woodland (Box-gum Woodland) EEC.

8.1.2 *Threatened species*

One threatened species observed within the development site is listed as an SAII entity in the *Guidance to assist a decision-maker to determine a serious and irreversible impact*. This is the Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*).

8.1.3 *Additional potential entities*

No further entities were identified as being impacted on by the proposal with the potential to becoming a serious and irreversible impact.

8.2 ASSESSMENT OF SERIOUS AND IRREVERSIBLE IMPACTS

8.2.1 *White Box Yellow Box Blakely's Red Gum Woodland (Box-gum woodland)*

a) the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII

Approximately 47ha of good condition Box-gum woodland falling within the subject land was avoided by the proposal. A further 18ha of moderate condition Box-gum woodland was also avoided by the development footprint by arranging the solar array to avoid patches of remnant woodland.

It is noted that areas that cannot be avoided may not be completely removed by infrastructure. Removal would occur to accommodate tracks and infrastructure footings however; the largest proportion of the infrastructure footprint is the mounted solar panels which leave understorey vegetation largely intact. Indirect impacts of shading and altered microclimate would impact these areas but the understorey species composition in these areas would be expected to remain largely intact during the operational phase of the project. Remediation of the site during decommissioning is also a commitment of the project.

b) the area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone

Approximately 10.8ha (western transmission line) or 8.3ha (Eastern Transmission Line) of Box-gum woodland would be removed by the proposal. The planted Box-gum woodland (PCT437_planted) does not meet the criteria of the EEC due to a predominantly shrubby

understorey of planted acacias. The condition of the Box-gum Woodland to be removed is shown in Table 8-1.

Table 8-1 Box-gum Woodland Vegetation Integrity Score for the Western Transmission Line.

Zone ID	Vegetation Zone	Area to be removed (ha)	Vegetation Integrity Score
1	266_ Moderate	3.7	23
3	266_Planted	2.1	53.7
7	266_Moderate/Good	0.8	46.7
4	437_Moderate	2.8	64.3
12	266_DNG_Good	0.3	40
13	437_Low	1.1	8.3

Table 8-3 Box-gum Woodland Vegetation Integrity Score for the Eastern Transmission Line.

Zone ID	Vegetation Zone	Area to be removed (ha)	Vegetation Integrity Score
1	266_ Moderate	3.1	23
3	266_Planted	2.2	53.7
7	266_Moderate/Good	0.4	45.3
4	437_Moderate	1.0	64.3
12	266_DNG_Good	0.5	40
13	437_Low	1.1	8.3

c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact

No threshold has yet been defined by OEH for the extent of Box-gum Woodland to be removed that constitutes a serious and irreversible impact.

d) the extent and overall condition of the potential TEC within an area of 1000ha, and then 10,000ha, surrounding the proposed development footprint

Using GIS and State Vegetation Mapping, it is estimated 153ha of Box-gum Woodland occurs within an area of 1000ha surrounding the proposed development footprint and 1640ha of Box-gum Woodland occurs within an area of 10,000 ha surrounding the proposed development footprint. The areas of Box-gum Woodland estimated are likely to be in good condition as they are visible using aerial imagery and have tree cover. There may be some further areas that are in low condition or derived native grasslands that are not easily distinguished using aerial imagery.

e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration

Threatened Species Scientific Committee (2006) estimates 55,798ha of Box-gum Woodland remains in the NSW South Western Slopes IBRA Region. Approximately 10.8ha (western

transmission line) or 8.3ha (Eastern Transmission Line) is proposed to be removed which is 0.005% of the estimated extent remaining.

f) an estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion

In NSW, Box-gum grassy Woodland is known to occur within at least 42 reserve systems. 8,000ha of Box-gum woodland is estimated to occur in national parks and nature reserves within the NSW South Western Slopes IBRA Region (Benson 2008).

g) The development, clearing or biodiversity certification proposal's impact on:

i. *abiotic factors critical to the long-term survival of the potential TEC*. Groundwater supplies and levels are unlikely to be affected by the development of the solar plant are no groundwater is anticipated to be intercepted or extracted. During construction, the proposal would have a short term gross impact upon soils and possibly surface water flow, within discreet areas. These impacts are manageable with the implementation of erosion and sediment controls and would be unlikely to impact on abiotic factors critical to the long-term survival of Box-gum woodland. As above, relatively small proportion of the infrastructure footprint requires excavation with the vast majority being mounted panels. Flood studies undertaken to support the EIS have verified the infrastructure would have no offsite impacts on flooding and would not exacerbate erosion onsite.

ii. *characteristic and functionally important species.* The Box-gum woodland to be impacted has an exotic dominated understorey and very few native species present. The overstorey species, White Box (*E. albens*) and Yellow Box (*E. melliodora*) are characteristic of the community and some remnant trees would be removed by the proposal. Understorey native species that are present are common plants often found in agricultural and disturbed landscapes. No impacts are anticipated to the remaining Box-gum woodland. No introduced fire or flooding regimes would occur and no increase of natural occurrences of these events is anticipated from the development. No removal of understorey species of harvesting of plants would occur in the remaining Box-gum woodland.

iii. *the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts.* 8.2ha of Box-gum Woodland would be removed. It is likely the remaining 65ha of Box gum woodland avoided by the development would improve in condition through reduced impacts from cropping and grazing[1]. The loss of cropping adjacent to the Box-gum woodlands will reduce fertiliser and herbicide impacts and erosion. The reduction in livestock and grazing will reduce localised impacts to the understorey of the Box-gum woodland where high concentrations of livestock have used the trees for shelter.

h) direct or indirect fragmentation and isolation of an important area of the potential TEC

The 10.5ha (western transmission line) or 10.6ha (Eastern Transmission Line) of Box-gum Woodland to be removed is already fragmented and isolated. It is unlikely the removal of this Box-gum Woodland would significantly exacerbate reduced connectivity across the landscape.

i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.

[1] Managed grazing may be a tool used to manage ground cover onsite but it is not expected to be as high as current stocking rates.

The 10.8ha (western transmission line) or 8.3 ha (Eastern Transmission Line) to be removed will be offset by 468.25 (Western transmission line option) or 409 (Eastern transmission line option) ecosystem credits that will be used for management of another area of Box-gum woodland in the same IBRA region.

Based on these criteria, it is considered unlikely the proposal would have a serious and irreversible impact on the White Box Yellow Box Blakely's Red Gum Woodland EEC.

8.2.2 *Eastern Bent-wing Bat (Miniopterus schreibersii oceanensis)*

a) the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII

The Eastern Bent-wing Bat was detected in the development site from two ANABAT recordings. The Eastern Bent-wing Bat breeds in caves, tunnels, mines or culverts (OEH, 2018). Two culverts were present in the development site that may provide breeding or roosting habitat for the bat. These areas are avoided by the proposal and no impacts to breeding or roosting habitat would occur.

Indirect impacts may occur through the removal of potential foraging habitat. The Eastern Bent-wing Bat forages on moths, flies, cockroaches and beetles just above the forest canopy or in grasslands, a few metres above the ground (Churchill, 2009). Approximately 112ha of native vegetation, (comprised of up to 21ha of woodland and 91ha of derived native grassland) would be removed by the development. 730ha of agricultural land would be replaced by solar panels. As these species are aerial hunters, foraging habitat would still remain within the development site to some degree. 65ha of remnant woodland and about 20ha of grassland vegetation along tributary 1 would be retained by the development and would remain as foraging habitat for this species.

The connectivity value of the site has been assessed as low and therefore unlikely to provide an important stepping stone for this species however, foraging habitat to be removed will be offset in the region.

b) the size of the local population directly and indirectly impacted by the development, clearing or biodiversity certification

The size of the local population is unknown. 13 records of the Eastern Bent-wing Bat were detected on the ANABAT over a period of two nights in two separate locations along the tributary 1. This suggests only low number of individuals are present within the site. No key management sites occur within or surrounding the development site and no known maternity caves occur on site. The nearest previous known record of the species occurs about 10km south of the development site with one sighting East of Burrendong Dam and two records on the Bell River near Neurea (BioNet, 2018). Populations of this species are centred around maternity caves. The species is wide ranging and highly mobile and may travel distances of several hundred kilometres to maternity roosts (Hoye and Spence, 2004). The closest known maternity roost is located in Drum Cave near Goulburn, 300km South of the development site. As above, the connectivity value of the site has been assessed as low and therefore unlikely to provide an important stepping stone for this species during migration.

c) The threshold for the extent to which the impact exceeds any threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact

The threshold defined by OEH for the Eastern Bent-wing Bat is 'Breeding Habitat identified by survey' . Breeding habitat for the Eastern Bent-wing Bat are caves, tunnels, mine or culverts. Two culverts identified in the survey would not be impacted by the proposal. The proposal does not exceed the threshold for this species

d) the likely impact (including direct and indirect impacts) that the development, clearing or biodiversity certification will have on the habitat of the local population, including but not limited to:

i. an estimate of the change in habitat available to the local population as a result of the proposed development

No roosting habitat would be impacted by the proposal.

Up to 21ha of native woodland vegetation (depending on transmission line option) would be removed by the proposal that could provide foraging habitat. The Eastern Bent-wing Bat forages on moths, flies, cockroaches and beetles just above the forest canopy or in grasslands, a few metres above the ground (Churchill, 2009). As this species is an aerial species, the species could continue to utilise the site for foraging, however the quality of the foraging habitat would be lower with a reduced native woodland cover.

ii. the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and

Up to 21ha of native woodland vegetation (depending on transmission line option) would be removed by the proposal that could be used by foraging habitat. The species is highly mobile and broad ranging and unlikely to be impacted by the loss of this native woodland.

The connectivity value of the site has been assessed as low and therefore the proposal is unlikely to exacerbate the isolation of habitat.

iii. modification of habitat required for the maintenance of processes important to the species' life cycle, genetic diversity and long-term evolutionary development.

There is no suitable breeding habitat for these species in the development sites. The proposal would not disrupt the breeding cycle of the local population. The species is highly mobile and no isolation of populations would occur. The proposal is unlikely to modify habitat that would impact on the species lifecycle or genetic diversity.

e) the likely impact on the ecology of the local population. At a minimum, address the following:

i. for fauna, (breeding, foraging, rooting and dispersal or movement pathways)

– *breeding*

There is no suitable breeding habitat for these species in the development sites. The proposal would not disrupt the breeding cycle of the local population.

– *foraging*

Up to 21ha of native woodland (depending on transmission line route) would be removed that could provide foraging habitat. The species is broad ranging and highly mobile travelling up to 65km from their roost sites (Churchill, 2009). The area of foraging habitat to be removed is relatively small within their foraging range and unlikely to impact on the ecology of the local population.

– *roosting, and*

No roosting habitat would be impacted by the development. The proposal would not disrupt roosting sites of the local population.

– dispersal or movement pathways

The species is wide-ranging and can travel large distances. It flies high above the canopy. The proposal would not impact on movement pathways for the local population.

f) a description of the extent to which the local population will become fragmented or isolated as a result of the proposed development

The Eastern Bent-wing Bat is highly mobile and flies high above the canopy (Churchill, 2009). The Eastern Bent-wing Bat could continue to utilise the aerial space above the solar panels. The proposal would not fragment or isolate a population of this species. The existing vegetation is already fragmented. The proposal would not significantly increase this effect, as the infrastructure has been planned to avoid better woodland patches.

g) the relationship of the local population to other population/populations of the species.

Populations are centred around maternity caves. Three major maternity caves are known in NSW, Willi Willi Caves in Kempsey, Drum Cave near Goulburn and Church Cave at Wee Jasper (Hoye and Spence, 2004). During winter smaller colonies move out to smaller roost caves. The species is highly mobile and can travel hundreds of kilometres to maternity caves (Churchill, 2009). The local population would migrate to a maternity cave during Autumn to breed, however the location of the maternity cave is unknown.

h) the extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population

Threats to this species include (OEH, 2017):

- Disturbance by recreational cavers.
- Cave entrances being blocked.
- Loss of high productivity foraging habitat.
- Introduction of exotic pathogens.
- Hazard reduction and wildfire fire during the breeding season.
- Predation by feral cats and foxes around roosting sites, particularly maternity caves.

The proposal may lead to an increase to two of these threats;

Loss of high productivity foraging habitat. Up to 8.2ha (depending on transmission line route) of native woodland that could provide foraging habitat would be impacted by the proposal. The quality of potential foraging habitat is low, being highly disturbed and fragmented by agriculture. The species is highly mobile and can forage up to 65km from their roosting site (Churchill, 2009). The area of foraging habitat to be removed is relatively small within their foraging habitat and unlikely to lead to a decrease in the viability of the local population.

Introduction of exotic pathogens. There is a risk that diseases could be introduced to the development site via machinery, vehicles and materials during construction and operation. With the implementation of recommended mitigation measures for hygiene protocols, the proposal is unlikely to result in the introduction of disease that may cause a decrease in the viability of the local population.

i) an estimate of the area, or number of populations and size of populations that is in the reserve system in NSW, the IBRA region and the IBRA subregion

The size of the local population is unknown. Three major maternity roosts are known in NSW, Willi Willi Caves in Kempsey, Drum Cave near Goulburn and Church Cave at Wee

Jasper (Hoye and Spence, 2004). These main maternity roosts are protected in NSW National Parks or Nature Reserves.

j) the measure/s proposed to contribute to the recovery of the species in the IBRA subregion

The Eastern Bent-wing Bat is considered an ecosystem species for White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT266). 205.5 ecosystem credits (Western transmission line option) or 155.5 ecosystem credits (Eastern transmission line option) would be generated for this vegetation community by the proposal. These ecosystem credits will be used for management and restoration of another area of White Box Grassy woodland in the IBRA region that would increase high productivity foraging habitat and contribute to the recovery of the species.

8.2.3 *Conclusion*

Based on the appropriate criteria, it is considered highly unlikely the proposal would have a serious and irreversible impact on the White Box Yellow Box Blakely's Red Gum Woodland EEC or the Eastern Bentwing-Bat.

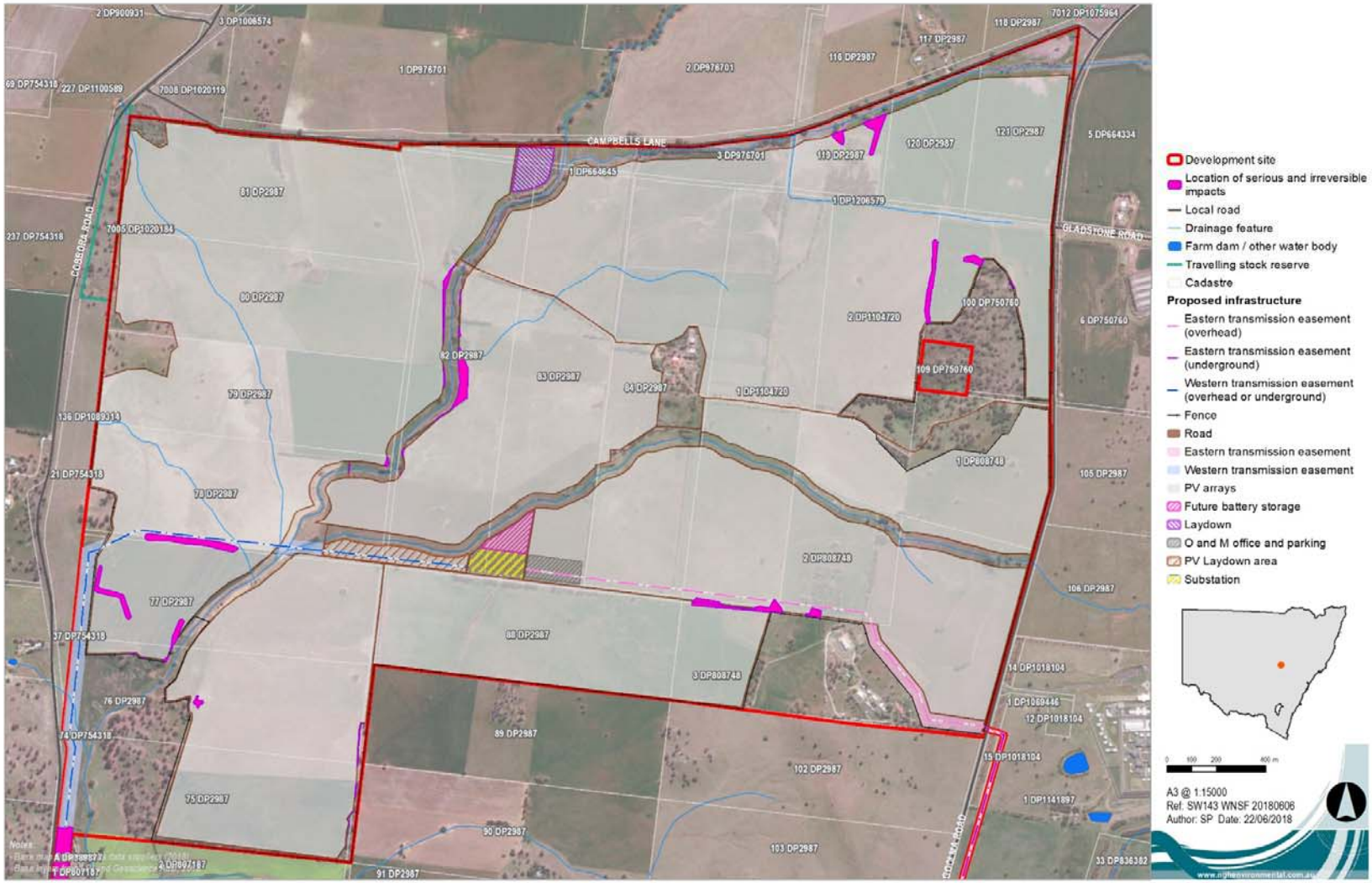

Figure 8-1 Location of serious and irreversible impacts (north).

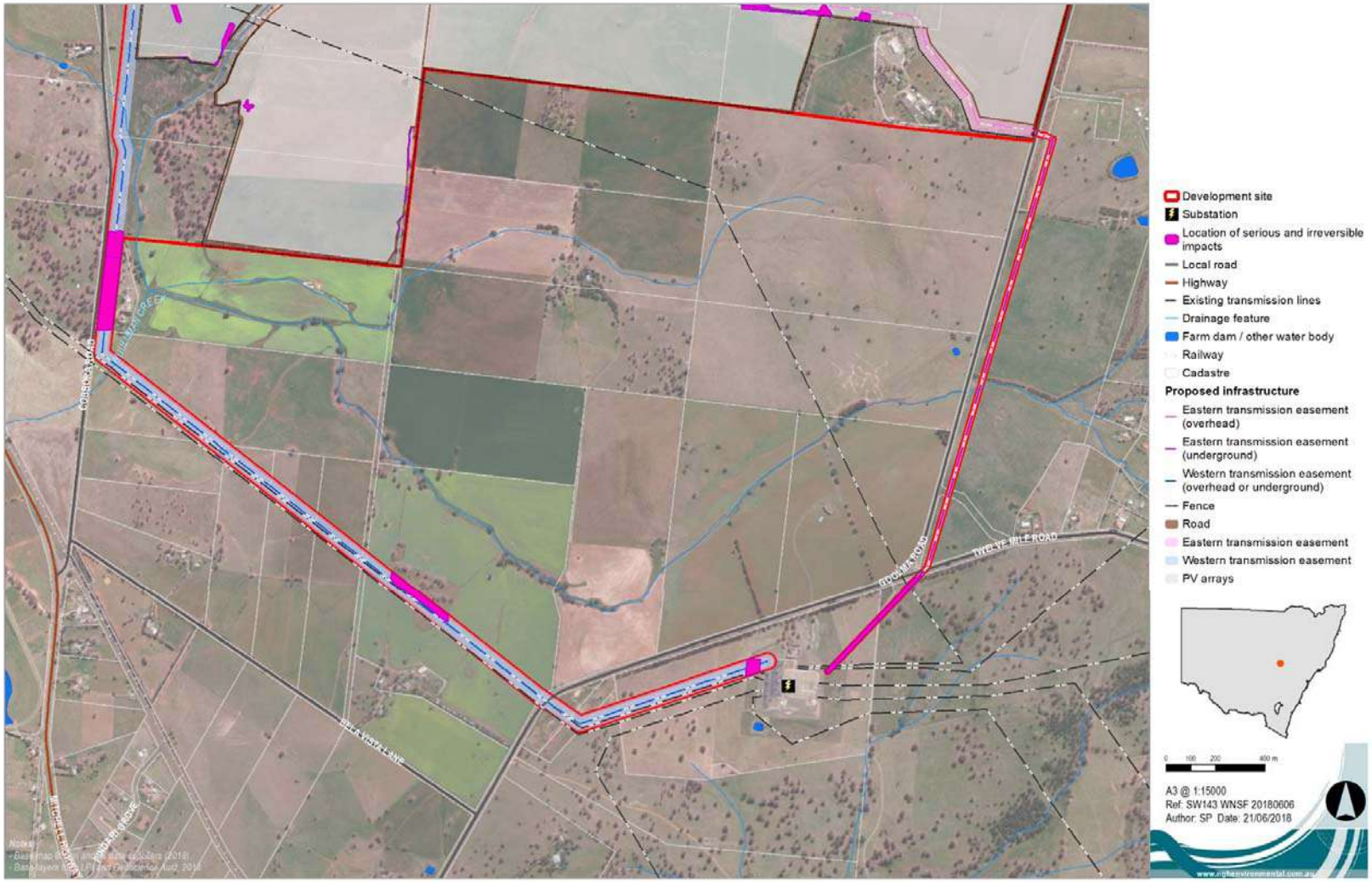

Figure 8-2 Location of serious and irreversible impacts (south).

9 REQUIREMENT TO OFFSET

9.1 IMPACTS REQUIRING AN OFFSET

9.1.1 *Ecosystem credits*

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

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

The PCTs and vegetation zones requiring offset and the ecosystem credits required are documented in Table 9-1 and mapped on Figure 9-1.

Table 9-1 PCTs and vegetation zones that require offsets for the development site and Western Transmission Line option

Zone ID	PCT ID	Zone name	Impact area (ha)	Vegetation integrity loss	Ecosystem credits required
White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266)					
1	266	266_Moderate	3.7	23	42
3	266	266_Planted	2.1	53.7	56
7	266	266_Moderate/Good	0.8	46.7	19
12	266	266_DNG_Good	0.3	40	6
				Subtotal:	**123**
Yellow Box Grassy Woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion (PCT437)					
4	437	437_Moderate	2.8	49.4	69
5	437	437_Planted	10.5	45.3	238
				Subtotal:	**307**
				TOTAL:	**430**

Table 9-2 PCTs and Vegetation Zones that require offsets for the development site and Eastern Transmission Line Option

Zone ID	PCT ID	Zone name	Impact area (ha)	Vegetation integrity score	Ecosystem credits required
White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266)					
1	266	266_ Moderate	3.1	23	36
3	266	266_Planted	2.2	53.7	59
8	266	266_Moderate/Good	0.4	46.7	9
12	266	266_DNG_Good	0.5	40	10
				Subtotal:	**114**
Yellow Box Grassy Woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion (PCT437)					
4	437	437_Moderate	1.0	49.4	25
5	437	437_Planted	10.2	45.3	231
				Subtotal:	**256**
				TOTAL:	**370**

The full Biodiversity Credit Reports generated by the BAM Calculator is provided in Appendix J.

