Appendix B

Biodiversity Development Assessment Report

Tamworth Solar Farm
Biodiversity Development Assessment Report
Streamlined assessment

Tamworth LGA, NSW
December 2019

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Executive Summary

Oriens Energy Pty Ltd is seeking approval under Division 4.1, Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for a Development Application (DA) for the Tamworth Solar Farm (the project) on Lot 186 DP755340. This State Significant Development (SSD-9264) is comprised of three Development Areas cumulatively on 200.49 hectares of land (Figures 1-1 to 1-8). These areas are:

- The Solar Farm and Battery Energy Storage System (BESS), 200.04 hectares
- The deceleration lane at the intersection of Oxley Highway and Babbinboon Road, 0.41 hectares
- An area requiring one tree, a mature *Acacia stenophylla*, be removed to improve sight distance at Babbinboon Road and Warminster Road intersection, 0.04 hectares.

The Solar Farm Development Area is located approximately seven kilometres south of Somerton in the Tamworth Local Government Area (LGA). Ancillary sight distance work at Warminster and Babbinboon Roads intersection and a proposed deceleration lane on Oxley Highway for Gunnedah bound traffic at the Babbinboon Road intersection, are both 4.5 kilometres from Somerton.

The project involves the construction of an 80MW Photovoltaic (PV) facility. Oriens Energy has an option to purchase the property. It is intended that the PV Facility will have minimal impact to the overall landscape when decommissioned.

An Environmental Impact Statement (EIS) is required as part of the approval process and this project is to be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Under s.4.15(1)(b) of the EP&A Act, the applicant must consider “the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality”.

This streamlined (paddock tree) Biodiversity Development Assessment Report (BDAR) has been prepared to assess impact to biodiversity by the project to meet the requirements of the EP&A Act. The Solar Farm Development Area is currently managed under a Property Vegetation Plan which authorises clearing of *non-protected groundcover regrowth*. The paddock trees are considered as category 2 land, while the other areas are considered as category 1 land.

A field survey for this project took place from Tuesday 17 to Thursday 19 September 2019.

In the Solar Farm Development Area, the project will remove 19 large paddock trees with hollows which are remnant from the Plant Community Type (PCT) 433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion. Removal of these trees will generate a credit requirement of 19 Ecosystem Credits. Two sheds and two disused silos will also be removed for this project.

The project will also remove one tree (*Acacia stenophylla*) in the Sight Distance Development Area. This tree will be removed using a chainsaw with no impact to

groundcover. This species is not a paddock tree and its removal does not trigger assessment under the biodiversity offset scheme.

Document Controls

Proponent	Oriens Energy Pty Ltd		
Client	PROJECTe-		
Document Description	Biodiversity Development Assessment Report: Tamworth Solar Farm		
Clients Representative Managing this Document	AREA Person(s) Managing this Document		
Daryl Brown	Phil Cameron (PJC) - Principal Consultant		
Document Status:	Version	Date	Action
Series V1.X = Internal edits	V1.0 V1.1	30.10.2019 5.11.2019	AW TO PJC Reviewed
Series V2.X = Client internal edits	V2.0 V2.1	5.11.2019	For Client Client edits provided
FINAL when draft is approved by client	V3.0 V3.1	06.12.2019 20.12.2019	Edits completed Minor update
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BAM definitions and acronyms used in this document

Definitions

Accredited person: has the same meaning as in the BC Act, referred to in the BAM as 'assessor'.
Ancillary rules: has the same meaning as set out in clause 6.5 of the BC Regulation.
Annual probability of decline in vegetation and habitat condition: an estimate of the average probability of decline of each attribute through clearing, stochastic factors or ongoing degrading actions (firewood removal, weed invasion, livestock grazing).
Areas of geological significance: geological features such as karst, caves, crevices, cliffs.
Assessment area surrounding the subject land: the area of land in the 1500m buffer zone around a development site, or land to be biodiversity certified or a biodiversity stewardship site, that is determined in accordance with Subsection 4.3.2.
Assessor: the person accredited under the BC Act referred to in Subsection 2.1.2 and who has been engaged by the proponent.
Averted loss: the gain in vegetation and habitat condition that arises from managing the proposed land as an offset compared to the probable future vegetation condition if the land was to be left unmanaged (see *Annual probability of decline*).
Avoid: measures taken by a proponent such as careful site selection or actions taken through the design, planning, construction and operational phases of the development to completely avoid impacts on biodiversity values, or certain areas of biodiversity. Refer to the BAM for operational guidance.
BAM: the Biodiversity Assessment Method.
BC Act: the Biodiversity Conservation Act 2016.
BC Regulation: the Biodiversity Conservation Regulation 2017.
Benchmark data: for a PCT, vegetation class or vegetation formation benchmark data is contained in the BioNet Vegetation Classification. A local reference site may also be used to establish benchmark data for a PCT that may be used in a BAM assessment.
Benchmarks: the quantitative measures that represent the 'best-attainable' condition, which acknowledges that native vegetation within the contemporary landscape has been subject to both natural and human-induced disturbance. Benchmarks are defined for specified variables for each PCT. Vegetation with relatively little evidence of modification generally has minimal timber harvesting (few stumps, coppicing, cut logs), minimal firewood collection, minimal exotic weed cover, minimal grazing and trampling by introduced or overabundant native herbivores, minimal soil disturbance, minimal canopy dieback, no evidence of recent fire or flood, is not subject to high frequency burning, and has evidence of recruitment of native species.
Biodiversity certification: has the same meaning as in the BC Act.
Biodiversity Certification Assessment Report (BCAR): has the same meaning as in the BC Act.
Biodiversity credit report: the report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a development footprint.
Biodiversity Development Assessment Report (BDAR): has the same meaning as in the BC Act.
Biodiversity offsets: management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development.
Biodiversity stewardship agreement: has the same meaning as in the BC Act.
Development footprint: has the same meaning as in the BC Act.
Biodiversity Stewardship Assessment Report (BSAR): the report that must be prepared in accordance with the BAM and submitted as part of an application for a biodiversity stewardship agreement.
Biodiversity values: has the same meaning as clause 1.5(2) of the BC Act.
Biodiversity values map: is established according to clause 7.3 of the BC Regulation. Development within an area identified on the map requires assessment using the BAM.
BioNet Atlas: the OEH database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the BC Act) and some fish.
BioNet Vegetation Classification: the master vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by OEH and available at www.environment.nsw.gov.au/research/Visclassification.htm.
Broad condition state: areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Certified more appropriate local data: has the same meaning as set out in Subsection 2.2.2.
Change in vegetation integrity score for a development footprint: the difference (gain) between the estimated vegetation integrity score without management at a development footprint and the predicted future vegetation integrity score with management at a development footprint, calculated in accordance with Equation 28.
Class of biodiversity credit: as defined in Section 11.3.
Clearing site: the site proposed to be cleared of native vegetation where approval is sought under Part 4 *Environment Planning and Assessment Act 1979.*
Clonal species: flora species that propagate asexually at a site or have a limited degree of sexual reproduction, either within or between sites. Modes of asexual reproduction will include vegetative reproduction such as by rhizomes, root suckers or bulb replication.
Connectivity: the measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.

Credit Calculator: the computer program that provides decision support to assessors and proponents by applying the BAM, in particular by using the data required to calculate the number and class of biodiversity credits required to offset the impacts of a development or created at a development footprint.
Critically endangered ecological community (CEEC): an ecological community specified as critically endangered in Schedule 2 of the BC Act and/or listed under Part 13, Division 1,
Subdivision A of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
Crown cover: the vertical projection of the periphery of tree crowns within a designated area.
Derived vegetation: PCTs that have changed to an alternative stable state as a consequence of land management practices since European settlement. Derived communities can have one or more structural components of the vegetation entirely removed or severely reduced (e.g. over-storey of grassy woodland) or have developed new structural components where they were previously absent (e.g. shrubby mid-storey in an open woodland system).
Development Area: See Development site
Development footprint: the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term *development footprint* is also taken to include clearing footprint except where the reference is to a small area development or a major project development.
Development site: an area of land that is subject to a proposed development that is under the EP&A Act. The term *development site* is also taken to include clearing site except where the reference is to a small area development or a major project development.
Ecosystem credits: a measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a development footprint.
Endangered ecological community (EEC): an ecological community specified as endangered in Schedule 2 of the BC Act, or listed under the EPBC Act.
Environment Agency Head: has the same meaning as in the BC Act.
EP&A Act: the NSW Environmental Planning and Assessment Act 1979.
EPBC Act: the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
Ephemeral flora species: flora species where the abundance of the species above ground fluctuates in response to the plant life history in combination with environmental conditions and/or disturbance regimes. Fluctuations in abundance may be short-term (seasonal) or long-term (yearly to decadal). Many ephemeral species persist underground through unfavourable conditions via soil seed banks or dormant vegetative organs (bulbs, tubers, rootstocks).
Estuarine area: a semi-enclosed body of water having an open or intermittently open connection with the ocean, in which water levels do not vary with the ocean tide (when closed to the sea) or vary in a predictable, periodic way in response to the ocean tide at the entrance (when open to the sea).
Expert: a person who has the relevant experience and/or qualifications to provide expert opinion in relation to the biodiversity values to which an expert report relates.
Foliage cover: the percentage of a plot area that would be covered by a vertical projection of the foliage and branches and trunk of a plant, or plants or a growth form group. Foliage cover can also be referred to as percent foliage cover.
Gain: the gain in biodiversity values at a development footprint, over time from undertaking management actions at a development footprint. Gain in biodiversity values is the basis for creating biodiversity credits at the development footprint.
Grassland: native vegetation classified in the vegetation formation 'Grasslands' in Keith (2004)[2]. Grasslands are generally dominated by large perennial tussock grasses, lack of woody plants, the presence of broad-leaved herbs in inter-tussock spaces, and their ecological association with fertile, heavy clay soils on flat topography in regions with low to moderate rainfall.
Growth form: the form that is characteristic of a particular flora species at maturity.
Habitat: an area or areas occupied, or periodically or occasionally occupied, by a species or ecological community, including any biotic or abiotic component.
Habitat component: the component of habitat that is used by a threatened species for either breeding, foraging or shelter.
Habitat surrogates: measures of habitat that predict the occurrence of threatened species and communities: IBRA subregion, PCT, percent vegetation cover and vegetation condition.
Herbfield: native vegetation which predominantly does not contain an over-storey or mid- storey and where the ground cover is dominated by non-grass species.
High threat exotic plant cover: plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species. Also referred to as high threat weeds.
Hollow bearing tree: a living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1m above the ground. Trees must be examined from all angles.
IBRA region: a bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system[3], which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA subregion: a subregion of a bioregion identified under the IBRA system.
Impact assessment: an assessment of the impact or likely impact of a development on biodiversity values which is prepared in accordance with the BAM.
Impacts on biodiversity values: loss in biodiversity values from direct or indirect impacts of development in accordance with Chapters 8, 1 and 10.
Important wetland means:
(a) a wetland that is listed in the Directory of Important Wetlands of Australia
(DIWA) from time to time, and
(b) for the purposes of all paragraphs except 4.2.1.6 the actual location on the

ground that corresponds to a SEPP 14 Coastal wetland
(c) for the purposes of Paragraph 4.2.1.6:
(i) a SEPP 14 Coastal Wetland, and
(ii) the actual location on the ground that corresponds to a SEPP 14 Coastal Wetland.

Individual: in relation to organisms, a single, mature organism that is a threatened species, or any additional threatened species listed under Part 13 of the EPBC Act.

Intact vegetation: vegetation where all tree, shrub, grass and/or forb structural growth form groups expected for a plant community type are present.

Intrinsic rate of increase (*ir*): an estimate of the rate of gain for an attribute at a development footprint from actions undertaken as part of the management plan. The intrinsic rate of increase is specified for an attribute according to the formation of the PCT being assessed.

Landscape attributes: in relation to a development site or a development footprint, native vegetation cover, vegetation connectivity, patch size and the strategic location of a development footprint.

Large tree benchmark: is the largest stem size class for a PCT as determined by the benchmark for the PCT.

Life cycle: the series of stages of reproduction, growth, development, aging and death of an organism.

Life form: the form that is characteristic of a particular species at maturity. In the BAM, life form has the same meaning as growth form for flora species.

Linear shaped development: development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length.

Litter cover: the percentage ground cover of all plant material that has detached from a living plant, including leaves, seeds, twigs, branchlets and branches (<10cm in diameter).

Local population: the population that occurs in the development footprint. In cases where multiple populations occur in the development footprint or a population occupies part of the development footprint, impacts on each subpopulation must be assessed separately.

Local wetland: any wetland that is not identified as an important wetland (refer to definition of *Important wetland*).

Loss of biodiversity: the loss of biodiversity values from a development site, native vegetation clearing site or land where biodiversity certification is conferred.

Major project: State Significant Development and State Significant Infrastructure.

Minimise: a process applied throughout the development planning and design life cycle which seeks to reduce the residual impacts of development on biodiversity values.

Mitchell landscape: landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.

Multiple fragmentation impact development: developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines.

Native ground cover: all native vegetation below 1m in height, including all such species native to NSW (i.e. not confined to species indigenous to the area).

Native ground cover (grasses): native ground cover composed specifically of native grasses. **Native ground cover (other):** native ground cover composed specifically of non-woody native vegetation (vascular plants only) <1m in height that is not grass (e.g. herbs, ferns).

Native ground cover (shrubs): native ground cover composed specifically of native woody vegetation <1m in height.

Native mid-storey cover: all vegetation between the over-storey stratum and a height of 1m (typically tall shrubs, under-storey trees and tree regeneration) and including all species native to NSW (i.e. native species not local to the area can contribute to mid-storey structure).

Native over-storey cover: the tallest woody stratum present (including emergent) above 1m and including all species native to NSW (i.e. native species not local to the area can contribute to over-storey structure). In a woodland community, the over-storey stratum is the tree layer, and in a shrubland community the over-storey stratum is the tallest shrub layer. Some vegetation types (e.g. grasslands) may not have an over-storey stratum.

Native plant species richness: the number of different native vascular plant species that are characteristic of a PCT.

Native vegetation: has the same meaning as in section 1.6 of the BC Act.

Native vegetation cover: the percentage of native vegetation cover on the subject land and the surrounding buffer area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, taking into account vegetation condition and extent. Native over-storey vegetation is used to determine the percent cover in woody vegetation types, and native ground cover is used to assess cover in non-woody vegetation types.

Number of trees with hollows: a count of the number of living and dead trees that are hollow bearing.

Offset rules: are those established by the BC Regulation.

Onsite measures: measures and strategies that are taken or are proposed to be taken at a development site to avoid and minimise the direct and indirect impacts of the development on biodiversity values.

Operational Manual: the Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM.

Patch size: an area of intact native vegetation that:
a) occurs on the development site or development footprint, and
b) includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems).

Patch size may extend onto adjoining land that is not part of the development site or development footprint.
PCT classification system: the system of classifying native vegetation approved by the NSW Plant Community Type Control Panel and described in the BioNet Vegetation Classification.
Percent cleared value: the percentage of a PCT that has been cleared as a proportion of its pre-1750 extent, as identified in the BioNet Vegetation Classification.
Plant community type (PCT): a NSW plant community type identified using the PCT classification system.
Plot: an area within a vegetation zone in which site attributes are assessed.
Population: a group of organisms, all of the same species, occupying a particular area.
Probability of reaching benchmark: the probability of a specific attribute or growth form group reaching benchmark conditions in the vegetation zone at the end of the management timeframe.
Proponent: a person who intends to apply for consent or approval to carry out development, clearing, biodiversity certification or for approval for infrastructure.
Reference sites: the relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration: the proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5cm within a vegetation zone.
Residual impact: an impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits: the retirement of biodiversity credits from a biobank site or a development footprint secured by a biodiversity stewardship agreement.
Riparian buffer: an area of land determined according to appropriate guidelines.
Risk of extinction: the likelihood that the local population or CEEC or EEC will become extinct either in the short term or in the long term as a result of direct or indirect impacts on the viability of that population or CEEC or EEC.
SEPP 14 Coastal wetland: a wetland to which *State Environmental Planning Policy No 14 – Coastal Wetlands* applies or an area that is identified as a coastal wetland within the meaning of the term *coastal wetlands and littoral rainforests area* for the purposes of *Coastal Management Act 2016*.
Site attributes: the matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development: a development other than a linear shaped development, or a multiple fragmentation impact development.
Site context: the value given to landscape attributes of a development site or development footprint after an assessment undertaken in accordance with Section 4.3.
Species credit species: are threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits.
Species credits: the class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
State Significant Development: has the meaning given by Division 4.1 of Part 4 of the EP&A Act.
State Significant Infrastructure: has the meaning given by Part 5.1 of the EP&A Act. **Stream order:** 'Stream order' is used to describe the hierarchy of streams from the top to the bottom of a catchment.
Subject land: is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threat status class: the extent to which a species or ecological community is threatened with extinction, or the extent to which a PCT is estimated to have been cleared (see *Percent cleared value*).
Threatened Biodiversity Data Collection: part of the BioNet database, published by OEH and accessible from the BioNet website at www.bionet.nsw.gov.au.
Threatened ecological community (TEC): means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act.
Threatened species: critically endangered, endangered or vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.
Threatened species survey: a targeted survey for threatened species undertaken in accordance with Section 6.5.
Threatened species survey guidelines: survey methods or guidelines published by OEH from time to time at www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/about-threatened-species/surveys-and-assessments.
Total length of fallen logs: the total length of logs present in a vegetation zone that are at least 10cm in diameter and at least 0.5m long.
Transect: a line or narrow belt along which environmental data is collected.
Upland Swamp Policy: the document entitled *Addendum to NSW Biodiversity Offsets Policy for Major Projects: Upland swamps impacted by longwall mining subsidence* as in force on the day when the BAM is published until such time as the Environment Agency Head publishes any further document for the purpose of it being adopted by the BAM as the Upland Swamp Policy.

Vegetation Benchmarks Database: a database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification. It is available at www.environment.nsw.gov.au/research/Visclassification.htm.
Vegetation class: a level of classification of vegetation communities defined in Keith (2004)[4]. There are 99 vegetation classes in NSW.
Vegetation formation: a broad level of vegetation classification as defined in Keith (2004)[4]. There are 16 vegetation formations and sub-formations in NSW.
Vegetation integrity: the condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT.
Vegetation integrity score: the quantitative measure of vegetation condition calculated in accordance with Equation 15 or Equation 16.
Vegetation zone: a relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a development footprint that is the same PCT and broad condition state.
Viability: the capacity of a species to successfully complete each stage of its life cycle under normal conditions so as to retain long-term population densities.
Vulnerable ecological community (VEC): an ecological community specified as vulnerable in Schedule 2 of the BC Act and/or listed under Part 13, Division 1, Subdivision A of the EPBC Act.
Wetland: an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water (see also *Important wetland* and *Local wetland*).
Woody native vegetation: native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs.

Acronyms

Acronym	Definition
BAR	Biodiversity Assessment Report
BAMC	Biodiversity Assessment Method Calculator
BASSR	Biodiversity Steward Site Assessment Report
BDAR	Biodiversity Development Assessment Report
BOM	Bureau of Meteorology
BC Act	Biodiversity Conservation Act 2016
BESS	Battery Energy Storage System
BOS	Biodiversity Offset Strategy
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environment Management Plan
DPIE	Department of Planning, Industry and Environment
DPI	Department of Primary industries
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPBC	Environment Protection and Biodiversity Conservation Act 1999
GDE	Groundwater dependent ecosystems
GIS	Geographic information system
GPS	Global positioning system
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key threatening process
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NP&W Act	National Parks and Wildlife Act 1974
NPWS	National Parks and Wildlife Services
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	Plant Community Types
PMST	Protected Matters Search Tool
SAT	Scat Assessment Technique
SEARS	Secretary's Environmental Assessment Requirement
SEPP	State Environmental Planning Policy
SSD	State Significant Development
TEC	Threatened Ecological Community
TSPD	Threatened Species Profile Database
VEC	Vulnerable Ecological Community
VIS	Vegetation Information System
WIRES	Wildlife Information, Rescue and Education Services

1. Stage 1 Biodiversity assessment

1.1 Introduction

AREA Environmental Consultants & Communication (AREA) was commissioned by PROJECTe- on behalf of Oriens Energy Pty Ltd (the proponent) to complete a biodiversity assessment for a proposed solar farm near Tamworth, NSW (the project).

This Biodiversity Development Assessment Report (BDAR) has been prepared to meet the following Secretary's Environmental Assessment Requirements (SEARs):

- an assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR)
- the BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM
- an assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the Fisheries Management Act 1994, and a description of the measures to minimise and rehabilitate impacts.

In this report, 'Development Area' has the same meaning as 'Development Site' as defined in the Biodiversity Assessment Method (2017). See definitions list earlier in this document. The Development Area in this report refers to three distinct areas (see section 1.1.2):

- The Solar Farm Development Area
- The Deceleration Lane Development Area
- The Sight Distance Development Area.

This biodiversity assessment qualifies as a streamlined paddock tree assessment using the Appendix 1: definition of paddock trees a): *the trees located on category 2 land are surrounded by category 1 land on the regulatory maps under the Biodiversity Conservation Act.* By this definition, the trees are considered as category 2 land, while the surrounding groundcover is category 1 land.

The surrounding land (groundcover regrowth) is designated as category 1 land as allowable under an existing Property Vegetation Plan relevant in perpetuity and which authorises the removal of *non-protected regrowth groundcover* (see section 1.1.2). To confirm this the Solar Farm Development Area is consistent with the requirements for category 1 land, an assessment of the existing vegetation was completed using Biodiversity Assessment Method (BAM) plots. Data collected from the plots was used in the Biodiversity Assessment Method Calculator (BAMC) to determine the Vegetation Integrity Score.

The ploughed agricultural land covered by the PVP does not require further assessment, but the native trees in this area do. There trees have been assessed using the streamlined paddock tree assessment.

The PVP will no longer apply to the property after the proposal has received approval and the property becomes the site of a State Significant Development with associated conditions of consent.

1.1.1 The project

The project involves the construction of a 80MW Photovoltaic (PV) and Battery Energy Storage System (BESS) facility located on approximately 200.04 ha of farmland (Figure 1-28).

Oriens Energy has an option to purchase the land. The facility when decommissioned will restore the land to its former use in agricultural pursuits. It is intended that the PV Facility will have minimal impact to the overall landscape when decommissioned. The system is to be operated remotely with physical presence on the site limited to maintenance activities and inspections. The PV facility will consist of the following components:

- Solar panels (also known as “modules”)
- Steel module mounts
- Electrical transformers and inverters
- Electrical wiring
- Telecommunications equipment (an approximately seven metre high pole if required)
- Electrical metering and switchgear housed inside a cabin
- Informal employee parking area
- Perimeter fencing and access gates.

The facility will include a Battery Energy Storage System (BESS), housed in electrical enclosures approximately the size of a shipping container.

The extent of civil works to occur on the site will include the following:

- Site preparation, tree removal and minor earth work for buildings and solar arrays, temporary handstand and compound areas and for roads.
- Driven W Sections or I Beams will be used for the piles for the foundations
- Piles will be 1.5 metres above ground with likely 1.5 to two metres below ground
- Each row will consist of 11 to 13 piles
- Each row will be 85 to 100 metres in length
- Trenching for the electrical wiring
- The internal access track leading from the main entrance will be graded and surfaced with crushed rock, there will be no formalised internal roads provided between panels.
- The existing soil will be retained and reseeded to provide grass coverage over the site. Grass will be maintained through periodic slashing or potential grazing opportunities.

Two farm sheds and silos will be removed where they occur in the proposed solar panels footprint.

1.1.2 General description of the Development Area

The Development Area is located approximately 32 kilometres north west from Tamworth, NSW (Figure 1-1).

The project involves the construction of an 80MW Photovoltaic (PV) facility, BESS facility and vehicle access route modifications. The Tamworth Solar Farm (the project) State

Significant Development (SSD-9264) is comprised of three Development Areas cumulatively on 200.49 hectares of land (Figure 1-2 to Figure 1-7):

- The Solar Farm Development Area:
  - 200.04 hectares
  - approximately seven kilometres south of Somerton in the Tamworth Local Government Area (LGA)
- The Deceleration Lane Development Area
  - at the intersection of Oxley Highway and Babbinboon Road
  - 0.41 hectares
  - 4.5 kilometres from Somerton
  - The Sight Distance Development Area
    - an area requiring a tree removed to improve sight distance at Babbinboon Road and Warminster Road intersection
    - 0.04 hectares
    - 4.5 kilometres from Somerton.

All three Development Areas are on land subject to previous significant ground surface disturbance activities including agriculture such as dryland cropping and grazing, heavy vehicle movements and previous gravel stockpiles (Figures 1-2 to 1-7).

