APPENDIX C

Biodiversity development assessment report

New England Solar Farm

Biodiversity development assessment report

Prepared for UPC Renewables Australia Pty Ltd | 14 November 2018

New England Solar Farm

Biodiversity development assessment report

Prepared for UPC Renewables Australia Pty Ltd | 14 November 2018

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New England Solar Farm

Final

Report J17300RP1 | Prepared for UPC Renewables Australia Pty Ltd | 14 November 2018

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Executive Summary

ES1 Overview

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (Figure 1.1) (the project).

The project is a State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). Therefore, a development application (DA) for the project is required to be submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The NSW Minister for Planning (Minister), or the Minister's delegate, is the consent authority.

The development site referred to in this report is shown in Figure 1.1 and represents the potential disturbance footprint of the three solar array areas and associated infrastructure. The development site encompasses a total area of 2,787 ha.

An environmental impact statement (EIS) is a requirement of the approval process. The Biodiversity Assessment Method (BAM) (OEH 2017a) has been followed to produce this biodiversity development assessment report (BDAR), which forms part of the EIS. It documents the biodiversity assessment methods and results, the initiatives built into the project design to avoid and minimise impacts to biodiversity, and the additional mitigation and management measures and biodiversity offsets to address any residual impacts.

ES2 Ecological values

The development site is primarily used for sheep and cattle grazing. Native vegetation is highly modified by both historical and ongoing management practices. Where woodland occurs, it is either limited to planted native wind breaks or patchy remnant woodland with an entirely absent midstorey and disturbed groundcover.

Native vegetation within the development site was attributed to two plant community types (PCTs) across four zones, namely:

- PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland;
- PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_pasture;
- PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted; and
- PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland.

Assessment of fauna and flora habitat concluded that the development site is only likely to support species that are able to persist in highly modified agricultural landscapes. Despite targeted surveys being undertaken for four threatened flora species and one threatened fauna species, no threatened species were recorded within the development site.

ES3 Impact avoidance, minimisation and mitigation

UPC has undertaken significant steps to avoid, minimise and mitigate impacts to biodiversity. As part of the project refinement process, EMM provided advice to UPC on areas which were of the highest priority for avoidance. This led to areas of PCT 510_woodland being avoided, particularly in the south-east of the southern array area and the north-east of the northern array area (refer to the insets provided in Figure 6.1 of this report). The alignment of the electricity transmission line (ETL) between the southern and central array areas has also been refined to avoid potential impacts to PCT 510_woodland that were identified between the southern and central array areas.

ES4 Matters of national environmental significance

An assessment of the impacts of the project on matters of national environmental significance (MNES) within the development site was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required. Five assessments of significance have been completed for three threatened species and two migratory species. All assessments concluded that no significant impacts on threatened entities are predicted to result from the project. Referral of the project to the Commonwealth Minister for the Environment for assessment is not required.

ES5 Biodiversity credits

Two native vegetation zones (namely PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland and PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_pasture) were below the vegetation integrity score threshold and therefore offsets are not required.

Impacts to native vegetation requiring offsets include:

- 15.26 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted, generating 252 credits;
- 5.67 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland, generating 68 credits; and
- direct impacts to 92 paddock trees, generating 73 credits.

The total number of ecosystem credits required to offset the project is 393 credits. No species credits are required.

ES6 Conclusion

This assessment has been completed in accordance with the BAM (OEH 2017a) on behalf of UPC. Overall the development site is considered of low biodiversity value with impacts largely limited to the direct clearance of native vegetation. The residual impact of the project will require 393 ecosystem credits.

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Acknowledgements

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EMM and UPC also appreciate the advice provided by Lachlan Copeland (Botanist - Ecological Australia) regarding potential reference sites for threatened flora species.

PART A

Stage 1: Biodiversity Assessment

1 Introduction

1.1 Project background

UPC Renewables Australia Pty Ltd (UPC) proposes to develop the New England Solar Farm; a significant grid-connected solar farm and battery energy storage system (BESS) along with associated infrastructure, approximately 6 kilometres (km) east of the township of Uralla, which lies approximately 19 km south of Armidale in the Uralla Shire local government area (LGA) (Figure 1.1) (the project).

The project is a State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP). Therefore, a development application (DA) for the project is required to be submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The NSW Minister for Planning (Minister), or the Minister's delegate, is the consent authority.

An environmental impact statement (EIS) is a requirement of the approval process. This biodiversity development assessment report (BDAR) forms part of the EIS. It documents the biodiversity assessment methods and results, the initiatives built into the project design to avoid and minimise impacts, and the additional mitigation and management measures and biodiversity offsets to address any residual impacts.

1.2 Assessment requirements

On 8 May 2018, the Department of Planning and Environment (DPE) provided Secretary's Environmental Assessment Requirements (SEARs) for the New England Solar Farm (the project).

Revised SEARs were issued for the project on 11 October 2018 in response to UPC's request for a revision to the project description to include a temporary construction accommodation village (should it be required). The revised SEARs did not include any additional biodiversity requirements, beyond the original SEARs.

A copy of the SEARs is attached to the EIS as Appendix A. In relation to biodiversity, the SEARs are listed in Table 1.1.

Table 1.1 SEARS requirements and how they have been addressed

Requirement	Section addressed
An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with Section 7.9 of the Biodiversity Conservation Act 2016 (NSW) the Biodiversity Assessment Method (BAM) and documented in a biodiversity development assessment report (BDAR), unless OEH and DPE determine that the proposed development is not likely to have any significant impacts on biodiversity values.	Biodiversity values are assessed in Sections 3 to 5 of this report. Impacts to these values are assessed in Section 6 of this report.
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.	Measures to avoid, minimise and mitigate impacts are detailed in Section 6 of this report. Direct, indirect and prescribed impacts are assessed in Section 6 of this report.

Table 1.1 SEARS requirements and how they have been addressed

Requirement	Section addressed
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.	Consideration of aquatic impacts is provided in Section 4.3.3 and 5.1 of this report. Avoidance and mitigation measures are provided in Section 6 of this report. Potential impacts on surface water and groundwater resources have also been considered as part of the surface water assessment (refer Appendix H of the EIS).