9.1.2 *Species credits*

An offset is required for the threatened species impacted by the development that require species credits. These species and the species credits required are documented in Table 9-3.

Table 9-3 Species credit species that require offsets

Species Credit Species	Biodiversity risk weighting	Area of habitat or count of individuals lost	Species credits required
Southern Myotis (*Myotis macropus*)	2	0.23	6
		TOTAL	**6**

The full Biodiversity Credit Reports generated by the BAM Calculator is provided in Appendix J.

9.1.3 *Paddock Tree credits*

Offsets are required for the clearing of paddock trees. 56 paddock trees would be removed by construction of the solar arrays, lay down areas and access roads. 11 of these are Class 1 paddock trees and do not require offsetting. One further paddock trees would be removed through the construction of the Eastern transmission line option. No additional paddock trees would need be removed through the construction of the Western transmission line option.

Ecosystem credits are calculated as per the streamlined assessment defined in the BAM – Appendix 1 and Table 12. These ecosystem credits required are documented in Table 9-4. Paddock trees are likely to be comprised from PCT 266 and PCT 437. The large tree benchmark for these PCTs is 50cm DBH.

38.25 ecosystem credits are required for the clearing of the paddock trees with the Western Transmission Line option and 39 ecosystem credits are required for the clearing of the paddock trees within the Eastern Transmission Line option. This is in addition to the biodiversity credits required by the BAM calculator for defined vegetation zones (refer to credit reports provided in Appendix J).

Table 9-4 Paddock Trees that require offsets with the development site.

Class of Paddock Tree being cleared	Hollows Present	Number of Paddock Trees to be cleared	Number of Credits Required	Ecosystem credits required
PCT 266				
Class 2 (>20cm DBH and < 50cm DBH)	No	2	0.5	1
Class 2 (>20cm DBH and < 50cm DBH)	Yes	0	0.75	0
Class 3 >50cm DBH	No	6	0.75	4.5
Class 3 >50cm DBH	Yes	4	1	4
			TOTAL	**9.5**
PCT 437				
Class 2 (>20cm DBH and < 50cm DBH)	No	10	0.5	5
Class 2 (>20cm DBH and < 50cm DBH)	Yes	0	0.75	0
Class 3 >50cm DBH	No	18	0.75	18.75
Class 3 >50cm DBH	Yes	5	1	5
			TOTAL	**28.75**

Table 9-5 Additional Paddock Trees that require offsets for the Eastern Transmission Line option.

Class of Paddock Tree being cleared	Hollows Present	Number of Paddock Trees to be cleared	Number of Credits Required	Ecosystem credits required
PCT 437				
Class 3 >50cm DBH	No	1	0.75	0.75
			TOTAL	**0.75**

9.1.4 *Offsets required under the EPBC Act*

No species listed on the EPBC Act have been identified as having the potential to be significantly impacted by the development (Section 7.4). As such, the proposal is not considered to require offsets in accordance with the EPBC Offsets Policy.

9.2 IMPACTS NOT REQUIRING AN OFFSET

It is expected that 90.7ha of Derived Native Grassland would be impacted by the proposal. This grassland is in low condition, comprising of only 0.5 – 20% native ground cover. Six vegetation integrity plots were undertaken in this area and returned a vegetation integrity score of 5.8.

1.1ha of Low condition woodland (PCT 437) would be impacted by the proposal. This woodland is in low condition comprising less than 10% native ground cover and only a few remnant Yellow Box (*Eucalyptus camaldulensis*) remaining. This zone returned a vegetation integrity score of 8.3.

As defined in section 10.1.1 of the BAM, vegetation zones that have a vegetation integrity score of less than 15 do not require offsets. These PCTs and vegetation zones are identified in Table 9-6 and mapped on Figure 9-1 and Figure 9-2.

Table 9-6 PCTs and vegetation zones that do not require offsets.

Zone ID	PCT	Zone Name	Zone area (ha)	Vegetation integrity score
2	266	Derived Grassland	90.7	5.8
13	437	Low	1.1	8.3

9.3 AREAS NOT REQUIRING ASSESSMENT

11.8ha of planted vegetation that does not form part of a PCT would be impacted by the development. Planted areas may still provide habitat for threatened species. Targeted surveys for threatened species, including bird surveys and nocturnal spotlighting surveys did not detect any threatened species using these areas. No habitat features such as hollow bearing trees or fallen timber were present in these plantings. These areas did not require offsetting or further assessment.

Approximately 700ha of exotic vegetation, comprised of agricultural crops or planted exotic trees would be impacted by the proposal. These zones are not considered native vegetation and do not require offsetting or further assessment.

Table 9-7 Vegetation zones that do not require offsets.

Zone ID	PCT	Zone Name	Zone area (ha)	Vegetation integrity score
10	-	Planted Vegetation (No PCT)	11.8	NA
11	-	Exotic vegetation	Approx. 700	NA

These areas are mapped on Figure 9-1 and Figure 9-2.

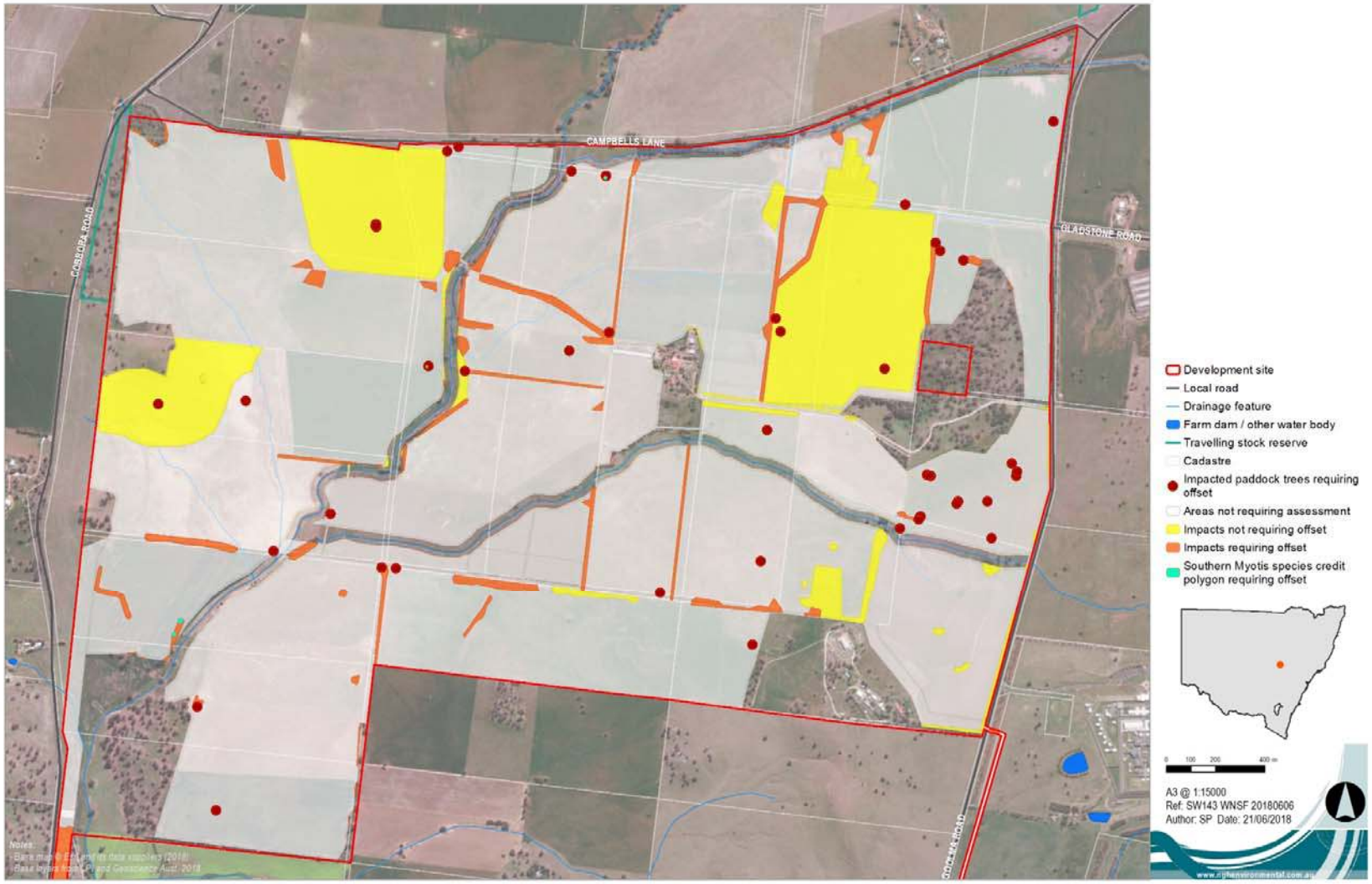

Figure 9-1 Impacts requiring offset, not requiring offset and not requiring assessment (north).

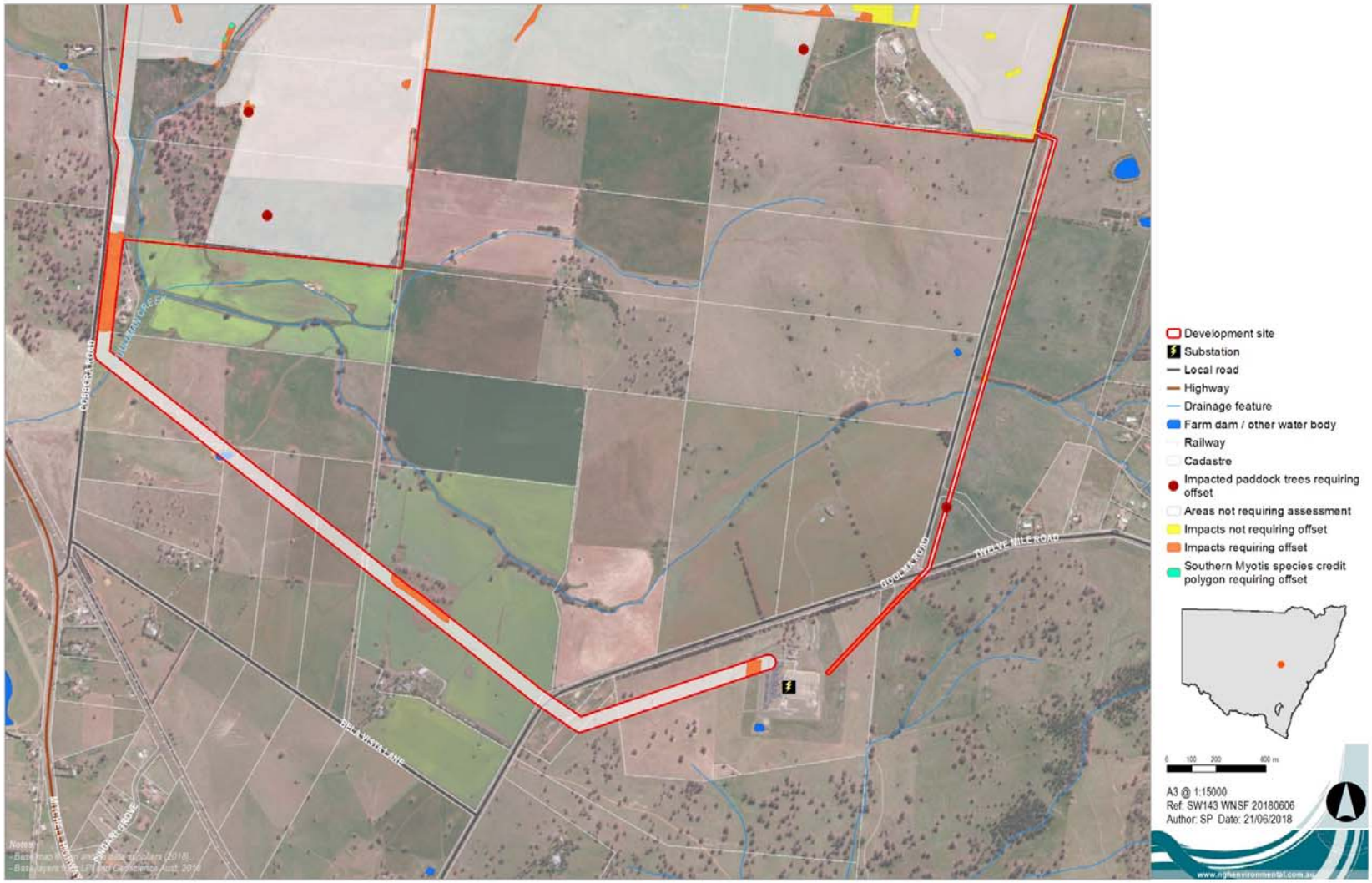

Figure 9-2 Impacts requiring offsets, not requiring offset and not requiring assessment (south).

9.4 SUMMARY OF OFFSET CREDITS REQUIRED

The following credit requirement is generated for the project.

Table 9-8 Credit Requirement for the project - Western Transmission Line option

Ecosystem Credits	Offset credits required
White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266)	123
Paddock Trees – White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266)	9.5
Subtotal:	**132.5**
Yellow Box Grassy Woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion (PCT437)	307
Paddock Trees - Yellow Box Grassy Woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion (PCT437)	28.75
Subtotal:	**335.75**
TOTAL	**468.25**
Species Credits	**Offset Credits Required**
Southern Myotis (*Myotis Macropus*)	6
TOTAL	**6**

Table 9-9 Credit requirement for the project – Eastern transmission Line Option

Ecosystem Credits	Offset credits required
White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266)	114
Paddock Trees – White Box Grassy Woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT 266)	9.5
Subtotal:	**123.5**
Yellow Box Grassy Woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion (PCT437)	256
Paddock Trees - Yellow Box Grassy Woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion (PCT437)	29.5
Subtotal:	**285.5**
TOTAL:	**409**
Species Credits	**Offset Credits Required**
Southern Myotis (*Myotis Macropus*)	6
TOTAL	**6**

10 CONCLUSION

NGH Environmental has prepared this BDAR on behalf of AGL for the Wellington North Solar Plant in Wellington, NSW. The purpose of this BDAR was to address the requirements of the BAM and to address the biodiversity matters raised in the SEARs.

In this BDAR:

- Biodiversity impacts have been assessed through comprehensive mapping and assessment completed in accordance with the BAM.
- Mitigation measures which have been outlined to reduce the impacts to biodiversity.
- The credit requirement has been defined as:

  Western Transmission Line Option
  - 468.25 Ecosystem Credits for impacts to White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT266) and Yellow Box grassy woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion for
  - 6 species credits for impacts to the Southern Myotis (*Myotis macropus*)

  Eastern Transmission Line Option
  - 409 Ecosystem Credits for impacts to White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (PCT266) and Yellow Box grassy woodland on lower hillslopes and valley flats in the Southern NSW Brigalow Belt South Bioregion for
  - 6 species credits for impacts to the Southern Myotis (*Myotis macropus*)

The retirement of these credits will be carried out in accordance with the NSW Biodiversity Offsets scheme, and will be achieved by either:

a) Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules, or
b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or
c) Funding a biodiversity action that benefits the threaten entity(ies) impacted by the development.

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APPENDIX A PERSONNEL

Personnel involved in the report are:

Name	Title	Qualifications	Roles
Dave Maynard	Principal Ecologist	• BAM Accredited Assessor • B Science (Ecology, First Class Honours)	Direction in BAM assessment and BDAR. Approval of BDAR
Brooke Marshall	Manager Projects	• BAM Assessor Training – Accreditation in progress • B. Nat Res. (Hons)	Assistance in review QA Approval
Julie Gooding	Environmental Consultant - Ecologist	• BAM Assessor Training – Accreditation in progress • B. Science (Biology)	Field Work including PCT identification, vegetation mapping, vegetation integrity plots and threatened flora surveys. Writing of BDAR
Lisa Hamilton	Environmental Consultant - Ecologist	• B. Environmental Science and Management	Field Work including vegetation integrity plots, threatened flora surveys and targeted fauna surveys.
Damian Lettoof	Wildlife Ecologist	• M Science in Wildlife health and population management • 8 years field survey experience in terrestrial fauna	Targeted Fauna surveys
Shane Priddle	Principal Consultant	• Certified Environmental Practitioner	GIS Mapping

APPENDIX B PADDOCK TREES

Paddock Trees within the development site.

ID	Latitude	Longitude	Species	Common Name	Associated PCT	DBH (cm)	DBH above benchmark (50cm)	Hollows Present	Paddock Tree Class	Impacted by proposal
1	148.9692	-32.523005	*B. populneus*	Kurrajong	437	45	No	No	2	No
2	148.9691	-32.522871	*M. azedarach*	White Cedar	266	30	No	No	2	No
2	148.9703	-32.520805	*B. populneus*	Kurrajong	437	60	Yes	No	3	Yes (transmission line eastern option)
3	148.9704	-32.52079	*Acacia sp.*	Acacia sp	437	10	No	No	1	No
4	148.9666	-32.492456	*E. albens*	White Box	266	23	No	No	2	Yes
5	148.9736	-32.489702	*Unknown*	Stag		61	Yes	No	3	Yes
6	148.9734	-32.489406	*E. albens*	White Box	266	90	Yes	Yes	3	Yes
7	148.9493	-32.487949	*B. populneus*	Kurrajong	437	48	No	No	2	Yes
8	148.9493	-32.488051	*B. populneus*	Kurrajong	437	65	Yes	No	3	Yes
9	148.9518	-32.494593	*E. melliodora*	Yellow Box	437	80	Yes	No	3	No
10	148.949	-32.500516	*E. melliodora*	Yellow Box	437	80	Yes	No	3	Yes
11	148.9549	-32.498483	*E. microcarpa*	Grey Box	266	69	Yes	No	3	No
12	148.9727	-32.497884	*B. populneus*	Kurrajong	437	45	No	No	2	Yes
13	148.9728	-32.497923	*B. populneus*	Kurrajong	437	30	No	No	2	Yes
14	148.9751	-32.497101	*B. populneus*	Kurrajong	437	65	Yes	No	3	No
15	148.9723	-32.499425	*E. melliodora*	Yellow Box	437	60	Yes	No	3	Yes
16	148.9723	-32.499389	*E. melliodora*	Yellow Box	437	60	Yes	No	3	Yes
17	148.974	-32.498892	*E. sideroxylon*	Mugga Ironbark	437	60	Yes	No	3	Yes
18	148.9753	-32.500286	*B. populneus*	Kurrajong	437	21	No	No	2	Yes
19	148.9752	-32.500353	*B. populneus*	Kurrajong	437	15	No	No	1	Yes
20	148.9765	-32.498049	*E. sideroxylon*	Mugga Ironbark	437	53	Yes	No	3	Yes
21	148.9339	-32.513114	*B. populneus*	Kurrajong	437	22	No	No	2	No
22	148.934	-32.512807	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No

ID	Latitude	Longitude	Species	Common Name	Associated PCT	DBH (cm)	DBH above benchmark (50cm)	Hollows Present	Paddock Tree Class	Impacted by proposal
23	148.934	-32.512916	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
24	148.934	-32.512651	*E. melliodora*	Yellow Box	437	80	Yes	Yes	3	No
25	148.9745	-32.510414	*E. sideroxylon*	Mugga Ironbark	437	70	Yes	No	3	No
26	148.9745	-32.510658	*E. sideroxylon*	Mugga Ironbark	437	60	Yes	No	3	No
27	148.9743	-32.511132	*E. sideroxylon*	Mugga Ironbark	437	60	Yes	No	3	No
28	148.936	-32.509106	*E. melliodora*	Yellow Box	437	1	Yes	No	3	No
29	148.9362	-32.509073	*E. melliodora*	Yellow Box	437	1	Yes	Yes	3	No
30	148.9569	-32.498139	*E. microcarpa*	Grey Box	266	55	Yes	No	2	No
31	148.9571	-32.49819	*E. microcarpa*	Grey Box	266	55	Yes	No	2	No
32	148.9574	-32.497855	*E. microcarpa*	Grey Box	266	55	Yes	No	2	No
33	148.9405	-32.508446	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
34	148.9403	-32.509372	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
35	148.9496	-32.500562	*E. melliodora*	Yellow Box	437	80	Yes	No	2	Yes
36	148.97	-32.490687	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
37	148.9773	-32.490693	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
38	148.9789	-32.482562	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
39	148.9794	-32.483616	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
40	148.9795	-32.482749	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No

ID	Latitude	Longitude	Species	Common Name	Associated PCT	DBH (cm)	DBH above benchmark (50cm)	Hollows Present	Paddock Tree Class	Impacted by proposal
41	148.9795	-32.483029	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
42	148.9788	-32.482122	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
43	148.9796	-32.482109	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
44	148.9797	-32.481874	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
45	148.9585	-32.48599	*B. populneus*	Kurrajong	437	45	No	No	2	No
46	148.958	-32.486055	*B. populneus*	Kurrajong	437	45	No	No	2	No
47	148.9578	-32.486299	*B. populneus*	Kurrajong	437	45	No	No	2	Yes
48	148.9746	-32.49007	*E. albens*	White Box	266	70	Yes	Yes	3	Yes
49	148.9575	-32.49286	*Unknown*	Stag	-	60	Yes	Yes	3	Yes
50	148.9575	-32.495201	*Unknown*	Stag	-	0	No	No	1	Yes
51	148.9649	-32.503864	*Unknown*	Stag	-	80	Yes	Yes	3	Yes
52	148.9593	-32.486513	*E. melliodora*	Yellow Box	437	200	Yes	Yes	3	Yes
53	148.9514	-32.493221	*E. melliodora*	Yellow Box	437	110	Yes	Yes	3	Yes
54	148.9592	-32.492246	*E. albens*	White Box	266	40	No	No	2	Yes
55	148.9469	-32.498484	*C. glaucophylla*	White Cypress	266	57	Yes	No	3	Yes
56	148.9415	-32.509157	*C. glaucophylla*	White Cypress	266	65	Yes	No	3	Yes
57	148.9396	-32.494238	*C. glaucophylla*	White Cypress	266	52	Yes	No	3	Yes
58	148.9434	-32.494228	*C. cunninghamiana*	River Sheoak	437	100	Yes	No	3	Yes
59	148.9728	-32.497909	*B. populneus*	Kurrajong	437	55	Yes	No	3	Yes
60	148.9664	-32.491972	*E. sideroxylon*	Mugga Ironbark	266	56	Yes	No	3	Yes
61	148.9722	-32.487966	*B. populneus*	Kurrajong	437	70	Yes	No	3	Yes
62	148.9787	-32.485151	*B. populneus*	Kurrajong	437	0	No	No	2	Yes