Figure 1-1: Location of the Development Areas

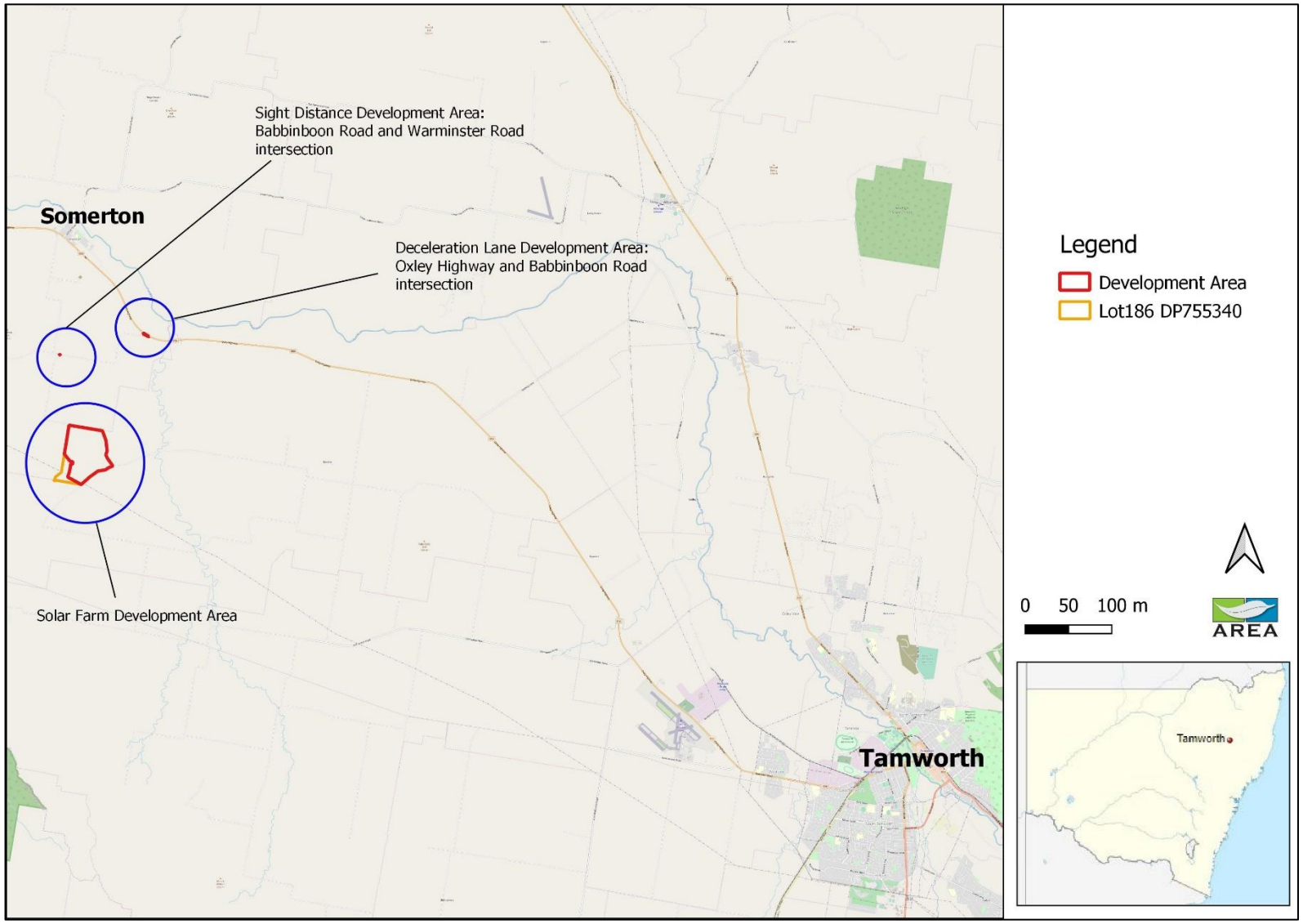


Figure 1-2: Aerial view of the Solar Farm Development Area

Figure 1-3: Topographical view of the Solar Farm Development Area

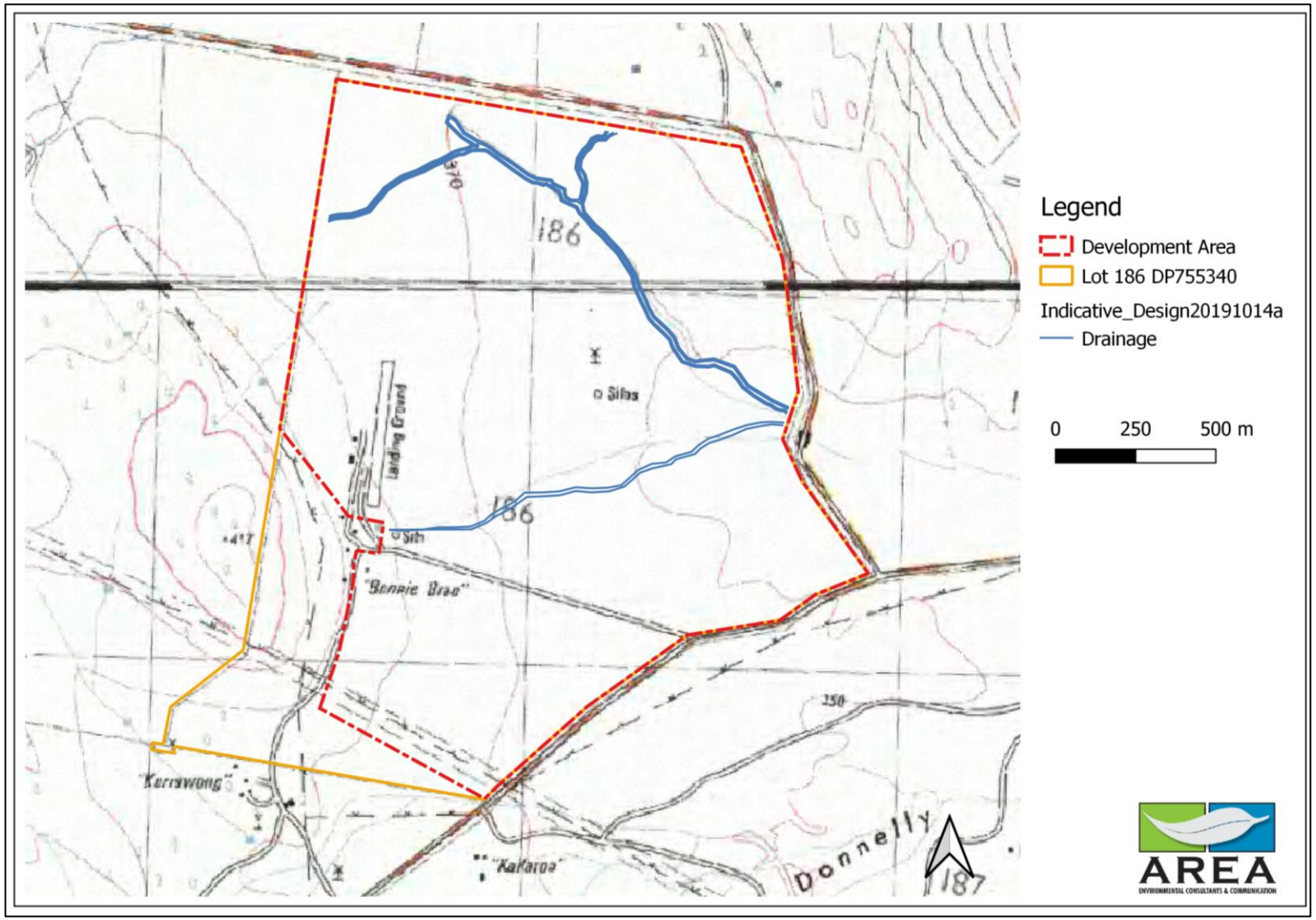


Figure 1-4: Aerial view of the Deceleration Lane Development Area at the intersection of Oxley Highway and Babbinboon Road

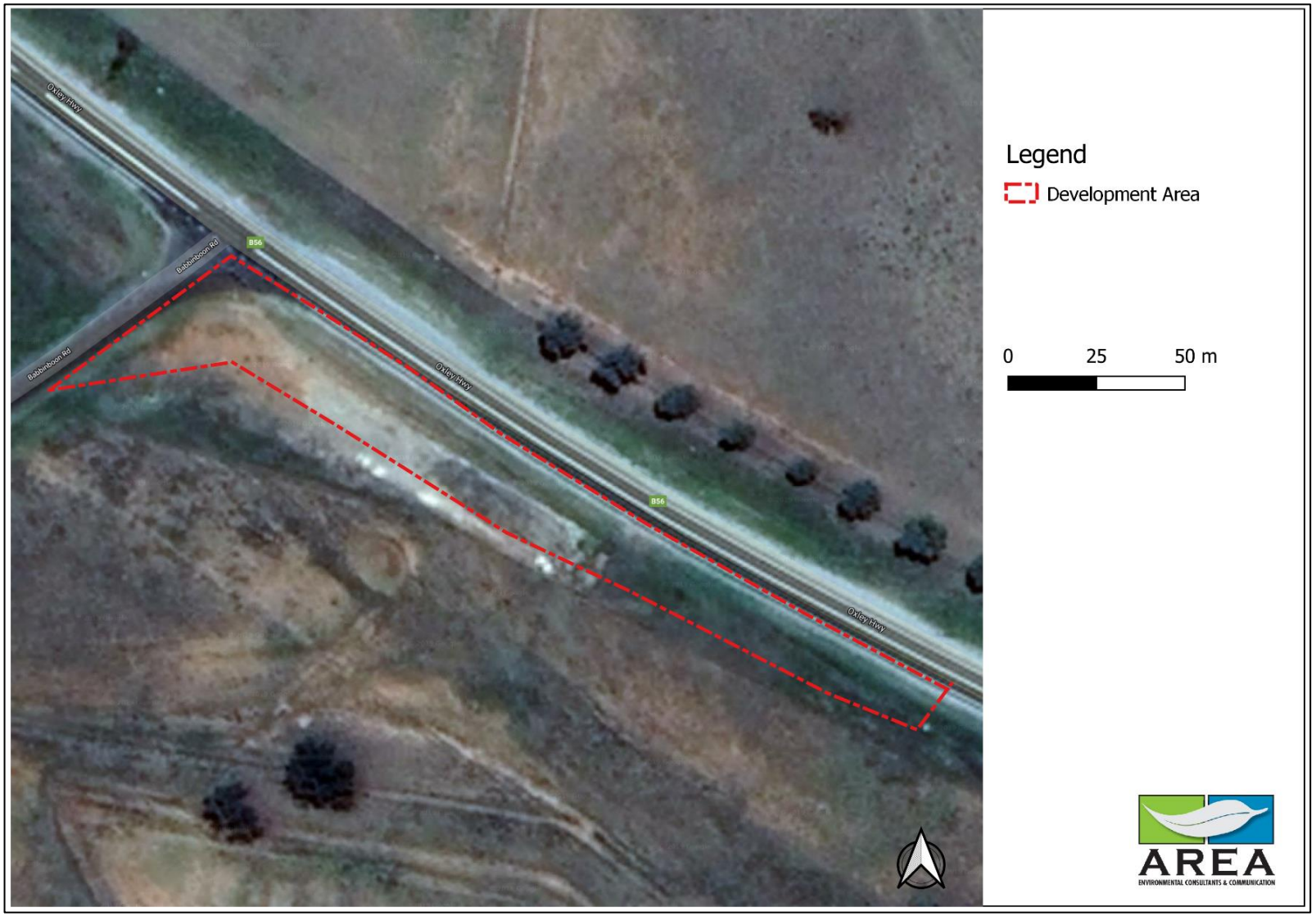


Figure 1-5: Topographical view of the Deceleration Lane Development Area at the intersection of Oxley Highway and Babbinboon Road

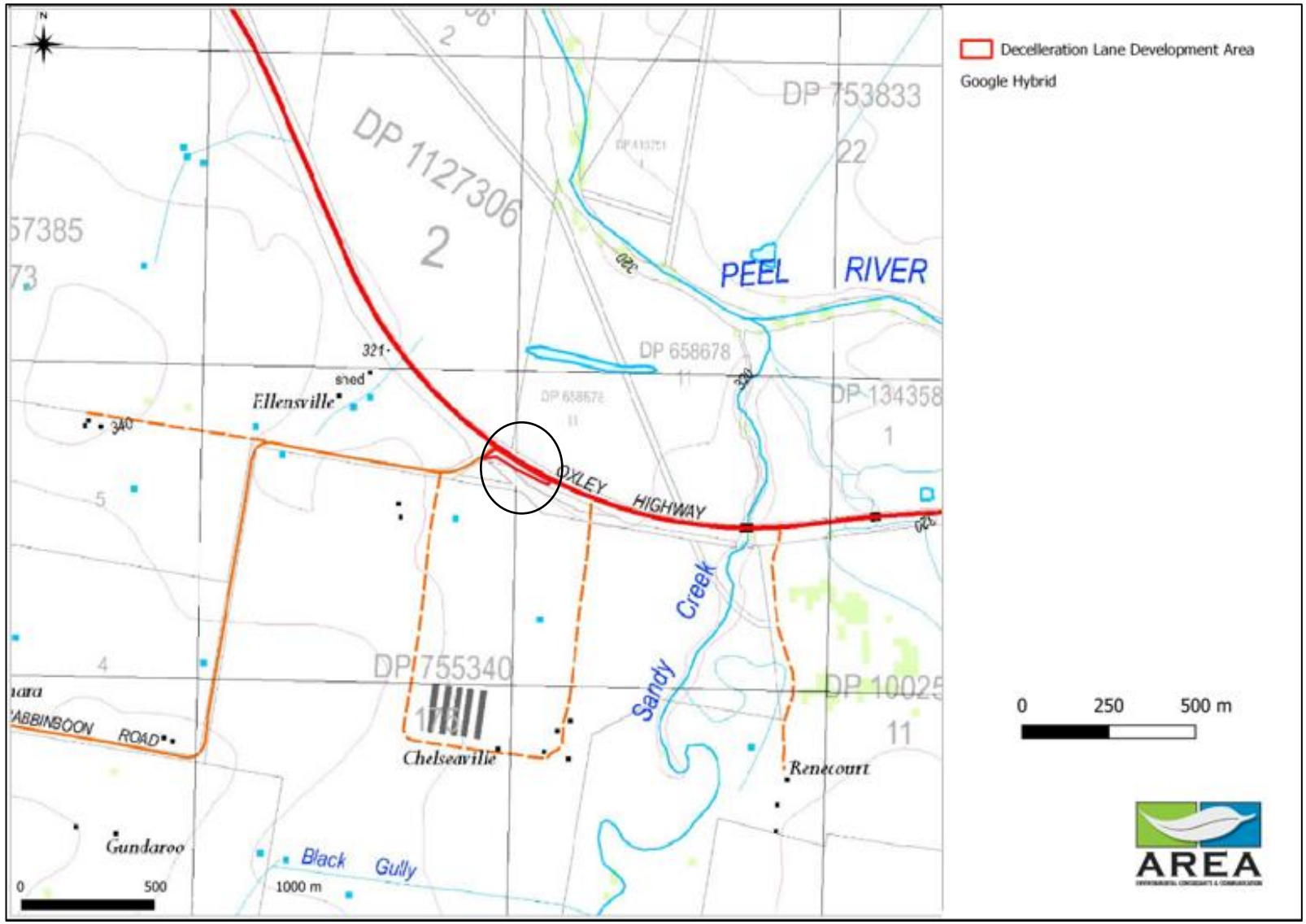


Figure 1-6: Aerial view of Sight Distance Development Area at Babbinboon Road and Warminster Road

Figure 1-7: Topographical view of Sight Distance Development Area at Babbinboon Road and Warminster Road

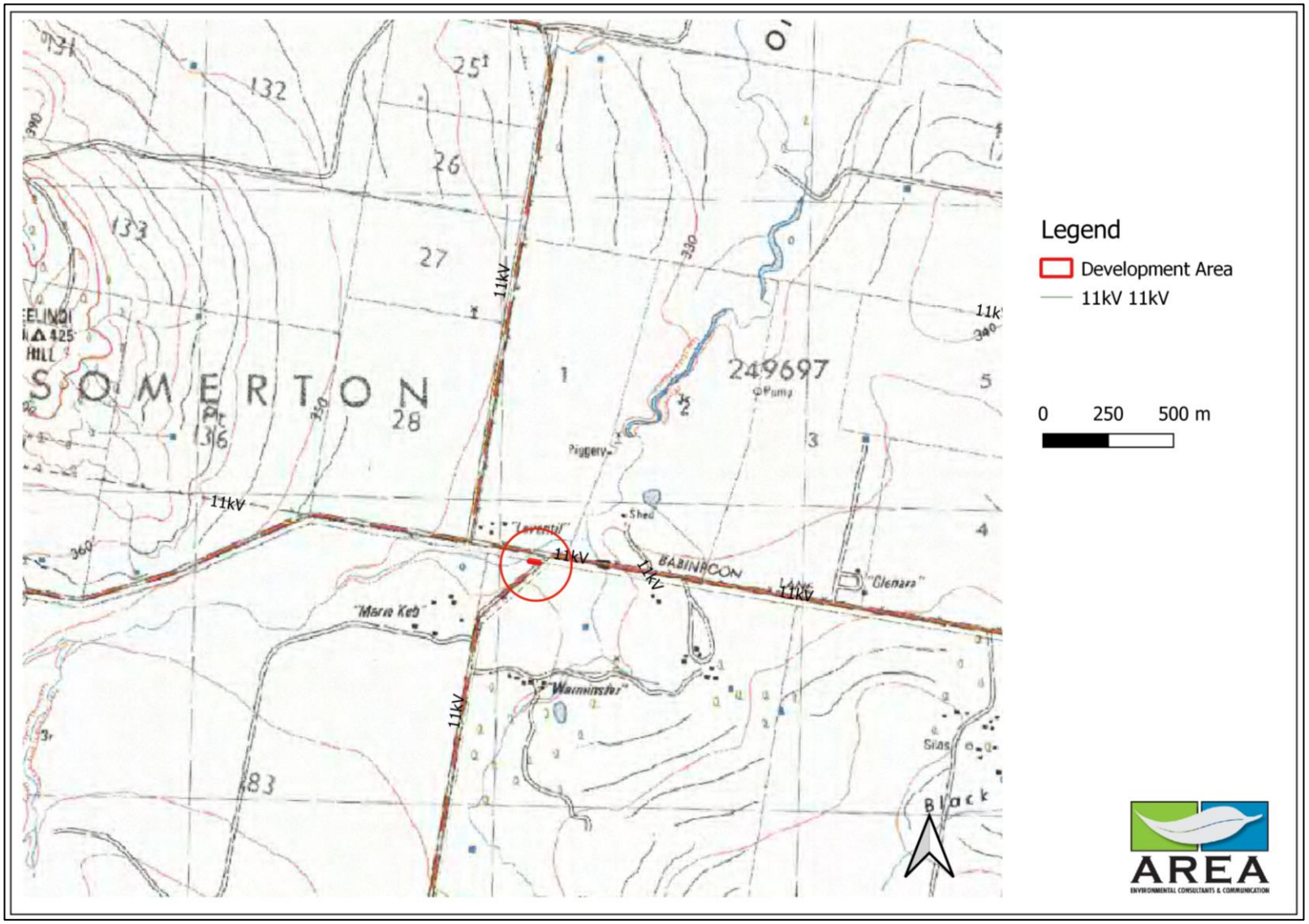


Table 1-1: Regional geographical context of the Development Area

Criteria	Development Area		
Interim Biogeographic Regionalisation for Australia (IBRA Region)	Nandewar Bioregion Peel subregion NSW		
State	New South Wales		
Topographical map sheet	Somerton 1:25K 9036- 3-S		
Local Government Area	Tamworth LGA		
Criteria	Solar Farm	Deceleration Lane	Sight Distance
Nearest town / locality	Somerton (locality) (7 km N)	Somerton (locality) (4.5 km E)	Somerton (locality) (4.5 km S)
Accessed from nearest town by	Oxley Hwy along Racecourse and Warminster Roads	Oxley Hwy to Babbinboon Road	Oxley Hwy along Babbinboon Road to Warminster Road
Land use / disturbance	Intensive agriculture (ploughed landscapes).	RMS stockpile area	Local road corridor
Nearest waterway (Name, Strahler Order)	The study area possesses three unnamed Strahler 1st Order and one unnamed second order drainage lines. These drainage lines are not mapped as Key Fish Habitat and can be described as 'Unlikely Key Fish Habitat' under the NSW FM Act. These drainage lines drain into Sandy Creek 2km to the East which in turn drains into the Peel river 5km to the North.	Peel river 850 m North. Peel River is Key Fish Habitat under the NSW FM Act.	On the banks of Onus Creek, a Strahler 2nd Order drainage line. This drainage line is mapped as Key Fish Habitat, however with site inspection, it can be described as 'Unlikely Key Fish Habitat' under the NSW FM Act. This drainage line drains into the Peel river 5km to the North.
Spot point Australian Height Datum (AHD)	Lowest point is 350 m the highest is, an unnamed hill is 410 m AHD.	320 m AHD.	330 m AHD.
Surrounding land use	Grazing, ploughed agriculture	Road corridor. Grazing, ploughed agriculture	Road corridor. Grazing, ploughed agriculture
Expected disturbance footprint land use	Grazing, ploughed agriculture	Road corridor.	Road corridor.

1.1.3 Representative photos of the Development Area

Photos of the three Development Areas are provided in Figure 1-8 and Table 1-2.

Figure 1-8: Location direction of representative photo points

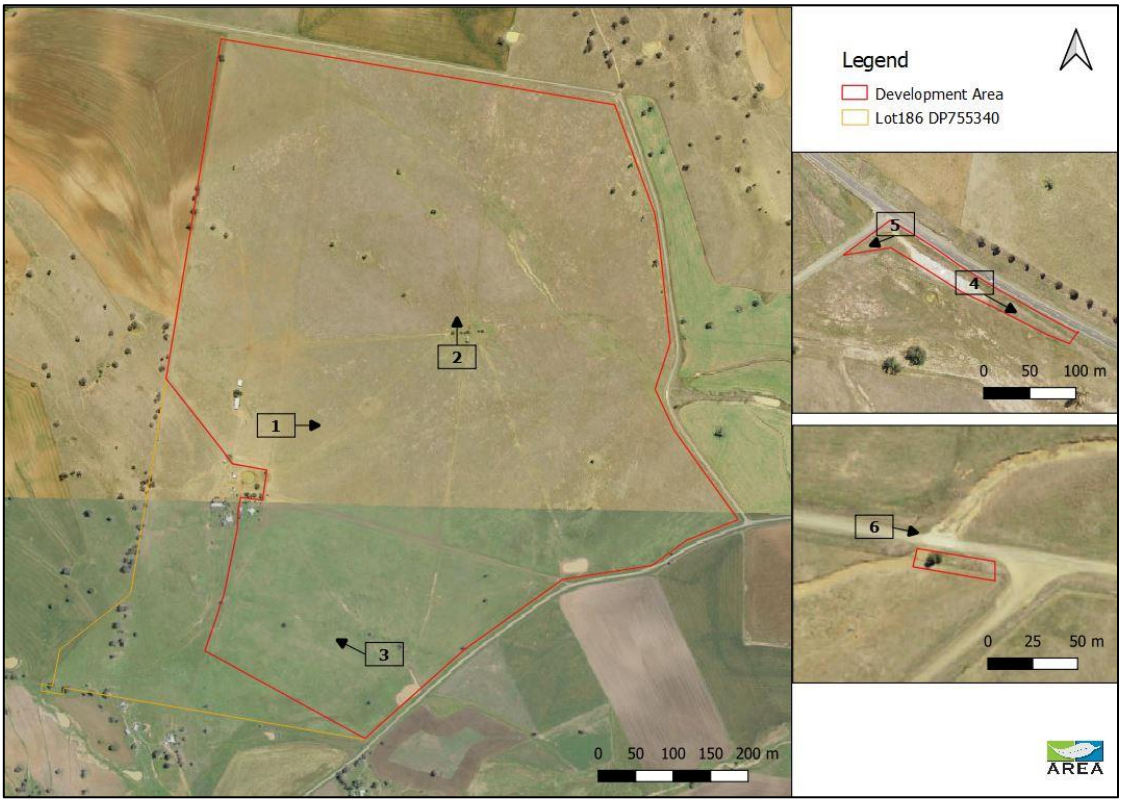


Table 1-2: Photos depicting the Development Area

Plate number	Development Area	Photos
1	Solar Farm	

Plate number	Development Area	Photos
2	Solar Farm Silo to be removed	
3	Solar Farm	

Plate number	Development Area	Photos
4	Deceleration Lane	
5	Deceleration Lane	

Plate number	Development Area	Photos
6	Sight Distance Removal of *Acacia stenophylla* only.	