To inform preparation of the SEARs, DPE invited other government agencies to recommend matters to be addressed in the EIS. These matters were taken into account by the Secretary for DPE when preparing the SEARs. A copy of the NSW Office of Environment and Heritage (OEH) advice to DPE was attached to the SEARs and matters relevant to the BDAR are listed in Table 1.2.

Table 1.2 Government agency (OEH) requirements

Requirement	Section addressed
Biodiversity impacts are to be assessed in accordance with the Biodiversity Assessment Method (BAM) (OEH 2017a) and documented in a biodiversity development assessment report (BDAR).	Assessment has been undertaken in accordance with the BAM and outlined in this 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.	Measures to avoid, minimise and mitigate impacts are detailed in Section 6 of this report. Direct, indirect and prescribed impacts are assessed in Section 6 of this report.
The BDAR must include details of the measures proposed to address the offset obligations as follows; • the total number and classes of biodiversity credits required to be retired for the development/project; • the number and classes of like-for-like biodiversity credits proposed to be retired; • the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; • any proposal to fund a biodiversity conservation action; • any proposal to conduct ecological rehabilitation (if a mining project); and • any proposal to make a payment to the Biodiversity Conservation Fund (Fund). If seeking approval to use the variation rules, the BDAR must contain detail of all reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.	The number and class of credits required to be retired for the project are outlined in Section 6.5 of this report. The proposed strategy to secure biodiversity offsets is provided in Section 6 of this report.
The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix 11 of the BAM.	Spatial data has been saved in ESRI shapefile format and will be provided at the time of the BAM calculator submission to OEH.
The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the BAM Order 2017 under Section 6.10 of the BC Act.	This report has been prepared by Eugene Dodd (senior ecologist and BAM Assessor Accreditation Number BAAS17009), and reviewed by Aaron Mulcahy (ecologist and BAM Assessor Accreditation Number BAAS18150).

1.3 Development proposal

The project involves the development, construction and operation of a solar photovoltaic (PV) electricity generation facility and BESS, which consists of PV modules, batteries, inverters, transformers and associated infrastructure.

The development site provided on Figure 1.1 incorporates the land required for:

- the three solar array areas;
- up to three internal solar array substations and a single grid substation;
- associated BESS(s);
- operations and maintenance (O&M) infrastructure, including:
    - O&M buildings (namely meeting facilities, a temperature-controlled spare parts storage facility, supervisory control and data acquisition (SCADA) facilities, a workshop and associated infrastructure); and
    - car parking facilities;
- a construction accommodation village for non-local construction employees, which may be established as part of the early stages of the project's construction;
- connection infrastructure between the three array areas (including electricity transmission lines (ETLs) and underground or overhead cabling); and
- a new internal road network to enable access from surrounding local roads to the three array areas during construction and operations.

In addition, security fencing will be placed within the project boundary.

The project will have a targeted 'sent out' electricity generating capacity of up to 800 MW (AC) and up to 200 MW (AC) two-hour energy storage. The final number of PV modules within the three array areas will be dependent on detailed design, availability and commercial considerations at the time of construction.

Electricity generated by the project will be injected into the grid via a new cut-in to TransGrid's 330 kV transmission line that traverses the northern and central array areas.

The infrastructure associated with the project will cover an area within the development site, which is defined as the maximum area to be impacted by the project (Figure 1.1). During the preparation of the EIS, the development site within the project boundary has been refined on the basis of environmental constraints identification, stakeholder engagement, community consultation and design of project infrastructure with the objective of developing an efficient project that avoids and minimises environmental impacts.

1.4 Site description

The project will be developed within the Uralla Shire LGA. At its closest point, the project boundary is approximately 6 km east of the township of Uralla, and the northern array area starts approximately 8.6 km south of Armidale (refer to Figure 1.1).

The project boundary, which is defined as the entirety of all of the involved lots, encompasses 61 lots across a total area of 8,380 ha. The legal property descriptions of the Lot/DPs that make up the project boundary are provided in the EIS.

The development site is the area within the project boundary on which infrastructure will be located. The development site encompasses a total area of 2,787 ha, which includes 1,418 ha within the northern array area, 625 ha within the central array area and 653 ha within the southern array area. Within the development site, approximately 1,000 ha will be required for the rows of PV modules. The remaining area is associated with power conversion units (PCUs), space between the rows, internal access tracks and associated infrastructure (including substations and BESSs). The development site also includes land required for connection infrastructure between the three array areas as well as land required for new internal roads to enable access to the three array areas from the surrounding road network. Subject to detailed design and consultation with the project landholders, security fencing may be required on land outside of the development site, but within the project boundary.

The land within the project boundary is zoned RU1 Primary Production under the Uralla Local Environmental Plan 2012 (Uralla LEP). As noted above, the project boundary encompasses 61 lots, the majority of which have been modified by historical land use practices and past disturbances associated with land clearing, cropping and intensive livestock grazing. The properties within the project boundary are currently primarily used for sheep grazing for production of wool and lambs, with some cattle grazing for beef production.

The project is ideally located close to Transgrid's 330 kilovolt (kV) transmission line, which passes through the northern and central array areas. It also has access to the regional road network; including the New England Highway and Thunderbolts Way.

A number of local roads traverse the array areas and their surrounds, including Gostwyck Road, Salisbury Plains Road, The Gap Road, Carlon Menzies Road, Munsies Road, Saumarez War Service Road, Hillview Road, Elliots Road and Big Ridge Road, and will provide access to the three array areas from the regional road network throughout the construction and operation of the project.

The primary site access points will be from The Gap Road, Salisbury Plains Road, Hillview Road, Munsies Road and Big Ridge Road, with emergency access points from Saumarez War Service Road and Elliots Road.

1.5 Project boundary terms and definitions

The **project boundary** referred to in this report encompasses the 61 Lot/DPs that make up the development footprint. It is shown in Figure 1.1 and includes the involved lots beneath each of the three array areas as well as potential connection infrastructure and access corridors.