ID	Latitude	Longitude	Species	Common Name	Associated PCT	DBH (cm)	DBH above benchmark (50cm)	Hollows Present	Paddock Tree Class	Impacted by proposal
63	148.971	-32.493959	*B. populneus*	Kurrajong	437	85	Yes	No	3	Yes
64	148.9493	-32.488007	*B. populneus*	Kurrajong	437	43	No	No	2	Yes
65	148.9764	-32.497592	*E. melliodora*	Yellow Box	437	70	Yes	No	3	Yes
66	148.9766	-32.497893	*E. sideroxylon*	Mugga Ironbark	437	60	Yes	No	3	Yes
67	148.9659	-32.496033	*B. populneus*	Kurrajong	437	60	Yes	No	3	Yes
68	148.9654	-32.500809	*B. populneus*	Kurrajong	437	60	Yes	No	3	Yes
69	148.9714	-32.499801	*E. albens*	White Box	266	80	Yes	No	3	Yes
70	148.9722	-32.499501	*E. sideroxylon*	Mugga Ironbark	437	70	Yes	No	3	Yes
71	148.9752	-32.498939	*C. endlicheri*	Black Cypress	437	53	Yes	No	3	Yes
72	148.9739	-32.498981	*B. populneus*	Kurrajong	437	47	No	No	2	Yes
73	148.9616	-32.494956	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
74	148.962	-32.494981	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
75	148.9625	-32.495668	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
76	148.9634	-32.495755	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	No
77	148.9627	-32.495165	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
78	148.9631	-32.49594	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
79	148.9444	-32.499761	*E. melliodora*	Yellow Box	437	110	Yes	Yes	3	Yes
80	148.9435	-32.500851	*B. populneus*	Kurrajong	437	45	No	No	2	No
81	148.942	-32.501677	*B. populneus*	Kurrajong	437	45	No	No	2	No
82	148.9529	-32.493451	*E. melliodora*	Yellow Box	437	55	Yes	No	3	Yes

ID	Latitude	Longitude	Species	Common Name	Associated PCT	DBH (cm)	DBH above benchmark (50cm)	Hollows Present	Paddock Tree Class	Impacted by proposal
83	148.9522	-32.492948	*C. cunninghamiana*	River Sheoak	437	55	Yes	No	3	No
84	148.9571	-32.485306	*E. melliodora*	Yellow Box	437	70	Yes	Yes	3	No
85	148.953	-32.485241	*E. melliodora*	Yellow Box	437	70	Yes	Yes	3	Yes
86	148.9525	-32.485392	*E. blakelyi*	Blakely's Red Gum	437	65	Yes	Yes	3	Yes
87	148.9596	-32.485418	*E. melliodora*	Yellow Box	437	75	Yes	Yes	3	No
88	148.9693	-32.496289	Unknown	Stag	-	0	No	No	1	Yes
89	148.957	-32.50278	**S. molle* var. *areira*	Pepper Tree	Exotic	0	No	No	1	Yes
90	148.961	-32.501832	*E. albens*	White Box	266	65	Yes	No	3	Yes

APPENDIX C FAUNA SPECIES RECORDED

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Amphibia	*Crinia parinsignifera*	Beeping Froglet	20/10/2017 11:19	2	-32.4844	148.938034	357	5	
Amphibia	*Crinia signifera*	Clicking Froglet	11/12/2017 21:45	2	-32.4894	148.953476	334	5	
Amphibia	*Crinia signifera*	Clicking Froglet	19/10/2017 20:51	5	-32.4896	148.952759	334	5	
Amphibia	*Crinia signifera*	Clicking Froglet	18/10/2017 22:18	2	-32.4896	148.953201	340	10	
Amphibia	*Limnodynastes dumerilii*	Eastern Pobblebonk	12/12/2017 21:09		-32.497	148.947708	322	5	
Amphibia	*Limnodynastes dumerilii*	Eastern Pobblebonk	11/12/2017 21:44	2	-32.4894	148.953476	333	5	
Amphibia	*Limnodynastes dumerilii*	Eastern Pobblebonk	11/12/2017 20:48	3	-32.5051	148.938065	310	5	
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	12/12/2017 21:07		-32.497	148.94902	326	5	
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	12/12/2017 20:43		-32.5044	148.939316	314	5	
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	11/12/2017 21:41	3	-32.4896	148.952957	332	5	
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	11/12/2017 21:15	2	-32.5052	148.93898	308	5	
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	19/10/2017 20:51	2	-32.4896	148.952789	337	10	
Amphibia	*Limnodynastes tasmaniensis*	Spotted Marsh Frog	18/10/2017 22:18	2	-32.4897	148.952621	338	5	
Amphibia	*Litoria caerulea*	Green Tree Frog	11/12/2017 21:09	2	-32.5052	148.938675	313	5	
Amphibia	*Litoria peronii*	Emerald-spotted Tree Frog	20/10/2017 9:38	1	-32.4859	148.970627	369	5	
Amphibia	*Uperoleia laevigata*	Smooth Gungan	19/10/2017 7:25	2	-32.4896	148.952972	338	5	
Aves	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	19/10/2017 10:40	3	-32.4966	148.958984	345	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	19/10/2017 9:24	2	-32.494	148.941605	341	5	
Aves	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	19/10/2017 7:51	7	-32.4972	148.947632	322	5	
Aves	*Anas superciliosa*	Pacific Black Duck	19/10/2017 7:49	3	-32.4965	148.949341	329	5	
Aves	*Anthochaera carunculata*	Red Wattlebird	18/10/2017 16:43	1	-32.5061	148.971115	391	5	
Aves	*Anthus novaeseelandiae*	Australasian Pipit	20/10/2017 8:42	1	-32.4928	148.960907	356	5	
Aves	*Cacatua galerita*	Sulphur-crested Cockatoo	19/10/2017 7:19	1	-32.4896	148.95256	339	5	
Aves	*Cacatua galerita*	Sulphur-crested Cockatoo	19/10/2017 7:09	2	-32.4937	148.962082	361	5	
Aves	*Cacatua sanguinea*	Little Corella	19/10/2017 8:01	2	-32.5076	148.939728	313	5	
Aves	*Cacatua sanguinea*	Little Corella	19/10/2017 6:59	2	-32.4951	148.972992	409	5	
Aves	*Chenonetta jubata*	Australian Wood Duck	18/10/2017 16:30	10	-32.5	148.971603	356	5	
Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	19/10/2017 9:11	2	-32.4998	148.944366	322	5	
Aves	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	19/10/2017 6:37	2	-32.4952	148.972672	403	5	
Aves	*Corcorax melanorhamphos*	White-winged Chough	19/10/2017 7:41	10	-32.4896	148.95314	334	5	
Aves	*Corcorax melanorhamphos*	White-winged Chough	18/10/2017 16:42	4	-32.5061	148.97113	378	5	
Aves	*Corcorax melanorhamphos*	White-winged Chough	18/10/2017 16:25	5	-32.5004	148.970535	373	5	
Aves	*Corvus coronoides*	Australian Raven	19/10/2017 7:48	2	-32.4896	148.953094	334	5	
Aves	*Corvus tasmanicus*	Forest Raven	19/10/2017 6:38	2	-32.4951	148.972534	402	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Coturnix ypsilophora*	Brown Quail	20/10/2017 11:35	1	-32.4844	148.938141	357	5	
Aves	*Cracticus nigrogularis*	Pied Butcherbird	20/10/2017 9:11	1	-32.4847	148.97052	370	5	
Aves	*Cracticus nigrogularis*	Pied Butcherbird	19/10/2017 15:23	1	-32.4924	148.952713	337	5	
Aves	*Cracticus nigrogularis*	Pied Butcherbird	19/10/2017 8:15		-32.5075	148.939148	317	5	
Aves	*Cracticus nigrogularis*	Pied Butcherbird	19/10/2017 8:01	1	-32.5076	148.939758	312	5	
Aves	*Cracticus nigrogularis*	Pied Butcherbird	19/10/2017 6:37	1	-32.4952	148.972656	402	5	
Aves	*Cracticus nigrogularis*	Pied Butcherbird	18/10/2017 17:58	1	-32.523	148.947357	341	5	
Aves	*Cracticus tibicen*	Australian Magpie	19/10/2017 7:23	1	-32.4895	148.952881	337	5	
Aves	*Cracticus tibicen*	Australian Magpie	18/10/2017 18:21	2	-32.5195	148.945358	323	5	
Aves	*Cracticus torquatus*	Grey Butcherbird	20/10/2017 9:12	1	-32.4848	148.970688	369	5	
Aves	*Cracticus torquatus*	Grey Butcherbird	19/10/2017 7:23	1	-32.4895	148.952881	337	5	
Aves	*Cracticus torquatus*	Grey Butcherbird	19/10/2017 6:47	1	-32.4953	148.972626	399	5	
Aves	*Dacelo novaeguineae*	Laughing Kookaburra	20/10/2017 9:17	1	-32.4848	148.970703	367	10	
Aves	*Dacelo novaeguineae*	Laughing Kookaburra	19/10/2017 8:18	1	-32.5074	148.938812	319	5	
Aves	*Elanus axillaris*	Black-shouldered Kite	20/10/2017 10:54	1	-32.4917	148.973068	375	5	
Aves	*Elanus axillaris*	Black-shouldered Kite	18/10/2017 17:05	1	-32.4985	148.977905	383	5	
Aves	*Entomyzon cyanotis*	Blue-faced Honeyeater	20/10/2017 9:26	2	-32.4852	148.969269	367	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Entomyzon cyanotis*	Blue-faced Honeyeater	18/10/2017 16:40	2	-32.5072	148.97374	355	10	
Aves	*Entomyzon cyanotis*	Blue-faced Honeyeater	18/10/2017 16:25		-32.5004	148.970535	371	10	
Aves	*Entomyzon cyanotis*	Blue-faced Honeyeater	18/10/2017 16:06	1	-32.5064	148.966873	401	5	
Aves	*Eolophus roseicapillus*	Galah	20/10/2017 9:11	2	-32.4846	148.970596	374	10	
Aves	*Eolophus roseicapillus*	Galah	19/10/2017 15:04	6	-32.4868	148.959244	350	5	
Aves	*Eolophus roseicapillus*	Galah	19/10/2017 8:00	3	-32.5076	148.939774	312	5	
Aves	*Eolophus roseicapillus*	Galah	19/10/2017 7:19	3	-32.4896	148.95256	338	5	
Aves	*Eolophus roseicapillus*	Galah	19/10/2017 6:50	2	-32.4948	148.972809	403	5	
Aves	*Eolophus roseicapillus*	Galah	18/10/2017 17:57	1	-32.5231	148.947433	341	5	
Aves	*Eolophus roseicapillus*	Galah	18/10/2017 15:34	6	-32.5055	148.964813	377	5	
Aves	*Falco berigora*	Brown Falcon	19/10/2017 8:52	1	-32.5046	148.939819	312	5	
Aves	*Falco cenchroides*	Nankeen Kestrel	20/10/2017 10:15	2	-32.4902	148.97551	391	5	
Aves	*Falco cenchroides*	Nankeen Kestrel	19/10/2017 10:39	1	-32.4966	148.958954	343	5	
Aves	*Glossopsitta concinna*	Musk Lorikeet	20/10/2017 9:16	2	-32.4849	148.970703	364	10	
Aves	*Grallina cyanoleuca*	Magpie-lark	20/10/2017 9:11	1	-32.4847	148.97052	362	10	
Aves	*Grallina cyanoleuca*	Magpie-lark	19/10/2017 7:23	2	-32.4895	148.952881	337	5	
Aves	*Grallina cyanoleuca*	Magpie-lark	19/10/2017 6:36	2	-32.4953	148.972687	394	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Grallina cyanoleuca*	Magpie-lark	18/10/2017 15:48	2	-32.5027	148.964432	370	5	
Aves	*Hirundo neoxena*	Welcome Swallow	19/10/2017 15:04	2	-32.4868	148.959244	349	5	
Aves	*Hirundo neoxena*	Welcome Swallow	19/10/2017 7:10	1	-32.4937	148.962082	361	5	
Aves	*Lichenostomus chrysops*	Yellow-faced Honeyeater	19/10/2017 10:39	2	-32.4966	148.958984	344	5	
Aves	*Lichenostomus penicillatus*	White-plumed Honeyeater	20/10/2017 9:39	2	-32.4861	148.970612	389	10	
Aves	*Lichenostomus penicillatus*	White-plumed Honeyeater	18/10/2017 16:34	1	-32.5017	148.9758	381	5	
Aves	*Malurus cyaneus*	Superb Fairy-wren	19/10/2017 15:13	4	-32.492	148.95256	330	5	
Aves	*Malurus cyaneus*	Superb Fairy-wren	19/10/2017 7:11	3	-32.4927	148.96109	358	5	
Aves	*Malurus cyaneus*	Superb Fairy-wren	18/10/2017 15:05	4	-32.5066	148.971375	394	5	
Aves	*Manorina flavigula*	Yellow-throated Miner	18/10/2017 16:43	3	-32.5061	148.971054	391	5	
Aves	*Manorina flavigula*	Yellow-throated Miner	18/10/2017 15:37	3	-32.5047	148.965118	379	10	
Aves	*Manorina melanocephala*	Noisy Miner	20/10/2017 9:19	2	-32.4848	148.970673	370	5	
Aves	*Manorina melanocephala*	Noisy Miner	19/10/2017 8:11	5	-32.5077	148.939728	313	5	
Aves	*Manorina melanocephala*	Noisy Miner	19/10/2017 6:41	1	-32.4952	148.972565	399	5	
Aves	*Manorina melanocephala*	Noisy Miner	18/10/2017 18:35	2	-32.5202	148.945358	330	5	
Aves	*Manorina melanocephala*	Noisy Miner	18/10/2017 17:54	2	-32.5242	148.948547	343	5	
Aves	*Ninox novaeseelandiae*	Southern Boobook	18/10/2017 21:47	1	-32.5092	148.947449	337	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Northiella haematogaster*	Blue Bonnet	19/10/2017 18:08	2	-32.4954	148.967758	370	10	
Aves	*Northiella haematogaster*	Blue Bonnet	18/10/2017 15:59	3	-32.5051	148.964981	378	5	
Aves	*Ocyphaps lophotes*	Crested Pigeon	20/10/2017 9:40	2	-32.4866	148.970459	361	10	
Aves	*Ocyphaps lophotes*	Crested Pigeon	19/10/2017 6:45	1	-32.4953	148.97261	379	5	
Aves	*Ocyphaps lophotes*	Crested Pigeon	18/10/2017 18:16	1	-32.5204	148.945404	326	5	
Aves	*Ocyphaps lophotes*	Crested Pigeon	18/10/2017 15:52	5	-32.5027	148.965485	381	5	
Aves	*Ocyphaps lophotes*	Crested Pigeon	18/10/2017 15:14	2	-32.5041	148.968018	386	5	
Aves	*Pachycephala rufiventris*	Rufous Whistler	19/10/2017 10:54	1	-32.493	148.959274	351	5	
Aves	*Pachycephala rufiventris*	Rufous Whistler	19/10/2017 10:40	1	-32.4966	148.958984	344	5	
Aves	*Pardalotus punctatus*	Spotted Pardalote	19/10/2017 8:01	2	-32.5076	148.939774	311	5	
Aves	*Pardalotus striatus*	Striated Pardalote	20/10/2017 9:12	1	-32.4847	148.97052	375	5	
Aves	*Pardalotus striatus*	Striated Pardalote	19/10/2017 16:27	1	-32.5021	148.940155	314	333.101959	
Aves	*Pardalotus striatus*	Striated Pardalote	19/10/2017 10:43	1	-32.4967	148.959106	346	5	
Aves	*Pardalotus striatus*	Striated Pardalote	19/10/2017 9:30	1	-32.4931	148.93985	350	5	
Aves	*Pardalotus striatus*	Striated Pardalote	19/10/2017 8:14	3	-32.5075	148.939224	318	5	
Aves	*Passer domesticus*	House Sparrow	19/10/2017 7:10	3	-32.4937	148.962082	360	5	
Aves	*Petrochelidon nigricans*	Tree Martin	19/10/2017 8:14	2	-32.5075	148.939224	318	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Platycercus eximius*	Eastern Rosella	20/10/2017 9:36	2	-32.4862	148.969971	382	10	
Aves	*Platycercus eximius*	Eastern Rosella	19/10/2017 17:26	2	-32.4919	148.938278	349	5	
Aves	*Platycercus eximius*	Eastern Rosella	19/10/2017 8:15	2	-32.5075	148.939148	317	5	
Aves	*Platycercus eximius*	Eastern Rosella	19/10/2017 6:50	3	-32.4948	148.972855	400	5	
Aves	*Platycercus eximius*	Eastern Rosella	18/10/2017 18:29	1	-32.5194	148.945602	330	5	
Aves	*Platycercus eximius*	Eastern Rosella	18/10/2017 17:57	1	-32.523	148.947464	340	5	
Aves	*Platycercus eximius*	Eastern Rosella	18/10/2017 16:35	2	-32.5018	148.975708	380	5	
Aves	*Platycercus eximius*	Eastern Rosella	18/10/2017 15:48	2	-32.5026	148.964432	371	5	
Aves	*Plectorhyncha lanceolata*	Striped Honeyeater	18/10/2017 16:46	2	-32.5068	148.971146	393	5	
Aves	*Podargus strigoides*	Tawny Frogmouth	19/10/2017 22:07	1	-32.4955	148.971039	381	5	
Aves	*Podargus strigoides*	Tawny Frogmouth	18/10/2017 22:51	1	-32.4853	148.960159	348	5	
Aves	*Podargus strigoides*	Tawny Frogmouth	18/10/2017 22:39	1	-32.5068	148.970398	395	5	
Aves	*Podargus strigoides*	Tawny Frogmouth	18/10/2017 22:32	1	-32.4963	148.970413	375	5	
Aves	*Psephotus haematonotus*	Red-rumped Parrot	20/10/2017 9:11	1	-32.4847	148.97052	375	5	
Aves	*Psephotus haematonotus*	Red-rumped Parrot	19/10/2017 7:26	1	-32.4897	148.953293	337	5	
Aves	*Psephotus haematonotus*	Red-rumped Parrot	19/10/2017 6:35	4	-32.4953	148.972702	397	5	
Aves	*Psephotus haematonotus*	Red-rumped Parrot	18/10/2017 18:33	1	-32.5187	148.945847	322	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Psephotus haematonotus*	Red-rumped Parrot	18/10/2017 15:49	4	-32.5026	148.964478	372	5	
Aves	*Rhipidura leucophrys*	Willie Wagtail	19/10/2017 8:19	2	-32.5074	148.938736	319	5	
Aves	*Rhipidura leucophrys*	Willie Wagtail	19/10/2017 7:19	2	-32.4896	148.952591	339	5	
Aves	*Rhipidura leucophrys*	Willie Wagtail	19/10/2017 6:41	1	-32.4952	148.97261	400	5	
Aves	*Rhipidura leucophrys*	Willie Wagtail	18/10/2017 15:49	1	-32.5026	148.964478	372	5	
Aves	*Strepera graculina*	Pied Currawong	20/10/2017 9:35	1	-32.4861	148.969864	372	5	
Aves	*Struthidea cinerea*	Apostlebird	20/10/2017 9:13	7	-32.4848	148.970749	368	5	
Aves	*Struthidea cinerea*	Apostlebird	19/10/2017 7:18	12	-32.4896	148.952545	338	10	
Aves	*Struthidea cinerea*	Apostlebird	18/10/2017 16:50	9	-32.5064	148.970047	400	5	
Aves	*Sturnus vulgaris*	Common Starling	20/10/2017 9:11	2	-32.4847	148.97052	374	5	
Aves	*Sturnus vulgaris*	Common Starling	19/10/2017 15:04	2	-32.4868	148.959167	342	10	
Aves	*Sturnus vulgaris*	Common Starling	19/10/2017 8:00	5	-32.5076	148.939804	312	5	
Aves	*Sturnus vulgaris*	Common Starling	19/10/2017 7:22	5	-32.4897	148.952652	337	5	
Aves	*Sturnus vulgaris*	Common Starling	19/10/2017 6:50	2	-32.4948	148.972855	402	5	
Aves	*Sturnus vulgaris*	Common Starling	18/10/2017 18:16	1	-32.5204	148.945404	327	5	
Aves	*Sturnus vulgaris*	Common Starling	18/10/2017 16:35	7	-32.5018	148.975708	382	5	
Aves	*Sturnus vulgaris*	Common Starling	18/10/2017 15:48	3	-32.5027	148.964401	369	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Aves	*Taeniopygia bichenovii*	Double-barred Finch	20/10/2017 8:40	3	-32.4925	148.959412	349	5	
Aves	*Vanellus miles*	Masked Lapwing	20/10/2017 9:32	2	-32.4851	148.968323	376	5	
Mammalia	*Felis catus*	Cat	19/10/2017 20:36	1	-32.4954	148.975372	394	5	
Mammalia	*Felis catus*	Cat	18/10/2017 22:43	1	-32.5072	148.972717	380	5	
Mammalia	*Lagorchestes asomatus*	Central Hare-wallaby	19/10/2017 9:30	1	-32.493	148.939865	351	5	
Mammalia	*Lepus capensis*	Brown Hare	18/10/2017 16:33	1	-32.5015	148.975082	379	5	
Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo	19/10/2017 8:20	3	-32.5074	148.938751	319	5	
Mammalia	*Macropus giganteus*	Eastern Grey Kangaroo	18/10/2017 16:33	1	-32.5015	148.975037	378	5	
Mammalia	*Macropus robustus*	Common Wallaroo	19/10/2017 7:01	1	-32.495	148.973022	407	5	
Mammalia	*Macropus robustus*	Common Wallaroo	18/10/2017 18:56	1	-32.4954	148.97258	401	10	
Mammalia	*Macropus robustus*	Common Wallaroo	18/10/2017 17:48	1	-32.5233	148.94722	340	5	
Mammalia	*Macropus robustus*	Common Wallaroo	18/10/2017 15:17	3	-32.5059	148.964828	375	5	
Mammalia	*Macropus robustus*	Common Wallaroo	18/10/2017 15:11	1	-32.5066	148.968338	398	5	
Mammalia	*+Myotis macropus*	Southern Myotis	12/12/17	2 records					ANABAT recording
Mammalia	*+Miniopterus schreibersii oceanensis*	Eastern Bent-wing Bat	12/12/17	13 records					ANABAT recording
Mammalia	*Oryctolagus cuniculus*	Rabbit	18/10/2017 18:55	11	-32.4953	148.976013	389	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Mammalia	+*Pteropus poliocephalus*	Grey-headed Flying-fox	12/12/2017 21:05	3	-32.4969	148.949722	325	5	Feeding in flowering gum
Mammalia	+*Pteropus poliocephalus*	Grey-headed Flying-fox	12/12/2017 20:50	1	-32.5055	148.937042	295	5	
Mammalia	+*Pteropus poliocephalus*	Grey-headed Flying-fox	11/12/2017 20:45	1	-32.505	148.938293	310	5	
Mammalia	+*Pteropus poliocephalus*	Grey-headed Flying-fox	11/12/2017 20:40	1	-32.5029	148.94014	317	5	
Mammalia	*Trichosurus vulpecula*	Common Brushtail Possum	19/10/2017 22:20	1	-32.4961	148.9729	380	5	
Mammalia	*Trichosurus vulpecula*	Common Brushtail Possum	18/10/2017 22:33	1	-32.4962	148.970474	373	5	
Mammalia	*Vulpes vulpes*	Fox	18/10/2017 22:03	2	-32.4969	148.947647	321	5	
Mammalia	*Vulpes vulpes*	Fox	18/10/2017 21:10	1	-32.4954	148.966217	347	1655.3347 2	
Mammalia	*Vulpes vulpes*	Fox	18/10/2017 20:58	1	-32.4942	148.959091	353	5	
Reptilia	*Anilios proximus*	Proximus Blind Snake	19/10/2017 10:41	1	-32.4966	148.959076	343	10	
Reptilia	*Anilios proximus*	Proximus Blind Snake	19/10/2017 9:54	1	-32.4916	148.938492	352	5	
Reptilia	*Austrelaps superbus*	Lowlands Copperhead	19/10/2017 6:41	3	-32.4952	148.97261	399	5	
Reptilia	*Carlia tetradactyla*	Southern Rainbow-skink	19/10/2017 11:13	1	-32.5039	148.966339	382	5	
Reptilia	*Carlia tetradactyla*	Southern Rainbow-skink	18/10/2017 18:16	2	-32.5204	148.945389	328	10	
Reptilia	*Cryptoblepharus australis*	Inland Snake-eyed Skink	19/10/2017 17:10	1	-32.4926	148.937881	340	5	
Reptilia	*Cryptoblepharus australis*	Inland Snake-eyed Skink	19/10/2017 16:38	1	-32.5019	148.938019	312	5	
Reptilia	*Cryptoblepharus australis*	Inland Snake-eyed Skink	19/10/2017 16:26	1	-32.5022	148.940369	289	5	