1.1.4 Property Vegetation Plan

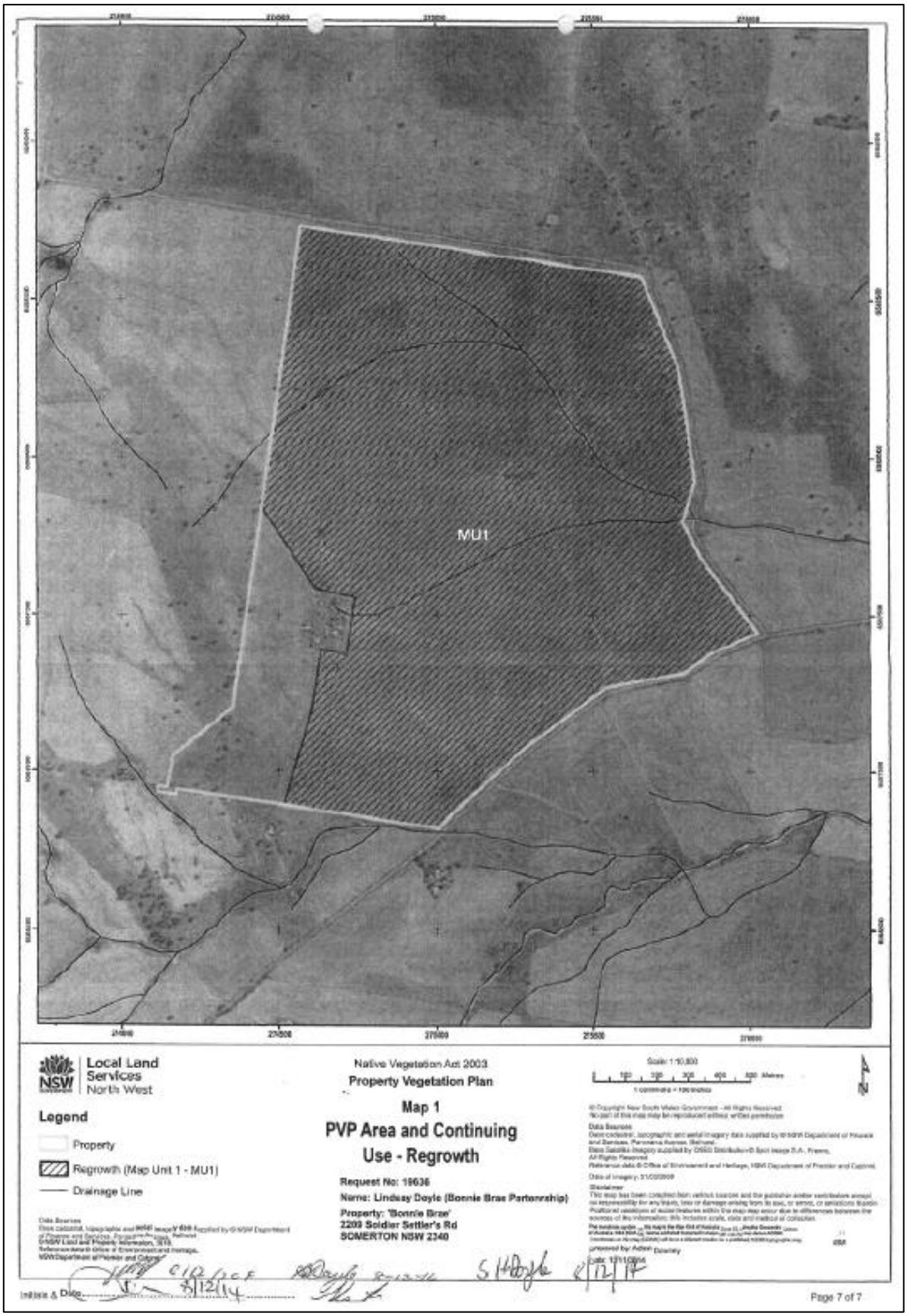
The area designated is currently managed under a Property Vegetation Plan (PVP) – number 22PVP00121. This PVP commenced on 15 December 2014.

Under this PVP the following is allowable:

- **Management Action:** Clearing non-protected regrowth via Change of Regrowth Date
- **Duration of Management Action:** In perpetuity
- **Management Action Details:**
    1. The landholder may clear native vegetation consisting of groundcover considered to be verified non-protected regrowth in the area identified as Map Unit 1, as permitted by section 9(2) of the *Native Vegetation Act 2003* and clause 10(a)(b) of the *Native Vegetation Regulation 2013*, via the Change of Regrowth Date provisions. In this instance, the regrowth date has been changed from 1990 to 1968.
    2. The landholder may use all relevant Routine Agricultural management Activities (RAMAs) in the area identified as Map Unit 1 (shaded area in Figure 1-9).

The relationship between the PCP and the SSD is the PVP is just to demonstrate land in the proposal has been legally cleared and is subject to ongoing seasonally dependant regular / routine agricultural management activities (intensive ploughing agriculture) supporting a Category 1 classification.

Figure 1-9: Boundary of Map Unit 1 (taken from PVP 22PVP0021)



1.1.5 Data sources used

Information used to inform this BDAR has been provided in the following sections of this report and in Table 1-3 and Table 1-4.

Table 1-3: Spatial data used in this report

GIS layer name	Reference
IBRA bioregions and subregion	NSW data porthole
NSW landscape regions	Mitchell Landscapes V3
Rivers and streams	Six Viewer / SEED WMS topographic layer
Wetlands	Directory of Important Wetlands
Waterways	Waterways_NSW_Final
Key Fish Habitat	DPI Key Fish Habitat GIS layer
Connectivity of different areas of habitat	Central Tablelands SVM 4778veg map and Six Viewer
Native vegetation extent	Central Tablelands SVM 4778veg map and Six Viewer

Table 1-4: Web sites and links to documents used in this report

Title	Web address
Legislation	
Commonwealth Environment Protection & Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Biodiversity Conservation Act 2016	https://www.legislation.nsw.gov.au/~/view/act/2016/63
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Local Land Services Act 2013	https://www.legislation.nsw.gov.au/~/view/act/2013/51
Biodiversity	
Biodiversity Assessment Methodology (OEH, 2017)	http://www.environment.nsw.gov.au/biobanking/assessmethodology.htm
BAM Credit Calculator	http://www.environment.nsw.gov.au/biobanking/calculator.htm
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna –Amphibians (DECCW, 2009)	http://www.environment.nsw.gov.au/resources/threatenedspecies/09213amphibians.pdf
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC, 2004)	http://www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf
Survey requirements (birds, bats, reptiles, frogs, fish and mammals) for species listed under the EPBC Act	http://www.environment.gov.au/topics/environmentprotection/environment-assessments.
Guide to Surveying Threatened Plants (OEH, 2015)	http://www.environment.nsw.gov.au/resources/threatenedspecies/160129-threatened-plants-survey-guide.pdf
Threatened biodiversity profile search	http://www.environment.nsw.gov.au/threatenedspeciesapp/
NSW BioNet	http://www.bionet.nsw.gov.au/
Vegetation Types databases	http://www.environment.nsw.gov.au/biobanking/vegtypedatabase. htm
PlantNET	http://plantnet.rbgsyd.nsw.gov.au/
Threatened Species Assessment Guideline - The Assessment of Significance (DECCW, 2007)	http://www.environment.nsw.gov.au/resources/threatenedspecies/tsaguide07393.pdf
Significant Impact Guidelines 1.1 - Matters of National Environmental Significance	http://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance
Principles for the use of biodiversity offsets in NSW	http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip .htm

1.2 Legislative context

An Environmental Impact Statement (EIS) is required as part of the approval process and this project is to be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Under s.4.15(1)(b) of the EP&A Act, the applicant must consider "the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality".

This BDAR has been prepared using the Biodiversity Assessment Method (2017) to assess the biodiversity present at the Development Area and the likely impacts of the project.

1.3 Landscape features

1.3.1 IBRA regions and subregions and NSW Landscape

The project is in the lower middle portion of the Nandewar Bioregion, Peel subregion (Figure 1-10). The Nandewar Bioregion lies in northern NSW and across the Qld border. The bioregion is bounded by the North Coast, New England Tablelands and Brigalow Belt South bioregions in the south, east and west respectively. It spans an area of 2,700,313 hectares, with 2,069,604 hectares or 76.6 per cent of it falling in NSW and occupying 2.59 per cent of the state.

The bioregion encompasses Inverell and Tamworth and the smaller towns of Quirindi, Bingara, Barraba, Manilla and Bendemeer.

The development is entirely within the Tamworth – Keepit Slopes NSW Landscapes (Figure 1-11).

Figure 1-10: IBRA subregions and LGA boundaries

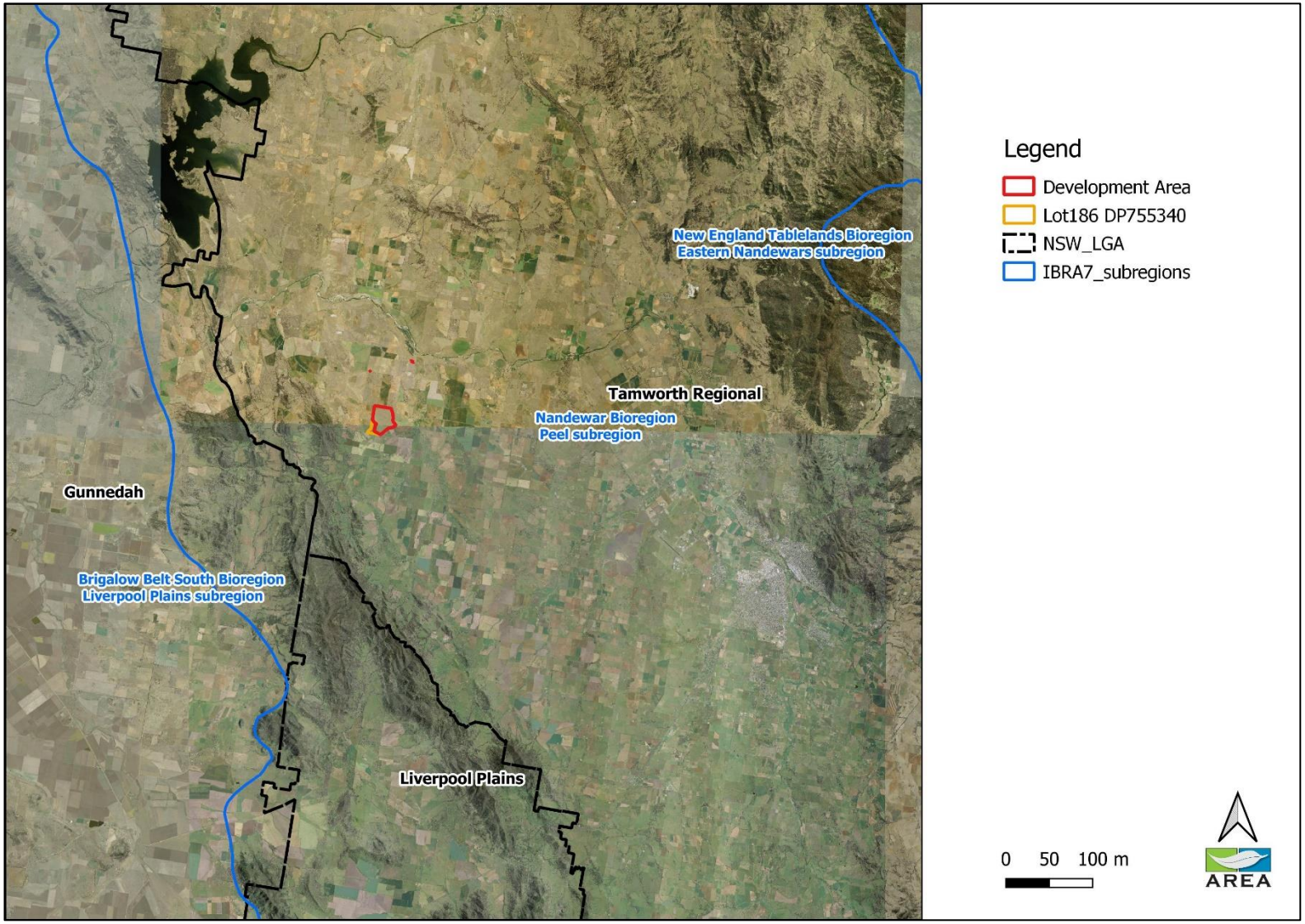
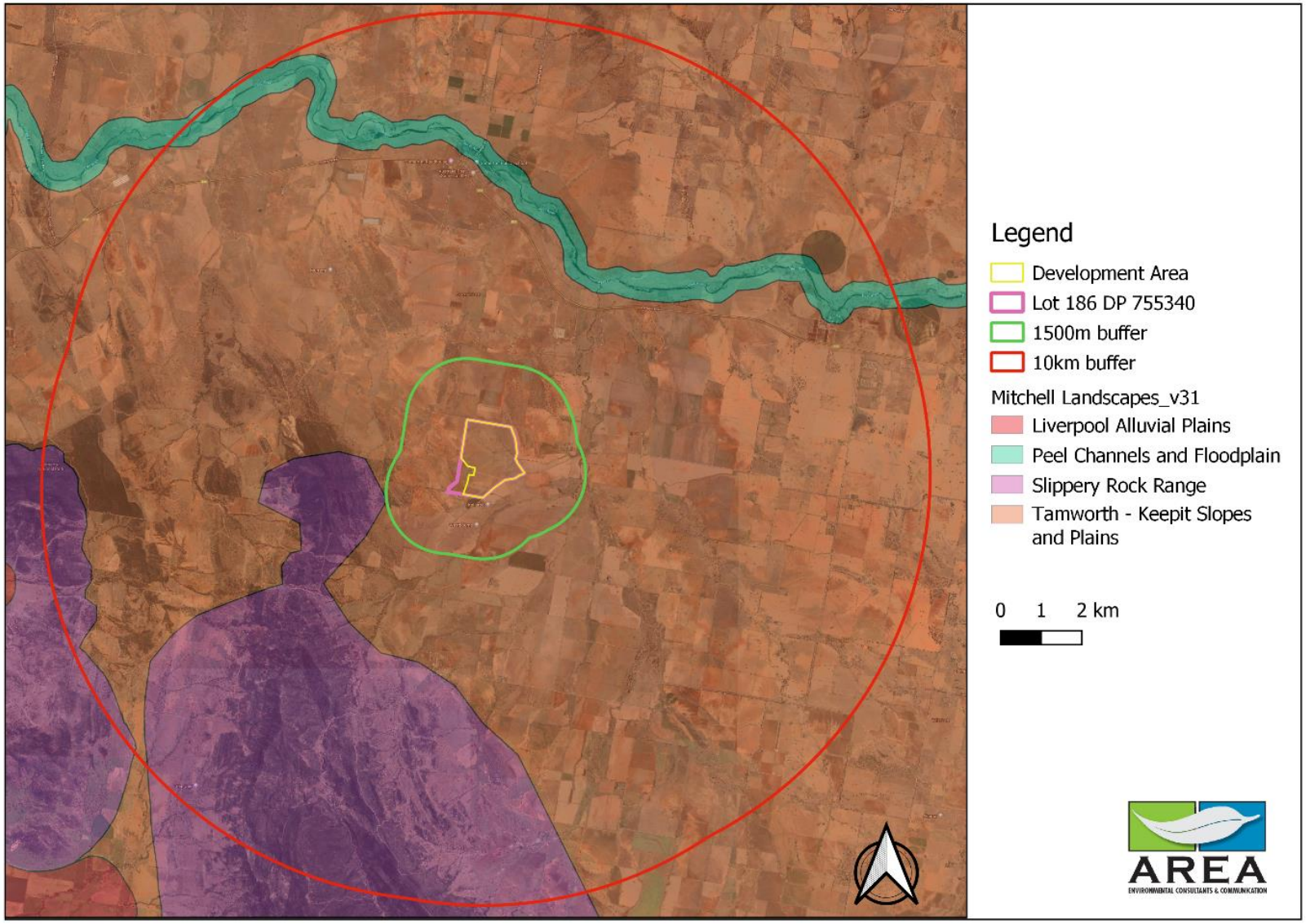


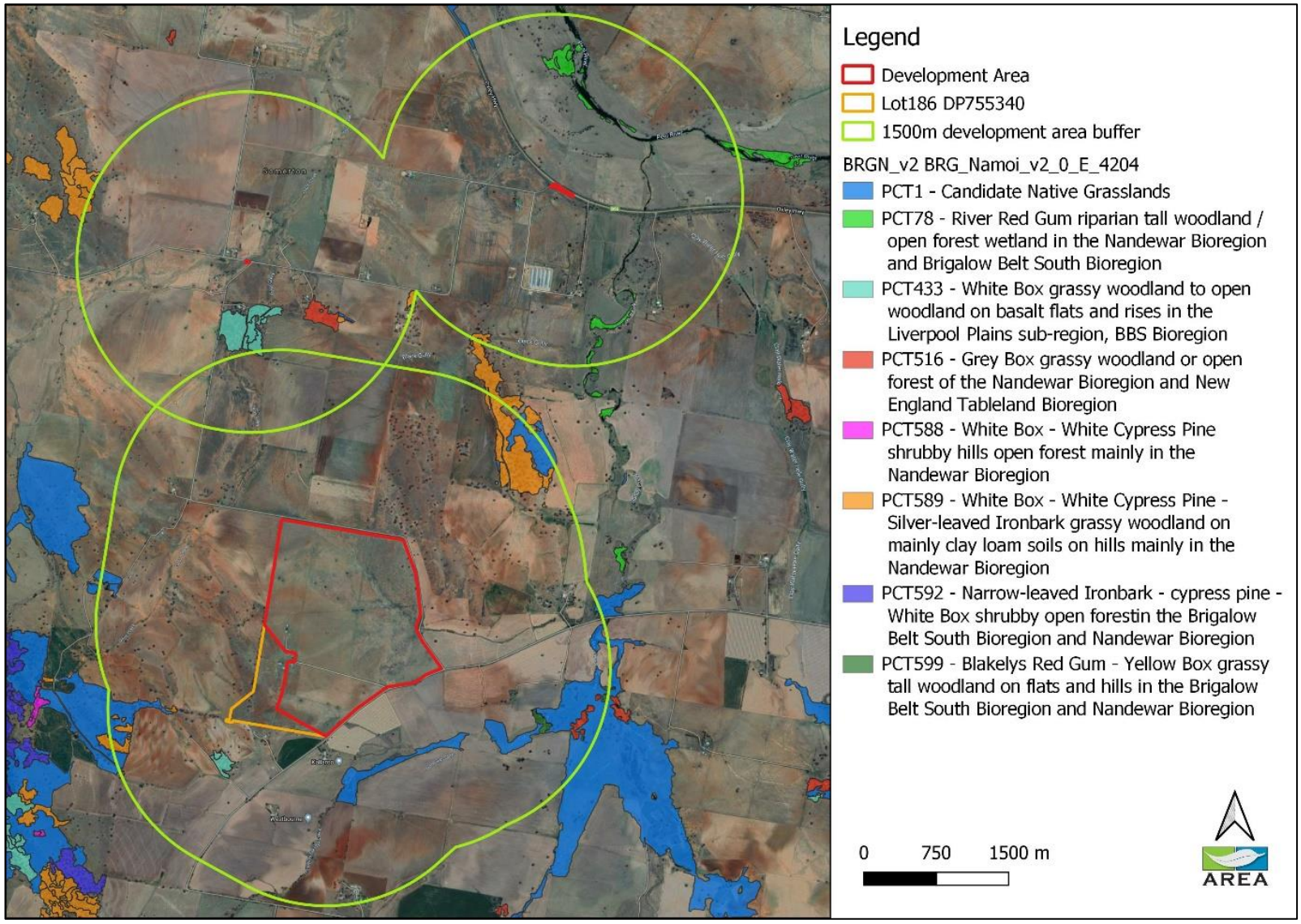
Figure 1-11: NSW Landscapes



1.3.2 Native vegetation

The extent of native vegetation within 1500 metres of the Development Area is estimated at approximately five percent with reference to the BRGN v2 Namoi 4204 vegetation map layer (Figure 1-12).

Figure 1-12: Native vegetation extent in 1500m



1.3.3 Rivers and streams

The MacIntyre, Gwydir and Namoi catchments are in the bioregion, and the Peel, Macdonald, McIntyre, Namoi, Severn and Gwydir Rivers traverse the bioregion.

The Solar Farm Development Area has three Strahler First Order drainage lines and a second Order drainage line (Figure 1-13). These drain east into Sandy Creek, which in turn drains north for eight kilometres into the Peel River.

The Deceleration Lane Development Area does not possess a drainage line but is 840 metres south of the Peel River (Figure 1-15). The Peel River is a significant waterway in the region, being a reliable water source.

The Sight Distance Development Area is on the bank of Onus Creek, a Strahler third Order drainage line (Figure 1-15). This drains north for four kilometres into the Peel River. This is also mapped as Key Fish Habitat.