The **study area** referenced throughout this report is shown in Figure 1.1. This represents the site boundary presented as part of the preliminary environmental assessment (PEA).

The **development site** referred to in this report is shown in Figure 1.1 and represents the potential disturbance footprint of the three solar array areas and associated infrastructure. As noted in Section 1.3, the development site also includes land required for connection infrastructure between the three array areas (ie ETL easements and underground or overhead cabling), as well as land required for new internal roads to enable access to the three array areas from the surrounding road network (ie site access corridors). Ground disturbance will occur in these areas; however, only discrete areas of disturbance are anticipated, particularly along ETL easements namely to facilitate power pole placement.

1.6 Information sources

1.6.1 Publications and databases

In order to provide context for the development site, information about flora and fauna species, populations, ecological communities and habitats, was obtained from the following databases:

- Office of Environment and Heritage (OEH) *BioNet Atlas of NSW Wildlife* (Bionet) for previous threatened species records, within 10 km of the development site (search undertaken 23/08/2018);
- Commonwealth Department of Environment and Energy (DoEE) *Protected Matters Search Tool* (PMST) for MNES, including threatened species likely to occur within the development site (most recent search undertaken 11/09/2018); and
- The NSW Plant Community Types (PCT), as held within the Bionet Vegetation Classification System.

1.6.2 Spatial data

Spatial data encompassing the study area and development site was provided by UPC. Base map data was obtained from DFSI NSW databases, with cadastral data obtained from DFSI digital cadastral database. Mapping for stream orders was obtained from DPI (2013).

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

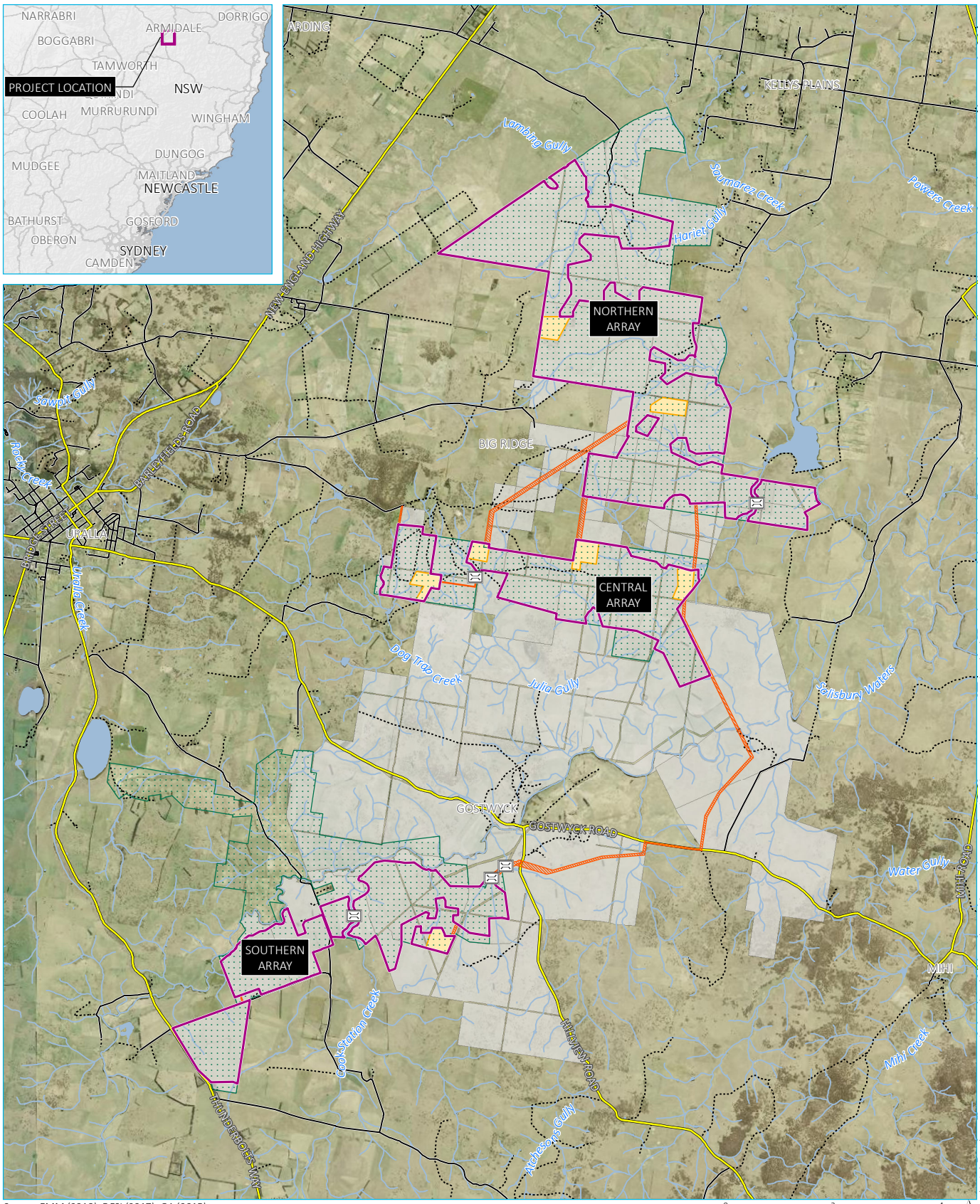
- Northern River Catchment Management Authority Native Vegetation Mapping (VIS map 524, Ecological Australia 2005);
- Soil landscapes from Espade, NSW (OEH 2018). (espade.environment.nsw.gov.au);
- Mitchell Landscapes Version V3.1 (OEH 2016a);
- Interim Biogeographic Regionalisation of Australia (IBRA) Version 7 (DoEE 2013);
- Directory of important wetlands (DoEE 2010);
- SEPP 14 Coastal Wetlands (DPE 2006); and
- NSW Wetlands (DECC 2010).

Mapping undertaken during the site assessment was conducted using a hand-held GPS unit (GDA94), mobile tablet computer and aerial photo interpretation. Mapping has been produced using a Geographic Information System (GIS; ArcGIS 10.5).