Family	Scientific Name	Common Name	Date and Time	Quantity	Latitude	Longitude	Altitude (m)	Accuracy (m)	Comment
Reptilia	*Cryptoblepharus australis*	Inland Snake-eyed Skink	19/10/2017 15:22	1	-32.4924	148.952682	340	10	
Reptilia	*Ctenotus robustus*	Eastern Striped Skink	20/10/2017 12:26	1	-32.491	148.939331	337	5	
Reptilia	*Ctenotus robustus*	Eastern Striped Skink	20/10/2017 12:10	1	-32.49	148.938644	349	5	
Reptilia	*Ctenotus robustus*	Eastern Striped Skink	20/10/2017 12:07	1	-32.4899	148.938629	348	5	
Reptilia	*Ctenotus robustus*	Eastern Striped Skink	19/10/2017 10:04	1	-32.4916	148.938522	357	5	
Reptilia	*Morethia boulengeri*	South-eastern Morethia Skink	19/10/2017 9:42	1	-32.4927	148.938858	354	5	
Reptilia	*Morethia boulengeri*	South-eastern Morethia Skink	19/10/2017 8:37	2	-32.5074	148.938751	318	5	
Reptilia	*Pseudonaja textilis*	Eastern Brown Snake	12/12/2017 19:04	1	-32.4834	148.973801	367	5	
Reptilia	*Pseudonaja textilis*	Eastern Brown Snake	18/10/2017 18:01	1	-32.5231	148.94754	345	5	

+ denotes threatened species

APPENDIX D FLORISTIC PLOT FIELD DATA

Results of Field data

C – Cover (% cover in 20m * 20m quadrat)

A – Abundance (approximate # plants)

*exotic species

Δ – High Threat Exotic (defined by OEH)

Plot locations are shown on Figure 3-4

Table 11-1 Flora Species list - Plot 1 -13

	Scientific Name	Common Name	Plot 1 (Zone 7)		Plot 2 (Zone 8)		Plot 3 (Zone 5)		Plot 4 (Zone 4)		Plot 5 (Zone 11)		Plot 6 (Zone 10)		Plot 7 (Zone 2)		Plot 8 (Zone 2)		Plot 9 (Zone 1)		Plot 10 (Zone 2)		Plot 11 (Zone 4)		Plot 12 (Zone 3)		Plot 13 (Zone 11)	
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
TREES																												
	Acacia dealbata	Silver Wattle																							8	15		
	Acacia linearifolia	Narrow-leaved Wattle																										
	Acacia melanoxylon	Blackwood																							2	1		
	Acacia pendula	Weeping Myall, Boree																							2	2		
	Acacia pycnantha	Golden Wattle																										
	Acacia salicina	Cooba					2	2																				
	Brachychiton populneus	Kurrajong																							1	1		
	Callitris glaucophylla	White Cypress																										
	Callitris endlicheri	Black Cypress																										
	Casuarina cunninghamiana	River Oak																										
*	*Corymbia citriodora*	Lemon Scented Gum																										
	Eucalyptus albens	White Box	5	1															10	2					10	5		
	Eucalyptus camaldulensis	River Red Gum																										
	Eucalyptus cinerea	Argyle Apple																										
*	*Eucalyptus cladocalyx*	Sugar Gum																										
	Eucalyptus cypellocarpa	Monkey Grey Gum																										
	Eucalyptus maculata	Spotted Gum																										
	Eucalyptus melliodora	Yellow Box					2	1	5	2													15	1	5	2		
	Eucalyptus microcarpa	Western Grey Box																							10	3		
	Eucalyptus sideroxylon	Mugga Ironbark											10	4														
	Eucalyptus goniocalyx	Long Leaved Box											15	3														
	Eucalyptus sp 2	Planted Eucalyptus											10	4														
	Eucalyptus sp 3	Planted Eucalyptus																										
	Grevillea robusta	Silky Oak																										
	Melia azedarach	White Cedar																										
*	*Pinus sp.*	Pine Tree											3	1														
SHRUBS																												
	Acacia baileyana	Cootamundra Wattle																										
	Acacia cardiophylla	Wyalong Wattle																							3	2		
	Acacia cultriformis	Cut-leaf Wattle																										
	Acacia decora	Western Silver Wattle																							5	5		
	Acacia havilandii	Needle Wattle																										
	Acacia implexa	Hickory Wattle																							3	3		
	Acacia iteaphylla	Willow-leafed wattle																										
	Acacia uncinata	Gold-dust Wattle																										
	Callistemon sieberi	River Bottlebrush																										
	Dissocarpus biflorus								0.5	50																		
	Exocarpos cupressiformis	Cherry Ballart																										

	Scientific Name	Common Name	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Plot 13	
			(Zone 7)		(Zone 8)		(Zone 5)		(Zone 4)		(Zone 11)		(Zone 10)		(Zone 2)		(Zone 2)		(Zone 1)		(Zone 2)		(Zone 4)		(Zone 3)		(Zone 11)	
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
* Δ	*Lycium ferocissimum*	African Boxthorn							2	10																		
	Acacia cultriformis	Knife-leaf wattle																										
	Acacia leucoclada	Northern Silver Wattle																										
	Melaleuca linariifolia	Flax leaved Paperbark																										
	Melaleuca nodosa	Black Tea Tree																										
	Melaleuca styphelioides	Prickly Tea Tree																										
*	*Schinus molle*	Pepper Tree																										
*	*Senna* (*occidentalis?*)	Coffee Senna			0.1	10																						
FORBS																												
* Δ	*Alternanthera pungens*	Khaki Weed	0.1	30					0.1	5							0.1	50			0.4	50	0.1	50				
*	*Amaranthus* sp.	Amaranth																										
*	*Arctotheca calendula*	Capeweed					0.1	1																				
*	*Argemone ochroleuca*	Mexican Poppy																									0.1	50
*	*Asphodelus fistulosus*	Onion Weed																										
*	*Astragalus hamosus*	Yellow Milk-vetch	0.1	2	0.1	30					0.1	5																
	Atriplex semibaccata	Creeping Saltbush							3	100			0.1	2														
	Boerhavia dominii	Tarvine													0.1	3	0.1	5			0.1	5	0.1	1	0.1	3	5	500
*	*Brassica tournefortii*	Mediterranean Turnip					0.1	10	0.1	5	0.3	50																
	Calotis lappulacea	Yellow Burr-daisy							0.1	2																		
* Δ	*Carthamus lanatus*	Saffron Thistle	0.1	1	10	1000			0.2	5	0.2	50			2	20	5	200			0.5	20						
*	*Centaurea solstitialis*	St Barnabys Thistle	10	300	2	1000	3	200	0.2	50	0.2	20			2	50	4	100	4	100	1	100	0.2	30	0.1	10		
	Chenopodium melanocarpum	Black Crumbweed																					0.1	1				
*	*Cirsium vulgare*	Spear Thistle																										
*	*Citrullus lanatus*	Camel Melon																										
*	*Conyza* sp.	Fleabane																										
	Dichondra repens	Kidney Weed							0.1	30																		
*	*Echium plantagineum*	Patterson's Curse			0.1	50	0.1	1					0.1	1														
*	*Euphorbia drummondii*	Caustic Weed																										
	Einadia nutans	Climbing Saltbush	0.1	1					0.1	20			0.2	50			0.1	1			0.1	5			3	30		
*	*Erodium botrys*	Long Storksbill																										
*	*Fumaria muralis*	Fumitory																	0.1	3								
*	*Geranium molle*	Cranesbill Geranium			0.1	500	0.1	5																				
*	*Heliotropium europaeum*	Common Heliotrope																										
*	*Hypochaeris radicata*	Catsear													0.1	2												
*	*Lactuca serriola*	Prickly Lettuce									0.1	1			2	20												
	Lepidium pseudohyssopifolium	Peppercress	0.5	20			0.1	1	8	100	0.1	3	0.2	50	0.2	20	0.1	5							0.1	30		
*	*Malva parviflora*	Small-flowered Mallow	0.1	1					0.1	2									0.1	20			0.1	30			0.1	2
*	*Marrubium vulgare*	White Horehound											0.1	5	0.1	5									0.1	3		
*	*Medicago minima*	Woolly Burr Medic			0.1	400																					2	50

	Scientific Name	Common Name	Plot 1 (Zone 7)		Plot 2 (Zone 8)		Plot 3 (Zone 5)		Plot 4 (Zone 4)		Plot 5 (Zone 11)		Plot 6 (Zone 10)		Plot 7 (Zone 2)		Plot 8 (Zone 2)		Plot 9 (Zone 1)		Plot 10 (Zone 2)		Plot 11 (Zone 4)		Plot 12 (Zone 3)		Plot 13 (Zone 11)	
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
*	*Medicago sativa*	Lucerne			1	100	15	200	5	100	60	800	0.2	20	2	25	4	100			3	50	10	400	0.1	5		
*	*Medicago truncatula*	Barrel Medic	0.1	40			1	50	3	20					0.1	20	0.5	500										
	Oxalis perennans	Oxalis	0.1	2	0.1	500			0.2	30	0.1	1	0.1	50	0.1	40	0.1	50			0.1	30						
*	*Plantago lanceolata*	Lambs Tongue							0.1	5																		
	Rumex brownii	Swamp Dock																										
	Rumex dumosus	Wiry Dock																										
*	*Salvia verbenaca*	Vervain			1	100	2	100	0.1	5							0.1	2			0.1	5			0.1	30		
	Sida corrugata	Corrugated Sida	1	25	0.1	500	0.1	40	0.1	100					0.5	40	0.1	30	0.1	30	0.1	30			0.1	20	0.1	5
	Sida cunninghamii	Ridge Sida																										
*	*Silybum marianum*	Variegated Thistle	0.1	5			0.1	40			0.1	5	0.2	30			0.1	20	0.1	20			0.1	10				
*	*Sisymbrium erysimoides*	Smooth Mustard																	0.1	10								
* Δ	*Solanum elaeagnifolium*	Silver-leaved Nightshade			0.1	30			0.1	5																		
	Solanum esuriale	Quena					0.1	30	3	80	0.1	20	0.2	20	0.1	25												
*	*Solanum nigrum*	Black-berry Nightshade																										
	Solenogyne bellioides																		0.1	1								
*	*Sonchus oleraceus*	Common Sowthistle																					0.1	1	0.1	1		
*	*Tragopogon porrifolius*	Salsify					0.1	5																				
*	*Tribulus terrestris*	Cat-head																	0.1	50	0.2	30	0.1	100				
*	*Trifolium arvense*	Haresfoot Clover			0.1	100																						
*	*Trifolium subterraneum*	Subterranean clover									0.5	500					0.5	500									0.1	50
	Vittadinia cuneata	A Fuzzweed	0.1	30																								
	Vittadinia gracilis	Woolly New Holland Daisy			2	100	0.1	30	0.1	10							0.1	10										
	Wahlenbergia spp.	Bluebell			0.1	80																						
	Wahlenbergia communis	Tufted Bluebell															0.1	30			0.1	10						
* Δ	*Xanthium spinosum*	Bathurst Burr																	0.2	5	0.1	5						
	Zaleya galericulata	Hogweed																										
GRASSES and GRASSLIKE																												
	Aristida ramosa	Purple Wiregrass			5	30	1	50																				
	Austrostipa scabra	Speargrass	10	500	1	100			8	100					0.1	5	0.2	30										
	Austrostipa sp.	Speargrass			0.1	10																						
	Austrostipa verticillata	Slender Bamboo Grass							0.1	20					0.2	10	0.2	30			0.1	5						
*	*Avena fatua*	Wild Oats	0.1	50	1	500	5	500	0.2	50															0.1	50		
*	*Avena sativa*	Oats																									80	1000
	Bothriochloa macra	Red Grass			10	500																						
*	*Bromus catharticus*	Prairie Grass					10	1000																				
* Δ	*Bromus diandrus*	Great Brome	5	500					10	500			1	500			0.1	30										
*	*Bromus hordeaceus*	Soft Brome	20	1000	5	1000	15	1000											5	400	5	500					10	500
	Cynodon dactylon	Common Couch													10	100												
	Dichanthium sericeum	Queensland Blue Grass																										

	Scientific Name	Common Name	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Plot 13	
			(Zone 7)		(Zone 8)		(Zone 5)		(Zone 4)		(Zone 11)		(Zone 10)		(Zone 2)		(Zone 2)		(Zone 1)		(Zone 2)		(Zone 4)		(Zone 3)		(Zone 11)	
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A
	Digitaria brownii	Cotton Panic																										
	Echinochloa colona	Barnyard Grass																										
	Enteropogon ramosus	Curly Windmill Grass			2	500	0.5	50	0.1	10					0.1	10									5	100		
	Eragrostis sp.	A Lovegrass			0.1	100			5	100																		
*	*Hordeum distichon*	Two Row Barley																									0.1	10
*	*Hordeum leporinum*	Barley Grass	20	1000			10	1000	10	500	5	500	2	500	65	1000	10	1000	40	1000	25	1000	15	1000	5	1000	1	500
	Juncus (usitatus?)	A Rush													0.1	1												
*	*Cenchrus clandestinus*	Kikuyu																										
*	*Lolium perenne*	Perennial Ryegrass	10	1000	1	1000	10	1000							0.2	50							5	500			0.1	20
	Lomandra filiformis	Wattle Matt-rush																										
	Microlaena stipoides	Weeping Grass																										
	Paspalidium constrictum	Knottybutt Grass			1	100							0.2	10			5	100	0.2	50	0.5	50						
* Δ	*Paspalum dilatatum*	Paspalum			0.1	30							0.2	5														
*	*Phalaris aquatica*	Phalaris					30	50	0.5	5					0.1	2	25	200			20	50			15	15		
	Phragmites australis	Common Reed																										
*	*Polypogon monspeliensis*	Annual Beard Grass																										
	Rytidosperma caespitosum	Ringed Wallaby Grass	10	500	15	500	5	500	15	500																		
	Rytidosperma sp.	Wallaby Grass																							0.1	5		
*	*Thinopyrum ponticum*	Tall Wheat Grass																										
	Typha orientalis	Cumbungi																										
*	*Vulpia myuros*	Rat's Tail Fescue																									0.1	20
VINES and CLIMBERS																												
	Glycine sp.	Glycine	0.1	5																								
	Glycine tabacina	Variable Glycine																										

Table 11-2 Flora species list - plot 14 - 26

	Scientific Name	Common Name	Plot 14 (Zone 5)		Plot 15 (Zone 1)		Plot 16 (Zone 5)		Plot 17 (Zone 10)		Plot 18 (Zone 3)		Plot 19 (Zone 2)		Plot 20 (Zone 10)		Plot 21 (Zone 1)		Plot 22 (Zone 2)		Plot 23 (Zone 2)		Plot 24 (Zone 9)		Plot 25 (Zone 8)		Plot 26 (Zone 3)		Incidentals
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	
TREES																													
	Acacia dealbata	Silver Wattle													10	4													
	Acacia linearifolia	Narrow-leaved Wattle					0.1	1																					
	Acacia melanoxylon	Blackwood																											
	Acacia pendula	Weeping Myall, Boree					10	2																					
	Acacia pycnantha	Golden Wattle													2	2													
	Acacia salicina	Cooba																											
	Brachychiton populneus	Kurrajong			0.1	2					0.1	1																	
	Callitris glaucophylla	White Cypress																											√
	Callitris endlicheri	Black Cypress																											√
	Casuarina cunninghamiana	River Oak							5	4																			
*	*Corymbia citriodora*	Lemon Scented Gum																											√
	Eucalyptus albens	White Box	20	1	30	4					8	7					13	3									8	4	
	Eucalyptus camaldulensis	River Red Gum							30	8																			
	Eucalyptus cinerea	Argyle Apple																											√
*	*Eucalyptus cladocalyx*	Sugar Gum																											√
	Eucalyptus cypellocarpa	Monkey Grey Gum																											√
	Eucalyptus maculata	Spotted Gum																											√
	Eucalyptus melliodora	Yellow Box	15	1			40	5															10	3			10	4	
	Eucalyptus microcarpa	Western Grey Box																									10	5	
	Eucalyptus sideroxylon	Mugga Ironbark													1	1													
	Eucalyptus goniocalyx	Long Leaved Box	10	2																									
	Eucalyptus sp 2	Planted Eucalyptus																											
	Eucalyptus sp 3	Planted Eucalyptus													10	7													
	Grevillea robusta	Silky Oak													1	1													
	Melia azedarach	White Cedar																					0.3	1					√
*	*Pinus sp.*	Pine Tree																											
SHRUBS																													
	Acacia baileyana	Cootamundra Wattle																											√
	Acacia cardiophylla	Wyalong Wattle																											
	Acacia cultriformis	Cut-leaf Wattle	20	2																									
	Acacia decora	Western Silver Wattle	10	1																									
	Acacia havilandii	Needle Wattle																											√
	Acacia implexa	Hickory Wattle																											
	Acacia iteaphylla	Willow-leafed wattle									25	5																	
	Acacia uncinata	Gold-dust Wattle																											√
	Callistemon sieberi	River Bottlebrush							0.5	1																			
	Dissocarpus biflorus																												
	Duma florulenta	Lignum																					0.1	2					

	Scientific Name	Common Name	Plot 14 (Zone 5)		Plot 15 (Zone 1)		Plot 16 (Zone 5)		Plot 17 (Zone 10)		Plot 18 (Zone 3)		Plot 19 (Zone 2)		Plot 20 (Zone 10)		Plot 21 (Zone 1)		Plot 22 (Zone 2)		Plot 23 (Zone 2)		Plot 24 (Zone 9)		Plot 25 (Zone 8)		Plot 26 (Zone 3)		Incidentals
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	
	Exocarpos cupressiformis	Cherry Ballart																											√
	Eremophila debilis	Amulla																					0.1	2					
* Δ	*Lycium ferocissimum*	African Boxthorn																					0.1	1					
	Acacia cultriformis	Knife-leaf wattle																											
	Acacia leucoclada	Northern Silver Wattle	5	1																									
	Melaleuca linariifolia	Flax leaved Paperbark	1	1																									
	Melaleuca nodosa	Black Tea Tree	1	1																									
	Melaleuca styphelioides	Prickly Tea Tree					20	4																					
*	*Schinus molle*	Pepper Tree																											√
*	*Senna* (*occidentalis?*)	Coffee Senna	0.1	1																									
FORBS																													
* Δ	*Alternanthera pungens*	Khaki Weed	0.1	1															0.1	20			0.1	5					
*	*Amaranthus* sp.	Amaranth																	0.1	3									
*	*Arctotheca calendula*	Capeweed																											
*	*Argemone ochroleuca*	Mexican Poppy																											
*	*Asphodelus fistulosus*	Onion Weed									0.1	5																	
*	*Astragalus hamosus*	Yellow Milk-vetch																											
	Atriplex semibaccata	Creeping Saltbush	0.2	50																									
	Boerhavia dominii	Tarvine																					0.1	10					
*	*Brassica tournefortii*	Mediterranean Turnip			0.1	50									0.1	10	1	50											
	Calotis lappulacea	Yellow Burr-daisy																											
* Δ	*Carthamus lanatus*	Saffron Thistle																	1	80	0.1	5	0.1	10	5	200			
*	*Centaurea solstitialis*	St Barnabys Thistle	0.5	50							0.1	5					0.1	20					0.1	50	4	500			
	Chenopodium melanocarpum	Black Crumbweed																			0.1	10							
*	*Cirsium vulgare*	Spear Thistle	0.1	1																									
*	*Citrullus lanatus*	Camel Melon							0.1	20									0.1	1	0.1	1							
*	*Conyza* sp.	Fleabane																			1	100							
	Dichondra repens	Kidney Weed									0.1	20																	
*	*Echium plantagineum*	Patterson's Curse	0.1	1																									
*	*Euphorbia drummondii*	Caustic Weed																			0.1	20							
	Einadia nutans	Climbing Saltbush	0.2	100			0.1	1			0.1	1	0.1	1	0.1	1											0.1	30	
*	*Erodium botrys*	Long Storksbill															0.1	3											
*	*Fumaria muralis*	Fumitory																											
*	*Geranium molle*	Cranesbill Geranium																											
*	*Heliotropium europaeum*	Common Heliotrope																	2	200	0.2	50							
*	*Hypochaeris radicata*	Catsear																											
*	*Lactuca serriola*	Prickly Lettuce									0.1	5											0.1	1					
	Lepidium pseudohyssopifolium	Peppercress													0.1	30													
*	*Malva parviflora*	Small-flowered Mallow													0.5	100	30	1000			0.1	5							