Figure 1-13: Drainage lines in Solar Farm Development Area

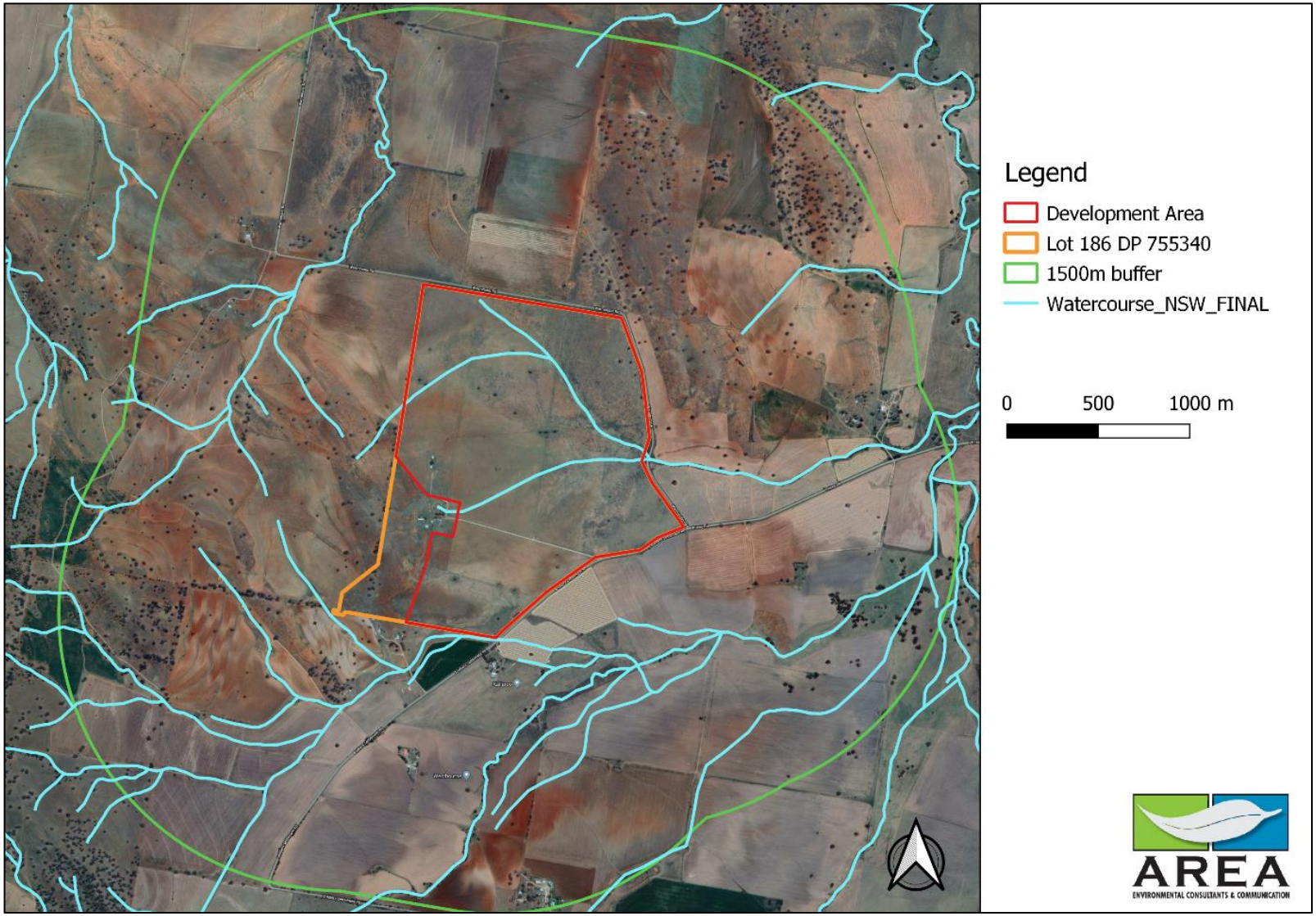


Figure 1-14: Key Fish Habitat – Solar Farm Development Area

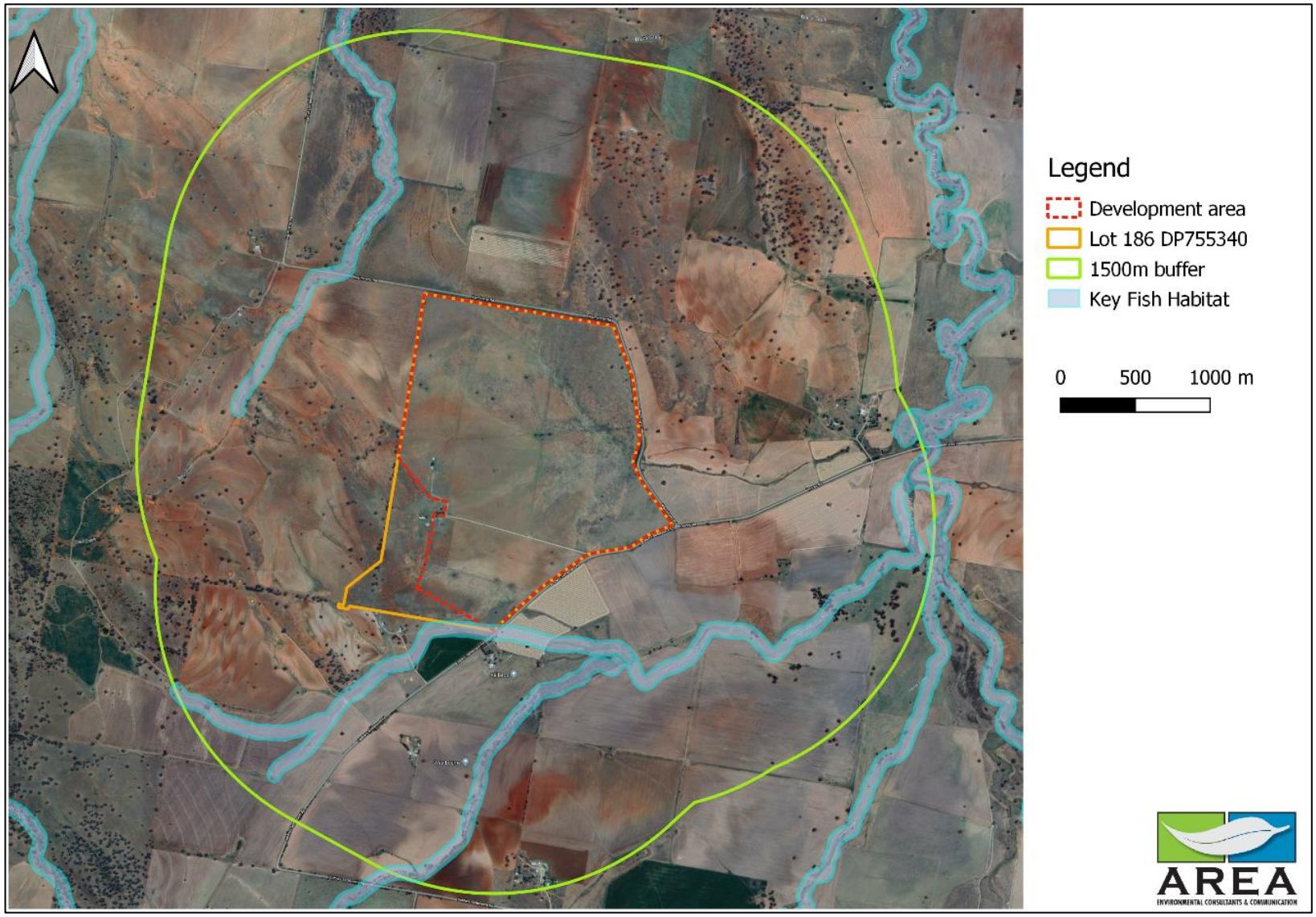
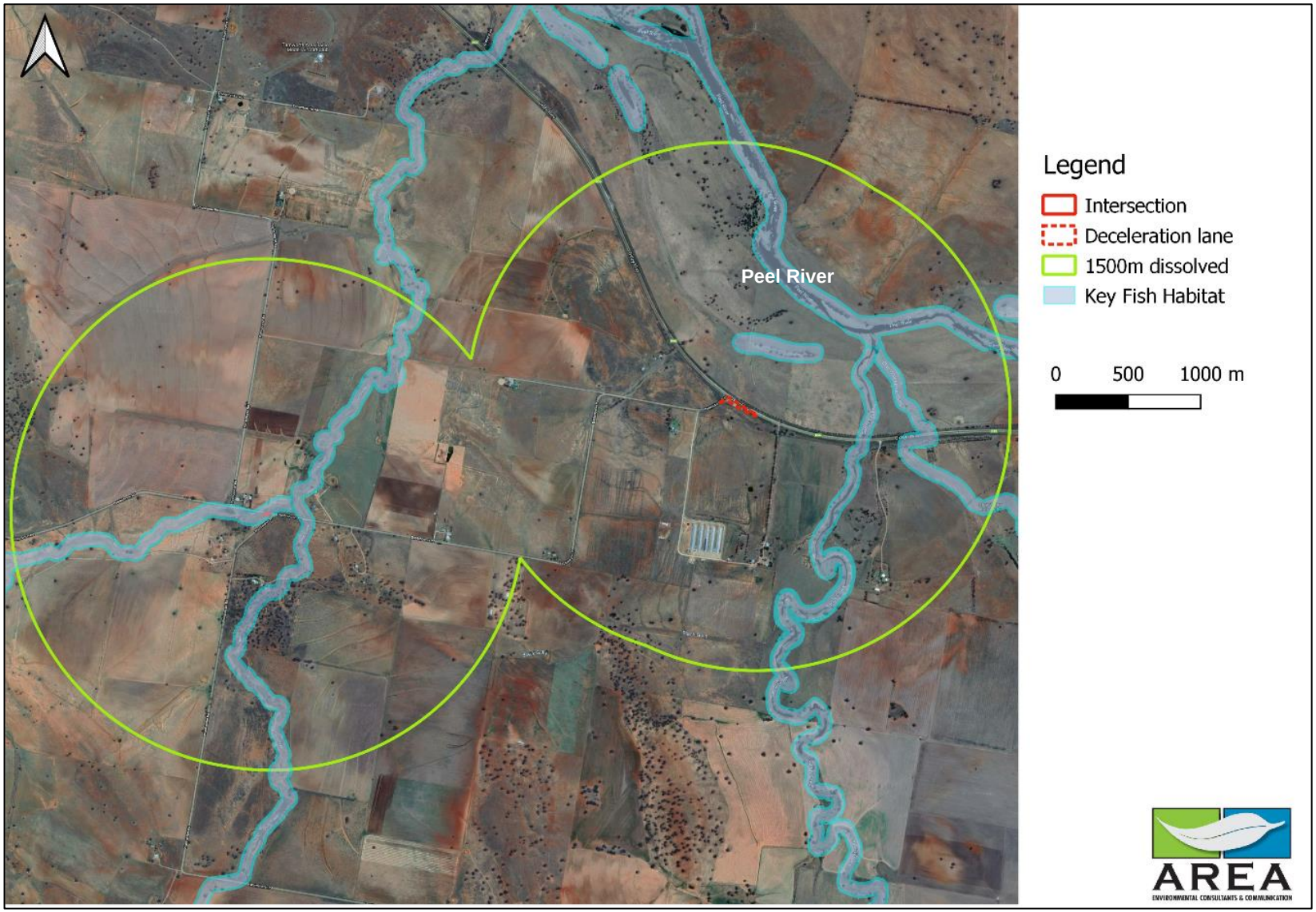


Figure 1-15: Key Fish Habitat – Deceleration Land and Sight Distance Development Areas



1.3.4 Wetlands

Farm dams are the only wetlands, or other water bodies, within 1500 metres of the Development Area.

1.3.5 Connectivity features

Few connectivity features exist in the Development Area. The landscape is highly cleared and intensely managed for agriculture or transport infrastructure.

Terrestrial connectivity between the Peel River and the Melville Range is provided by an open, highly cleared, rural landscape. Connectivity is poor in the Development Area due to sparse remnant trees. Other properties within 1500 metres of the Development Area appear to have a slightly denser coverage of trees, some in patches.

Drainage lines through the Development Area provide some connectivity when water flow occurs, as these flow into larger, perennial waterways.

1.3.6 Areas of geological significance and soil hazard features

The Nandewar Peel Bioregion has fine grained Silurian to Devonian sedimentary rocks which are strongly folded and faulted with marked northwest alignment. Areas of sub-horizontal Carboniferous shales and sandstones occur in the north. Limited areas of basalt cap from the Nandewar and Liverpool Ranges. Linear outcrops of serpentinite and scattered bodies of limestone also locally occur (OEH website).

All Development Areas possess shallow stony soils on ridges grading into plains soil types. Texture contrast soils on almost all slopes shifts in colour from red brown on upper slopes to yellow on lower slopes. Black earths also occur on basalt areas. The lower areas (plains) have alluvial loams and clays with moderate to high fertility in alluvium with harsh subsoils prone to gully development on lower slopes.

The geology in the Solar Farm Development Area is complex, with folded and faulted sedimentary and metamorphic rocks with minor interbedded volcanics. Rock types include; Silurian-Devonian chert, slate, phyllite, tuff, schist and Carboniferous conglomerate, sandstone, mudstone and andesite. Quartzite ranging from fine grained to course materials was the most common material observed

No cliffs, caves or outcropping rocky ridges occur in the Development Areas.

1.4 Native vegetation

1.4.1 Survey effort

Survey was conducted from Tuesday 17 to Thursday 19 September 2019.

Survey effort for this assessment was considered as eight arbitrary survey units, which divided the Development Area. Figure 1-16 indicates boundaries of survey units. Survey Unit 1 is the Deceleration Lane Development Area and Survey Unit 2 is the Sight Distance Development Area. Survey units 3 to 8 are in the Solar Farm Development Area.

Figure 1-17 shows threatened species search transects across the Development Area and the location of the ultrasonic bat recorders. Search transects were conducted either on foot or from a vehicle driven slowly. Where natural (trees and drainage lines) or artificial (silos and sheds) occurred in the Development Area, these were inspected more closely for habitat values.

All paddock trees were identified, measured and checked for hollows (see section 1.4.3).

Figure 1-16: Development Area Survey Units

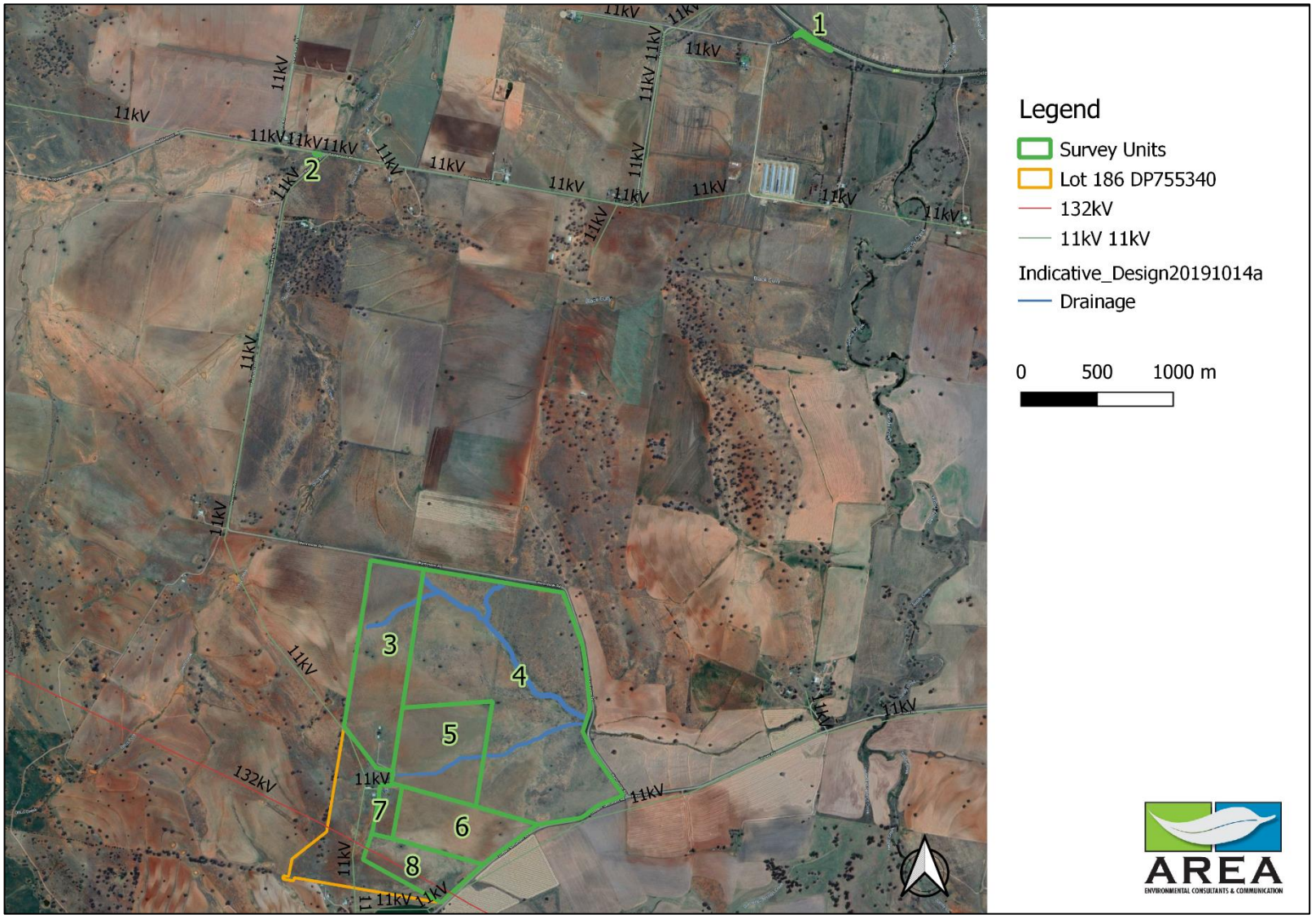


Figure 1-17: Survey effort

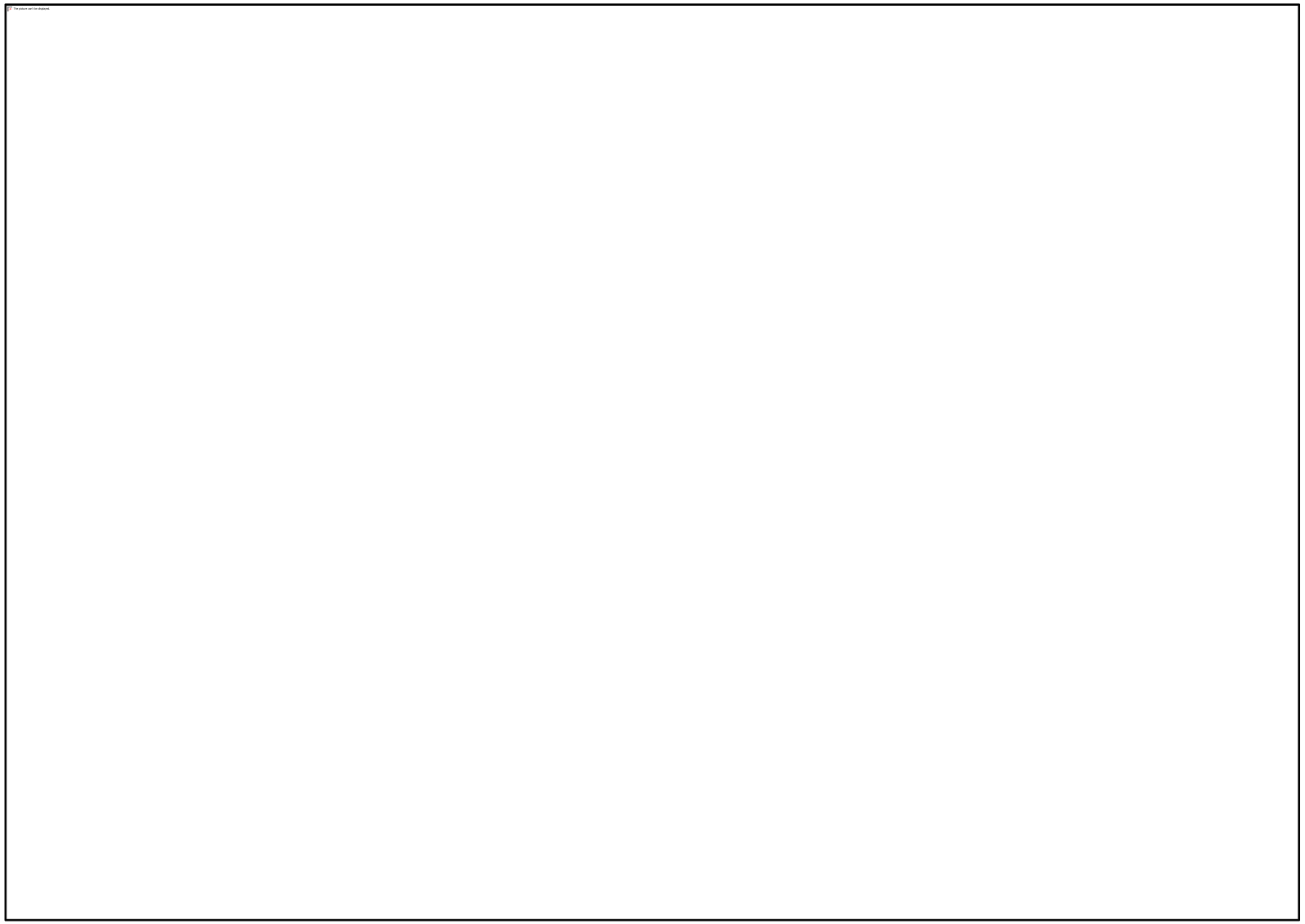


Table 1-5: Metric in each Development Area

Development Area	SHAPE area m2	Hectares
Warminster and Babbinboon Roads	351.4171143	0.04
Oxley Highway and Babbinboon Road	4060.098022	0.41
Solar Farm	2000397.916	200.04
		200.49

Table 1-6: Metric per survey unit

Survey Unit	SHAPE area m2	Development Area	Hectares	
1	4061	Warminster and Babbinboon Roads	**0.41**	
2	351	Oxley Highway and Babbinboon Road	**0.04**	
3	328590	Solar Farm	32.86	
4	1058732	Solar Farm	105.87	
5	253577	Solar Farm	25.36	
6	198402	Solar Farm	19.84	
7	34787	Solar Farm	3.48	
8	126306	Solar Farm	12.63	**200.04**
			200.49	

Table 1-7: Effective survey coverage calculations for survey units

Survey Unit	transect length	m2 x10 PJC	m2 x10 (PJC) x 5 (team)	km / PJC	Survey Unit hectares	survey coverage ha\PJC (10m)	Survey coverage (ha) team (n=5)	Exposure %	GSV % on unit	Survey coverage (%)	Effective survey coverage (ha)	Effective survey coverage (% of survey unit)
1	482.784	4827.84	24139.20	0.48	0.41	0.48	2.41	100.00	40	100.00	0.16	40
2	101.676	1016.76	5083.80	0.10	0.04	0.10	0.51	100.00	90	100.00	0.03	90
3	10904.1215	109041.21	545206.07	10.90	32.86	10.90	54.52	100.00	40	100.00	13.14	40
4	39441.42515	394414.25	1972071.26	39.44	105.87	39.44	197.21	100.00	50	100.00	52.94	50
5	6305.872465	63058.72	315293.62	6.31	25.36	6.31	31.53	100.00	75	100.00	19.02	75
6	14130.14247	141301.42	706507.12	14.13	19.84	14.13	70.65	100.00	65	100.00	12.90	65
7	3508.908926	35089.09	175445.45	3.51	3.48	3.51	17.54	100.00	90	100.00	3.13	90
8	5641.583117	56415.83	282079.16	5.64	12.63	5.64	28.21	100.00	60	100.00	7.58	60
				79.93	**200.49**							

1.4.2 Plant Community Types present

A Plant Community Type (PCT) was selected which best fit the remnant paddock trees in the Development Area.

The PCT was determined using the following filtering process, noting the limited floristics available in the Development Area:

- IBRA bioregion
    - Nandewar
- Subregion
    - Peel
- Upper stratum species (Dominant present in the Development Area and the local environment):
    - *Eucalyptus albens*
- Vegetation Formation
    - Grassy Woodlands
- Vegetation Class
    - Western Slopes Grassy Woodland
- Vegetation description
    - “Dominated by White Box (*Eucalyptus albens*)”
- Soil description
    - Occurs on basalts.

After this filtering process, two PCTs remain (PCT433 and PCT590). PCT433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion was determined to represent the remnant trees in the Development Area for the following reasons:

- PCT433 is mapped within 10 kilometres of the Development Area on the BRGN v2 Namoi 4204 vegetation map. PCT590 is not
- Based on observations of local, more intact, vegetation during the field assessment.

1.4.3 Paddock trees

Paddock trees recorded in the Development Area were identified to species, measured using Diameter at Breast Height (DBH) and checked for hollows (Table 1-8 and Figure 1-18). All trees to be removed trigger an offset requirement.

DBH measurement enabled the trees to be allocated a size class. These are:

- Class 1 DBH <20 centimetres
- Class 2 DBH 20 – 50 centimetres
- Class 3 DBH >50 centimetres

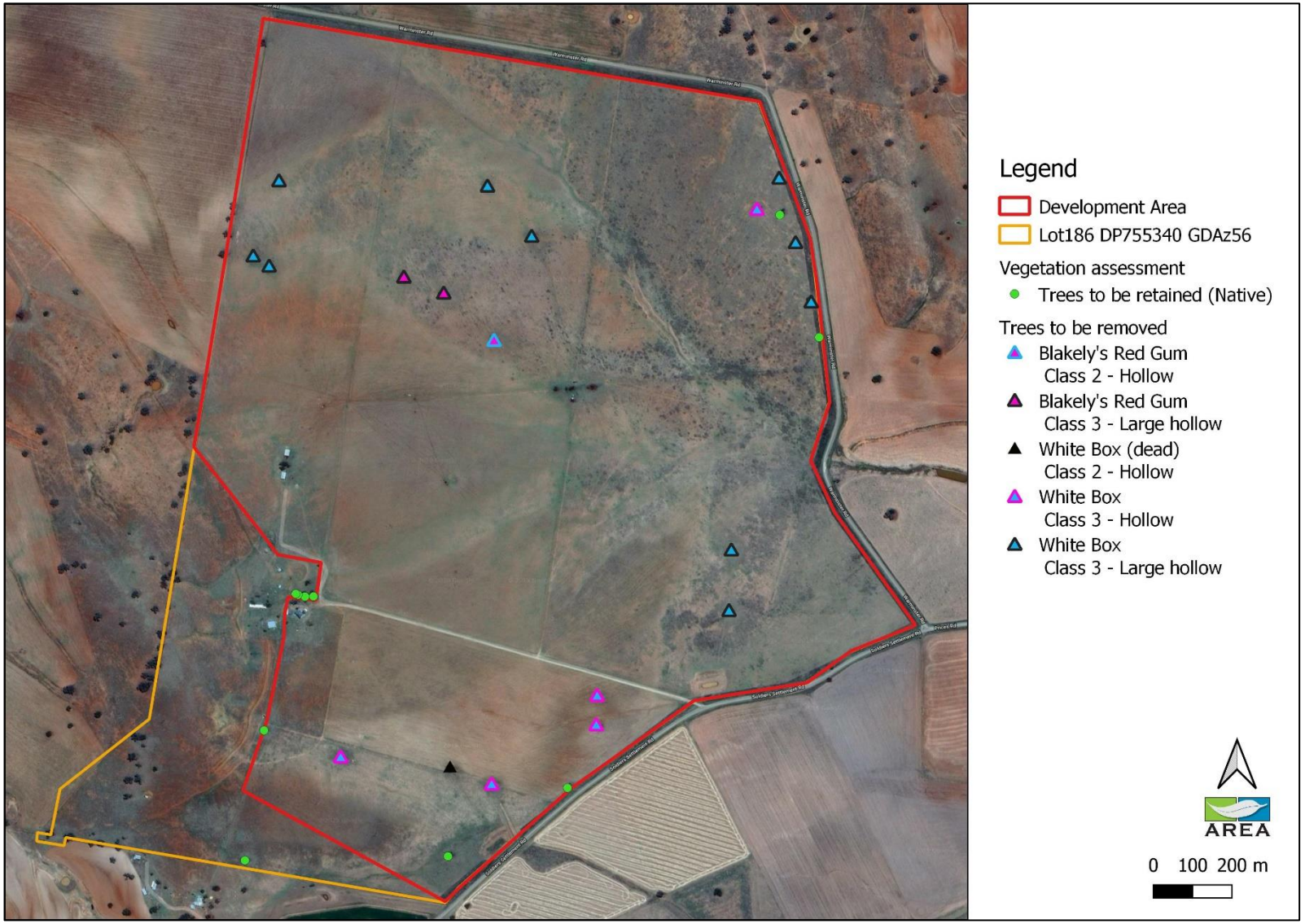
Hollows recorded are an indication of presence or absence – not hollow count. Presence of hollows was considered as providing suitable habitat and during the diurnal assessment, no

listed species were observed using the hollows. No further assessment of hollow quality or use was conducted. Condition of trees was assessed as living or dead. One dead tree and 18 living trees were identified in the Development Area.