1.7 Legislative requirements

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

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- NSW *Environmental Planning and Assessment Act 1979* (EP&A Act);
- NSW *Biodiversity Conservation Act 2017* (BC Act);
- NSW *Fisheries Management Act 1994* (FM Act); and
- NSW *Biosecurity Act 2015* (BS Act).



Source: EMM (2018); DFSI (2017); GA (2015)

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GDA 1994 MGA Zone 56

N

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KEY

- Project boundary
- Study area

Development site

- Solar array
- Potential site access/ETL easement/electrical cabling
- Potential substation/BESS footprint
- Potential creek crossing
- Main road
- Local road
- Vehicular track
- Watercourse / drainage line

Regional locality

New England Solar Farm
Biodiversity development assessment
Figure 1.1

EMM
creating opportunities

2 Legislative context

This chapter provides a brief outline of the key biodiversity legislation and government policy considered in this assessment.

2.1 Commonwealth

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and water resources which are defined as MNES (Matters of National Environmental Significance) under the EPBC Act. These are:

- world heritage properties;
- places listed on the National Heritage Register;
- Ramsar wetlands of international significance;
- threatened flora and fauna species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, an action that may have a significant impact on a MNES is deemed to be a 'controlled action' and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially have a significant impact on a MNES is to be referred to DoEE for determination as to whether or not it is a controlled action. If deemed a controlled action the project is assessed under the EPBC Act for approval.

The project is unlikely to have a significant impact on MNES and is, therefore, not required to be referred to DoEE for approval. Further information is provided in Section 7.1 of this report.

2.2 State

2.2.1 Environmental Planning and Assessment Act 1979

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

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

i State Environmental Planning Policies (Part 3 Division 3.3)

State Environmental Planning Policies (SEPPs) outline policy objectives relevant to state wide issues. The SEPP relevant to the current development is *SEPP No. 44 Koala Habitat Protection.*

SEPP 44 aims to encourage the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range and to reverse the current trend of koala-population decline. It applies to areas of native vegetation greater than one hectare and in Councils listed in Schedule 1 of SEPP 44. The development site is located in the Uralla Shire LGA, which is listed in Schedule 1, therefore Koala habitat has been considered within this assessment.

Further consideration of SEPP 44 is provided in Section 7.2.1 of this report.

2.2.2 Biodiversity Conservation Act 2016

In August 2017, the BC Act commenced operation and changed the way impacts to biodiversity are assessed and offset in NSW, with offsetting required for any projects exceeding certain clearing thresholds outlined in the *Biodiversity Conservation Regulation 2017* (BC Regulation).

Concurrent with the commencement of the BC Act, the NSW Government released the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* (Savings and Transitional Regulation). This Regulation sets out a number of transitional arrangements, including for Major Projects (Part 7) for which development applications can be considered under the previous legislation if assessment requirements have been issued or substantial environmental assessment was undertaken before the 25 August 2017.

As identified within the SEARs, the project is not defined as a pending or interim planning application under Part 7 of the Savings and Transitional Regulation, therefore the BAM has been used to assess and offset impacts to biodiversity in accordance with the BC Act.

2.2.3 Fisheries Management Act

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

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

A number of creeks mapped as key fish habitat occur within the development site, which are discussed in Section 5.1. No habitat of threatened species listed under the FM Act is mapped within or adjacent to the development site. No mapped threatened species habitat was mapped within or adjacent to the development site.

2.2.4 Biosecurity Act 2015

The BS Act has superseded the Noxious Weeds Act 1993, which is now been repealed.

The primary object of the BS Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

The BS Act stipulates management arrangements for weed biosecurity risks in NSW, with the aim to prevent, eliminate and minimise risks. Management arrangements include:

- any land managers and users of land have a responsibility for managing weed biosecurity risks that they know about or could reasonably be expected to know about;
- applies to all land within NSW and all waters within the limits of the State; and
- local strategic weed management plans will provide guidance on the outcomes expected to discharge duty for the weeds in that plan.

The *Northern Tablelands Regional Strategic Management Weed Management Plan 2017-2022* (NTLLS 2017) outlines how government, industry, and the community will share responsibility and work together to identify, minimise, respond to and manage weeds within the Northern Tablelands region. The plan also supports regional implementation of the BS Act.

3 Landscape features

The identification of landscape features at the development site was determined using Section 4 of the BAM (OEH 2017a), as summarised within this chapter.

3.1 Landscape features

3.1.1 Bioregions and landscapes

The development site occurs within the New England Tablelands IBRA Bioregion. The majority of the development site is within the Armidale Plateau IBRA subregion, which will be used for the purposes of the assessment. A small portion of the western-most area of the development site extends into the Yarrowyck-Kentucky Downs IBRA subregion (Figure 3.1).

A total of four Mitchell landscapes intersect with the development site; including Niangala Plateau and Slopes (41 %), Moonbi - Walcha Granites (35 %), Uralla Basalts and Sands (21 %) and Guyra Lagoons and Swamps (3 %). For the purposes of the BAM assessment, the Niangala Plateau and Slopes Mitchell landscape was selected, given it occupies the largest area of the development site (Figure 3.1).

3.1.2 Waterways and wetlands

The study area is part of the Macleay catchment. The source of the Macleay River is in the Northern Tablelands east of the project boundary at the confluence of the Gara River, Salisbury Waters and Bakers Creek, and flows south-east through a coastal floodplain, where it meets the Pacific Ocean. The landform pattern within and surrounding the project boundary can be described as low rolling hills that are frequently dissected by drainage networks and their adjacent flood plains, terraces and foot slopes. Perennial watercourses within the project boundary and surrounds include:

- Salisbury Waters and Cook Station Creek (sixth and fifth order streams, respectively) within proximity of the southern array area (Figure 3.1); and
- Dog Trap Creek and Julia Gully (both fourth order streams) that traverse the landscape south of the central array area (Figure 3.1).