	Scientific Name	Common Name	Plot 14 (Zone 5)		Plot 15 (Zone 1)		Plot 16 (Zone 5)		Plot 17 (Zone 10)		Plot 18 (Zone 3)		Plot 19 (Zone 2)		Plot 20 (Zone 10)		Plot 21 (Zone 1)		Plot 22 (Zone 2)		Plot 23 (Zone 2)		Plot 24 (Zone 9)		Plot 25 (Zone 8)		Plot 26 (Zone 3)		Incidentals
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	
	Maireana enchylaenoides	Wingless Bluebush																					0.1	1					
*	*Marrubium vulgare*	White Horehound			0.4	20					0.2	20			2	15	20	20	0.1	20									
*	*Medicago minima*	Woolly Burr Medic																											
*	*Medicago sativa*	Lucerne			0.4	80	0.1	20					10	100	0.1	5	5	50	40	500			0.1	1			0.1	10	
*	*Medicago truncatula*	Barrel Medic																											
	Oxalis perennans	Oxalis									0.1	30			0.1	10	0.1	50											
*	*Plantago lanceolata*	Lambs Tongue																											
	Rumex brownii	Swamp Dock									0.1	1																	
	Rumex dumosus	Wiry Dock	0.1	1																									
*	*Salvia verbenaca*	Vervain	3	500																			0.1	20					
	Sida corrugata	Corrugated Sida	0.1	50									0.1	2							2	100	0.1	50	0.1	10	0.1	1	
	Sida trichopoda	Ridge Sida																									0.1	10	
*	*Silybum marianum*	Variegated Thistle	1	100											0.1	1													
*	*Sisymbrium erysimoides*	Smooth Mustard													0.1	30	10	100											
* Δ	*Solanum elaeagnifolium*	Silver-leaved Nightshade			0.5	100																							
	Solanum esuriale	Quena	0.1	1																	0.2	100							
*	*Solanum nigrum*	Black-berry Nightshade									0.1	1																	
*	*Solanum rostratum*	Buffalo Burr																			0.1	3							
	Solenogyne bellioides																												
*	*Sonchus oleraceus*	Common Sowthistle	0.1	2					0.1	1					0.1	5													
*	*Tragopogon porrifolius*	Salsify																											
*	*Tribulus terrestris*	Cat-head			0.1	10									0.1	100	30	100	0.1	20	0.5	100							
*	*Trifolium arvense*	Haresfoot Clover																											
*	*Trifolium subterraneum*	Subterranean clover	0.1	30	0.1	30																							
	Vittadinia cuneata	A Fuzzweed	0.1	1									0.1	30															
	Vittadinia gracilis	Woolly New Holland Daisy																									0.1	30	
	Wahlenbergia spp.	Bluebell																											
	Wahlenbergia communis	Tufted Bluebell																											
* Δ	*Xanthium spinosum*	Bathurst Burr							0.1	1									0.1	1			0.1	1	0.5	100			
	Zaleya galericulata	Hogweed					0.1	1			0.1	20					0.1	50	0.1	2					0.1	1			
GRASSES and GRASSLIKE																													
	Aristida ramosa	Purple Wiregrass																											
	Austrostipa scabra	Speargrass																	0.2	40			0.1	10					
	Austrostipa sp.	Speargrass																											
	Austrostipa verticillata	Slender Bamboo Grass			0.4	20					0.4	40	0.1	1									10	80	0.5	50			
*	*Avena fatua*	Wild Oats									10	1000	40	1000	5	500													
*	*Avena sativa*	Oats																											
	Bothriochloa macra	Red Grass																			0.5	50					0.1	10	
*	*Bromus catharticus*	Prairie Grass			0.2	300	0.5	100							5	500													

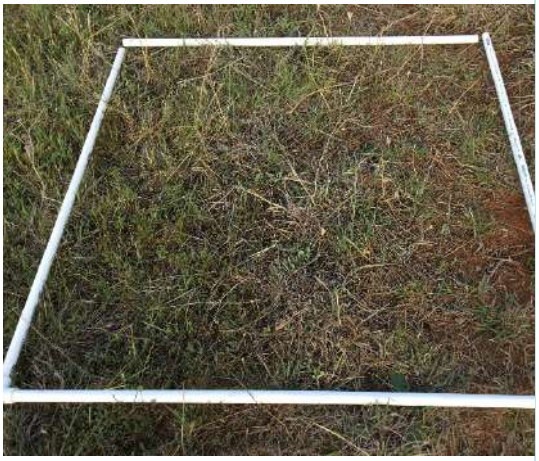
	Scientific Name	Common Name	Plot 14 (Zone 5)		Plot 15 (Zone 1)		Plot 16 (Zone 5)		Plot 17 (Zone 10)		Plot 18 (Zone 3)		Plot 19 (Zone 2)		Plot 20 (Zone 10)		Plot 21 (Zone 1)		Plot 22 (Zone 2)		Plot 23 (Zone 2)		Plot 24 (Zone 9)		Plot 25 (Zone 8)		Plot 26 (Zone 3)		Incidentals
			C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	
* Δ	*Bromus diandrus*	Great Brome	10	1000							10	500																	
*	*Bromus hordeaceus*	Soft Brome	3	500																									
	Chloris truncata	Windmill Grass																							15	200	5	300	
	Cynodon dactylon	Common Couch															30	300											
	Dichanthium sericeum	Queensland Blue Grass																											√
	Digitaria brownii	Cotton Panic																			0.5	30							
*	*Echinochloa colona*	Barnyard Grass																			30	300							
	Enneapogon nigricans	Nineawn Grass																									15	500	
	Enteropogon ramosus	Curly Windmill Grass																			25	300	10	200	5	100	0.5	30	
	Eragrostis sp.	A Lovegrass																											
*	*Hordeum distichon*	Two Row Barley																											
*	*Hordeum leporinum*	Barley Grass	15	1000			0.5	100	10	1000			10	500	10	500	5	1000			1	100							
	Juncus (usitatus?)	A Rush																											
*	*Cenchrus clandestinus*	Kikuyu																											√
*	*Lolium perenne*	Perennial Ryegrass	30	1000			0.5	100	5	100			10	500															
	Lomandra filiformis	Wattle Matt-rush									0.1	2																	
	Microlaena stipoides	Weeping Grass			0.1	2																							
	Paspalidium constrictum	Knottybutt Grass	0.1	30	0.1	50					30	100																	
* Δ	*Paspalum dilatatum*	Paspalum																											
*	*Phalaris aquatica*	Phalaris	15	100																									
	Phragmites australis	Common Reed																											√
*	*Polypogon monspeliensis*	Annual Beard Grass																											√
	Rytidosperma caespitosum	Ringed Wallaby Grass	20	100			0.1	1																					
	Rytidosperma setaceum	Small-flower Wallaby Grass																									15	500	
	Rytidosperma sp.	Wallaby Grass																							0.1	50			
*	*Thinopyrum ponticum*	Tall Wheat Grass							70	1000																			
	Typha orientalis	Cumbungi																											√
*	*Vulpia myuros*	Rat's Tail Fescue																											
VINES and CLIMBERS																													
	Glycine sp.	Glycine																					0.1	20					
	Glycine tabacina	Variable Glycine																											√

Table 11-3 Summary of Plot field data.

	PCT	Veg Zone	Zone	Easting	Northing	Bearing	Composition (No. of plants)						Structure (% Cover native species)						Function (#)		Function	Function (Tree stem Count - Present/Absent)							High Threat Exotic %
							Tree	Shrubs	Grass	Forbs	Ferns	Other	Tree	Shrubs	Grass	Forbs	Ferns	Other	Large Trees	Hollow Trees	Litter (%)	Logs (m)	5-10cm	10-20cm	20-30cm	30-50cm	50-80cm	Regen	
1	266	7	55	682815	6399947	122	1	0	2	5	0	1	5	0	20	1.8	0	0.1	3	1	45	16	0	0	0	0	1	0	5.2
2	437	8	55	685589	6404283	41	0	0	8	4	0	0	0	0	34.2	2.4	0	0	0	0	20	0	0	0	0	0	0	0	10.2
3	437	5	55	685783	6404291	87	2	0	3	4	0	0	4	0	6.5	0.4	0	0	0	0	48	0	1	1	1	1	0	1	0.5
4	437	4	55	685192	6404127	231	1	1	5	10	0	0	5	0.5	27.2	15.3	0	0	2	2	64	19	0	0	0	0	0	0	12.4
5	-	11	55	685203	6403786	-	0	0	0	2	0	0	0	0	0	0.2	0	0	0	0	8	0	0	0	0	0	0	0	0.2
6	-	10	55	685145	6403842	-	2	0	1	5	0	0	25	0	0.2	0.8	0	0	0	0	85.5	28	1	1	1	1	1	1	1.2
7	266	2	55	684851	6403075	250	0	0	4	5	0	1	0	0	10.4	14.6	0	0.1	0	0	79	0	0	0	0	0	0	0	2.2
8	266	2	55	682420	6403306	35	0	0	2	7	0	0	0	0	0.4	0.7	0	0	0	0	67.4	0	0	0	0	0	0	0	5.2
9	266	1	55	682115	6403374	-	1	0	0	1	0	0	10	0	0	0.1	0	0	2	1	56	0	0	0	0	0	1	0	0.2
10	266	2	55	682206	6403046	-	0	0	2	5	0	0	0	0	0.6	0.5	0	0	1	1	77	0	0	0	0	0	0	0	1
11	437	4	55	682207	6403046	-	1	0	0	2	0	0	15	0	0	0.2	0	0	1	0	35.6	6	0	0	0	0	0	0	0.1
12	266	3	55	682951	6402316	-	7	3	1	4	0	0	38	11	5	3.4	0	0	0	0	52	2	1	1	1	0	0	1	0
13	-	11	55	682918	6402378	-	0	0	0	2	0	0	0	0	0	5.1	0	0	0	0	12	0	0	0	0	0	0	0	0
14	437	6	55	684381	6402866	-	4	6	3	5	0	0	50	58	20	0.6	0	0	0	0	43.6	0	1	1	1	1	0	1	10
15	266	1	55	686044	6403321	-	1	0	3	0	0	1	30	0	0.6	0	0	0.1	4	2	80.6	25.3	0	0	0	1	1	0	0.5
16	437	6	55	683573	6403559	-	3	1	1	2	0	0	50.1	20	0.1	0.2	0	0	0	0	42.4	9	1	1	1	0	0	1	0
17	-	10	55	684722	6403778	65	4	0	0	0	0	0	37.5	0	0	0	0	0	4	0	35	0	1	1	1	1	1	0	0.1
18	266	3	55	682759	6404120	-	2	1	1	5	0	0	8.1	25	30	0.6	0	0	0	0	40	0	1	1	1	0	0	1	10
19	266	2	55	683365	5403797	354	0	0	1	3	0	0	0.0	0.0	0.1	0.3	0.0	0.0	0	0	22.6	0.0	0	0	0	0	0	0	0.0
20	-	10	55	685132	6403876	-	5	0	0	3	0	0	29.0	0.0	0.0	0.3	0.0	0.0	0	0	82.8	0.0	0	0	0	0	0	0	0.0
21	266	1	55	684827	6403797	55	1	0	0	2	0	0	13.0	0.0	0.0	0.2	0.0	0.0	3	3	60.0	0.0	0	1	0	0	0	0	0.0
22	266	2	55	685363	6403667	200	0	0	1	1	0	0	0.0	0.0	0.2	0.1	0.0	0.0	0	0	80.0	0.0	0	0	0	0	0	0	1.2
23	266	2	55	683354	6404012	58	0	0	3	4	0	0	0.0	0.0	26.0	2.4	0.0	0.0	0	0	51.0	0.0	0	0	0	0	0	0	0.1
24	437	9	55	682069	6401384	260	1	2	3	3	0	1	10.0	0.2	20.1	0.3	0.0	0.1	3	3	89.0	98.0	0	0	0	0	0	0	0.4
25	437	8	55	681971	6401407	255	0	0	4	2	0	0	0.0	0.0	20.6	0.2	0.0	0.0	0	0	76.0	0.0	0	0	0	0	0	0	5.5
26	266	3	55	685628	6401904	188	3	0	5	4	0	0	28.0	0.0	30.6	0.4	0.0	0.0	0	0	44.0	0.0	1	1	1	1	0	0	0.0
27*	266	12	55	684287	6399601	0	0	0	11	10	0	0	0.0	0.0	60.0	22.0	0.0	0.0	0	0	56.0	0.0	0	0	0	0	0	0	0.0
28	437	13	55	683412	6403267	0	1	0	2	1	0	0	8.0	0.0	0.1	0.1	0.0	0.0	1	1	45.0	5.0	0	0	0	0	0	0	0.4
29	437	13	55	683280	6402988	0	0	0	3	0	0	0	0.0	0.0	2.6	0.0	0.0	0.0	0	0	39.0	0.0	0	0	0	0	0	0	0.2

*Data collected for Wellington solar farm BAR

APPENDIX E FLORISTIC PLOT PHOTOS

Plot 1	**Zone 7: PCT266 _ Moderate/Good**
Plot 2	**Zone 8: PCT437_Derived Native Grassland**
	
Plot 3	**Zone 5: PCT437 _Planted**

Plot 4	**Zone 4: PCT 437_moderate**
Plot 5	**Zone 11: Exotic Vegetation**
Plot 6	**Zone 10: Planted Woodlot**

Plot 7	**Zone 2: PCT266 _Derived Native Grassland**
Plot 8	**Zone 2_PCT266 -Derived Native Grassland**
Plot 9	**Zone 1: PCT266_moderate**

Plot 10	**Zone 2: PCT266 _Derived Native Grassland**
Plot 11	**Zone 4: PCT437_Moderate**
Plot 12	**Zone 3_PCT266_Planted**

Plot 13	**Zone 11_ Exotic Vegetation**
Plot 14	**Zone 5: PCT437_Planted**
Plot 15	**Zone 1: PCT266_Moderate**

Plot 16	**Zone 5: PCT437_Planted**
Plot 17	**Zone 10: Planted Woodlot**
Plot 18	**Zone 3: PCT266_ Planted**

Plot 19	**Zone 2: PCT266_Derived Native Grassland**
Plot 20	**Zone 10: Planted Woodlot**
Plot 21	**Zone 1: PCT266_Moderate**

Plot 22	**Zone 2: PCT266_Derived Native Grassland**
Plot 23	**Zone 2: PCT266_Derived Native Grassland**
Plot 24	**Zone 9: PCT437_ Good**

Plot 25	**Zone 8: PCT437_Derived Native Grassland**
Plot 26	**Zone 3: PCT266_Planted**
Plot 27	**Zone 13: PCT437_Low**

Plot 28	**Zone 13: PCT437_Low**

APPENDIX F FIELD DATA SHEETS

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name		Plot Identifier		Recorders	
Date	18 10 17	Ross transmission l.		1(wff1)		Julie Gooding Lisa Hamilton	
Zone 55	Datum	IBRA region	south west slopes	Photo #		Zone ID	
Easting 551168281	Northing 6399947	Dimensions	20 x 50 m	Orientation of midline from the 0 m point.	122° SE		
Vegetation Class		~~White Box~~ Grassy Woodland					Confidence: H M L
Plant Community Type		White box Grassy Woodland ~~PCT 266~~ 266			EEC:		Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	62
	Forbs	5 ~~6~~
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	5
	Shrubs	0
	Grasses etc.	~~75~~ 20
	Forbs	18
	Ferns	0
	Other	0.1
High Threat Weed cover		5.2 ~~6~~

BAM Attribute (20 x 50 m plot)		# Tree Stems Count	
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	1	0	0
50 – 79 cm	11	0	1
30 – 49 cm	0	0	0
20 – 29 cm	0	0	0
10 – 19 cm	0	0	0
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	4m 4m 4m 3m 1m		total 16m

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30.... 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	15	50	80	40	50	1	0	0	0	5	0	0	0	0	0	2	0	1	0	0
Average of the 5 subplots	45					1.2					0					0.6				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 18 10 17	Ross trasmission	WNSF1	JCa/LH "

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
T	White Box	Eucalyptus albens	N	5	1	05	
(G)	D1 Barley grass	Hordeum leporinum	E	20	1000	GC	
(G)	D2 Rye grass	Lolium perenne	E	10	1000	GC	
(G)	D3 Wallaby grass	Austrodanthonia caespitosa	N	10	500	GC	
(F)	St Barnaby's Thistle	Centaurea solstitialis	E	10	300	GC	
(F)	Cida Cunninghamii	Sida corrugata	N	1	25	GC	
(G)	Canedia	Glycine tomentella	N	0.1	5	GC	
G	Great Brome	Bromus diandrus	HTE	5	500	GC	
G	Stypa scabra	Austrostipa scabra	N	10	500	GC	
F	Common peppercress	Lepidium (pseudohyssopifolium)	N	.5	20	GC	
F	Fuzz weed	Vittadinia cuneata	N	0.1	30	GC	
(G)	D1 Soft brome	Bromus hordeaceus	E	20	1000	GC	
F	Medic - ~~cut leaf~~ barrel	Medicago truncatula	E	.1	40	GC	
F	Kahki weed	Alternanthera pungens	HTE	.1	30	GC	
F	Saffron thistle	Carthamus lanatus	HTE	.1	1	GC	
F	Einida nutans	Einadia nutans	N	.1	1	GC	
F	variegated thistle	Silybum marianum	E	.1	5	GC	
G	Wild Oats	Avena fatua	E	.1	50	GC	
F	pea – Yellow Vetch	~~Astragalus~~ Astragalus hamosus ~~cicinnipos compressus~~	E	.1	2	GC	
F	Oxalis perrenans		N	.1	2	GC	
F	small flowered mallow	Malva parviflora	E	.1	1	GC	
	~~Glycine tomentella~~						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

Wellington North

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Grassland	WNSF2	Julie + Lisa - NGH

Zone	Datum	IBRA region	Photo #	Zone ID
55		south west slopes		

Easting	Northing	Dimensions	Orientation of midline from the 0 m point.
~~5886589~~	6409283	20 x 50m	41°

Vegetation Class	Grassland		Confidence: H M L
Plant Community Type	Yellow Box Derived grassland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	8
	Forbs	4
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	34.2
	Forbs	2.4
	Ferns	0
	Other	0
High Threat Weed cover		10.2

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	0	0	0
30 – 49 cm	0	0	0
20 – 29 cm	0	0	0
10 – 19 cm	0	0	0
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥0 cm diameter, >50 cm in length)	0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 30 40 30 20	20 5 10 1 15	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	20	10.2	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 29 10 17	Wellington North	WNSF 2	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(F)	saffron Thistle	Carthamus lanatus	HTE	10	2000+	GC	
(F)	wild sage	Salvia verbenaca	E	1	100	GC	
F	Fuzz weed	Vittadinia gracilis	N	2	100	GC	
~~F~~	~~Vittadinia gracilis~~		~~N~~				
G	Soft brome	Bromus hordeaceus	E	5	1000	GC	
(G)	Aristita sp	Aristida ramosus	N	5	~~100~~ 30	GC	
(G)	Wallaby grass - Ringed	Rytidosperma caespitosa	N	15	500	GC	
(G)	Red leg grass	Bothriochloa macra	N	10	500	GC	
F	hares foot clover	Trifolium arvense	E	.1	100	GC	
F	Cida corrugata		N	.1	500	GC	
~~GF~~	medenc - Woolly	Medicago minima ~~polymorpha~~	E	.1	400	GC	
F	waelenbergia sp	Whalenbergia sp	N	.1	80	GC	
F	lucern	Medicago sativa	E	1	100	GC	
G	Spear grass	Austrostipa sp. 1	N	.1	100	GC	
F	native geranium	Geranium molle	E	.1	500	GC	
G	wild Oats	Avena fatua	E	.1	500	GC	
~~G~~F	oxalis perrenans		N	.1	~~100~~ 500	GC	
F	Senna occidentalis - ?		E	.1	10	GC	
(F)	St Barnabys	Centaurea solstitialis	E	2	1000	GC	
G	Rye grass	Lolium perenne	E	1	1000	GC	
F	silver leaf nightshade	Solanum elaeagnifolium	HTE	.1	~~50~~ 30	GC	
G	eragrostis sp		N	.1	~~100~~	GC	
G	Stypa scabra	Austrostipa scabra	N	1	100	GC	
G	Curly windmill grass	Enteropogon ramosus	N	2	500	GC	
G	Spordolis	Paspalidium constrictum	N	1	100	GC	
F	pattersons curse	Echium plantagineum	E	.1	50	GC	
F	yellow milk vetch	Astragalus hamosus	E	.1	30	GC	
G	ornothopus compressus		E	.1	30	GC	
G	paspalum	Paspalum dilatum	HTE	.1	30	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington Nth	WNSF 3	Lisa + Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							
Easting 685783	Northing 6404291	Dimensions	20 x 50m	Orientation of midline from the 0 m point.	87 °C		

Vegetation Class	~~Yello~~ woodland		Confidence: H M L
Plant Community Type	Yellow box woodland - planted	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	0
	Grasses etc.	3
	Forbs	4
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	4
	Shrubs	0
	Grasses etc.	6.5
	Forbs	0.4
	Ferns	0
	Other	0
High Threat Weed cover		~~0.72~~ 0 0.5

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows[1]
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	0	0	0
30 – 49 cm	11	0	0
20 – 29 cm	11	0	0
10 – 19 cm	1	0	0
5 – 9 cm	1	0	n/a
< 5 cm	11	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