Table 1-8: Native trees to be removed

Common name	Scientific name	Hollow	Size class
Blakely's Red Gum	*Eucalyptus blakelyi*	<20cm diameter	2
Blakely's Red Gum	*Eucalyptus blakelyi*	>20cm and < 20cm diameter	3
Blakely's Red Gum	*Eucalyptus blakelyi*	>20cm and < 20cm diameter	3
Dead tree (White Box)	*Eucalyptus albens*	<20cm diameter	2
White Box	*Eucalyptus albens*	<20cm diameter	3
White Box	*Eucalyptus albens*	<20cm diameter	3
White Box	*Eucalyptus albens*	<20cm diameter	3
White Box	*Eucalyptus albens*	<20cm diameter	3
White Box	*Eucalyptus albens*	<20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3
White Box	*Eucalyptus albens*	>20cm and < 20cm diameter	3

Figure 1-18: Paddock trees



1.4.4 Threatened Ecological Community

The Plant Community Type from which the paddock trees are derived (PCT433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion) is associated with a Threatened Ecological Community under the BC Act and the EPBC Act:

BC Act:
Endangered: White Box Yellow Box Blakely's Red Gum Woodland (Part) wholly subset of;

This listing has been recognised in the BAMC for the paddock tree credit calculations.

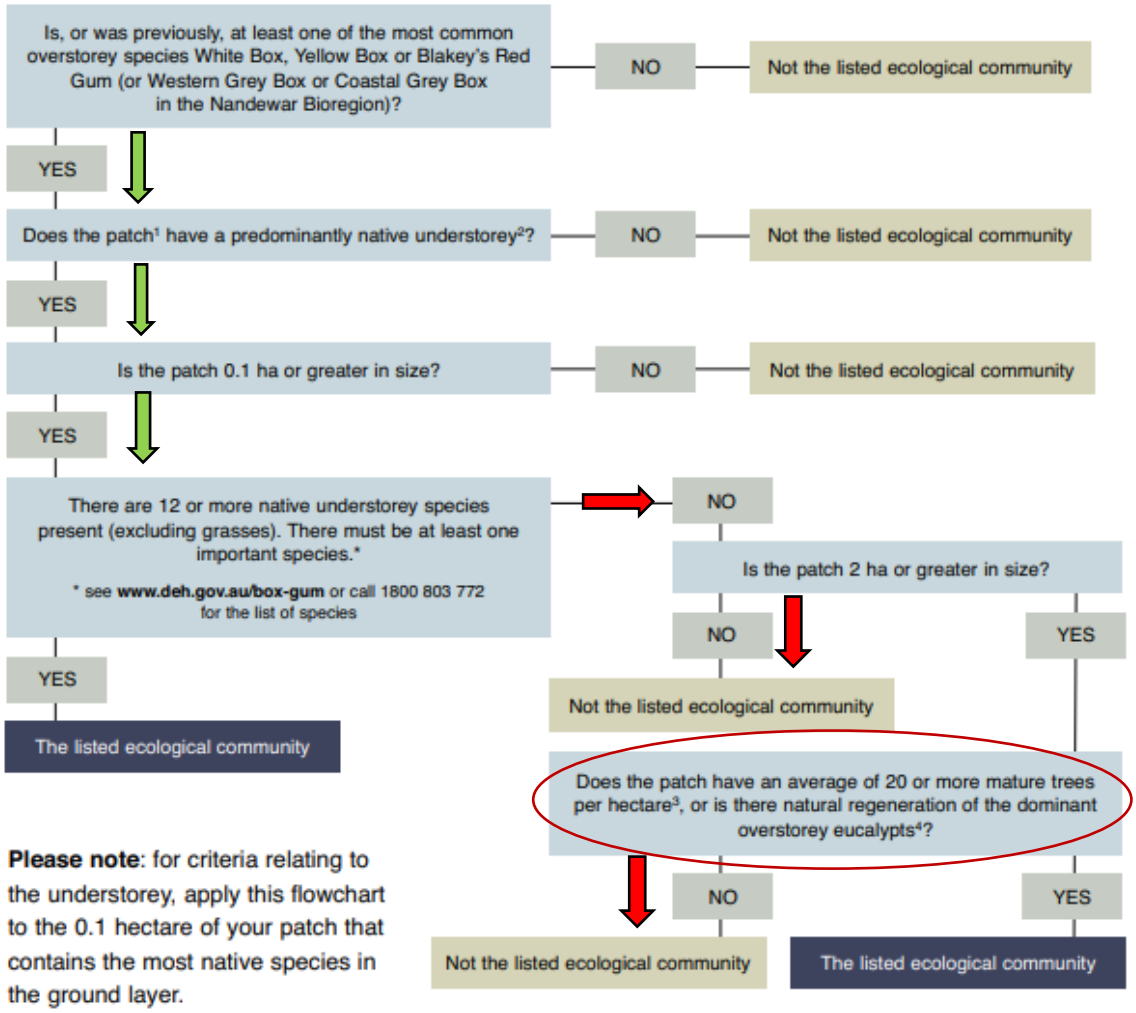
EPBC Act:
Critically Endangered: White Box Yellow Box Blakely's Red Gum Woodland (Part) wholly subset of.

As the community has fewer than 20 mature trees per hectare (Solar Farm Development Area, for example, is fewer than one mature tree per hectare), the Development Area is not consistent with the criteria for the Critically Endangered: White Box Yellow Box Blakely's Red Gum Woodland (Part) wholly subset of, under the EPBC Act (Figure 1-19).

Figure 1-19: EPBC Act – Determining a listed ecological community

The flowchart below represents the lowest condition at which patches are included in the listed ecological community. This is not the ideal state of the ecological community. Large patches, those that link remnants in the landscape, those that occur in highly cleared areas, those that contain rare, declining or threatened species, and those that represent the entire range of the ecological community, are important for the long-term future of the ecological community.

Determining if your land has an area of the listed ecological community



Please note: for criteria relating to the understorey, apply this flowchart to the 0.1 hectare of your patch that contains the most native species in the ground layer.

1 Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
- an area that contains five or more trees in which no tree is greater than 75 m from another tree, or
- the area over which the understorey is predominantly native.

Patches must be assessed at a scale of 0.1 ha (1000m^2) or greater.

2 A predominantly native ground layer is one where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species. The best time of the year to determine this is late autumn when the annual species have died back and have not yet started to regrow. (At other times of the year, you can determine whether something is perennial or not is if it is difficult to pull out of the soil. Annual species pull out very easily.)

3 Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.

4 Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

1.4.5 Groundwater Dependent Ecosystems

Groundwater Dependent Ecosystems (GDE) are not mapped at the Development Area.

Figure 1-20: Aquatic GDE

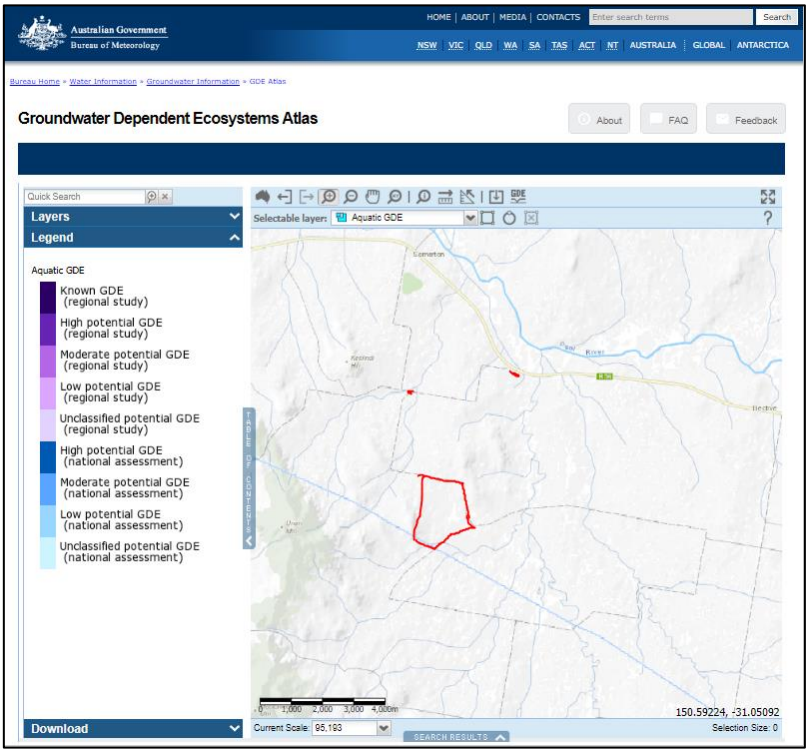


Figure 1-21: Terrestrial GDE

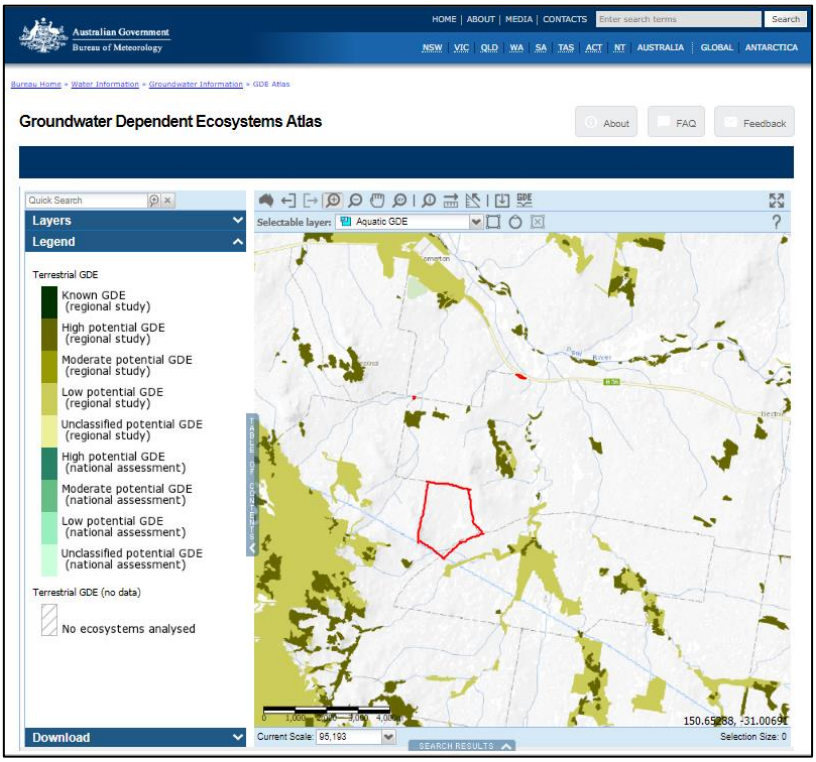
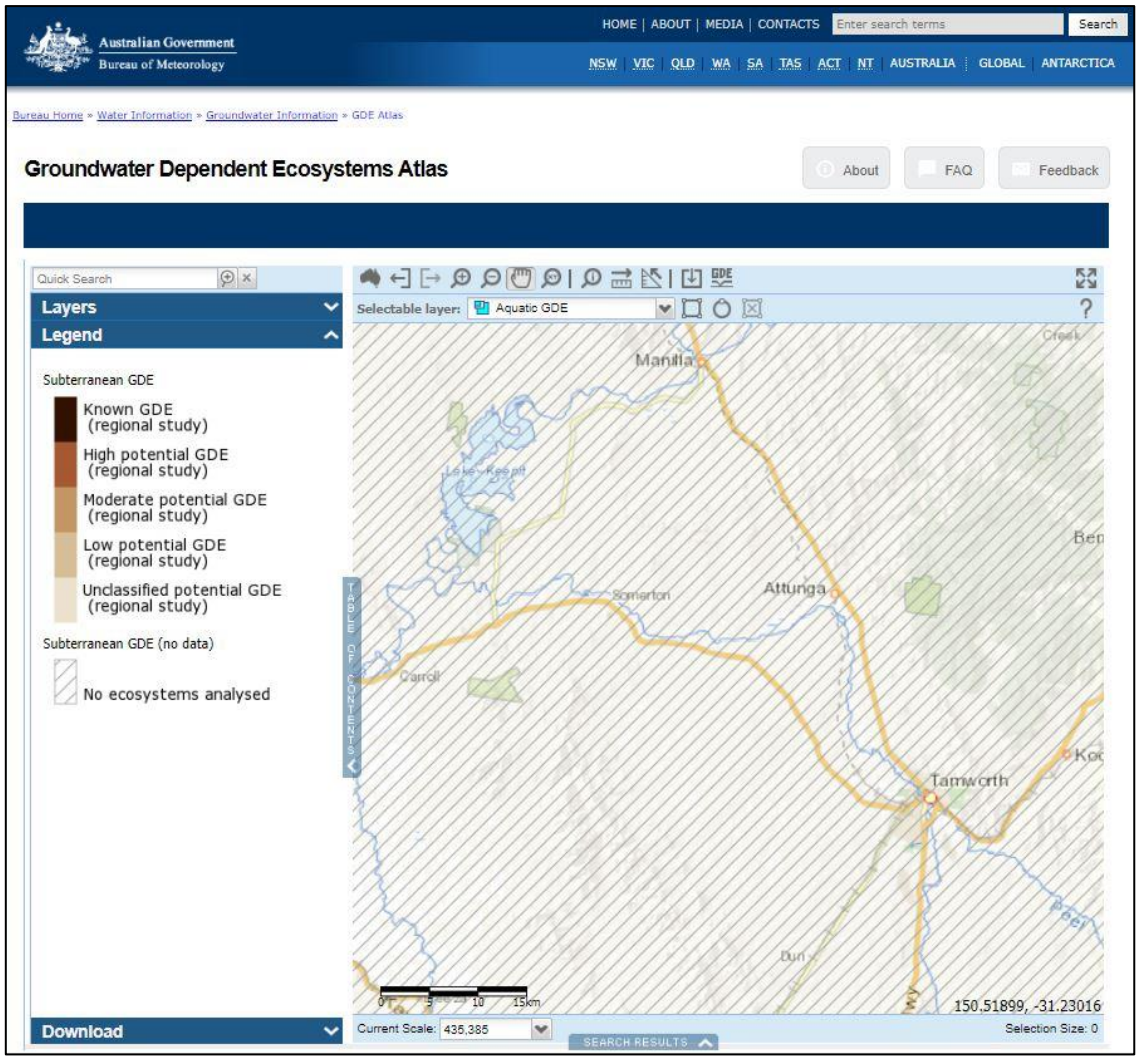


Figure 1-22: Subterranean GDE



1.5 Threatened species

1.5.1 Desktop assessment - database searches

Desktop threatened species, population and community database searches were conducted prior to the field assessment.

One threatened species, Spotted Harrier (*Circus assimilis*) has been recorded within 1500 metres of the Development Area. Species recorded within 10 kilometres of the Development Area have been provided in Table 1-9, Figure 1-23 and Figure 1-24.

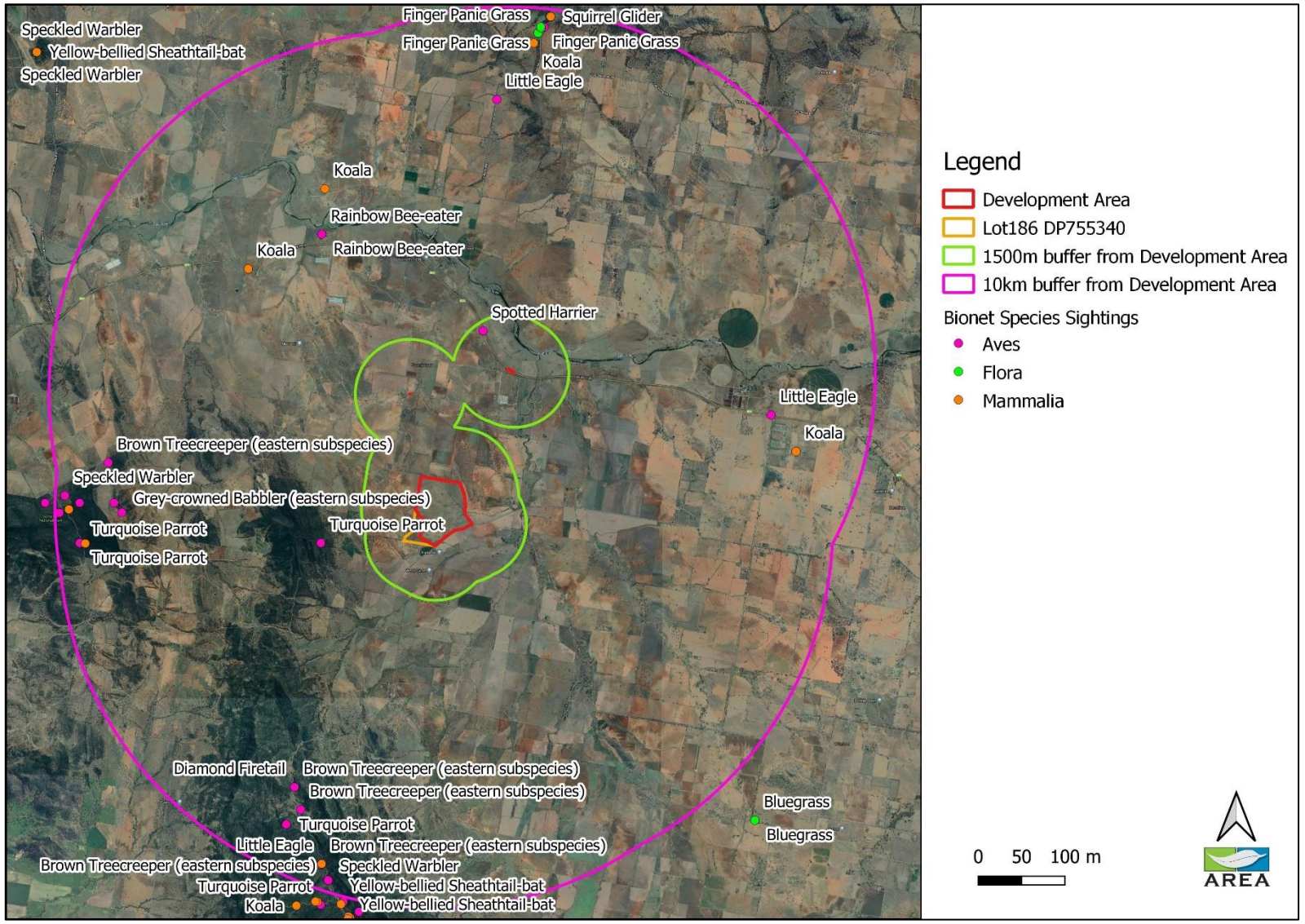
Table 1-9: BioNet records within 10km of the Development Area

Scientific Name	Common Name	NSW Status	Commonwealth Status	Number of records
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not listed	8
Merops ornatus	Rainbow Bee-eater	Not listed	JAMBA	2
Chthonicola sagittata	Speckled Warbler	Vulnerable	Not listed	6
Stagonopleura guttata	Diamond Firetail	Vulnerable	Not listed	1
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	Not listed	3
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not listed	2
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not listed	1
Neophema pulchella	Turquoise Parrot	Vulnerable	Not listed	11
Hieraaetus morphnoides	Little Eagle	Vulnerable	Not listed	3
Circus assimilis	Spotted Harrier	Vulnerable	Not listed	1
Digitaria porrecta	Finger Panic Grass	Endangered	Not listed	3
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable	4
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not listed	5
Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not listed	1

JAMBA = Japan bilateral agreement.

Figure 1-23: BioNet Species Sighting records – 1500m

Figure 1-24: BioNet Species Sighting records – 10km



A threatened species search of the Peel IBRA subregion, filtered by Western Slopes Grassy Woodland highlighted 46 fauna species, 20 flora species, two threatened ecological communities and one endangered population.

Table 1-10: Predicted threatened species – Peel IBRA subregion and Western Slopes Grassy Woodland

Scientific name	Common name	NSW status	Commonwealth status
Litoria booroolongensis	Booroolong Frog	Endangered	Endangered
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not listed
Burhinus grallarius	Bush Stone-curlew	Endangered	Not listed
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Not listed
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Not listed
Chthonicola sagittata	Speckled Warbler	Vulnerable	Not listed
Circus assimilis	Spotted Harrier	Vulnerable	Not listed
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not listed
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not listed
Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not listed
Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable
Hieraaetus morphnoides	Little Eagle	Vulnerable	Not listed
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered
Lophoictinia isura	Square-tailed Kite	Vulnerable	Not listed
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	Not listed
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not listed
Neophema pulchella	Turquoise Parrot	Vulnerable	Not listed
Ninox connivens	Barking Owl	Vulnerable	Not listed
Ninox strenua	Powerful Owl	Vulnerable	Not listed
Petroica boodang	Scarlet Robin	Vulnerable	Not listed
Petroica phoenicea	Flame Robin	Vulnerable	Not listed
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not listed
Stagonopleura guttata	Diamond Firetail	Vulnerable	Not listed
Tyto novaehollandiae	Masked Owl	Vulnerable	Not listed
Haliaeetus leucogaster	White-bellied Sea Eagle	Vulnerable	Not listed
Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions	Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered Ecological Community	Endangered Ecological Community
White Box Yellow Box Blakely's Red Gum Woodland	White Box Yellow Box Blakely's Red Gum Woodland	Endangered Ecological Community	Critically Endangered
Aepyprymnus rufescens	Rufous Bettong	Vulnerable	Not listed
Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	Not listed

Scientific name	Common name	NSW status	Commonwealth status
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable
Chalinolobus picatus	Little Pied Bat	Vulnerable	Not listed
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	Not listed
Macropus dorsalis	Black-striped Wallaby	Endangered	Not listed
Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not listed
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable
Petaurus australis	Yellow-bellied Glider	Vulnerable	Not listed
Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not listed
Petrogale penicillata	Brush-tailed Rock-wallaby	Endangered	Vulnerable
Phascogale tapoatafa	Brush-tailed Phascogale	Vulnerable	Not listed
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not listed
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not listed
Vespadelus troughtoni	Eastern Cave Bat	Vulnerable	Not listed
Acacia atrox	Myall Creek Wattle	Endangered	Not listed
Bothriochloa biloba	Lobed Bluegrass	Not listed	Not listed
Callistemon pungens	*Callistemon pungens*	Not listed	Vulnerable
Commersonia procumbens	*Commersonia procumbens*	Vulnerable	Vulnerable
Dichanthium setosum	Bluegrass	Vulnerable	Vulnerable
Digitaria porrecta	Finger Panic Grass	Endangered	Not listed
Euphrasia arguta	Euphrasia arguta	Critically Endangered	Critically Endangered
Homopholis belsonii	Belson's Panic	Endangered	Vulnerable
Monotaxis macrophylla	Large-leafed Monotaxis	Endangered	Not listed
Picris evae	Hawkweed	Vulnerable	Vulnerable
Polygala linariifolia	Native Milkwort	Endangered	Not listed
Prasophyllum sp. Wybong	*Prasophyllum sp. Wybong*	Not listed	Critically Endangered
Thesium australe	Austral Toadflax	Vulnerable	Vulnerable
Tylophora linearis	*Tylophora linearis*	Vulnerable	Endangered
Adelotus brevis - endangered population	Tusked Frog population in the Nandewar and New England Tableland Bioregions	Endangered Population	Not listed
Hoplocephalus bitorquatus	Pale-headed Snake	Vulnerable	Not listed
Uvidicolus sphyrurus	Border Thick-tailed Gecko	Vulnerable	Vulnerable

1.5.2 Ecosystem credit species

The threatened species in Table 1-11 were highlighted as part of ecosystem credit calculations in the BAMC. None of these species were excluded.

Table 1-11: Ecosystem credit species

Scientific name	Common name	BC Act listing status	EPBC Act listing status.	Sensitivity to gain class
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Listed	Moderate
Calyptorhynchus lathami	Glossy Black-Cockatoo (Foraging)	Vulnerable	Not Listed	High
Chalinolobus picatus	Little Pied Bat	Vulnerable	Not Listed	High
Chthonicola sagittata	Speckled Warbler	Vulnerable	Not Listed	High
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Listed	High
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Listed	Moderate
Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Listed	High
Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable	Moderate
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	Vulnerable	Not Listed	High
Hieraaetus morphnoides	Little Eagle (Foraging)	Vulnerable	Not Listed	Moderate
Lathamus discolor	Swift Parrot (Foraging)	Endangered	Critically Endangered	Moderate
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	Not Listed	Moderate
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not Listed	Moderate
Ninox connivens	Barking Owl (Foraging)	Vulnerable	Not Listed	High
Petroica boodang	Scarlet Robin	Vulnerable	Not Listed	Moderate
Petroica phoenicea	Flame Robin	Vulnerable	Not Listed	Moderate
Phascolarctos cinereus	Koala (Foraging)	Vulnerable	Vulnerable	High
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not Listed	Moderate
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not Listed	High
Tyto novaehollandiae	Masked Owl (Foraging)	Vulnerable	Not Listed	High

1.6 Species credit species

The Paddock Tree assessment module in the BAMC did not identify any species credits species. No habitat assessment or further consideration of Candidate Species Credit Species is required.