Refinements to the development site have excluded higher order steams (ie third order and above), with the exception of a number of creek crossings (refer Section 5.1). Most watercourses within the development site are ephemeral and, with the exception of a small number of streams, were dry during site investigations. Watercourses within the development site are highly modified and in many cases undiscernible owing to multiple dams and retention banks.

No wetlands occur within the development site, with the closest wetland, Dangars Lagoon, occurring west of the development site approximately 4.2 km from the southern array area at its closest point. Dangars Lagoon is listed on the Directory of Important Wetlands in Australia (DIWA).

Aquatic habitat is described further in Section 5.1.

3.1.3 Connectivity

The development site exists within an over-cleared landscape surrounded by agricultural land. Treed areas are limited to small patches and there are no landscape level connectivity features present within the development site or adjacent to it. Aside from vegetated corridors, there was a lack of significant geological features, such as ridgelines, valleys and large watercourses that may be used as flight corridors for migratory species across the development site.

Dangar's Lagoon provides wetland habitat for a number of wetland species, and birds may fly over the development site in order to access this wetland habitat; however these movements are anticipated to be infrequent.

3.1.4 Areas of geological significance and soil hazard features

The development site and buffer area does not contain karst, caves, crevices, cliffs or other areas of geological significance. Similarly, there are no soil hazard features that occur within the development site or buffer area.

3.1.5 Areas of outstanding biodiversity value

There are no areas of outstanding biodiversity value, as declared by the Minister, within the development site or study area.

3.1.6 Assessment of site context

Site context has been assessed in accordance with section 4.3 of BAM (OEH 2017a) for site-based developments.

3.2 Native vegetation extent

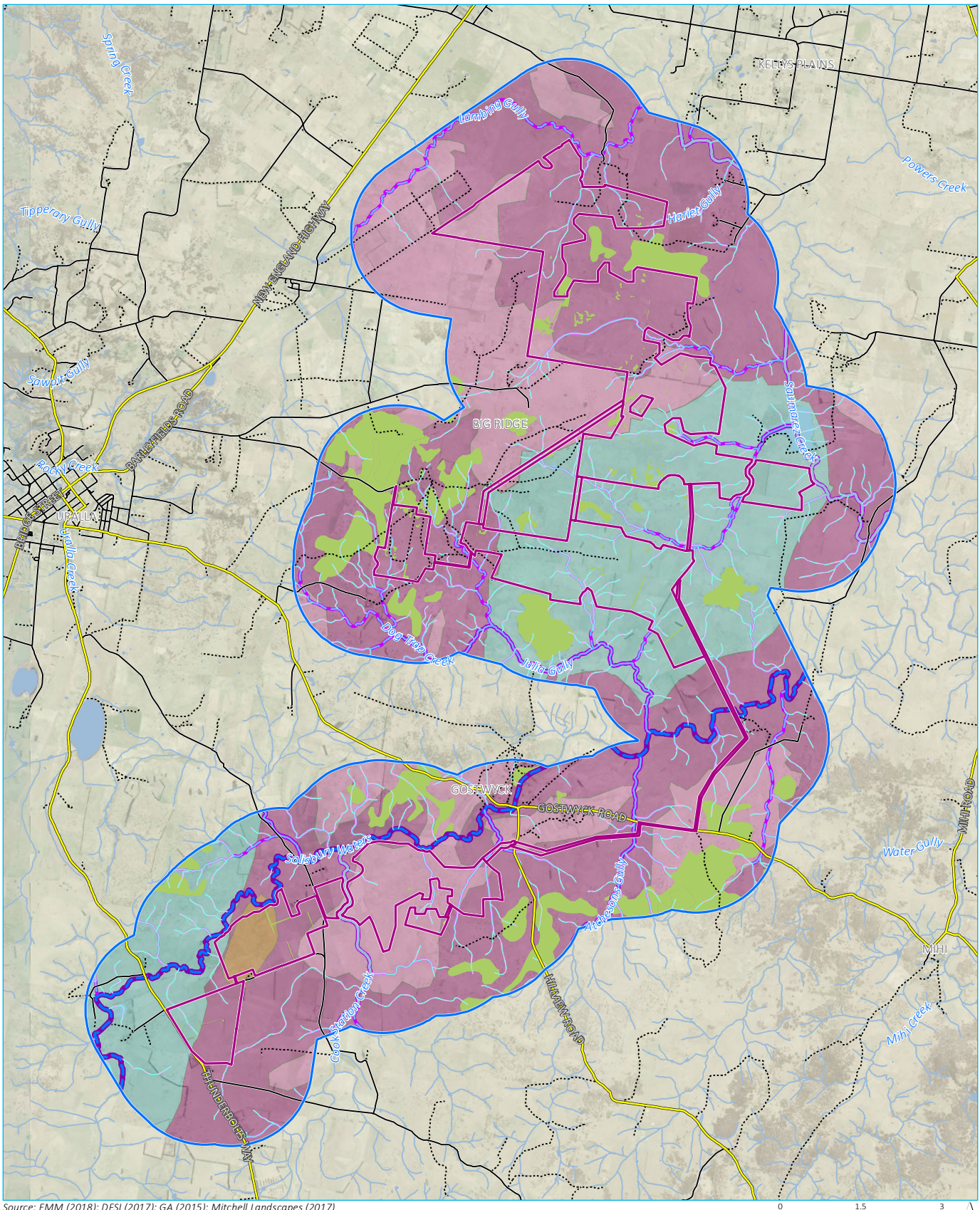
Mapping of native vegetation within a 1,500 m buffer of the development site was undertaken using *Northern River Catchment Management Authority Native Vegetation Mapping* (VIS map 524, Ecological Australia 2005).

Revised regional mapping of plant community types (PCTs) within the 1,500 m buffer includes:

- Apple-Manna Gum woodland;
- Broad-leaved Stringybark;
- Peppermint;
- Yellow Box-Blakely's Red Gum; and
- Yellow Box-Broad-leaved Stringybark.