[1] Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	30 5 50 70 85	20 10 5 2 1	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	48	7.42	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19/10/17	Wellington North	WSF3 - YBP	JG LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	Yellow Box	Eucalyptus melliodora	N	2%	1	S	
(F)	Lucerne	Medicago sativa	E	15	200	GC	
F	Fuzzweed (vitiadinia)	Vittadinia gracilis	N	0.1	30	GC	
F	Sida cunninghamii	Sida corrugata	N	0.1	40	GC	
(F)	Wild Sage	Salvia verbenaceae	E	~~20~~ 5	100	GC	
(G)	Phalaris	Phalaris aquatica	E	30	50	GC	
G	Rye Grass	Lolium perenne	E	10	1000	GC	
F	Variegated thistle	Silybum marianum	E	0.1	40	GC	
G	Serrated wallaby Grass	Rytidosperma caespitosum	N	5	500	GC	
G	Soft brome.	Bromus hordeaceus	E	15	1000	GC	
G	Saffron thistle	Carthamus lanatus	HTE	0.5	40	GC	
G	Great Brome	Bromus diandrus	E	5	1000	GC	
(T)	Barley Grass	Hordeum leporinum	E	10	1000	GC	
(F)	St Barnabys thistle	Centaurea solstitialis	E	3	200	GC	
F	~~Buttercup Lily~~ ? (pink daisy)	Tragopogon porrifolius	E	0.1	5	GC	
G	Aristida ramosa		N	1	50	GC	
(T)	Willow wattle	Acacia saligna	N	2%	2	S	
F	Oxalis	Solanum esuriale	N	0.1	30	GC	
F	Canola - Wild turnip	Brassica barrelieri	E	0.1	10	GC	
G	Curly Windmill Grass	Enteropogon ramosus	N	0.5	50	GC	
F	Capeweed	Arctotheca calendula	E	0.1	1	GC	
~~F~~	~~Saffron thistle~~	Cart					
F	Pickeron's weed	Echium plantagineum	E	0.1	1	GC	
(G)	Brome	Bromus orthanthus	E	10	1000	GC	
F	Common peppercress	Lepidium pseudophyssolicia)	N	0.1	1	GC	
(F)	Barrel Medic	Medicago truncatula	E	0.1 ~~0.5~~	50	GC	
G	Wild oat	Avena fatua	E	~~0~~5	500	GC	
F	Geranium molle		E	~~0~~ 1	5	GC	
				0			

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

[redacted]

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19/10/17	Wellington North	WNSF 4	Julie + Lisa

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							
Easting: 55H 665192	Northing: 6404127	Dimensions	20x 50m	Orientation of midline from the 0 m point.	231°		

Vegetation Class	grassy Woodland		Confidence: H M L
Plant Community Type	Yellow Box grassy woodland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	~~0~~ 1
	Grasses etc.	5
	Forbs	~~12~~ 10
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	5
	Shrubs	~~10~~ 0.5
	Grasses etc.	27.2
	Forbs	15.3
	Ferns	0
	Other	0
High Threat Weed cover		~~12.3~~ 12.4

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
dbh		Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc	80 + cm	11	–	11
	50 – 79 cm	–	–	–
30 – 49 cm		–	–	–
20 – 29 cm		–	–	–
10 – 19 cm		–	–	–
5 – 9 cm		–	–	n/a
< 5 cm		–	–	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		6m 5m 2m pile timber (6m)		total 19m

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70 10 90 80 70	~~19~~ 90 0 .1 5	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	~~66~~ 64	20.02	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19 10 17	Wellington North	WNSF4-VBW	JG / LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	Yellow Box	Eucalyptus melliodora	N	5	2	T	✓
(S)	African Box thorn	Lycium ferocissum	HTE	2	10	S	
F	Avena	Solanum esuriale	N	3	80	GC	
(F)	common peppercress	Lepidium pseudohyssopifolium	N	8	100	GC	
F	Silverleaf nightshade	Solanum eleagnifolium	HTE	0.1	5	GC	
(G)	Great Brome	Bromus diandrus	HTE	10	500	GC	
(F)	Creeping Saltbush (Atriplex semibaccatta)		N	3	100	GC	
G	eragrostis ~~sp~~ 2		N	5	100	GC	V1
(G)	~~Great Brom~~ Barley Grass	Hordeum leporinum	E	10	500	GC	
F	small flowered mallow	Malva parviflora	E	0.1	2	GC	
F	canola-wildturnip	Brassica tournefortii	E	0.1	5	GC	
G	Austrostipa scabra		N	8	100	GC	
F	Einadia nutans		N	0.1	20	GC	
F	oxalis perennens		N	0.2	30	GC	
~~F~~ S	Dissocarpus sp.	Dissocarpus biflorus	N	0.5	50	GC	V2
(F)	Lucerne	Medicago sativa	E	5	100	GC	
G	wild oats	Avena fatua	E	0.2	50	GC	
F	St Barnabys thistle	Centaurea solstitialis	E	0.2	50	GC	
F	Khaki weed	Alternanthera pungens	HTE	0.1	5	GC	
F	Saffron thistle	Carthamus lanatus	HTE	0.2	5	GC	
F	Barrel Medic	Medicago truncatula	E	3	20	GC	
G	Phalaris	Phalaris aquatica	E	05	5	GC	
(G)	Ringed Wallaby Grass	Rhytidosperma caespitosum	N	15	500	GC	
F	Plantain ~~native~~	Plantago lanceolata	HTE	0.1	5	GC	
~~F~~	Sida corrugata		N	0.1	100	GC	
G	Austrostipa verticillata		N	0.1	20	GC	
G	soft Brome	Bromus hordeaceus	E	0.1	500	GC	
	~~Poa sp. (pseudoalpina)~~						
F	Dichondra repens		N	0.1	30	GC	
F	Desert Sida	Sida cunninghamina	N	0.1	1	GC	
F	vittadinia	Vittadinia gracilis	N	0.1	10	GC	
F	wildsage	Salvia verbenaca	E	0.1	5	GC	
F	yellow flowered calotis	Calotis lappulacea	N	0.1	2	GC	
G	CWG	Enteropogon ramosus	N	0.1	10	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington North	WNSF5	Lisa + Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							
Easting	Northing	Dimensions	20 x 50 m	Orientation of midline from the 0 m point.			
55H 645 203	6403786						

Vegetation Class	Pasture/grassland (exotic)		Confidence: H M L
Plant Community Type	exotic pasture	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified; magnetic bearing taken along midline

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	0
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0
	Forbs	0.2
	Ferns	0
	Other	0
High Threat Weed cover		0.2

BAM Attribute (20 x 50 m plot)		# Tree Stems Count	
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	0	0	0
30 – 49 cm	0	0	0
20 – 29 cm	0	0	0
10 – 19 cm	0	0	0
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	10 10 10 5 5	50 40 70 60 30	0 0 0 0 0	0 0 0 1 1
Average of the 5 subplots	8	50	0	0.4

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19/10/17	Nellington North	WNSF 5	LISA JG

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
(F)	lucerne Medicago sativa	E	60	1000	GC	
(F)	saffron thistle Carthamus lanatus	HTE	0.2	50	GC	
F	Quena Solanum esuriale	N	0.1	20	GC	
F	peppercress common Lepidium pseudophysodes	N	0.1	3	GC	
(G)	Barley Grass Hordeum leporinum	E	5	500	GC	
F	clover (furry) Trifolium subterraneum	E	0.5	600	GC	
F	variegated thistle Silybum marianum	E	0.1	5	GC	
F	oxalis perennens	N	0.1	1	GC	
F	Astragalus hamosus	E	0.1	5	GC	
F	st barnabys thistle Centaurea solstitialis	E	0.2	20	GC	
F	~~(unidentified)~~ wild turnip (Brassica tournefortii)	E	0.3	50	GC	
F	Prickly lettuce Lactuca serriola	E	0.1	1	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington North	WNSF6	Lisa + Julie.

Zone 55	Datum	IBRA region	SWS	Photo #		Zone ID	
55H Easting 685145	Northing 6403842	Dimensions	20 x 50m	Orientation of midline from the 0 m point.	Marine		
Vegetation Class		Woodland				Confidence: H M L	
Plant Community Type		Planted Woodland			EEC:	Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	0
	Grasses etc.	1
	Forbs	5
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	25
	Shrubs	0
	Grasses etc.	0.2
	Forbs	0.8
	Ferns	0
	Other	0
High Threat Weed cover		1.2

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	0	0	0
30 – 49 cm	1111	~~#~~ (5 mm)	0
20 – 29 cm	~~HHT~~ ~~HHT~~	~~#~~	0
10 – 19 cm	~~HHT~~ ~~HHT~~ 1	~~#~~	0
5 – 9 cm	111	0	n/a
< 5 cm	11	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	5m 7m 9m 7m		total 28m

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30,..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	99 85 70 95 80	1 .1 .2 .1 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	85.8	0.28	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders
Date 19 10 17	Wellington North	WNSF6 - planted	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
F	Variegated thistle	Silybum marianum	E	0.2	30	GC	
(F)	Einadia nutans		N	0.2	50	GC	
(F)	oxalis perennans		N	0.1	50	GC	
(F)	Lucerne	Medico sativa	E	0.2	20	GC	
F	common peppercress	Lepidium pseudohyssofolium	N	0.2	50	GC	
F	Ovenna	Solanum esuriale	N	0.2	20	GC	
F	Patterson's curse	Echium plantagineum	E	0.1	1	GC	
(G)	Great Brome	Bromus diandrus	HTE	1	500	GC	
G	Aporobolus	Paspalidium constrictum	N	0.2	10	GC	
(G)	Barley Grass	Hordeum leporinum	E	0.2	500	GC	
(G)	~~Phalaris~~ Paspalum	Paspalum dilatatum	HTE	0.2	5	GC	
T	Mugga Ironbark	Eucalyptus siderotylon	N	10	4	TR	
F	Horehound	marrubium vulgare	E	0.1	5	GC	
F	creeping saltbush	Atriplex semibaccata	N	0.1	2	GC	
T	stringybark sp		(N)	15	3	T	1
T	Pine	Pinus halapensis	E	3	1	T	
T	Gum: Glossyleaves		(N)	10	4	T	2

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

native

confirmation

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19/10/17	Wellington North	WNSF7	Lisa Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							

Easting	Northing	Dimensions	20 x 50 m	Orientation of midline from the 0 m point.	250°
55H 684851	6403075				

Vegetation Class	Grassland		Confidence: H M L
Plant Community Type	white box grassland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	4
	Forbs	5
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	10.4
	Forbs	0.6
	Ferns	0
	Other	0.1
High Threat Weed cover		2.2

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	
50 – 79 cm	0	0	
30 – 49 cm	0	0	
20 – 29 cm	0	0	
10 – 19 cm	0	0	
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	80 80 80 85 60	0 1 0 0 1	0 0 0 0 0	0 1 0 0 1
Average of the 5 subplots	79	0.4	0	0.4

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet 2 of 2	Survey Name	Plot Identifier	Recorders ~~284~~
Date 19 10 17	Wellington North	WSF 7 - whiteBox grassland	JG!!!

	GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
	(G)	Barley Grass	Hordeum leporinum	E	65	1000	GC	
	(F)	Lucerne	Medicago Sativa	E	2	25	GC	
	(F)	St Barnabys thistle	Centaurea solstitialis	E	2	500	GC	
5	F	Sida corrugata	Sida corrugata.	N	0.5	40	GC	
	F	Prickly lettuce	Lactuca serrida	E	2	20	GC	
	(F)	saffron thistle	Carthamus lanatus	HTE	2	20	GC	
	F	Horehound	Murrubium vulgare	E	0.1	5	GC	
4	F	Tarvine	Boerhavia dominii	N	0.1	3	GC	
	F	Flatweed (Hairy leaf)	Hypochaeris radicata	E	0.1	2	GC	
3	F	common peppercress	Lepidium pseudohyssofolium	N	0.2	30	GC	
	(G)	Ryegrass	Lolium perenne	E	0.2	50	GC	
4	G	Austrostipa verticullata		N	0.2	10	GC	
2	F	Oxalis perennans		N	0.1	40	GC	
1	F	quenna	Solanum esuriale	N	0.1	25	GC	
3	G	Curly windmill grass	Enteropogon acicularis	N	0.1	10	GC	
2	G	Austrostipa scabra		N	0.1	5	GC	
	F	Barrel Medic	Medico truncatula	E	0.1	20	GC	
	G	Phalaris	Phalaris ~~sp~~ aquatica	E	0.1	2	GC	
	F	~~Wild sage~~ Juncus sp.	Juncus sp	N	0.1	1	GC	
1	(G)	COUCH!	Cynodon dactylon	N	10	100	GC	
		VB WOODLAND		LOW CONDITION				

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19/10/17	Wellington Nth	WNSF8	Lira + Julie

Zone 55	Datum	IBRA region	SWS	Photo #		Zone ID	
554 Easting 682420	Northing 6403306	Dimensions	20-50m	Orientation of midline from the 0 m point.	35°		

Vegetation Class	Grassland		Confidence: H M L
Plant Community Type	White Box Grassland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	2
	Forbs	7
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.4
	Forbs	0.7
	Ferns	0
	Other	0
High Threat Weed cover		5.2

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm			
50 – 79 cm			
30 – 49 cm			
20 – 29 cm		0	
10 – 19 cm			
5 – 9 cm			n/a
< 5 cm			n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	X 0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	85 82 89 70 85	.1 .1 .1 .1 .2	0 0 0 0 0	.2 .2 .5 .1 .1
Average of the 5 subplots	67.4	0.12	0	0.02

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington North	WSF8 - WB Grounds Lower	JS

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
G	Phalaris	Phalaris aquatic	E	25%	200	GC	
F	St Barnabys thistle	Centaurea solstialis	E	4	100	GC	
f	Wahlenbergia (Tall) (s	Wahlenbergia communis	N	0.1	30	GC	
G	Barley Grass	Hordeum leporinum	E	10%	1000	GC	
f	Lucerne	Medicago sativa	E	4%	100	GC	
G	Sporobolus	paspalidium constrictum		5%	100	GC	
F	saffronthistle	Carthamus lanatus	HTE	5%	200	GC	
G	Austrostipa scabra		N	0.2	30	GC	
G	Austrostipa retiollata		N	0.2	30	GC	
F	cida conyzaku		N	0.1	30	GC	
F	clover	Trifolium subterraneum	E	0.5	500	GC	phot
F	Medic - Barrel Medic	Medicago truncatula	E	0.5	500	GC	phot
F	Oxalis perennens		N	0.1	50	GC	
F	khaki weed	Alternanthera pungens	HTE	0.1	50	GC	
f	Common peppercress	Lepidium pseudo physofolia	N	0.1	5	GC	
f	Tarvine	Boerhavia domuni	N	0.1	5	GC	
f	Einadia nutans		N	0.1	1	GC	
f	Wild Sage	Salvia verbenaceae	E	0.1	2	GC	
f	Variegated thistle	Silybum marianum	E	0.1	20	GC	
f	Vittadinia - soft hairs	Vittadinia gracilis	N	0.1	10	GC	
g	Great Brome	Bromus diandrus	HTE	0.1	30	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19/10/17	Wellington North	WNSF 9	Lisa Jakie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							

Easting	Northing	Dimensions	20 x 50 m	Orientation of midline from the 0 m point.	
682115	6403374				

Vegetation Class	Grassy Woodland		Confidence: H M L
Plant Community Type	White Box grassy Woodland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	0
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	10
	Shrubs	0
	Grasses etc.	0
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover		0.2

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	11	0	1
30 – 49 cm	0	0	0
20 – 29 cm	0	0	0
10 – 19 cm	0	0	0
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	/		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	50 45 60 55 70	1 2 0 0 0	0 0 0 0 0	2 0 0 0 0
Average of the 5 subplots	56	0.42	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet 2 of 2		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington SF	WSF9 - Woodland	JG

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(G)	Barley Grass	Hordeum leporinum	E	40	10000+	GC	
(T)	White Box	Eucalyptus albens	N	10%	2	T	
(G)	Soft Brome	Bromus hordeaceus	E	5	400	GC	
F	Caltrop bindi	Tribulus terrestris	E	0.1	50	GC	
(F)	St Barnaby thistle	Centaurea solstitialis	E	5	100	GC	
F	Sida corrugata		N	0.1	30	GC	
F	Small flowered Mallow	Malva parviflora	E	0.1	20	GC	
F	Bathurst Burr	Xanthium spinosum	HTE	0.2	5	GC	
G	Sporobolus	Paspalidium constrictum	N	0.2	50	GC	
F	Solenogyne?	Solenogyne bellioides		0.1	1	GC	–
F	Wild mustard - smooth mustard (Sisymbrium erysimoides)		E	0.1	10	GC	
F	Variegated thistle (dead)	Silybum marianum	E	0.1	20	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19/10/17	North Wellington	WNSF10	Lisa + Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							

Easting	Northing	Dimensions		Orientation of midline from the 0 m point.	
682206	6403045				

Vegetation Class	Grassland		Confidence: H M L
Plant Community Type	White Box derived grassland - low cond	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	2
	Forbs	5
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.6
	Forbs	0.5
	Ferns	0
	Other	0
High Threat Weed cover		1.0

BAM Attribute (20 x 50 m plot)		# Tree Stems Count	
dbh	Euc*	Non Euc	Hollows[1]
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	0	0	0
30 – 49 cm	0	0	0
20 – 29 cm	0	0	0
10 – 19 cm	0	0	0
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

[1] Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	75 85 80 70 75	.1 .1 .1 0 .1	0 0 0 0 0	1 2 .1 2 1
Average of the 5 subplots	77	0.08	0	1.04

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet 2 of 2		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington North	WSF10 WG Grassow LOU	JG LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(G)	Barley Grass	Hordeum leporinum	E	25	1000	GC	
F	khaki weed	Alternanthera pungens	HTE	0.4	50	GC	
(F)	St Barnabys thistle	Centaurea solstitialis	E	1	100	GC	
F	Cida corrugata		N	0.1	30	GC	
F	oxalis perennans		N	0.1	30	GC	
(G)	soft brome	Bromus hordeaceus	E	5	1000	GC	
(G)	Phalaris	Phalaris ~~sp~~ aquatica	E	20	50	GC	
F	wild sage	Salvia verbenaceae	E	0.1	5	GC	
F	Bathurst Burr	Xanthium spinosum	HTE	0.1	5	GC	
G	Austrostipa verticillata		N	0.1	5	GC	
(F)	Saffron thistle	Carthamus lanatus	HTE	0.5	20	GC	
F	Wahlenbergia (tall)	Wahlenbergia communis	N	0.1	10	GC	
F	Tar Vine	Boerhavia dominii	N	0.1	5	GC	
F	Einadia nutans		N	0.1	5	GC	
G	Sporobolus	Paspalidium constrictum	N	0.5	50	GC	
F	Caltrop	Tribulus terrestris	E	0.2	30	GC	
(F)	Lucerne	Medicago sativa	E	3	50	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19/10/17	Wellington North	WNSF11	Julie + Lisa

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							

Easting	Northing	Dimensions	50x20m	Orientation of midline from the 0 m point.	
682207	6403046				

Vegetation Class	Woodland		Confidence: H M L
Plant Community Type	Yellow box woodland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	0
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	15
	Shrubs	0
	Grasses etc.	0
	Forbs	0.2
	Ferns	0
	Other	0
High Threat Weed cover		0.1

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	1	0	1
50 – 79 cm	0	0	0
30 – 49 cm	0	0	0
20 – 29 cm	0	0	0
10 – 19 cm	0	0	0
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	2.5m 2.5m 1m		total 6m

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	75 65 ~~8~~ 10 30 25	0 0 90 .1 50	0 0 0 0 0	2 0 ~~8~~ 1 2 15
Average of the 5 subplots	35.6	28.02	0	3.82

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

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

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

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

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

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

400 m² plot: Sheet 2 of 2		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington Park	WSF 11 YB Woodland	JA/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	Yellow Box	Eucalyptus melliodora	N	15	1	T	
(G)	Barley Grass	Hordeum leporinum	E	15	1000	GC	
(F)	Caltrops	Tribulus terrestris	E	0.1	100	GC	
F	Carrots	Fumaria (muralis)		0.1	3	GC	
F	Variegated thistle	Silybum marianum	E	0.1	10	GC	
F	Khaki Weed	Alternanthera pungens	HTE	0.1	50	GC	
F	Small flowered Mallow	Malvia parviflora	E	0.1	30	GC	
(G)	Rye Grass	Lolium perenne	E	5	500	GC	
F	Crumbweed	Chenopodium melanocarpum	N	0.1	1	GC	
(F)	Lucerne	Medicago sativa	E	10	400	GC	
F	Tarvine	Boerhavia dominii	N	0.1	1	GC	
F	Sow thistle	Sonchus oleraceus	E	0.1	1	GC	
(F)	St Barnabys thistle	Centaurea solstitialis	E	0.2	30	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

YB Woodland standard

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington North	WNSF12	Lisa + Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							

Easting	Northing	Dimensions	20 x 50m	Orientation of midline from the 0 m point.	
682951	6402316				

Vegetation Class	grassy Woodland		Confidence: H M L
Plant Community Type	Planted vegetation	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline. <25m transect

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	7
	Shrubs	3
	Grasses etc.	1
	Forbs	4
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	38
	Shrubs	11
	Grasses etc.	5
	Forbs	3.4
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (20 x 50 m plot) dbh	Euc*	# Tree Stems Count Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	—	0	0
50 – 79 cm	—	0	0
30 – 49 cm	—	0	0
20 – 29 cm	III (3)	0	0
10 – 19 cm	~~IIII~~ III (8)	15	0
5 – 9 cm	III (3)	10	n/a
< 5 cm	28	20	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	2m		total 2m

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	85 85 90 —	0 0 0 —	0 0 0 —	0 0 1 —
Average of the 5 subplots	52	0	0	0.02

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19 10 17	Wellington North	WSF 12 - WB planted	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	White Box	Eucalyptus albens	N	10	6	OS	
(T)	Yellow Box	Eucalyptus melliodora	N	5	2	OS	
(G)	Phalaris	Phalaris sp aquatica	E	15	15	MS	
(T)	Silver Wattle	Acacia dealbata	N	8	15	MS	
S	Acacia Implexa		N	3	3	MS	
F	Einadia nutans		N	3	30	GC	
(T)	Weeping Myall	Acacia pendula	N	2	2	MS	
F	Wild Sage	Salvia verbenaceae	E	0.1	30	GC	
(G)	Curly Windmill Grass	Enteropogon ramusus	N	5	100	GC	
T	Kurrajong	Brachychiton populneus	N	0.1%	1	OS	
F	Common peppercress	Lepidium pseudophyssofolium	N	0.1	30	GC	
(G)	Barley Grass	Hordeum leporinum	E	5	1000	GC	
S	Acacia sp. (Farm) cardiophylla - Wyalong Wattle		N	3	2	MS	-(1)
F	Sida corrugata		N	0.1	20	GC	
(T)	Acacia sp (acorn) Melanoxylon - Blackwood		N	2	1	MS	
S	Acacia decora		N	5	5	MS	
F	Horehound	Marrubium vulgare	E	0.1	3	GC	
G	Wild Oats	Avenua fatua	E	0.1	50	GC	
F	Tarvine	Boerhavia domin.	N	0.1	3	GC	
F	St Barnabys thistle	Centaurea solstialis	E	0.1	10	GC	
F	Lucerne	Medicago sativa	E	0.1	5	GC	
F	Sow thistle	Sonchus oleraceus	E	0.1	1	GC	
G	Rhodosperma (Inflower)	Rhodosperma sp.	N	0.1	5	GC	
(T)	Grey Box	Eucalyptus microcarpa	N	10	3	OS	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington North	WSF13-exotic	JG/LH