1.6.1 Targeted surveys

Targeted surveys were conducted to detect threatened species occurring in the category 1 land and the presence of threatened fauna in the Development Area.

The category 1 land was the subject of search transects to detect threatened flora species to meet biodiversity and impact assessment requirements of Part 7 of the NSW *Biodiversity Conservation Act 2016*.

Two ultrasonographic bat call recorders were deployed in the Solar Farm Development Area. One threatened species, Eastern Cave Bat (*Vespadelus troughtoni*) was detected in the three nights of survey (Table 1-12). There are no suitable roosting sites for this species, and it is expected this animal was travelling though the site from roosting habitat greater than 1500 metres to the east, likely to feeding resources associated with the Peel River, within 1500 metres of the Development Area to the north east. This species is a cave roosting species, not known to roost in trees or in human structures such as sheds (although it has been known to roost in mine workings which resemble caves).

Table 1-12: Ultrasonic ball call recording data

	17 September 2019		18 September 2019		19 September 2019	
Species detected	Bat 1	Bat 2	Bat 1	Bat 2	Bat 1	Bat 2
Chalinolobus gouldii	Bat 1 and Bat 2 NIL recordings (windstorm/gale force winds)		X			
Chalinolobus gouldii or Scotorepens balstoni				X		X
Chalinolobus morio						X
Ozimops petersi					X	
Ozimops planiceps					X	
flat pulses @25khz likely *Ozimops planiceps* possible *C dwyeri*			X		X	
Scotorepens balstoni			X		X	
Vespadelus troughtoni #					X	
Vespadelus vulturnus			X		X	

Listed threatened species under the BC Act

2. Stage 2: Impact assessment

2.1 Avoiding impact

2.1.1 Location of the project

The project has been located to avoid impact by:

- Restricting impact to within an area of Lot186 DP755340 which is currently managed under a Property Vegetation Plan (PVP). This PVP allows clearing of non-protected native regrowth groundcover.

2.1.2 Design of the project

The project has been designed to avoid impact by:

- avoiding impact to existing drainage lines in accordance with the Department of Industry's *Guidelines for controlled activities on waterfront land* (2018)[1].

2.2 Prescribed and additional biodiversity impacts

Karst, caves, crevices, cliffs and rock outcrops do not occur in the Development Area. Prescribed biodiversity impacts for these matters do not exist for this project.

Human made structures, non-native vegetation, drainage lines and scattered rock do occur in the Development Area:

- Human made structures including two sheds and two disused silos will be removed by this project. Some threatened species of bat are known to use human structures as roosting habitat. Three nights of monitoring bats using two SM2+ ultrasonic bat recorders were implemented to assess bats using the Solar Farm Development Area. One species of threatened microbat was detected, and this species is not known to use sheds as roosting habitat.
- Waterways and two farm dams occur in the Development Area. These will not be removed or disturbed by the project.
- Non-native vegetation occurring in the Development Area includes specimens of Athel Pine (*Tamarix aphylla*). This species is listed as a Weed of National Significance and as a High Threat Exotic. Wherever this species occurs in the Development Area, it will be removed.
- Scattered rock (on ground individual cobbles ranging is size from pebbles to the size of a hand) occurs in the Solar Farm Development Area where the terrain is hilly. This rock has been historically highly disturbed by ploughing activity. Species predicted in the IBRA threatened species search highlighted Border Thick-tailed Gecko. While this species is known to use rocky slopes, it favours forest and woodland areas with boulders, rock slabs, fallen timber and deep leaf litter. Occupied sites often have a dense tree canopy that helps create a sparse understorey. None of these habitat features are present in the Development Area.

[1]On page two of the guidance document managing Controlled Actions under the NSW Water Management Act it lists "Other exemptions" - point three says 'the activity is nothing more than removal of vegetation in circumstances that would otherwise be lawful". The Acacia requiring removal to improve sight distance at the Babbinboon x Warminster road intersection can be legally removed for the same circumstance under Section 88 of the NSW Roads Act.

Risk of vehicle strike is likely to increase during construction associated with an increase of vehicle activity. During the operation phase of this proposal, the increase will reflect operational and maintenance staff accessing the site.

This proposal will not reduce the ability of birds, bats or aquatic species to move across the landscape. There will be some reduction to the ability of terrestrial species to move between habitat areas however these species will be able to more around the perimeter of the Development Site. The proposal will not reduce threatened species movement required to maintain their lifecycle. The only terrestrial threatened species identified as an Ecosystem Credit Species in the BAMC was Koala.

2.3 Impact summary

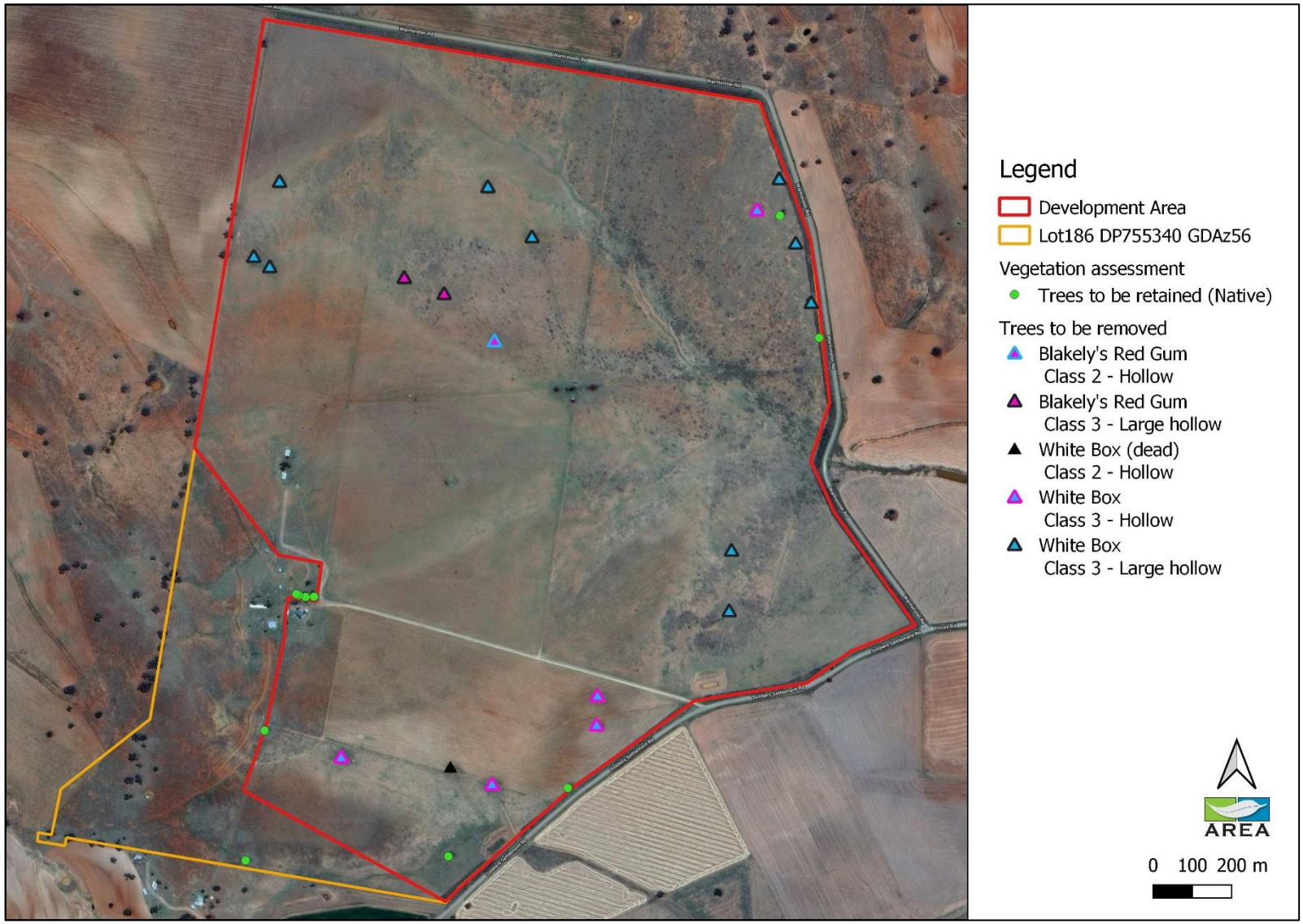
2.3.1 Serious and Irreversible Impacts

No Serious and Irreversible Impacts were identified by the BAMC.

2.3.2 Impact requiring offsets

Removal of 19 paddock trees, one of which is dead, will require offset under the BC Act. Credit requirement has been calculated using the BAMC (Paddock tree assessment module) (see section 2.4 and Appendix B).

Figure 2-1: Paddock trees to be removed



2.3.3 Impact not requiring offsets

The groundcover and woody weeds in the Solar Farm Development Area is consistent with category 1 land as authorised by the Property Vegetation Plan. This area does not require offset (section 2.3.4).

Removal of one *Acacia stenophylla* without disturbing ground cover in the Sight Distance Development Area does not require offsets.

Removal of Coolatai Grass (*Hyparrhenia hirta*) and other exotic species in the Deceleration Lane does not require offsets.

2.3.4 Areas not requiring assessment

The Solar Farm Development Area is category 1 land as authorised by the Property Vegetation Plan. Category 1 land does not require assessment. To confirm the property is consistent with the requirements for category 1 land, BAM vegetation plots were conducted, and a Vegetation Integrity score generated.

At the time of the assessment survey units:

- 5 and 6 possessed a crop (failed)
- 3 and 8 were recently fallow (maybe not ploughed in the last three years)
- 4 and 7 were likely not ploughed in the last five to, less likely, ten years.

Notwithstanding, all survey units were, and are, subject to cropping in more favourable seasons.

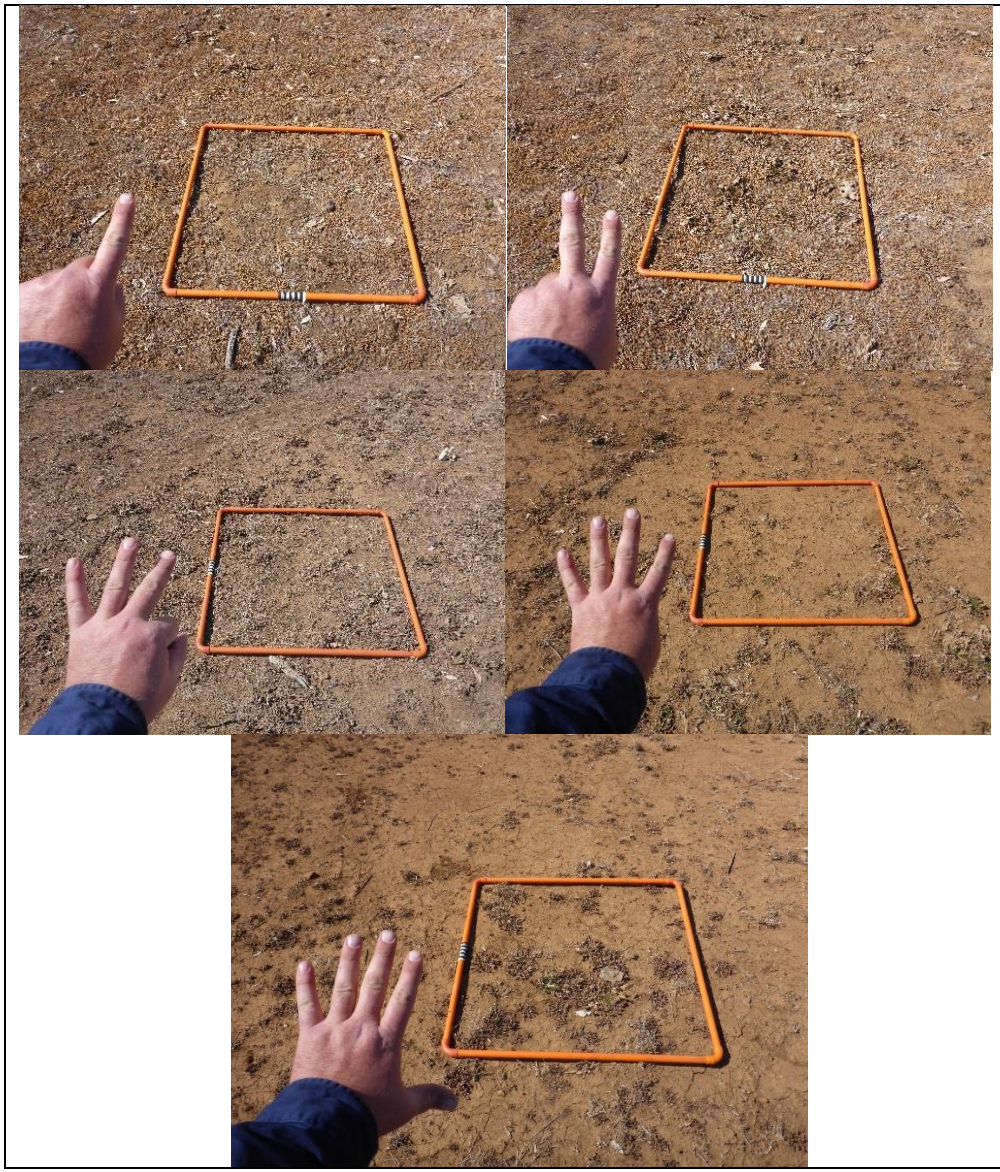
The area occupied by survey units 3, 4, 7 and 8 (fallow paddocks) equates to 154.84 hectares. Six plots are required to assess this area, however only five plots were completed. The mean of these five plots was used in lieu of a sixth plot for the BAMC calculations.

Location of BAM plots is shown in Figure 2-2. Photos are provided in Table 2-1.

Figure 2-2: Location of BAM plots in survey units

Table 2-1: Summary of existing levels of disturbance in the Solar farm Development Area per survey unit.

Image	Survey Unit and comment
 	**Survey unit 3 (Plot 2)** Plot 2 (measuring tapes show 20x20 m in 20x50 m nested plot laid out). Formerly a grassy woodland with well-spaced white box trees. Trees likely cleared for ploughing agriculture and construction of an airstrip. Subject to continuous grazing since European settlement. Likely only ploughed in more favourable seasons (once or twice) every five years and otherwise left fallow. The following photos variation of the ground surface in a 1 m2 area at 10 m intervals over the 50m Plot midline (1=5 m, 2=15 m, 3=25 m, 4=35 m, 5=45 m).



Survey unit 4 (Plot 4)
Sandy deflated area 60 m west of the unnamed larger drainage line.

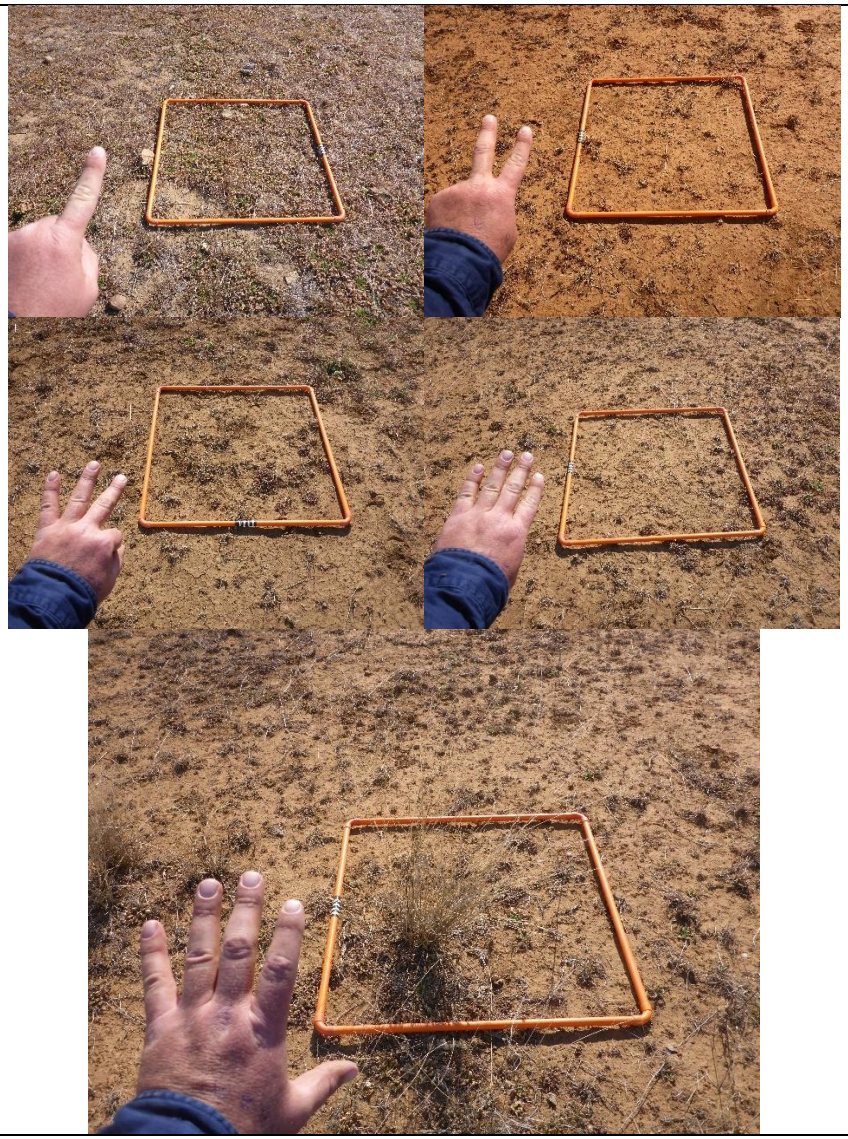
Plot 4 (measuring tapes show 20x20 m in 20x50 m nested plot laid out).

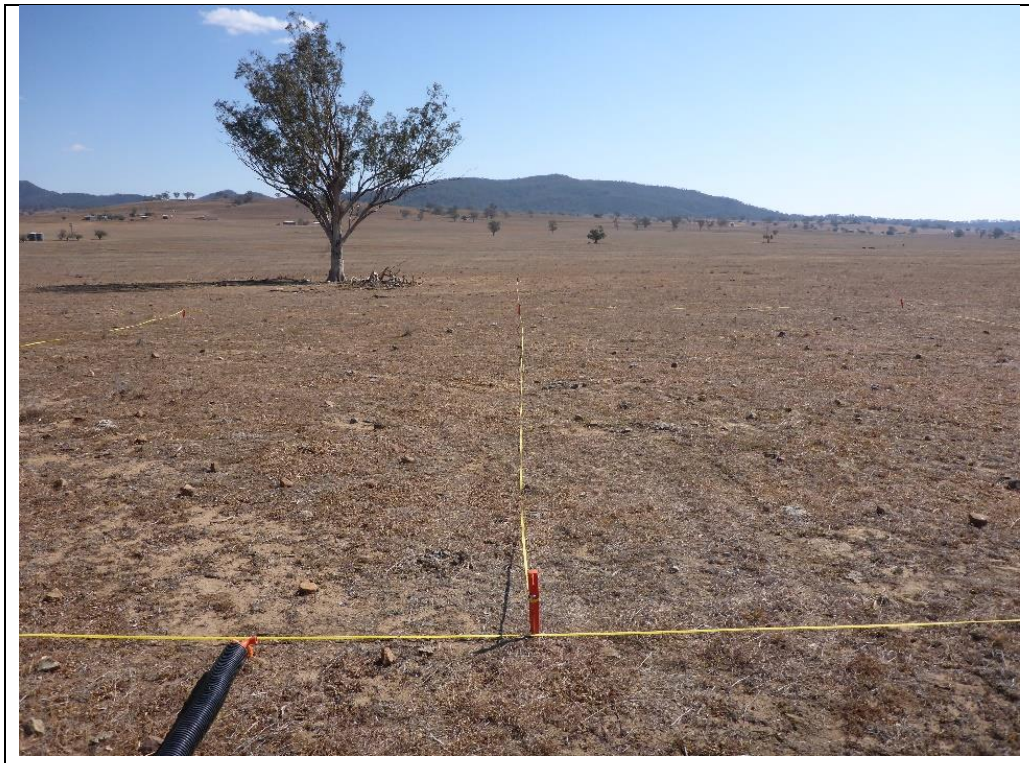
Formerly a grassy woodland with well-spaced white box and Blakely's Red Gum trees. Some trees likely cleared for ploughing agriculture. Subject to continuous grazing since European settlement.

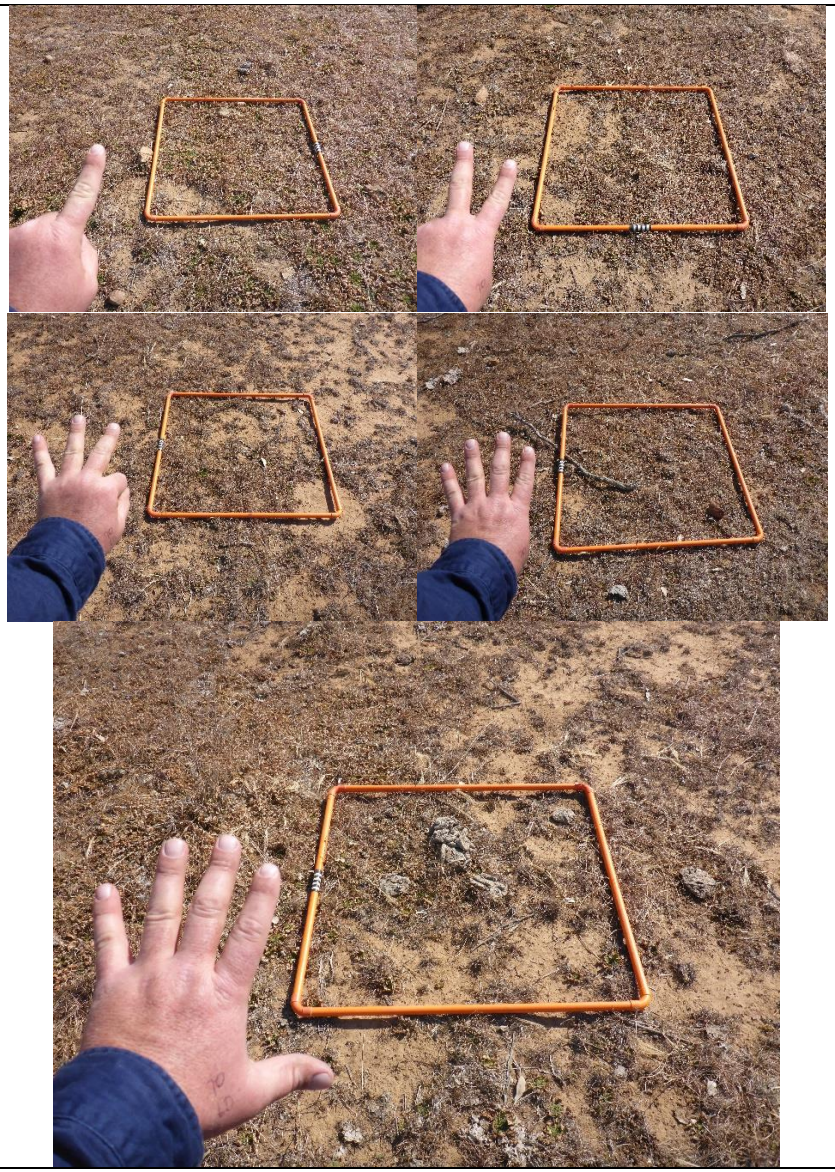
Likely only ploughed in more favourable seasons (once or twice) every five to ten years and otherwise left fallow.

A large farm dam occurs in the southeastern corner of the paddock in a low-lying area.

The following photos variation of the ground surface in a 1 m2 area at 10 m intervals over the 50 m Plot midline (1=5 m, 2=15 m, 3=25 m, 4=35 m, 5=45 m).



	**Survey unit 4 (Plot 3)** Elevated area on gently sloping hill area 360m east of the unnamed larger drainage line. Plot 3 (measuring tapes show 20x20 m in 20x50 m nested plot laid out). Formerly a grassy woodland with well-spaced white box trees. Some trees likely cleared for ploughing agriculture. Subject to continuous grazing since European settlement. Likely only ploughed in more favourable seasons (once or twice) every five to ten years and otherwise left fallow. The following photos variation of the ground surface in a 1 m2 area at 10 m intervals over the 50 m Plot midline (1=5 m, 2=15 m, 3=25 m, 4=35 m, 5=45 m).