Native vegetation within the development site and its surrounds was primarily assessed and mapped through extensive field surveys, with aerial imagery used to assist with verification of PCT boundaries. Plots, undertaken in accordance with the BAM, were used to determine vegetation integrity scores across the vegetation types. Where grassland vegetation scores fell below the BAM threshold, these areas were not considered native vegetation and excluded from native vegetation extent calculations. This applied to modified areas of pasture.

The native vegetation extent within the development site is 59.13 ha, combined with the 1,500 m buffer the native vegetation extent is 1,196.29 ha. Given that the area of the combined development site and the 1,500 m buffer is 14,617.06 ha, the percentage native vegetation cover is approximately 8%.



Source: EMM (2018); DFSI (2017); GA (2015); Mitchell Landscapes (2017)

0 1.5 3 km

GDA 1994 MGA Zone 56

N

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KEY

- Development site
- 1500 m buffer
- Native vegetation

Mitchell landscapes

- Guyra Lagoons and Swamps
- Moonbi - Walcha Granites
- Niangala Plateau and Slopes
- Uralla Basalts and Sands

Riparian buffers

- 10 m
- 20 m
- 30 m
- 40 m
- 50 m

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

- Main road
- Local road
- Vehicular track
- Watercourse / drainage line

*Entire site is located within Australian bioregion New England Tablelands

**Entire site is located within Uralla LGA

Native vegetation

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Biodiversity development assessment
Figure 3.1

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4 Native vegetation

The extent of native vegetation within the development site was determined using Section 5 of the BAM (OEH 2017a), as summarised within this chapter.

4.1 Background review

A review of regional vegetation mapping Northern River Catchment Management Authority Native Vegetation Mapping (VIS map 524) was undertaken to inform the site investigation. Two native vegetation communities were identified within the development site:

- White Box, Yellow Box, Blakely's Red Gum Woodland; and
- Broad-leaved Stringybark.

The mapping is not comprehensive and does not assign to PCT level; however it provided an indication of vegetation prior to more detailed surveys being undertaken.

4.2 Methods

4.2.1 Detailed vegetation mapping and habitat assessment

A preliminary assessment, including vegetation and habitat mapping, was undertaken during 8 - 11 January 2018 (four days). Remaining vegetation mapping was undertaken 5-9 March 2018 (four days) with additional mapping undertaken 9-13 April and 6-10 August due to the inclusion of additional surveys areas, including ETLs.

A significant part of the study area was traversed on foot and by vehicle with vegetation mapped and aligned with NSW PCTs (refer to Figures 4.1 and 4.1.1 to 4.1.4). These PCTs were stratified into vegetation zones based on their broad condition state and grouped according to their quality and levels of disturbance.

Where there was some uncertainty about correct PCT alignment, or to justify PCT alignment, a series of rapid vegetation assessments (RVAs) were undertaken, with the three dominant species in the overstorey, midstorey and groundcover recorded. Vegetation was mapped in the field using GPS-enabled tablet computers using Collector for ArcGIS™.

4.2.2 Vegetation integrity assessment

Following the stratification of vegetation zones within the study area, native vegetation integrity was assessed using data obtained via a series of plots as per the methodology outlined in Section 5 of the BAM (OEH 2017a). Plot data was collected from the development site and surrounds in January (4 plots), March (19 plots) and September 2018 (8 plots). At each plot location the following was undertaken:

- one 20 x 20 m plot for assessment of composition and structure; and
- one 20 x 50 m plots for assessment of function, including a series of five 1 x 1 m plots to assess average leaf litter cover.

The assessment of composition and structure, based on a 20 x 20 m plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) was estimated for all species rooted in or overhanging the plot, and recorded using decimals (if less than 1%, rounded to whole number (1-5%) or estimated to the nearest 5% (5- 100%). Abundance was counted (up to 20) and estimated above 20.

The assessment of function recorded the number of large trees, the presence of tree stem size class, tree regeneration, number of trees with hollows and length of fallen logs, as well as leaf litter cover within the 20 x 50 m plot and five 1 x 1 m subplots. The minimum number of plots and transects per vegetation zone was determined using Table 4 of the BAM (OEH 2017a). A total of 15 plots were undertaken within or in close proximity (200 m) to the development site and therefore used in determining vegetation integrity scores. A total of 8 plots located within the study area were considered too distant from the subject land and were excluded from the BAM calculations. Datasheets are provided in Appendix A while compiled plot data is provided in Appendix B.

Portions of the land within the study area are either cropped or consist of exotic grassland. Under the BAM (OEH 2017a), land not containing native vegetation is not subject to assessment beyond Section 5.4 (determination of a vegetation integrity score). A spectrum of grassland occurs within the development site, ranging from exotic with few native grass species, to areas of low diversity native pasture. The initial vegetation mapping was used to differentiate the grassland into two zones, exotic and native pasture. The areas mapped as native pasture were below the vegetation integrity threshold. Given these areas were the highest condition grassland areas within the development site, all areas mapped as exotic grassland would be even further below threshold and therefore no plots were considered necessary. Cropped land and exotic grassland are described in Section 4.3.3.

4.2.3 Paddock tree assessment

Paddock trees were assessed in accordance with Appendix 1 of the BAM (OEH 2017a). Given that regulatory maps for Category 1 and Category 2 land are yet to be produced, native trees were included within the paddock tree assessment if:

- they were outside of mapped woodland zones; and
- the ground cover was cropped or exotic grassland.

All paddock trees were assigned to the most likely PCT based on the tree species, landscape position and the surrounding mapped PCTs. Assigning a PCT enabled the determination of the large tree benchmark, used to calculate the category of paddock tree. Paddock trees were assessed across the entire development site over a period of four days in August 2018.

4.3 Results

4.3.1 Vegetation description

The properties within the development site are currently primarily used for sheep grazing for production of wool and lambs, with some cattle grazing for beef production. Native vegetation is highly modified by both historical and ongoing management practices including clearance of the original vegetation type, cropping, livestock grazing, addition of fertilisers, ploughing and weed invasion. No vegetation within the development site is considered intact.

Native remnant canopy vegetation is limited to paddock trees and small patches of woodland with an entirely cleared midstorey. The ground cover is heavily grazed, typically with a high coverage of exotic grasses. Canopy dieback is highly prominent across the landscape; in many cases more dead than living trees are present. No recruitment of canopy species was observed.