Zone	Datum	IBRA region	NSW slopes	Photo #		Zone ID	
55							

Easting	Northing	Dimensions	20 50	Orientation of midline from the 0 m point.	
682918	6402578				

Vegetation Class	Exotic Crop		Confidence: H M L
Plant Community Type	Exotic	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	0
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0
	Forbs	5.1
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
dbh		Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc	80 + cm	–	–	–
	50 – 79 cm	–	–	–
	30 – 49 cm	–	–	–
	20 – 29 cm	–	–	–
	10 – 19 cm	–	–	–
	5 – 9 cm	–	–	n/a
	< 5 cm	–	–	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	15 15 10 15 25	60 70 70 50 50	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	12	49.5	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 19/0/7	Wellington North	WNSF13	Lisa Julie

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
(G)	Oats - crop Avena sativa	E	80	1000	GC	
(G)	Soft brome Bromus hordeaceus	E	10	500	GC	
F	Cida corrugata	N	.1	5	GC	
(G)	barley grass - Hordeum leporinum	E	1	500	GC	
F	mexican poppy - Argemone ochroleuca	E	.1	~~100~~ 50	GC	
G	Rye grass Lolium perenne	E	.1	20	GC	
F	Furry medic - Medicago minima	E	2	50	GC	
G	2 row barley - ag. Hordeum distichon	E	.1	10	GC	
G	Rats tail phescue - Vulpia myuros	E	.1	20	GC	
(F)	tarvine - Boerhavia domuni	N	5	500	GC	
	Clover sp - white flowers Trifolium subterraneum	E	.1	50	GC	
F	Small flowered mallow - Malva parviflora	E	.1	2	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Plot Identifier	Recorders
Date	19 10 17	Wellington North	WNSF14	Lisa Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
Easting	Northing	Dimensions	20x50m	Orientation of midline from the 0 m point.	340°		
55H 684381	6402866						

Vegetation Class	grassy Woodland		Confidence: H M L
Plant Community Type	YB planted vegetation	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	4
	Shrubs	6
	Grasses etc.	3
	Forbs	5
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	50
	Shrubs	58
	Grasses etc.	20
	Forbs	0.6
	Ferns	0
	Other	0
High Threat Weed cover		10

BAM Attribute (20 x 50 m plot)		# Tree Stems Count	
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	0	0	0
30 – 49 cm	1	0	0
20 – 29 cm	1111	~~1111~~	0
10 – 19 cm	1	1111	0
5 – 9 cm	111	~~1111~~ 11	n/a
< 5 cm	1	1	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30 ..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	65 30 40 40 70	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	43.6	0	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet 2 of _	Survey Name	Plot Identifier	Recorders
Date 19 10 17	Wellington North	WSF 14 Planting	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
S	Acacia decora		N	10	1	MS	
T	Eucalypt 1 (thick oily leaf gum)		N	10	2	MS	
F	Cida corrugata		N	0.1	50	GC	
F	sow thistle	Sonchus oleraceus	E	0.1	2	GC	
G	Ryegrass	Lolium perenne	E	30	1000+	GC	
G	Barley grass	Hordeum leporinum	E	15	1000	GC	
G	Great brome	Bromus diandrus	HTE	10	1000+	GC	
F	Wild sage	Salvia verbenaca	E	3	500	GC	
S	Acacia cultriformis		N	20	2	GC	
F	Atriplex semibaccatta		N	0.2	50	GC	
F	Einadia nutans		N	0.2	100	GC	
G	Softbrome	Bromus hordeaceus	E	3	5000	GC	
S	Melaleuca linearifolia		N	1	1	MS	
S	Melaleuca nodosa		N	1	1	MS	
G	Phalaris	Phalaris aquatica	E	15	100	GC	
F	St barnabys thistle	Centaurea solstitialis	E	0.5	50	GC	
G	Sporobolus	Paspalidium constrictum	N	0.1	30	GC	
G	ringed wallaby grass	Rhytidosperma caespitosum	N	20	100	GC	
F	Variegated thistle	Silybum marubium	E	1	100	GC	
F	Rumex dumosus		N	0.1	1	GC	
S	Acacia (kurrypuck)		N	1	2	MS	—
T	Angophora sp (Apple Box?)		N	5	1	MS	—
S	Acacia Nbilli (insulicola)	Acacia leucoclada	N	5	1	MS	
T	Yellow box	Eucalyptus melliodora	N	15	1	MS	
F	clove	Trifolium subterraneum	E	0.1	30	GC	
F	senna	Senna (occidentalis)	E	0.1	1	GC	
F	Khaki weed	Alternanthera pungens	E	0.1	1	GC	
F	Pattersons curse	Echium plantagium	E	0.1	1	GC	
F	Avena	Solanum esuriale	E	0.1	10	GC	
F	Black thistle	Cirsium vulgare	E	0.1	1	GC	
T	White Box	Eucalyptus albens	N	20	1	OS	
F	Villadinia (soft hair)	Villadinia cuneata	N	0.1	1	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	20 10 17	Wellington North	WNSF 15	Julie + Lisa

Zone	Datum	IBRA region	Photo #	Zone ID
55		SW Slopes		

Easting	Northing	Dimensions	Orientation of midline from the 0 m point.
686044	6403321		

Vegetation Class	Grassy Woodland		Confidence: H M L
Plant Community Type	White Box Woodland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	~~1~~ 2
	Shrubs	0
	Grasses etc.	3
	Forbs	0
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	30
	Shrubs	0
	Grasses etc.	0.6
	Forbs	0
	Ferns	0
	Other	0.1
High Threat Weed cover		0.5

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	IIII	0	II
30 – 49 cm	II	0	0
20 – 29 cm	0	0	0
10 – 19 cm	0	0	0
5 – 9 cm	0	0	n/a
< 5 cm	0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	3.5m 1m 1.5 1.2 1.3 3m 1.5 1.5 3.5 1m .8m 1m 3m 1.5		total 25.3

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30,..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	80 70 95 98 60	0 1.0 1 0 20	0 0 0 0 0	0 0 0 0 2
Average of the 5 subplots	80.6	8.2	0	0.4

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 20 10 17	Wellington North	WS15-W8 WOODLAND	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	White box	Eucalyptus albens	N	30	4	T	
G	Auststip verticillata	Austrostipa verticillata	N	04	20		
(F)	Horehound	Marubium vulgare	E	04	50	GC	
(F)	Lucerne	Medicago sativa	E	0.4	80	GC	
(F)	Silverleaf nightshade	Solanum elaegnifolium	HTE	0.5	100	GC	
G	Brome - Praire	Bromus catharticus	E	0.2	300	GC	
F	Wild turnip (wild mustard)	Brassica tournifortii	E	0.1	50	GC	
T	Kurrajong (seedling)	Brachychiton populneus	N	0.1	2	OS	
(O)	Glycine (tabacina)	Glycine tabacina	N	0.1	2	GC	
G	Microleena stipoides		N	0.1	2	GC	
G	sporobolus	Paspalidium constrictum	N	0.1	50	GC	
F	clover	Trifolium subterraneum	E	0.1	30	GC	
F	Caltrop bindii	Tribulus terrestris	E	0.1	10	GC	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

* paper was wet

01

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	20/10/17	Wellington North	WNSF 16	Lisa / Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							
Easting 683573	Northing 6403559	Dimensions	20 × 50m	Orientation of midline from the 0 m point.			

Vegetation Class	Woodland		Confidence: H M L
Plant Community Type	Y8 Planted Vegetation	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	3
	Shrubs	1
	Grasses etc.	1
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	50.1
	Shrubs	20.1
	Grasses etc.	0.1
	Forbs	0.2
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	0	0	0
50 – 79 cm	0	0	0
30 – 49 cm	0	0	0
20 – 29 cm	1	0	0
10 – 19 cm	1	0	0
5 – 9 cm	1	0	n/a
< 5 cm	1	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	4m 1.5 1.5 2m		total 9m

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	60 90 25 70 30	1 1 60 5 40	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	42.4	21.4	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 2010 1-7	Wellington North	WNSF16	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	Weeping Myall	Acacia pendula	N	10	2	MS	
(T)	Yellow Box	Eucalyptus melliodora	N	40	5	OS	
T (S)	Melaleuca styphelioides.		N	20	4	MS	
(G)	Bromus catharticus		E	0.5	100	GC	
(G)	Rye Grass	Lolium perrens	E	0.5	100	GC	
(G)	Barley Grass	Hordeum leporinum	E	0.5	100	GC	
(F)	Lucerne	Medico sativa	E	0.1	20	GC	
F	Einedo nutans		N	0.1	1	GC	
				0.1	30		
G	Ringed Wallaby Grass	Rytidosperma caespitosa	N	0.1	1	GC	
F	Hogweed	Zaleya galericulata	N	0.1	1	GC	
				0.1	1		
T	Acacia lineatolia (seedling)		N	0.1	1	MS	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name		Plot Identifier		Recorders	
Date	20 10 17	Wollington		WNSF17		Lisa + Julie	
Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
Easting 684722	Northing 6403778	Dimensions	20x50m	Orientation of midline from the 0 m point.	65°		
Vegetation Class		Grassy Woodland					Confidence: H M L
Plant Community Type		Planted Veg				EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	4
	Shrubs	0
	Grasses etc.	0
	Forbs	6
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	37.5
	Shrubs	0
	Grasses etc.	0
	Forbs	0
	Ferns	0
	Other	0
High Threat Weed cover		0.1

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
dbh		Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc	80 + cm	0	0	0
	50 – 79 cm	IIII (4)	0	0
30 – 49 cm		HH I (6)	0	0
20 – 29 cm		IIII (4)	II (2)	0
10 – 19 cm		I (1)	0	0
5 – 9 cm		I (1)	III (3)	n/a
< 5 cm		0	0	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70 30 35 25 15	5 0 0 .1 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	35	1.02	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 20 10 17	Wellington North	WSF17 - Planted veg	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
(T)	River Red Gum Eucalyptus camaldulensis	N	30	7	OS	
(G)	Tall Wheat Grass. Thinopyrum ponticum	E	30	1000	GC	
(S)	Melaleuca	N	2	1	MS	
(G)	Barley Grass Hordeum leporinum	E	10	1000	GC	
(G)	Rye Grass Lolium perenne	E	5	100	GC	
	Camel Melon seedlings in Citrullus lanatus	E	0.1	20	GC	
	Bathurst Burr Xanthium spinosum	HTE	0.1	1	GC	
(S)	Callistemon Callistemon sieberi	N	0.5	1	MS	
	Casuarina cunninghamia	N	5	4	MS	
	Sow thistle Sonchus oleraceus	E	0.1	1	GC	
	ARRL(?)					

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Plot Identifier	Recorders
Date	20 10 17	Wellington North	WNSF 18	Lisa Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
55							

Easting	Northing	Dimensions		Orientation of midline from the 0 m point.	166°
682759	6404120				

Vegetation Class	Grassy Woodland		Confidence: H M L
Plant Community Type	planted White box woodland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	1
	Grasses etc.	1
	Forbs	5
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	8.1
	Shrubs	25
	Grasses etc.	30?
	Forbs	0.6
	Ferns	0
	Other	0
High Threat Weed cover		10

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
dbh		Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc	80 + cm	0	0	—
	50 – 79 cm	0	0	—
30 – 49 cm		0	0	—
20 – 29 cm		III	0	—
10 – 19 cm		IIII	0	—
5 – 9 cm		III	IIII	n/a
< 5 cm		0	II	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	50 50 80 50 30	0 0 0 0 0	0 0 0 0.1 0.1	50 45 2 30 30
Average of the 5 subplots	40	0	0.04	26

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

WSF18

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 20 10 17	Wellington North	WBWoodland planted	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	White Box	Eucalyptus albens	N	8	7	OS	
(S)	Acacia (sp)	Acacia iteaphylla	N	25	5	MS	
(G)	Sporobolus	Paspalidium constructum	N	30	100	GC	
G	Wild oats	Avena fatua	E	10	1000	GC	
F	Onion weed	Asphodelus fistulosus	E	01	5	GC	
F	Horehound	Murubium vulgare	E	0.2	20	GC	
(G)	Great brome	Bromus diandrus	HTE	10	500	GC	
F	Oxalis perennans		N	01	30	GC	
F	Rumex brownii		N	01	1	GC	
F	Einadia nutans		N	01	1	GC	
T	Kurajong	Brachychiton populneus	N	01	1	MS	
F	St Barnaby thistle	Centurea solstialis	E	0.1	5	GC	
F	Prickly lettuce	Lactuca serriola	E	0.1	5	GC	
F	Hogweed	Zaleya galericulata	N	0.1	20	GC	
	Mondring weed	Austrostipa verticillatus		04	40		
F	Dichondra repens		N	0.1	20	GC	
F	Lomandra filiformis		N	0.1	2	GC	
F	Blackberry nightshade	Solanum nigrum	E	01	1	GC	

Rocky outcrop

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	20 10 17	Wellington North	WNSF19	Lisa + Julie

Zone	Datum	IBRA region	SWS	Photo #		Zone ID	
Easting 653365	Northing 6403791	Dimensions		Orientation of midline from the 0 m point.	354°		

Vegetation Class	grassland		Confidence: H M L
Plant Community Type	Low condition grassland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	1
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.1
	Forbs	0.3
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (20 x 50 m plot)		# Tree Stems Count		
dbh		Euc*	Non Euc	Hollows[1]
large trees for Euc* & Non Euc	80 + cm	+		
	50 – 79 cm	–		
30 – 49 cm		–		
20 – 29 cm		–		
10 – 19 cm		–		
5 – 9 cm		–		n/a
< 5 cm		–		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0		total —

Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately.

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

[1] Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	20 25 30 18 20	0 10 15 20 35	~~0 0 0 0 0~~	0 0 0 0 0
Average of the 5 subplots	22.6			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

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

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

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

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

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 20 10 17	Wellington North	WSF 101	JG/LHB

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
F	Fuzzweed · cuneata	Vittadinia cuneata	N	0.1	30		
F	Sida corrugata	Sida corrugata	N	0.1	2		
	wild Oats	Avena fatua	E	10	1000		
	Lucerne	Medicago sativa	E	10	100		
G	Austrostipa verticillata	Austrostipa verticillata	N	0.1	1		
	Rye Grass	Lolium perenne	E	10	500		
	Barley Grass	Hordeum leporinum	E	10	500		
F	Einadia nutans	Einadia nutans	N	0.1	1		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

DP

BAM Site – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	20 10 17	Wollongong North	WNSF 20	Julie + Lisa.

Zone	Datum	IBRA region	Photo #	Zone ID
55		SNS		

Easting	Northing	Dimensions	Orientation of midline from the 0 m point.
685132	6403876		

Vegetation Class	Woodland		Confidence: H M L
Plant Community Type	Planted veg	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	5
	Shrubs	0
	Grasses etc.	0
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	29
	Shrubs	0
	Grasses etc.	0
	Forbs	03
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	–	–	
50 – 79 cm	–	–	
30 – 49 cm	0	0	
20 – 29 cm	1		
10 – 19 cm	𝍸 𝍸 𝍸 1	𝍸	
5 – 9 cm	𝍸 11	111	n/a
< 5 cm	1	𝍸 𝍸 1	n/a
Length of logs (m) (≥0 cm diameter, >50 cm in length)	0		total 0

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70 85 75 85 95	0 0 0 0 0	0 0 0 0 0	1 0 0 0 0
Average of the 5 subplots	82.8			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

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

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

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

400 m² plot: Sheet _	Survey Name	Plot Identifier	Recorders
Date 20 10 17		WSF20	JG/LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
(T)	Acacia pycnantha		N	2	2		
F	horehound	Marrubium vulgare	E	2	15		
F	Small flowered Mallow	Malva parviflora	E	0.5	100		
F	Vanegated thistle	Silybum marianum	E	0.1	1		
F	Caltrop	Tribulus terrestris	E	0.1	100		
F	sow thistle.	Sonchus oleraceus	E	0.1	5		
G	Wild Oats	Avena fatua	E	5	500		
G	Brome	Bromus cartharticus	E	5	500		
F	Wild turnip	Brassica tournefortii	E	0.1	10		
T (S)	Silver Wattle	Acacia dealbata	N	10	4		
F	Common Peppercress	Lepidium pseudohyssopifolium	N	0.1	30		
(T)	Euc - Rough barked Gum - glaucous leaves.		N	15	7		
F	Einadia nutans	Einadia nutans	N	0.1	1		
F	oxalis perennes	Oxalis perennens	N	0.1	10		
F	Wild mustard	Diplotaxis erysimoides	E	0.1	30		
T	silky Oak	Grevillea robusta	N	1	1		
T	Euc - ironbark		N	1	1		
F	Lucerne	Medicago sativa	E	0.1	5		
F	Barley grass	Hordeum leporinum	E	10	500		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Plot Identifier	Recorders
Date	20 10 17	Wellington North	WNSF 21	EL H / OG

Zone	Datum	IBRA region	SW slopes	Photo #		Zone ID	
55							

Easting	Northing	Dimensions		Orientation of midline from the 0 m point.	55° Magnetic
684827	6403797				

Vegetation Class	Woodland		Confidence: H M L
Plant Community Type	White box woodland	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	0
	Grasses etc.	0
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	13
	Shrubs	0
	Grasses etc.	0
	Forbs	0.2
	Ferns	0
	Other	0
High Threat Weed cover		0

BAM Attribute (20 x 50 m plot)	# Tree Stems Count		
dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	III		III
50 – 79 cm			
30 – 49 cm	0		
20 – 29 cm	0		
10 – 19 cm	0		
5 – 9 cm	0	1	n/a
< 5 cm	0		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	2m 3m 1.8 1.5 1.5 1m 1m 2.3m 1m 4m		total

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30…, 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70 80 30 60 60	20 1 40 20 15	0 0 0 0 0	[illegible] 3 0
Average of the 5 subplots	60%			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

Disturbance	Severity code	Age code	Observational evidence:
ing (inc. logging)			
tion (inc. pasture)			
sion			
l / CWD removal			
dentify native/stock)			
ge			
age			

or
m

evidence, 1=light, 2=moderate, 3=severe

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

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date		WNSF21	

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
F	small flowered mallow - Malva parviflora	E	30	1000		
F	horehound Marrubium vulgare	E N	20	20		
F	wild mustard Sisymbrium erysimoides	E	10	100		
F	lucern Medicago sativa	E	5	50		
	barley grass Hordeum leporinum	E	5	1000		
	caltrop / bindi Tribulus terrestris	E	30	1000		
F	hog weed Zaleya galenulata	N	.1	50		
T	white box Eucalyptus albens	N	13	3	1	
F	oxalis pes-caprae	N	.1	50		
	wild raddish Brassica tournefortii	E	1	50		
	erodium - Coral geranium Erodium botrys	E	.1	3		
	St Barnabys thistle ~~cent~~ Centaurea solstitialis	E	.1	20		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

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

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

BAM Site Field Survey

Project:	Welington North	**Plot Identifier**	27	**Pic 20x20**		**Pic 20x50**		
Survey date:	1/06/2018		**Compass Orientation (head of 20x20 plot)**				0	
Recorders	J.Gooding		**PCT:**	437				
GPS Easting	683412	**GPS Northing**	6403267		**Datum**	UTS	**Zone**	13

Landform		**Soils**		**Drainage & Slope**	
Morphology	Creekline	**Soil Texture**		**Slope**	
LandF Element		**Soil Colour**		**Aspect**	
LandF Pattern		**Soil Depth**		**Drainage**	
Microrelief		**Geology**		**Watercourses**	

Plot Disturbance

	Severity	**Age**	**Observational Evidence**
Clearing	3	O	
Cultivation	0		
Soil erosion	2	NR	
Firewood	0		
Grazing	3	R	Heavily grazed grasses - difficult to identify to species.
Fire Damage	0		
Storm Damage	0		
Weediness	2	R	
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Grazing

Age class of trees (DBH range) , Condition of Vegetation, Hollows

10 - 100 Very Few

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Grazing, vehicle track

Significant and threatened species and communities (if present, note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

27

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	1
	Grass/Sedge (GG)	2
	Fern (EG)	0
	Other (OG)	0
	TOTAL	3

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.1
	Grass/Sedge (GG)	0.6
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	0.7
	TOTAL 'HT'	4

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80	0	1	1
50-79	0	0	
30-49	0	0	
20-29	0	0	
10-19	0	0	
5-9	0	0	N/A
<5	0	0	N/A
Length of logs (m)		5	

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	20%	45%	
	15m	35%		
	25m	45%		
	35m	60%		
	45m	65%		
Bare ground	5m		#DIV/0!	
	15m			
	25m			
	35m			
	45m			
Cryptogam cover	5m		#DIV/0!	
	15m			
	25m			
	35m			
	45m			
Rock Cover	5m		#DIV/0!	
	15m			
	25m			
	35m			
	45m			

Species recorded for	27								
N:Native	E:Exotic	HT: High Threat Exotic							
Abbreviation	**Scientific Name**	**Common Name**	**Family**	**Exotic**	**% Cover**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**BCA Stat**
TREE (TG)									
casu cunn cunn	*euca*	River Oak	Casuarinaceae		8	1	N		P
SHRUB (SG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
lyci fero	*Lycium ferocissimum*	African Boxthorn	Solanaceae	*	0.1	1	HT		
FORB (FG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
Xant Spin	*Xanthium spinosum*	Bathurst Burr	Asteraceae	*	0.1	10	HT		
Cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	*	0.1	2	HT		
Zale gale	*Zaleya galericulata*	Hogweed	Aizoaceae		0.1	2	N		
alte pung	*Alternanthera pungens*	Khaki Weed	Amaranthacea	*	0.1	30	HT		
GRASS/SEDGE (G	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
cyno dact	*Cynodon dactylon*	Common Couch	Poaceae		0.5	10	N		
aust	*Austrostipa sp.*		Poaceae		0.1	100	N		
Penn clan	*Pennisetum clandestinum*	Kikuyu Grass	Poaceae	*	2	10	E		
FERN (EG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
	#N/A	#N/A	#N/A	#N/A				#N/A	#N/A
Other (OG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
	#N/A	#N/A	#N/A	#N/A				#N/A	#N/A

BAM Site Field Survey

Project:	Welington North	**Plot Identifier**	28	**Pic 20x20**		**Pic 20x50**		
Survey date:	1/06/2018		**Compass Orientation (head of 20x20 plot)**				226	
Recorders	J.Gooding		**PCT:**	437				
GPS Easting	683280	**GPS Northing**	6402988		**Datum**	UTS	**Zone**	13

Landform		**Soils**		**Drainage & Slope**	
Morphology	Creekline	**Soil Texture**		**Slope**	
LandF Element		**Soil Colour**		**Aspect**	
LandF Pattern		**Soil Depth**		**Drainage**	
Microrelief		**Geology**		**Watercourses**	