Survey unit 4 (Plot 1)
Sandy deflated area 600 m west of the unnamed larger drainage line.

Plot 1 (measuring tapes show 20x20 m in 20x50 m nested plot laid out).

Formerly a grassy woodland with well-spaced white box and Blakely's Red Gum trees. Some trees likely cleared for ploughing agriculture. Subject to continuous grazing since European settlement.

Likely only ploughed in more favourable seasons (once or twice) every five to ten years and otherwise left fallow.

A large farm dam occurs in the southeastern corner of the paddock in a low-lying area.

The following photos variation of the ground surface in a 1 m2 area at 10 m intervals over the 50 m Plot midline (1=5 m, 2=15 m, 3=25 m, 4=35 m, 5=45 m).

 	**Survey unit 5** Formerly a grassy woodland with well-spaced white box trees. All trees cleared for ploughing agriculture. Regularly ploughed, cropped during field assessment.

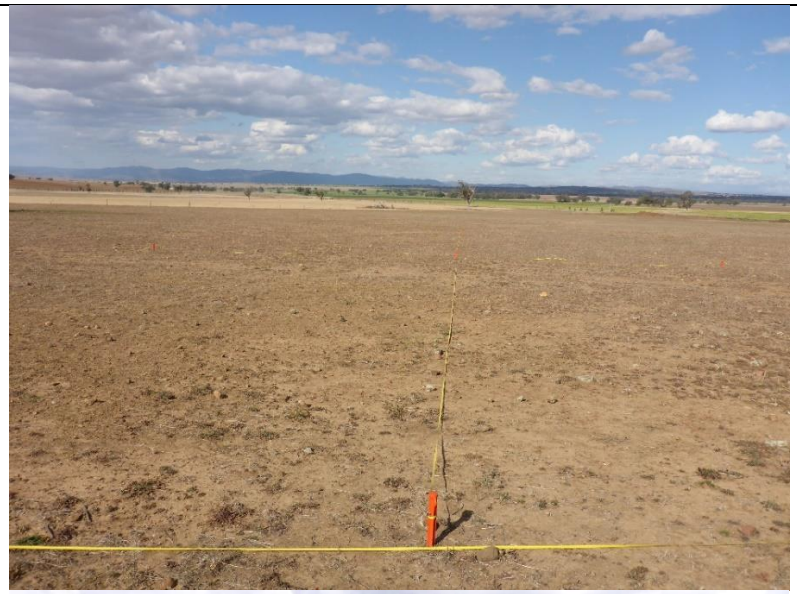
Survey unit 6
Formerly a grassy woodland with well-spaced white box trees. All but five native trees cleared for ploughing agriculture.

Regularly ploughed, cropped during field assessment.

Survey unit 7
Elevated area on gently sloping hill area 200 m south of the unnamed smaller drainage line. Small dam build on the western boundary.

Formerly a grassy woodland with well-spaced white box trees. All native trees likely cleared for ploughing agriculture.

Likely only ploughed in more favourable seasons (once or twice) every five to ten years and otherwise left fallow.



Survey unit 8
Mostly an elevated area on gently sloping hill area with an unmapped larger drainage line and dam in the eastern part.

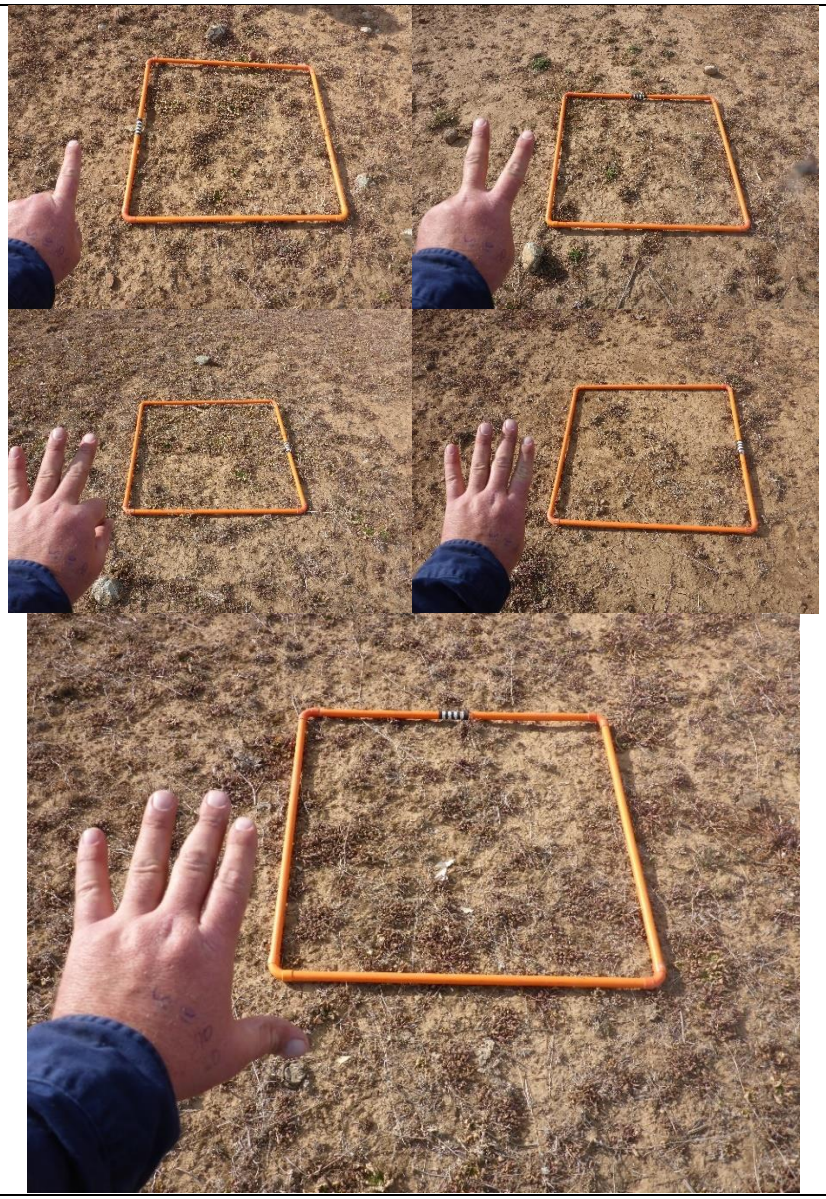
Plot 5 (measuring tapes show 20x20 m in 20x50 m nested plot laid out).

Transected by a northeast - southwest oriented 132kV powerline.

Formerly a grassy woodland with well-spaced white box and Blakely's red gum trees. Some trees likely cleared for ploughing agriculture, three white box remain.

Likely only ploughed in more favourable seasons (once or twice) every five years and otherwise left fallow.

The following photos variation of the ground surface in a 1m2 area at 10m intervals over the 50m Plot midline (1=5 m, 2=15 m, 3=25 m, 4=35 m, 5=45 m).



Exotic assessment:

Five BAM plots were used to confirm the exotic and native species cover. Table 2-2 shows a summary of the species recorded in each plot and their cover.

Table 2-2: BAM plot data summary

Plot	Number of native species	Number of exotic species	Total native cover (%)	Total exotic cover (%)	Exotic cover percent of groundcover vegetation
1	5	9	0.5	11.1	95.7
2	3	8	0.12	98.3	99.8
3	5	9	1.31	69.1	98.1
4	7	5	0.43	21.4	98.0
5	5	6	2.3	27.1	92.2

Native assessment:

Data from the BAM plots were entered in the BAMC which generated the composition, structure and vegetation integrity scores are provided in Table 2-3. 1000 hectares has been used for patch size to reflect the groundcover connectivity in a highly cleared landscape. A vegetation integrity score of less than 15 is consistent with the definition of category 1 land. The vegetation integrity score is very low at 1.4 further indicating highly disturbed low conservation value land.

Table 2-3: BAM Calculator results

PCT code	Patch size	Area	Composition	Structure	Function	Vegetation Integrity
433	1000	154.84	6.6	0	15	1.4

2.4 Credit summary

The following credit summary has been generated by the BAMC (paddock tree assessment). The Plant Community Type used for this assessment is PCT433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion.

Table 2-4: Credit summary – Paddock tree assessment

Scientific name	Common name	Size class	Number of trees	Contains hollows	Ecosystem credits per tree	Credits required
Eucalyptus albens	White Box	3	15	Yes	1	15
Eucalyptus albens	White Box (dead)	2	1	Yes	0.75	1
Eucalyptus blakelyi	Blakely's Red Gum	3	2	Yes	1	2
Eucalyptus blakelyi	Blakely's Red Gum	2	1	Yes	0.75	1
					Total	**19**

2.5 Environment Protection and Biodiversity Conservation Act (EPBC ACT) 1999

An EPBC Act Protected Matters Report was generated for each of the Development Areas and within one kilometre of each. The results from these reports are summaries below

Table 2-5: Protected Matters Report summary

Matter	Development Area		
	Solar Farm	Deceleration Lane	Sight Distance
World Heritage Properties	None	None	None
National Heritage Places	None	None	None
Wetlands of International Importance	3 All more than 900km away	3 All more than 900km away	3 All more than 900km away
Great Barrier Reef Marine Park	None	None	None
Commonwealth Marine Area	None	None	None
Listed Threatened Ecological Communities	5 One occurs in the Development Area	4 One occurs in the Development Area	4 One occurs in the Development Area
Listed Threatened Species	22	20	19
Listed Migratory Species	11	10	10
Commonwealth Land	None	None	None
Commonwealth Heritage Places	None	None	None
Listed Marine Species	17	16	16
Whales and Other Cetaceans	None	None	None
Critical Habitats	None	None	None
Commonwealth Reserves Terrestrial	None	None	None
Australian Marine Parks	None	None	None
State and Territory Reserves	None	None	None
Regional Forest Agreements	None	None	None
Invasive Species	26	25	25
Nationally Important Wetlands	None	None	None
Key Ecological Features (Marine)	None	None	None

2.6 Mitigation

Mitigation measures are required to further avoid and minimise impacts to biodiversity which may include:

- Loss of vegetation and habitat for threatened species (paddock trees).
- Potential fauna mortality during construction.

A list of recommended mitigation measures is summarised in Table 2-6. These are designed to provide guidance on recommended measures to further avoid and mitigate impact to biodiversity.

Table 2-6: Recommended mitigation measures

Item	Timing	Recommended mitigation measures
Site personnel induction	Pre-construction	Ensure all construction staff working on the proposal are inducted on: • Site environmental procedures (i.e. vegetation management, sediment and erosion control, protective fencing, noxious weeds, hygiene protocols, ethical procedures for handling fauna displaced on the site). • What to do in case of environmental emergency (chemical spills, fire, injured fauna). • Key contacts in case of environmental emergency.
Identification of clearing limits	Pre-construction	• Accurately and clearly mark out the limits of clearing (where appropriate) and the vegetation (paddock trees) to be retained outside of the construction footprint. • Regular inspections should be undertaken to ensure all retained vegetation/fauna habitat is clearly marked and that fencing is in place, where appropriate.
Protection of fauna during clearing of vegetation	Pre-construction and during clearing works	• Avoid clearing native vegetation in Spring. • Establish a procedure to ensure any fauna injured in the clearing or construction process is appropriately managed. • Ensure all staff area away of the local wildlife careers' contact details (WIRES)
Management of erosion and sediment control	Pre-and during construction	• Provide sediment and erosion controls to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways, vegetation and fauna habitat. • Clearly identify stockpile and storage locations and provide erosion and sediment controls around stockpiles.
Weed management	Pre-and during construction	• Ensure that any machinery arriving on site be inspected for any foreign soil or plant matter/weed material and be washed down before entering the site. • Weeds should be controlled within the work area according to the requirements of the *Biosecurity Act 2016* • Any noxious weeds which are identified as part of the proposal must be disposed of appropriately.
Revegetation and landscaping	Operation	• Minor landscaping around drains, embankments and paths may be required. Where this occurs, all species planted for any purpose should be consistent with those Plant Community Types described in this report or otherwise appropriate to the region or existing vegetation.

3. Conclusion

AREA Environmental Consultants & Communication (AREA) was commissioned by PROJECTe- on behalf of Oriens Energy Pty Ltd (the proponent) to complete a biodiversity assessment for a proposed solar farm near Tamworth, NSW (the project).

A field survey was conducted from Tuesday 17 to Thursday 19 September 2019. The survey included paddock tree assessment, BAM vegetation plots, threatened species searches and habitat assessment.

Nineteen paddock trees will be removed by this proposal and ground disturbance will occur on category 1 land. This proposal will require entry into the NSW Biodiversity Offset Scheme to offset the removal of the 19 large remnant paddock trees with hollows. Credit requirements are provided in section 2.4 and Appendix B.

Assessment concluded this proposal is unlikely to have a significant impact on threatened species, populations or communities. This assessment has confirmed Referral to Commonwealth environment department is not required.

3.1 Recommendations

The following recommendations seek to enhance the biodiversity of the site and manage construction, operational and end of project life impact:

- Establish a community of native grasses which are native and endemic to the region, cost effective and available commercially as seed, and can contribute to soil stability during the operation and end of project phases. Suggested species include:
  - Queensland Blue Grass – *Dichanthium sericeum*
  - Windmill Grass – *Chloris truncata*
- Prepare a Biodiversity Management Plan in accordance with conditions of consent or otherwise required by determining authorities. This plan may include a rehabilitation plan for implementation after the proposal is decommissioned
- Follow mitigation measures suggested in section 2.1.

4. References

Australia, B. (2016). *Find a Bird (online)*. Retrieved from Birdlife Australia: http://www.birdsaustralia.com.au/search/birds

Benson, J. (2009). *New South Wales Vegetation Classification and Assessment, NSWVCA batabase.* Sydney: NSW DEC.

Cropper, S. (1993). *Management of endangered plants.* Melbourne: CSIRO Publications.

DEC. (2004). *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities.* Sydney, NSW: NSW Government Department of Environment and Conservation.

DEC. (2009). *Biobanking Assessment Methodology and Credict Calculator Operation Manual .* Sydney: Department of Environment and Climate Change.

Department of Environment and Climate Change. (2009). *Threatened species survey and assessment guidelines: field survey methods for fauna – Amphibians.* Sydney: Department of Environment and Climate Change.

Department of Environment and Conservation . (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft).* Hurstville: Department of Environment and Conservation .

Department of Environment, Water, Heritage and the Arts . (2010b). *Survey Guidelines for Australia's Threatened Birds.* Commonwealth Government: Department of Environment, Water, Heritage and the Arts .

Department of Environment, Water, Heritage and the Arts . (2011a). *Survey Guidelines for Australia's Threatened Reptiles.* Commonwealth Government: Department of Environment, Water, Heritage and the Arts .

Department of Environment, Water, Heritage and the Arts . (2011b). *Survey Guidelines for Australia's Threatened Mammals.* Commonwealth Government: Department of Environment, Water, Heritage and the Arts .

Department of Environment, Water, Heritage and the Arts. (2010a). *Survey Guidelines for Australia's Threatened Bats.* Commonwealth Government: Department of Environment, Water, Heritage and the Arts.

Department of Environment, Water, Heritage and the Arts. (2010c). *Survey Guidelines for Australia's Threatened Frogs.* Commonwealth Government: Department of Environment, Water, Heritage and the Arts.

Department of Primary Industries . (2017b). *Listed threatened species, populations and ecological communities (online).* Retrieved from Listed threatened species, populations and ecological communities (online).: http://www.dpi.nsw.gov.au/fisheries/species-protection/conservation/what-current#Key- threatening-processes

Department of Primary Industries. (2017). *Threatened & protected species - records viewer (online)*. Retrieved from Threatened & protected species - records viewer (online): http://www.dpi.nsw.gov.au/fisheries/species-protection/records/viewer

Department of the Environment . (2013). *Commonwealth Significant Impact guidelines.* ACT: Commonwealth Government.

DoE. (2013). *Matters of National Environmental Significance - Significant impact guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999.* Department of the Environment. Canberra, ACT: Commonwealth of Australia . Retrieved April 2015, from http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf

Environment Australia. (2001). *A Directory of Important Wetlands in Australia, Third Edition.* ACT: Environment Australia.

Environment, D. o. (2017). *Protected Matters Search Tool (online)*. Retrieved from http://www.environment.gov.au/topics/about-us/legislation/environment-protection-and-biodiversity-

Environment, D. o. (2017). *Species Profiles and Threats Database (SPRAT), (online)*. Retrieved from Species Profiles and Threats Database (SPRAT), (online): http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Fairfull, S. a. (2003). *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings.* Cronulla: NSW Fisheries.

Kuginis L., Byrne G., Serov P, Williams J.P. (2012). *Risk assessment guidelines for groundwater dependent ecosystems, Volume 3 – Identification of high probability groundwater dependent ecosystems on the coastal plains of NSW and their ecological value.* Sydney: NSW Department of Primary Industries, Office of Water.

NSW Department of Industry - Natural Resources Access Regulator (2018) *Guidelines for controlled activities on waterfront land; riparian corridors*, NSW Government

NSW Department of Primary Industries. (2017a). *NSW WeedWise (online)*. Retrieved from NSW WeedWise (online): http://weeds.dpi.nsw.gov.au/

Office of Environment and Heritage. (2014). *Framework for Biodiversity Assessment.* Sydney: NSW Government.

Office of Environment and Heritage. (2014). *Major Projects Offsets Policy.* Sydney: NSW Government.

Office of Environment and Heritage. (2017). *Atlas of NSW Wildlife (online)*. Retrieved from Atlas of NSW Wildlife (online): http://www.environment.nsw.gov.au/asmslightprofileapp/account/login?ReturnUrl=%2fAtlasApp%2fDefault.aspx

Office of Environment and Heritage. (2017). *Threatened Species Profile Database (online)*. Retrieved from Threatened Species Profile Database (online): http://www.environment.nsw.gov.au/asmslightprofileapp/account/login?ForceLogin=1

Office of Environment and Heritage. (2017). *Vegetation Information System (online)*. Retrieved from Vegetation Information System (online): http://www.environment.nsw.gov.au/NSWVCA20PRapp/LoginPR.aspx

Resource and Conservation Division. (2001). *Comprehensive Regional Assessment Floristic Types Information (CRAFTI).*

Royal Botanic Gardens and Domain Trust, Sydney (online). (2017). *PlantNET (The NSW Plant Information Network System)*. Retrieved from PlantNET (The NSW Plant Information Network System): http://plantnet.rbgsyd.nsw.gov.au

Thackway, R. a. (1995). *An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program, Version 4.0.* ACT: Australian Nature Conservation Agency.

Appendix A EPBC Act Protected Matters Reports

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.

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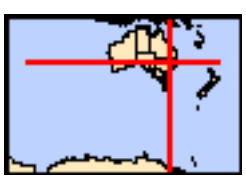

Summary

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:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	20
Listed Migratory Species:	10

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	25
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	1000 - 1100km
Riverland	900 - 1000km upstream
The coorong, and lakes alexandrina and albert wetland	1100 - 1200km

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
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat 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
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat known to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may 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 likely to 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
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Cadellia pentastylis Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta [4325]	Critically 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
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Tylophora linearis [55231]	Endangered	Species or species habitat may occur within area
Reptiles		
Uvidicolus sphyrurus Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	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]	Vulnerable	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
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
[Pandion haliaetus](#)		
Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

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
[Chrysococcyx osculans](#)		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
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 likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to 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
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
Frogs		

Name	Status	Type of Presence
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
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
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		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

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

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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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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.

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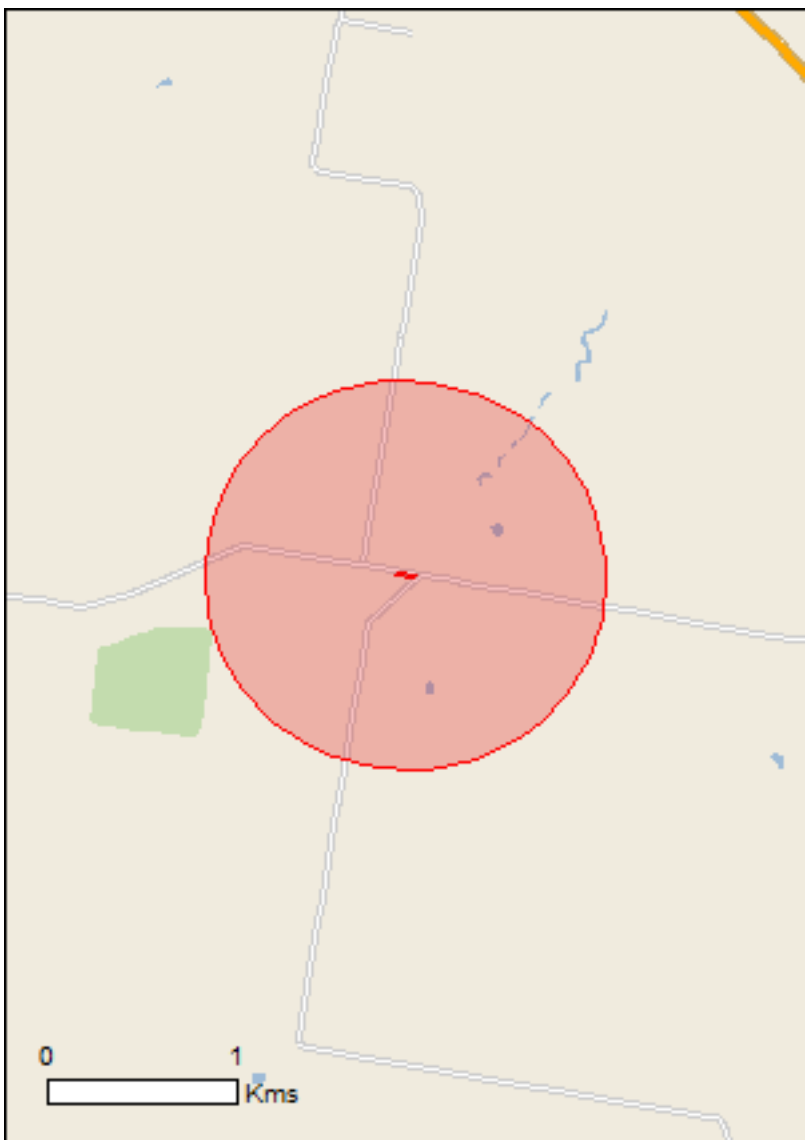
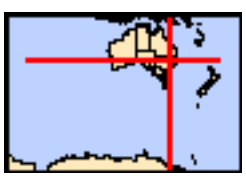


Coordinates

Buffer: 1.0Km



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:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	19
Listed Migratory Species:	10

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:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	25
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	1000 - 1100km
Riverland	900 - 1000km upstream
The coorong, and lakes alexandrina and albert wetland	1100 - 1200km

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
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community may 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
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may 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 likely to 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
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Cadellia pentastylis		
Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta		
[4325]	Critically 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
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Tylophora linearis		
[55231]	Endangered	Species or species habitat may occur within area
Reptiles		
Uvidicolus sphyrurus		
Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	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]	Vulnerable	Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Migratory Wetlands Species		

Name	Threatened	Type of Presence
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
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

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
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to 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
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
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may 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
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
Cylindropuntia spp. Prickly Pears [85131]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		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 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

Name	Status	Type of Presence 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

-30.97301 150.636185,-30.972876 150.635267,-30.972706 150.63531,-30.972826 150.636168,-30.97301 150.636185

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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Australian Government
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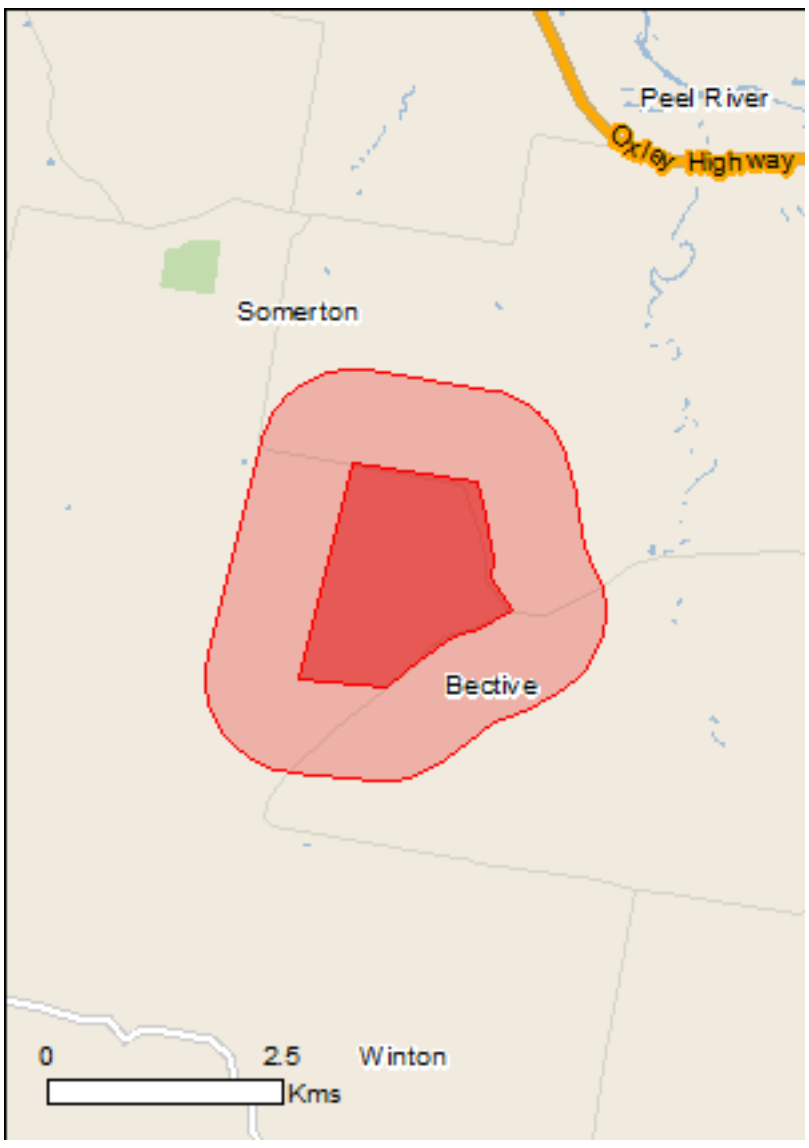
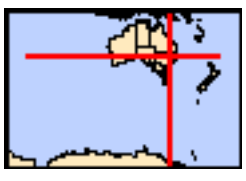


Coordinates

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

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World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	5
Listed Threatened Species:	22
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

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Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	17
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	26
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	1000 - 1100km
Riverland	900 - 1000km upstream
The coorong, and lakes alexandrina and albert wetland	1100 - 1200km

Listed Threatened Ecological Communities		[Resource Information]

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Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
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Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Mammals		

Name	Status	Type of Presence
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Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may 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 likely to 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
[Petrogale penicillata](#)		
Brush-tailed Rock-wallaby [225]	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 may occur within area
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[Uvidicolus sphyrurus](#)		
Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	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
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

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
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Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
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Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
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Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	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
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		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

Name	Status	Type of Presence
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
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
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,		Species or species

Name	Status	Type of Presence
Florist's Smilax, Smilax Asparagus [22473]		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
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 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

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

-30.993208 150.639278,-30.994827 150.651123,-30.997623 150.651981,-31.001191 150.652668,-31.002662 150.652496,-31.005384 150.654556,-31.006782 150.651552,-31.007407 150.648806,-31.009467 150.64563,-31.011674 150.642497,-31.010938 150.634086,-30.993208 150.639236,-30.993208 150.639278

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 B BAM plot sheets and BAMC outputs

Plot sheets

BAM Plot – Field Survey Form

Site Sheet no: 1 of

Survey Name	Plot Identifier	Recorders
Tamworth Solar	1	Phil Cameron

Date	Zone	Datum	IBRA region	Photo #	Zone ID
18/09/19	56		Nandewar Peel		1

Easting	Northing	Plot Dimensions (e.g. 20 x 20 in 20 x 50)	Orientation of midline from the 0 m point.
275259	6567423	20 x 20 in 20 x 50	70° Magnetic °

Likely Vegetation Class		Confidence: H M L
Plant Community Type	PCT 433 White Box Grassy	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	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.4
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover %		1

This table may be completed after entering data into available tools. It is not required while in the field.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm			
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			
10 – 19 cm	tick	tick	
5 – 9 cm	tick	tick	
< 5 cm	tick	tick	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

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

Data needed is presence only (tick) unless a 'large tree' for that veg class.