A large portion of the development site is native pasture, the majority of which no longer reflects the species composition of the community from which it was derived. Grazing-tolerant grass species dominate, or in some cases sown fodder species. Forb diversity and coverage is very low.

Planted native wind breaks are present in several properties, with a mixture of canopy and midstorey species that do not reflect any PCT. The groundcover is mainly exotic grasses and forbs.

Exotic vegetation within the development site includes exotic pasture, cropping and exotic wind breaks.

Each PCT and other exotic vegetation are described in further detail within the following section.

4.3.2 Biosecurity assessment

Blackberry (*Rubus fruticosus spp. agg*), a weed of national significance (WoNS), was identified within the development site in isolated patches. The BS Act requires mandatory measures implemented as per Part 2, Division 8, clause 33 of the NSW Biosecurity Regulation 2018; a person must not import into the State or sell.

One regional priority weeds species was identified within the development sites. Regional priority weeds are classified under a General Biosecurity Duty (GDB). GDB expects a shared responsibility within the region for managing the following weed:

- Sweet briar (*Rosa rubiginosa*) - Land managers should prevent the spread of this weed from their land, where feasible. Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.

Several species were recorded which are listed as additional species of concern. These are species that may have a high weed risk though there is not sufficient knowledge of the risk or impact to define a feasible regional response. These include; Cocksfoot (*Dactylis glomerata*), Paspalum (*Paspalum dilitatum*), Sweet Vernal Grass (*Anthoxanum odoratum*) and Hawthorn (*Crateagus monogyna*).

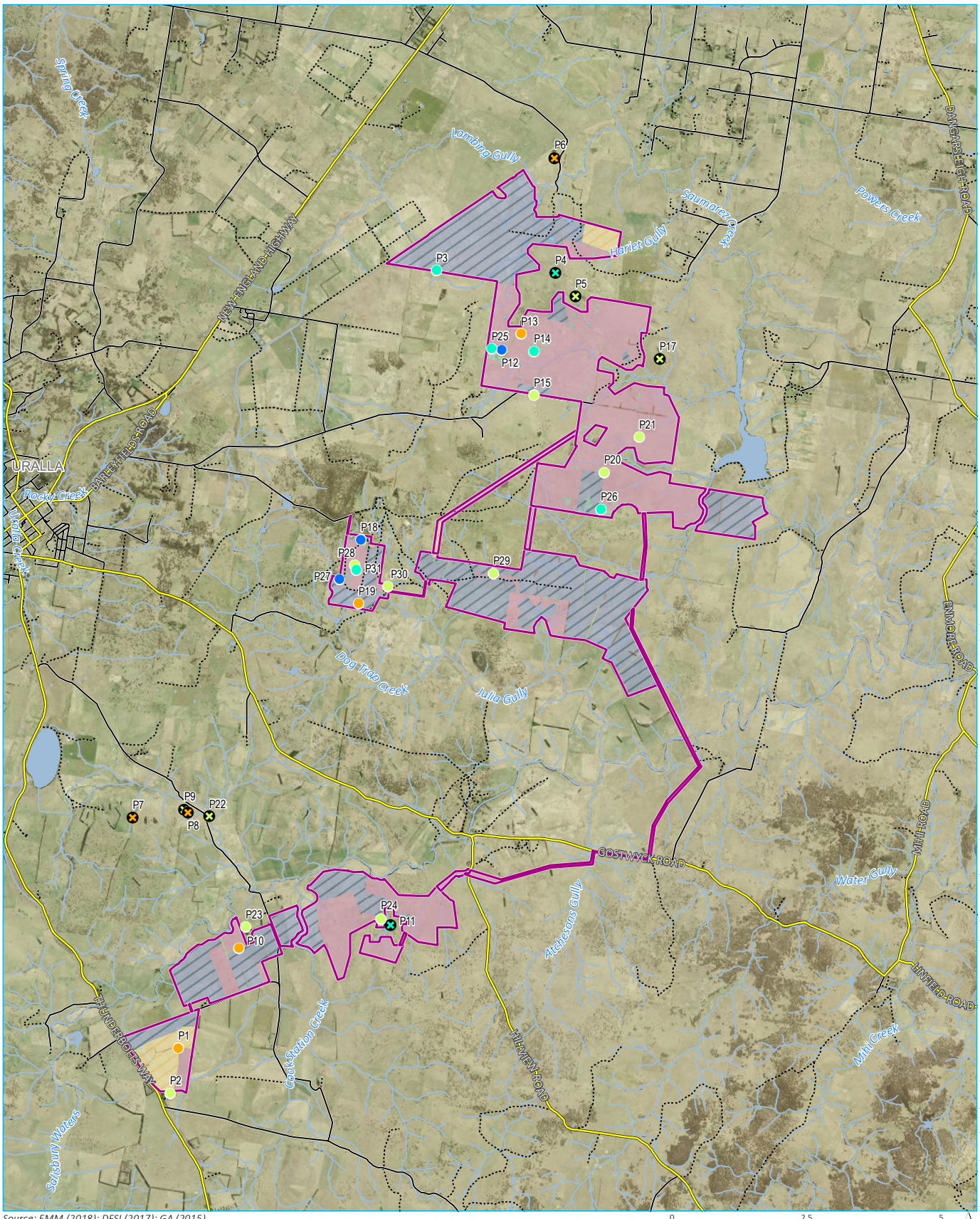
4.3.3 Plant community types

Site investigations, including determination of PCTs using the methods described in Section 4.2.1 and 4.2.2, identified the presence of two PCTs within the development site (Figures 4.1 and 4.1.1 to 4.1.4). The PCT, vegetation formation and vegetation class (Keith 2004) are described within Table 4.1.