Plot Disturbance

	Severity	**Age**	**Observational Evidence**
Clearing	3	O	
Cultivation	0		
Soil erosion	2	NR	
Firewood	0		
Grazing	3	R	Heavily grazed grasses - difficult to identify to species.
Fire Damage	0		
Storm Damage	0		
Weediness	2	R	
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Grazing

Age class of trees (DBH range) , Condition of Vegetation, Hollows

10 - 100 Very Few

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Grazing, vehicle track

Significant and threatened species and communities (if present, note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

28

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	1
	Grass/Sedge (GG)	3
	Fern (EG)	0
	Other (OG)	0
	TOTAL	4

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of cover abundance (native vascular plants)	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.1
	Grass/Sedge (GG)	2.6
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	2.7
	TOTAL 'HT'	3

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photos
Litter Cover	5m	40%	39%	
	15m	40%		
	25m	45%		
	35m	30%		
	45m	40%		
Bare ground	5m		#DIV/0!	
	15m			
	25m			
	35m			
	45m			
Cryptogam cover	5m		#DIV/0!	
	15m			
	25m			
	35m			
	45m			
Rock Cover	5m		#DIV/0!	
	15m			
	25m			
	35m			
	45m			

BAM Attribute (20 x 50m plot) Tree Stem Counts

DBH (cm)	Euc	Non Euc	Hollows
>80	0	1	1
50-79	0	0	
30-49	0	0	
20-29	0	0	
10-19	0	0	
5-9	0	0	N/A
<5	0	0	N/A
Length of logs (m)		5	

Species recorded for	28								
N:Native	E:Exotic	HT: High Threat Exotic							
Abbreviation	**Scientific Name**	**Common Name**	**Family**	**Exotic**	**% Cover**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**BCA Stat**
TREE (TG)									
		#N/A	#N/A	#N/A				#N/A	#N/A
SHRUB (SG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
	#N/A	#N/A	#N/A	#N/A				#N/A	#N/A
FORB (FG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
Xant Spin	*Xanthium spinosum*	Bathurst Burr	Asteraceae	*	0.1	1	HT		
Cart lana	*Carthamus lanatus*	Saffron Thistle	Asteraceae	*	0.1	1	HT		
medi	*Medicago spp.*	A Medic	Fabaceae (Fab	*	0.1	80	N		
salv verb	*Salvia verbenaca*	Vervain	Lamiaceae	*	0.5	80	HT		
GRASS/SEDGE (G	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
both macr	*Bothriochloa macra*	Red Grass	Poaceae		2	60	N		
aust	*Austrostipa sp.*		Poaceae		0.5	50	N		
ryti	*Rytidosperma spp.*		Poaceae		0.1	1	N		
FERN (EG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
	#N/A	#N/A	#N/A	#N/A				#N/A	#N/A
Other (OG)	***Scientific Name***	**Common Name**	**Family**	**Exotic**	**Cover%**	**Abundance**	**N, E or 'HT'**	**EPBC Stat**	**TSC Statu**
	#N/A	#N/A	#N/A	#N/A				#N/A	#N/A

APPENDIX G EPBC PROTECTED MATTERS SEARCH

Australian Government

Department of the Environment and Energy

EPBC Act Protected Matters Report

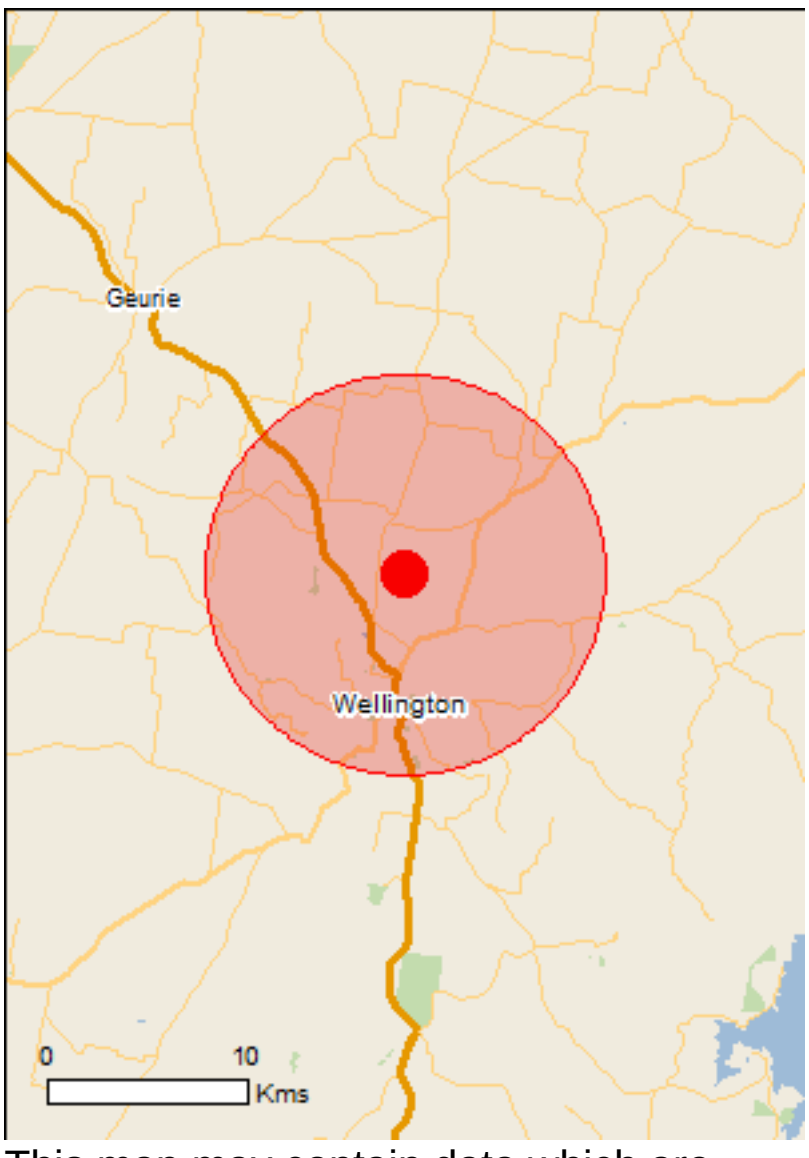
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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: 12/09/17 12:34:01

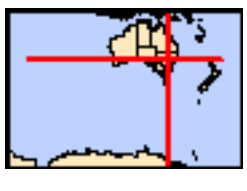
- Summary
- Details
  - Matters of NES
  - Other Matters Protected by the EPBC Act
  - Extra Information
- Caveat
- Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	29
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:	1
Listed Marine Species:	17
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:	29
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Banrock station wetland complex	800 - 900km upstream
Riverland	700 - 800km upstream
The coorong, and lakes alexandrina and albert wetland	900 - 1000km upstream
The macquarie marshes	150 - 200km upstream

Listed Threatened Ecological Communities	[Resource Information]

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

Name	Status	Type of Presence
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely 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
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 macquariensis		
Trout Cod [26171]	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
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni		
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Androcalva procumbens		
[87153]	Vulnerable	Species or species habitat likely to occur within area
Austrostipa wakoolica		
[66623]	Endangered	Species or species habitat may occur within area
Euphrasia arguta		
[4325]	Critically Endangered	Species or species habitat may occur within area
Philotheca ericifolia		
[64942]	Vulnerable	Species or species habitat likely to occur within area
Prasophyllum petilum		
Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area
Prasophyllum sp. Wybong (C.Phelps ORG 5269)		
a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
Swainsona recta		
Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
Tylophora linearis [55231]	Endangered	Species or species habitat may occur within area
Reptiles		
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area
Delma impar Striped Legless Lizard [1649]	Vulnerable	Species or species habitat may 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		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to 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 likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area
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 may 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

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 Postal Commission
Commonwealth Land - Australian Telecommunications Commission

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Wellington Post Office	NSW	Listed place

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 likely 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
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may 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
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely 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

Name	Threatened	Type of Presence
Myiagra cyanoleuca Satin Flycatcher [612]		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
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	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		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		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		
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
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

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

-32.50319 148.9466

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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APPENDIX H EPBC HABITAT ASSESSMENT

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
Regent Honeyeater *Anthochaera phrygia*	Temperate woodlands and open forests of the inland slopes of south-east Australia, in particular dry open forest, woodland, Box-Ironbark woodland, and riparian forests of River Sheoak.	Present – Box gum Woodlands present within the development site.	Unlikely – outside mapped important areas (OEH). Not detected during surveys.	No – Unlikely to occur on site
Australian Bittern *Botaurus poiciloptilus*	Permanent freshwater wetlands with tall, dense vegetation.	Absent – no freshwater wetlands with dense vegetation.	Unlikely	No – Unlikely to occur on site
Curlew Sandpiper *Calidris ferruginea*	Intertidal mudflats in both fresh and brackish waters in sheltered coastal areas, such as estuaries, bays, inlets, and lagoons. Also recorded inland, including around ephemeral and permanent lakes, dams, and waterholes, usually with bare edges of mud or sand.	Absent	Unlikely	No – Unlikely to occur on site
Painted Honeyeater *Grantiella picta*	Boree/Weeping Myall, Brigalow, and Box-Gum Woodlands and Box-Ironbark Forests.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Swift Parrot *Lathamus discolor*	On the coast and southwest slopes in areas with abundant flowering eucalypts or lerp. Feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Mugga Ironbark, and White Box.	Present	Unlikely – outside mapped important areas (OEH). Not detected during surveys	No – Unlikely to occur on site
Mallee Fowl *Leipoa ocellata*	Semi-arid to arid shrublands and low woodlands, especially those dominated by Mallee and/or Acacia which are tall, dense, and floristically rich. A sandy to sandy-loam substrate and abundance of leaf litter are required for breeding.	Absent	Unlikely	No – Unlikely to occur on site
Eastern Curlew *Numenius madagascariensis*	Large intertidal mudflats often with seagrass beds along sheltered coasts including in estuaries, bays, harbours, inlets, lagoons, and among saltmarshes and mangroves.	Absent	Unlikely	No – Unlikely to occur on site

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
Superb Parrot *Polytelis swainsonii*	Box-Gum, Box-Cypress, and Boree Woodlands and River Red Gum Forests. They nest in hollows of large trees in tall open forest or woodland.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Australian Painted Snipe *Rostratula australis*	Shallow terrestrial freshwater or occasionally brackish wetlands, including temporary and permanent lakes, swamps, and claypans, as well as inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms, and bore drains. Fringes of swamps, dams, and nearby marshy areas with cover of grasses, lignum, low scrub, or open timber. Shallow wetlands with areas of bare wet mud.	Absent	Unlikely	No – Unlikely to occur on site
Flathead Galaxias *Galaxias rostratus*	Still or slow-moving water bodies such as wetlands and lowland streams. Range of habitats including rock and sandy bottoms and aquatic vegetation.	Absent	Unlikely	No – No suitable habitat
Trout Cod *Maccullochella macquariensis*	Rivers with large in stream woody debris or snags.	Absent	Unlikely	No – No suitable habitat
Murray Cod *Maccullochelle peelii*	Wide range of warm water habitat including clear rocky streams, slow flowing turbid rivers, and billabongs, most frequently in main river channel and larger tributaries but occasionally in floodplain channels during floods. Near complex structural cover such as large rocks, woody debris, and overhanging vegetation.	Absent	Unlikely	No – No suitable habitat
Macquarie Perch *Macquaria australasica*	Both river and lake habitats; especially the upper reaches of rivers and their tributaries. Clear, deep, rocky holes with plenty of cover including aquatic vegetation, large boulders, large woody debris, and overhanging banks.	Absent	Unlikely	No – No suitable habitat

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
Large-eared Pied Bat *Chalinolobus dwyeri*	Low to mid elevation dry open forest and woodland near roosts. Roosts in caves (near entrance), crevices in cliffs, old mine workings and in disused mud nests of Fairy Martins.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Spot-tailed Quoll *Dasyurus maculatus*	Range of habitat types, including open forest, woodland, and inland riparian forest, using hollow-bearing trees, fallen logs, small caves, rock outcrops, and rocky cliff faces as den sites. Females occupy home ranges of up to about 750ha and males up to 3500ha.	Absent	Unlikely	No – No suitable habitat
Corben's Long-eared Bat *Nyctophilus corbei*	Variety of vegetation types, most commonly Mallee, Bulloak, and Box-dominated communities, but most common in vegetation with distinct canopy and dense understorey. Roost in tree hollows, crevices, and under loose bark.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Greater Glider *Petauroides volans*	Eucalypt forests and woodlands. Found in tall montane moist eucalypt forests with relatively old trees and abundant hollows.	Absent	Unlikely	No – No suitable habitat
Koala *Phascolarctos cinereus*	Temperate, subtropical and tropical eucalypt woodlands and forests where suitable food trees grow, of which there are more than 70 eucalypt species and 30 non-eucalypt species that are particularly abundant on fertile clay soils.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Grey-headed Flying-fox *Pteropus poliocephalus*	Range of vegetation communities including rainforest, open forest, and closed and open woodland. Roost sites usually near water, including lakes, rivers, and coastlines.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Pink-tailed Worm-lizard *Aprasia parapulchella*	Inhabits open woodland areas with predominantly native grassy ground layers. Commonly found beneath small, partially-embedded rock.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site

Name	Habitat	Habitat Present	Likelihood of occurrence	Potential for impact?
Striped Legless Lizard *Delmar impar*	Found mainly in Natural Temperate Grasslands but has also been captured in grasslands that have a high exotic component.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site
Small Purple-pea *Swainsona recta*	Grassy Woodlands dominated by Eucalyptus blakelyi. E. melliodora, E. rubida and E. goniocalyx.	Present	Unlikely – not detected during site surveys	No – Unlikely to occur on site

APPENDIX I EPBC ASSESSMENT OF SIGNIFICANT IMPACT

The *Environment Protection and Biodiversity Conservation Act* 1999 specifies factors to be considered in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. The *Matters of Environmental Significance – Significant Impact Guidelines* (DoE 2013) identify the factors the need to be considered.

The following assessment assesses the significance of the likely impacts associated with the proposed works on the Grey-headed Flying-fox (*Pteropus poliocephalus*) listed as Vulnerable under the EPBC Act:

a) Will the action lead to a long-term decrease in the size of an important population of a species?
Grey-headed Flying Fox (*Pteropus poliocephalus*)
Several Grey-headed Flying-foxes were seen flying overhead or in a tree foraging along tributary 1 in the development site. No breeding camps were present within the development site. Nationally important populations of the grey-headed flying fox are listed on the Department of Environments interactive flying fox viewer (DoE, 2015). No important population of Grey-headed Flying-fox is known in the development site. The nearest known flying fox camp is located on Wellington Island on the Macquarie River, Wellington approximately 4km south of the development site. It Is estimated 500-2500 flying fox could occupy the breeding camp (DoE, 2017). The flying fox camp located on Wellington Island supports a breeding population and is considered an important population. Grey-headed Flying-fox can forage within a range of up to 50km from their roosts (OEH, 2017) and individuals from the breeding camp may forage or travel over the development site on occasion. Impacts may occur on the nearest important population of Grey-headed Flying Fox on Wellington Island through the removal of potential foraging habitat. Grey-headed Flying-fox forages on fruits and flowers of native trees such as Eucalypts, Melaleucas and Banksia (OEH, 2017). Up to 21ha of native woodland vegetation would be removed by the development. Grey-headed Flying-foxes can travel up to 50km from the camp to forage (OEH, 2017). Based on the large tract (5500ha) of woodland immediately to the west of the known camp and 20km East, the removal of up to 21ha of native woodland would unlikely lead to a significant decrease to the Flying-fox forage area and size of the population.
b) Will the action reduce the area of occupancy of an important population of a species?
Grey-headed Flying Fox (*Pteropus poliocephalus*)
The nearest known important population of Grey-headed Flying-fox occurs approximately 4km south, on Wellington Island along the Macquarie River. Grey-headed Flying-fox generally forage within a range of around 15km from their roosts but can forage up to 50km. The proposal would involve the removal of up to 21ha of foraging habitat for the species. The quality of potential habitat for these species is low, and the area of habitat to be removed is relatively small within their foraging range. No barriers to movement would be created by the development. The action will not reduce the area of occupancy of an important population of these species.
c) Will the action fragment an existing important population into two or more populations?
Grey-headed Flying Fox (*Pteropus poliocephalus*)
The nearest known important population of Grey-headed Flying-fox occurs approximately 4km south, on Wellington Island along the Macquarie River. The proposal would involve the removal of up to 21ha of potential foraging habitat. The quality of potential habitat for these species is low, and the area of habitat to be removed is relatively small within their foraging range. Habitat would be retained along tributary 1

and connectivity would not be disrupted for these aerial species. The proposal would not fragment an existing important population of these species into two or more populations.

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

Grey-headed Flying Fox (*Pteropus poliocephalus*)

The Register of Critical Habitat established under the EPBC Act does not list any critical habitat for these species.

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

Grey-headed Flying Fox (*Pteropus poliocephalus*)

There is no breeding camp for this species in the development site. The proposal would not disrupt the breeding cycle of the Grey-headed Flying-fox

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

Grey-headed Flying Fox (*Pteropus poliocephalus*)

The proposal would involve the removal of up to 21ha of habitat. Grey-headed Flying-foxes forage a range of 15km from their breeding camps but can travel up to 50km from the camp to forage (OEH, 2017). Based on the large tract (5500ha) of woodland immediately to the west of the known camp and 20km East, the removal of 21ha of woodland would unlikely lead to a substantial decrease to foraging habitat for the Grey-headed flying fox.

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

Grey-headed Flying Fox (*Pteropus poliocephalus*)

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

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

Grey-headed Flying Fox (*Pteropus poliocephalus*)

There is a risk that diseases could be introduced to the development site via machinery, vehicles, and materials during construction and operation. With the implementation of the recommended mitigation measures, the proposal is unlikely to result in the introduction of any disease that may cause these species to decline.

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

Grey-headed Flying Fox (*Pteropus poliocephalus*)

The draft National Recovery Plan for Grey-headed Flying-fox lists the following overall objectives:

1. Improve the Grey-headed Flying-fox national population trend by reducing the impact of threatening processes on Grey-headed Flying-foxes through habitat identification, protection, restoration, and monitoring.
2. Assist communities and Grey-headed Flying-foxes to coexist through better education, stakeholder engagement, research, policy and continued support to fruit growers.

The proposal would not interfere with any of these objectives.

APPENDIX J BAM CALCULATOR CREDIT REPORTS

WESTERN TRANSMISSION LINE OPTION

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00009144/BAAS17026/18/00009145

Assessor Name
Julie Gooding

Proponent Names

Proposal Name
Wellington North Solar Farm

Assessor Number
17026

Report Created
22/06/2018

BAM data last updated *
24/02/2018

BAM Data version *
3

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

Candidate Serious and Irreversible Impacts

No Data

No Data

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Like for like)

Name
Glossopsitta porphyrocephala / Purple-crowned Lorikeet

Ecosystem Credit Summary

PCT	TEC	Area	Credits
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	97.6	123.00
437-Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	14.4	307.00

Credit classes for 266	**Like-for-like options**		
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions

	White Box Yellow Box Blakely's Red Gum Woodland (including PCT's 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698)	Yes	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Credit classes for 437	**Like-for-like options**		
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions

	White Box Yellow Box Blakely's Red Gum Woodland (including PCT's 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698)	Yes	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	

Species Credit Summary

Species	Area	Credits
Myotis macropus / Southern Myotis	0.2	6.00

Myotis macropus/ Southern Myotis	437_Moderate	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions

		Myotis macropus/Southern Myotis	Any in NSW

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00009144/BAAS17026/18/00009145	Wellington North Solar Farm	24/02/2018
Assessor Name	**Report Created**	**BAM Data version ***
Julie Gooding	22/06/2018	3
Assessor Number		
17026		

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

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion								
1	266_Moderate	23.0	3.7	0.25	High Sensitivity to Potential Gain	2.00	TRUE	42
2	266_DGL	5.8	90.7	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
3	266_Planted	53.7	2.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	56

6	266_Moderate_good	46.7	0.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	19
7	266_DGL_Good	40.0	0.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	6
							Subtotal	**123**
Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion								
4	437_Moderate	49.4	2.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	69
5	437_Planted	45.3	10.5	0.25	High Sensitivity to Potential Gain	2.00	TRUE	238
8	437_Low	8.3	1.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
							Subtotal	**307**
							Total	**430**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits
Myotis macropus / Southern Myotis (Fauna)						
437_Moderate	49.4	0.23	0.25	2	False	6
					Subtotal	**6**

EASTERN TRANSMISSION LINE OPTION

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00009144/BAAS17026/18/00009145

Assessor Name
Julie Gooding

Proponent Names

Proposal Name
Wellington North Solar Farm

Assessor Number
17026

Report Created
22/06/2018

BAM data last updated *
24/02/2018

BAM Data version *
3

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

Candidate Serious and Irreversible Impacts

No Data

No Data

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Like for like)

Name
Glossopsitta porphyrocephala / Purple-crowned Lorikeet

Ecosystem Credit Summary

PCT	TEC	Area	Credits
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	96.9	114.00
437-Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	12.3	256.00

Credit classes for 266	**Like-for-like options**		
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions

	White Box Yellow Box Blakely's Red Gum Woodland (including PCT's 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698)	Yes	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Credit classes for 437	**Like-for-like options**		
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions

	White Box Yellow Box Blakely's Red Gum Woodland (including PCT's 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698)	Yes	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	

Species Credit Summary

Species	Area	Credits
Myotis macropus / Southern Myotis	0.2	6.00

Myotis macropus/ Southern Myotis	437_Moderate	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions

		Myotis macropus/Southern Myotis	Any in NSW

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00009144/BAAS17026/18/00009145	Wellington North Solar Farm	24/02/2018
Assessor Name	**Report Created**	**BAM Data version ***
Julie Gooding	22/06/2018	3
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Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion								
1	266_Moderate	23.0	3.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	36
2	266_DGL	5.8	90.7	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
3	266_Planted	53.7	2.2	0.25	High Sensitivity to Potential Gain	2.00	TRUE	59
6	266_DNG_Good	40.0	0.5	0.25	High Sensitivity to Potential Gain	2.00	TRUE	10

7	266_Mod_good	46.7	0.4	0.25	High Sensitivity to Potential Gain	2.00	TRUE	9
							Subtotal	**114**
Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion								
4	437_Moderate	49.4	1.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	25
5	437_Planted	45.3	10.2	0.25	High Sensitivity to Potential Gain	2.00	TRUE	231
8	437_Low	8.3	1.1	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
							Subtotal	**256**
							Total	**370**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits
Myotis macropus / Southern Myotis (Fauna)						
437_Moderate	49.4	0.23	0.25	2	False	6
					Subtotal	**6**