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

† 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.

Each size class is noted as present by the **living tree stems** only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	15 15 10 15 5	30 75 85 80 90	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	16			

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
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description

Identified 2 LLS PVP as Cat 1 Land.
Plot used to confirm the only fallow paddock (rest have a crop).

Leaf Litter and end point GPS		
ID	Easting	Northing
End point		

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: 18/09/19	Tammish Saw	1	Phil Cowan

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
1	—	—	Centaurea melitensis	Maltese cockspur	E	1	200	L		0.3
2	—	—	Alternanthera pungens	Khaki ~~Khaki~~ weed	HTE	1	600	L		0.1
3	GG	g	Stipa aristiglumis	Plains Grass.	N	0.1	2	L		0.3
4	—	g	Carthamus lanatus	Saffron Thistle	E	0.1	20	L		0.3
5	GG	g	Enneapogon avicularis	Curly windmill	N	0.1	100	L		0.2
6	—	g	Medicago	Clover sp.	E	1	1000+	L		0.1
7	—	—	Cirsium vulgare	Black Spear Thistle	E	1	200	L		0.2
8	FG	f	Vittadinia cuneata	Fuzzweed	N	0.1	50	L		0.1
9	—	—	Salvia verbenaca	Wild sage	E	1	300	L		0.1
10	GG	g	Stipa scabra	Rough speargrass	N	0.1	100	L		0.2
11	—	g	Taraxacum officinale	Dandelion	E	1	200	L		0.2
12	GG	g	Dactyloctenium radulans	Button Grass	N	0.1	50	L		0.1
13	—	g	Avena fatua	Wild Oat	E	4	1000+	L		0.2
14	—	—	Bromus sp.		E	1	5000+	L		0.2
15				% cover						
16			N = 5	0.5						
17			E = 9	11.1						
18										
19				A / 1						
20			TG	0 / 0						
21			SG	0 / 0						
22			GG	4 / 0.4						
23			FG	~~8~~ 1 / 0.1						
24			OTH	0 / 0						
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

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, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

BAM Plot – Field Survey Form

Site Sheet no: 1 of

	Survey Name	Plot Identifier	Recorders
Date: 19/9/19	Tamworth Solar	Plot 2	Phil Cameron / Dave Stelman

Zone	Datum	IBRA region	Photo #	Zone ID
56				

Easting	Northing	Plot Dimensions (e.g. 20 x 20 in 20 x 50)	Orientation of midline from the 0 m point.
274578	6568198	20 x 20 in 20 x 50	Magnetic °

Likely Vegetation Class		Confidence: H M L
Plant Community Type	PCT 433	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	1
	Grasses etc.	1
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0.01
	Grasses etc.	0.1
	Forbs	0.01
	Ferns	0
	Other	0
High Threat Weed cover %		10.1

This table may be completed after entering data into available tools. It is not required while in the field.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm			ϕ
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			ϕ
10 – 19 cm	tick	tick	
5 – 9 cm	tick	tick	
< 5 cm	tick	tick	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

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

Data needed is presence only (tick) unless a 'large tree' for that veg class.

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

† 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.

Each size class is noted as present by the **living tree stems** only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	50 | 80 | 60 | 15 | 30			
Average of the 5 subplots	47			

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
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description

Selected to be representative of paddock. Cat 1 Land on LLS approved PVP.

Leaf Litter and end point GPS		
ID	Easting	Northing
End point		

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 19/9/19	Tamworth Solar	Plot 7	PJC + Dave S

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
1	—	—	Medicago	Barrel medic	E	80	SK?			
2	—	—	Carthamus lanatus	Saffron thistle	HTE	10	SK.			
3	—	—	Sisymbrium sp.	Hedge mustard	E	5.	SK?			
4	—	—	Silybum marianum	Variegated Thistle	E	0.1	100			
5	—	—	Malva parviflora	Marshmallow	E	0.1	100			
6	—	—	Hordeum glaucum	Barley Grass	E	2	900			
7	—	—	Erodium cicutarium	Storksbill	E	1	1000			
8	GG	G	Aristida ramosa		N	0.1	5			
9	SG	S	Sclerolaena muricata	Black Poly Poly	N	0.01	2			
10	FG	F	Vittadinia cuneata	Fuzz weed	N	0.01	4			
11	—	—	Cirsium vulgare	Black Spear Thistle	HTE	0.1	80			
12										
13										
14										
15										
16										
17										
18			N = 3							
19			E = 8							
20										
21										
22			ground cover = 98.42 %							
23			native = 0.12							
24			exotic = 98.3 (99.8)							
25										
26										
27										
28										
29				Total	Count					
30			total = 98.42	TG 0	0					
31			Perennial = 0	SG 1	0.01					
32				GG 1	0.1					
33				FG 1	0.01					
34				EG 0	0					
35				OG 0	0					
36										
37										
38										
39										
40										

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

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, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
Tamworth Sdcl	3	Phil Cameron Dave Stoward

Date	Zone	Datum	IBRA region	Photo #	Zone ID
19/09/19	56	GDA			

Easting	Northing	Plot Dimensions (e.g. 20 x 20 in 20 x 50)	Orientation of midline from the 0 m point.
275705	6569367	20 x 20 in 20 x 50	Magnetic °

Likely Vegetation Class		Confidence: H M L
Plant Community Type	PCT 433	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	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	1-3
	Forbs	0.01
	Ferns	0
	Other	0
High Threat Weed cover %		14

This table may be completed after entering data into available tools. It is not required while in the field.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm			0
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			0
10 – 19 cm	tick	tick	
5 – 9 cm	tick	tick	
< 5 cm	tick	tick	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			total 0

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

Data needed is presence only (tick) unless a 'large tree' for that veg class.

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

† 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.

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Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70 60 60 85 60	a b c d e	a b c d e	a b c d e
Average of the 5 subplots	67%			

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
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description

Representative of area.
Severe drought

Leaf Litter and end point GPS		
ID	Easting	Northing
End point		

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: 19/09/19.	Tamworth Sdcr	3	DJCameron Dave Stroeven

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
1	—	—	Carthamus lanatus	Saffron Thistle	HTE	2	400	L		0.5
2	—	—	Sisymbrium sp	Hedge mustard	HTE	2	400	L		
3	—	—	Medicago sp	Barrel medic	E	40	>5k	L		
4	GG	G	Aristida ramosa	Purple Wire grass	N	1	20	L		
5	—	—	Lepidium sp.		E	0.1	5	L		
6	FG	F	Vittadinea cuneata	Fuzzweed	N	0.01	25	L		
7	GG	G	Austrostipa scabra	Rough Spear grass	N	0.1	40	L		
8	GG	G	Danthonia sp	Wallaby Grass	N	0.1	15	L		
9	GG	G	Enteropogon acicularis	Curly Windmill	N	0.1	15	L		
10	—	—	Bromus catharticus	Prairie grass	HTE	5	>5k	L		
11	—	—	Bromus sp.		HTE	5	>5k	L		
12	—	—	Erodium cicutarium	Storksbill	E	5	>5k	L		
13	—	—	Lolium perenne	Perennial ryegrass	E	5	>5k	L		
14	—	—	Trifolium arvense	Hairstalk Clover	E	5	>5k	L		
15										
16										
17										
18										
19										
20			N = 5							
21			E = 9							
22										
23										
24										
25										
26			ground cover 74.41 %							
27			native 1.31 %							
28			exotic = 69.1 (98.1%)							
29										
30										
31										
32										
33						cont	cover			
34			total = 70.41	TG		0	0			
35			Perennial = 5 + 0.1	SG		0	0			
36			= 5.1	GG		4	1.3			
37				FG		1	0.01			
38				EG		0	0			
39				OG		0	0			
40										

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

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, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

BAM Plot – Field Survey Form

Site Sheet no: 1 of

	Survey Name	Plot Identifier	Recorders
Date: 19/09/19	Tamworth Solar	4	Phil Cameron, Dave Stormont

Zone	Datum	IBRA region		Photo #		Zone ID	
56							

Easting	Northing	Plot Dimensions (e.g. 20 x 20 in 20 x 50)	20 x 20 in 20 x 50	Orientation of midline from the 0 m point.	Magnetic °

Likely Vegetation Class		Confidence: H M L
Plant Community Type	PCT 433	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.	5
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.32
	Forbs	0.11
	Ferns	0
	Other	0
High Threat Weed cover %		11

This table may be completed after entering data into available tools. It is not required while in the field.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm			0
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			0
10 – 19 cm	tick	tick	
5 – 9 cm	tick	tick	
< 5 cm	tick	tick	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)			total

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

Data needed is presence only (tick) unless a 'large tree' for that veg class.

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

† 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.

Each size class is noted as present by the **living tree stems** only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Subplot score (% in each)	15	10	25	15	40															
Average of the 5 subplots	21 %																			

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
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description

Representative of area.
Severe drought.

Leaf Litter and end point GPS		
ID	Easting	Northing
End point		

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 19/06/19	Tamworth Solar	4	Phil Cameron Dave Stanman

ID	BAM Code	GF Code	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
1			Carthamus lanatus	Saffron Thistle	HTE	5	500	L		0.1
2	GG	g	Danthonia sp	Wallaby grass	N	0.1	50	L		
3	FG	f	Vittadinia cuneata	Fuzzweed	N	0.1	50	L		
4	GG	g	Austrostipa scabra	Rough spear grass	N	0.1	50	L		0.2
5			Medicago sp	Barrel Medic	E	10	>5k	L		0.1
6	FG	f	Wahlenbergia communis	River Bluebell	N	0.01	1	L		
7	GG	g	Bothriochloa	Qld bluegrass	N	0.01	10	L		
8	GG	g	Enteropogon acicularis	Curly Windmill	N	0.1	20	L		
9	GG	g		Bottlebrush grass	N	0.01	3	L		
10			Bromus catharticus	prairie grass	E	0.4	20	L		
11			Avena fatua	Wild oates	HTE	1	20	L		
12			Centaurea melitensis	Maltese COck spur	HTE	5	500	L		0.1
13										
14										
15										
16										
17										
18										
19										
20			N = 7							
21			E = 5							
22										
23										
24										
25										
26										
27			Ground cover = 21.83							
28			Native = 0.43							
29			exotic = 21.4 (98%)							
30										
31										
32										
33			total = 21.83		Count	cover				
34			perennial = 0	TG	0	0				
35				SG	0	0				
36				GG	5	0.32				
37				FG	2	0.11				
38				EG	0	0				
39				OG	0	0				
40										

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

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, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders
Date		Tamworth Sdw		Dave Sturman Phil Cameron
Zone 56	Datum GDA	5 Plot ID		Plot dimensions		Photo #	
Easting 274747	Northing 6567074	IBRA region	in m	Midline bearing from 0 m	Magnetic°
Vegetation Class				Confidence: H M L
Plant Community Type		PCT 433	EEC:	Confidence: H M L

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

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	2
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.2
	Forbs	2.1
	Ferns	0
	Other	0
High Threat Weed cover		15

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

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

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	40	30	60	10	50	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	42%																			

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

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

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

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			Representative of area
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 19-9-19	Tamworth Solar	5	Dave Swanson Phil Cameron

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
—	Centaurea melitensis Maltese Cockspur	HTE	5	>2k	L	
—	Cathamus lanatus Saffron Thistle	HTE	10	>2k	L	
FG	Vittadinea Cuneata Fuzzweed	N	1	20	L	
—	Medicago sp Barrel medic	E	10	>2k	L	
GG	Danthonia sp. Wallaby grass	N	0.1	50	L	
GG	Dicanthium sericeum QLD Bluegrass	N	0.1	50	L	
—	Bromus cathartics Prairie grass	E	1	50	L	
—	Erodium cicutarium Storksbill	E	1	50	L	
FG	Whalenbergia sp.	N	1	2	L	
—	Eragrostis sp	E	0.1	5	L	
FG	Chrysocephalum apiculatum Yellow buttons	N	0.1	5	L	

N = 5
E = 6

Groundcover 29.4%
native 2.3
exotic 27.1 (92.18)

total = 29.4
Perennial = 0.1

	COUNT	COVER
TG	0	0
SG	0	0
GG	2	0.2
FG	3	2.1
EG	0	0
OG	0	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, ...

BAM Plot – Field Survey Form	Site Sheet no:

		Survey Name	Plot Identifier	Recorders	
Date	__/__/__	Tamworth Solar	Combined X (6)	Phil Cameron	
Zone	Datum	IBRA region		Photo #	Zone ID
Easting	Northing	Plot Dimensions	20 x 20 in 20 x 50	Orientation of midline from the 0 m point.	Magnetic °
Likely Vegetation Class					Confidence: H M L
Plant Community Type	PCT 433			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.	3
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.4
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover %		10.2

This table may be completed after entering data into available tools. It is not required while in the field.

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm			—
50 – 79 cm			
30 – 49 cm			Hollows 20cm+
20 – 29 cm			
10 – 19 cm	tick	tick	—
5 – 9 cm	tick	tick	
< 5 cm	tick	tick	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Tally space		total

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

Data needed is presence only (tick) unless a 'large tree' for that veg class.

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

† 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.

Each size class is noted as present by the living tree stems only. Depending on the Vegetation Class, DBH values and counts may be needed for a size class. For a multi-stemmed tree, only the largest living stem is included in the count/estimate if it is required by the large tree category for that vegetation class.

Hollows at least 20cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	a b c d e	a b c d e	a b c d e	a b c d e
Average of the 5 subplots	40			

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
Clearing (inc. logging)		
Cultivation (inc. pasture)		
Soil erosion		
Firewood / CWD removal		
Grazing (identify native/stock)		
Fire damage		
Storm damage		

Free Text Section for brief site description	Leaf Litter and end point GPS		
	ID	Easting	Northing
	End point		

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe   Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Paddock tree BAMC outputs

Paddock Tree Report

Proposal Details

Assessment Id
00018017/BAAS17082/19/00018018

Assessment name
Tamworth Solar Farm

BAM data last updated *
26/11/2019

Assessor Name

Report Created
06/12/2019

BAM Data version *
22

Assessor Number

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
0

Assessment Type
Paddock Trees

* 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.

Paddock Trees

PCT code	PCT name	No. of trees	Species	DBHOB Category	Contain hollows	Class	Assessment required
433	White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion	15	Eucalyptus albens	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species

Paddock Tree Report

433	White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion	1	Eucalyptus albens	>= 20cm and <50cm	True	2	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
433	White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion	2	Eucalyptus blakelyi	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
433	White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion	1	Eucalyptus blakelyi	>= 20cm and <50cm	True	2	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018017/BAAS17082/19/00018018	Tamworth Solar Farm	26/11/2019
Assessor Name	Report Created	BAM Data version *
	06/12/2019	22
Assessor Number	BAM Case Status	Date Finalised
	Open	To be finalised
Assessment Revision	Assessment Type	
0	Paddock Trees	

* 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.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name
Barking Owl	Ninox connivens
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae
Dusky Woodswallow	Artamus cyanopterus cyanopterus
Flame Robin	Petroica phoenicea
Glossy Black-Cockatoo	Calyptorhynchus lathami
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata
Koala	Phascolarctos cinereus
Little Eagle	Hieraaetus morphnoides
Little Lorikeet	Glossopsitta pusilla
Little Pied Bat	Chalinolobus picatus
Masked Owl	Tyto novaehollandiae
Painted Honeyeater	Grantiella picta
Scarlet Robin	Petroica boodang
Speckled Warbler	Chthonicola sagittata
Swift Parrot	Lathamus discolor
Varied Sittella	Daphoenositta chrysoptera

White-bellied Sea-Eagle	Haliaeetus leucogaster
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00018017/BAAS17082/19/00018018	Tamworth Solar Farm	26/11/2019
Assessor Name	Report Created	BAM Data version *
	06/12/2019	22
Assessor Number	BAM Case Status	Date Finalised
	Open	To be finalised
Assessment Revision	Assessment Type	
0	Paddock Trees	

* 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.

Paddock Trees Credit Requirement

Class	Contains hollows	Number of trees	Ecosystem credits
433-White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion			
3	True	15.0	15
2	True	1.0	1
3	True	2.0	2
2	True	1.0	1
			19
			19

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00018017/BAAS17082/19/00018018

Proposal Name
Tamworth Solar Farm

BAM data last updated *
26/11/2019

Assessor Name

Assessor Number

BAM Data version *
22

Proponent Names

Report Created
06/12/2019

Date Finalised
To be finalised

Assessment Revision
0

Assessment Type
Paddock Trees

BAM Case Status
Open

* 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.

Potential Serious and Irreversible Impacts

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

BAM Biodiversity Credit Report (Like for like)

Ecosystem Credit Summary

PCT	TEC	Credits
433-White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	19.00

Credit classes for 433

Like-for-like options

TEC	Trading group	HBT	IBRA region
White Box Yellow Box Blakely's Red Gum Woodland	-	Yes	Peel, Eastern Nandewars, Hunter, Inverell Basalts, Kaputar, Liverpool Plains, Liverpool Range, Northern Basalts, Tomalla and Walcha Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00018017/BAAS17082/19/00018018

Proposal Name
Tamworth Solar Farm

BAM data last updated *
26/11/2019

Assessor Name

Assessor Number

BAM Data version *
22

Proponent Name(s)

Report Created
06/12/2019

Assessment Type
Paddock Trees

Date Finalised
To be finalised

Assessment Revision
0

BAM Case Status
Open

* 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.

Potential Serious and Irreversible Impacts

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

BAM Biodiversity Credit Report (Variations)

Ecosystem Credit Summary

PCT	TEC	Credits
433-White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	19.00

Credit classes for 433

Like-for-like options

TEC	Trading group	HBT	IBRA region
White Box Yellow Box Blakely's Red Gum Woodland	-	Yes	Peel, Eastern Nandewars, Hunter, Inverell Basalts, Kaputar, Liverpool Plains, Liverpool Range, Northern Basalts, Tomalla and Walcha Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	HBT	IBRA region
Grassy Woodlands	Tier 3	Yes (including artificial)	

BAMC outputs for category 1 assessment

BAM Calculator

App last updated: 19/11/2019 (Version: 1.2.7.2)
BAM data last updated *: 26/11/2019 (Version: 22) * Disclaimer

OPEN | SAVE | SAVE AS NEW VERSION | CANCEL | DELETE | FINALISE | PRINT | 00018017/BAAS17082/19/00018574 / Revision: 0 | LOGOUT

1. Assessment details | 2. Site context | 3. Vegetation | 4. Habitat suitability | 5. Habitat survey | 6. Credits | 7. Credit classes | 8. Price

All fields marked with an asterisk (*) are mandatory

Plant community types (PCT) & ecological communities

Formation *	Class *	Plant community type *	PCT % cleared	Associated TEC *	BC Act listing status	EPBC Act listing status	Action	Delete
Grassy Woodlands	Western Slopes Grassy Woodlands	433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion	85	White Box Yellow Box Blakely's Red Gum Woodland	Endangered Ecological Community	Critically Endangered	ADD VEG ZONE Modify default benchmarks	✖

ADD ANOTHER PCT | SEARCH PCT OUTSIDE IBRA

IMPORT SITE

Vegetation zones (Current vegetation integrity score)

#	Import	PCT code	Condition class *	Vegetation zone name	Patch Size*	Area (ha)*	Location	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score	Management zones	Delete
1		433	low	433_low	1000	154.84		6.6	0	15	1.4		✖

Vegetation zones (Future vegetation integrity score)

#	PCT code	Condition class	Vegetation zone name	Patch Size	Management zone	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total Change in VI score
1	433	low	433_low	1000		154.84	0	0	0	0	-1.4	-1.4

CLEAR | NEXT

Appendix C: Fauna handling process

Purpose

This procedure explains the actions to be taken if an animal or eggs are discovered on the Study area that require handling or rescue during vegetation and soil clearance and ongoing construction activities. The procedure relates primarily to injured shocked and juvenile individuals but also applies to nocturnal fauna or slow-moving species that may not be capable of moving away from mobile plant and equipment.

Scope

This procedure is applicable to all native and introduced species that are found on the Study area. attendee construction staff and contractors will attend the Project induction, which will include a section on Fauna. Procedure In the event wildlife (including shocked, juvenile animals or eggs) are discovered on the Study area during vegetation and soil clearance and ongoing construction activities the following steps shall be taken:

1. STOP ALL WORK in the vicinity of the fauna and immediately notify the Essential Energy Works Supervisor, who will then to notify A member of Essential Energy's Environmental Services team.

2. If required, contact project ecologist to obtain positive identification of the subject species.

3. Preferably allow fauna to leave the area without intervention.

4. If immediately available, use a licensed fauna ecologist or wildlife carer with specific animal handling experience to carry out any fauna handling.

5. To minimise stress to native fauna and remove the risk of further injury an appropriately competent person shall:

a. If time permits call ecologist or fauna rescue for advice.

b. Attempt to herd animal into adjoining forest, outside construction area.

c. If capture is necessary cover larger animals with a towel or blanket and place in a large cardboard box and/or cotton/calico bag

d. Place smaller animals in a cotton/calico bag tied at the top

e. Keep the animal in a quiet, warm, ventilated and dark place away from noisy construction activities.

f. Aquatic fauna are to be placed in plastic aquaria or a moistened plastic bag. Frogs will be transported in moistened plastic bags (1 frog/bag) with a small amount of leaf litter. Handling and translocation of frogs shall be in accordance with the Hygiene Protocol for the Control of Disease in Frogs (DECC 2008).