Table 4.1 Plant community types of the development site and corresponding formation and class

Plant community type	Vegetation formation	Vegetation class	Area (ha)
1174 - *Silvertop Stringybark open forest of the New England Tableland Bioregion*	Grassy Woodlands	New England Grassy Woodlands	5.67
510 - *Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion*	Grassy Woodlands	New England Grassy Woodlands	1,356

In addition to the two PCTs identified within the development site, dams and exotic vegetation were also identified including cropped land, exotic grassland and exotic trees (Figure 4.1). The dams and exotic vegetation do not require further assessment under the BAM (see Section 4.2.2 for further details).



Source: EMM (2018); DFSI (2017); GA (2015)

0 2.5 5 km

GDA 1994 MGA Zone 56

N

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KEY

- Main road
- Local road
- Vehicular track
- Watercourse / drainage line
- Development site

Plant community type

- PCT 1174 woodland
- PCT 510 pasture
- PCT 510 planted
- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping
- Dam

Plots included

- PCT 510 Woodland
- PCT 510 Planted
- PCT 510 Pasture
- PCT 1174 Woodland

Plots not included

- PCT 510 Woodland
- PCT 510 Planted
- PCT 510 Pasture

Plant community type and vegetation zone mapping within the development site, including plot locations

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Figure 4.1

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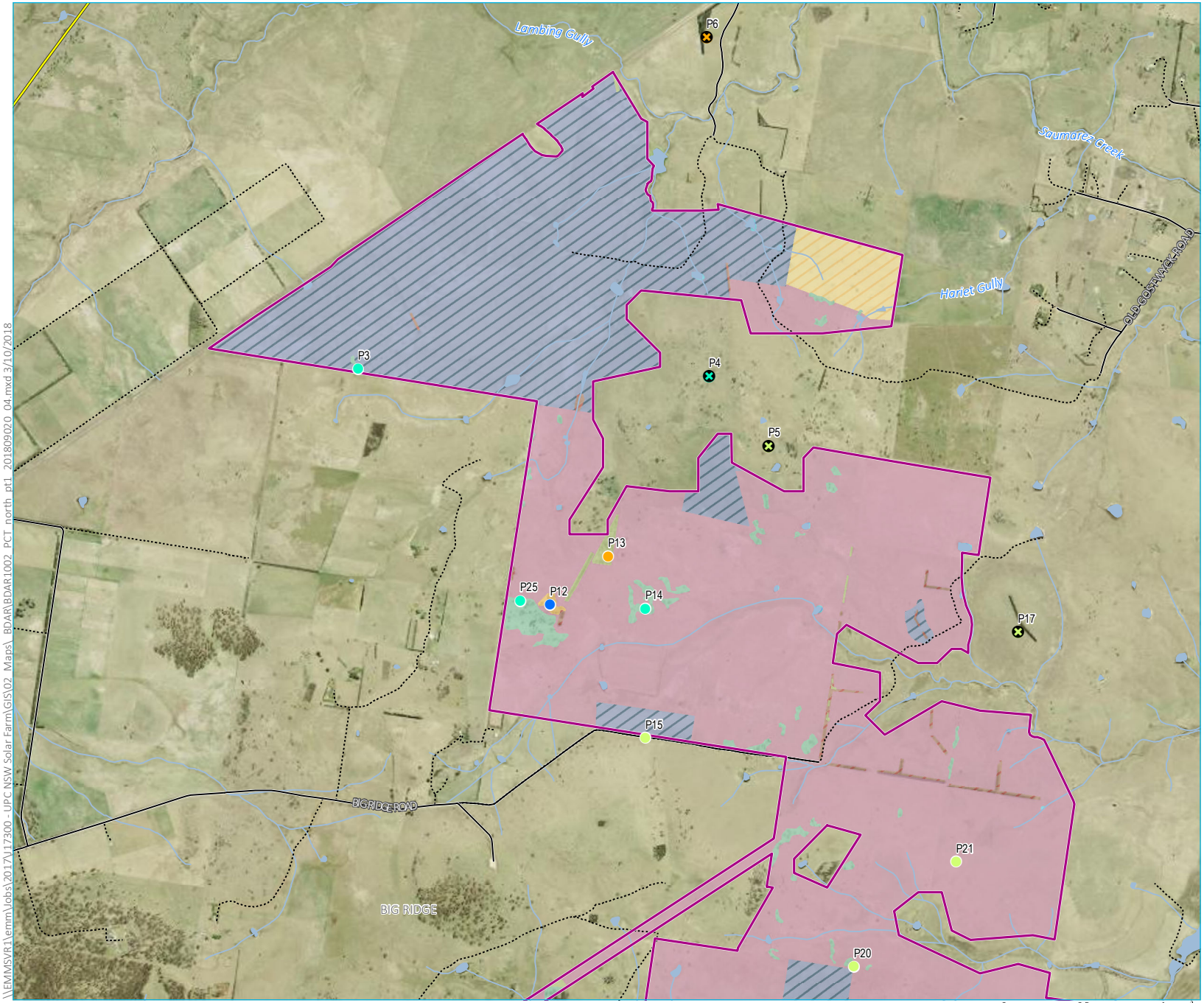

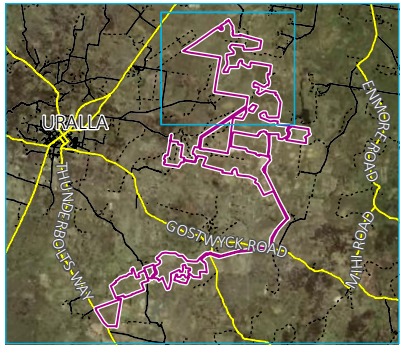

KEY

- Main road
- Local road
- Vehicular track
- Watercourse / drainage line
- Development site
- Waterbody

Plant community type

- PCT 1174 woodland
- PCT 510 pasture
- PCT 510 planted
- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping
- Dam

Plots included

- PCT 510 Woodland
- PCT 510 Planted
- PCT 510 Pasture
- PCT 1174 Woodland

Plots not included

- PCT 510 Woodland
- PCT 510 Planted
- PCT 510 Pasture

Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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Plant community type and vegetation zone mapping within the development site, and plot locations

New England Solar Farm
Biodiversity development assessment
Figure 4.1.1

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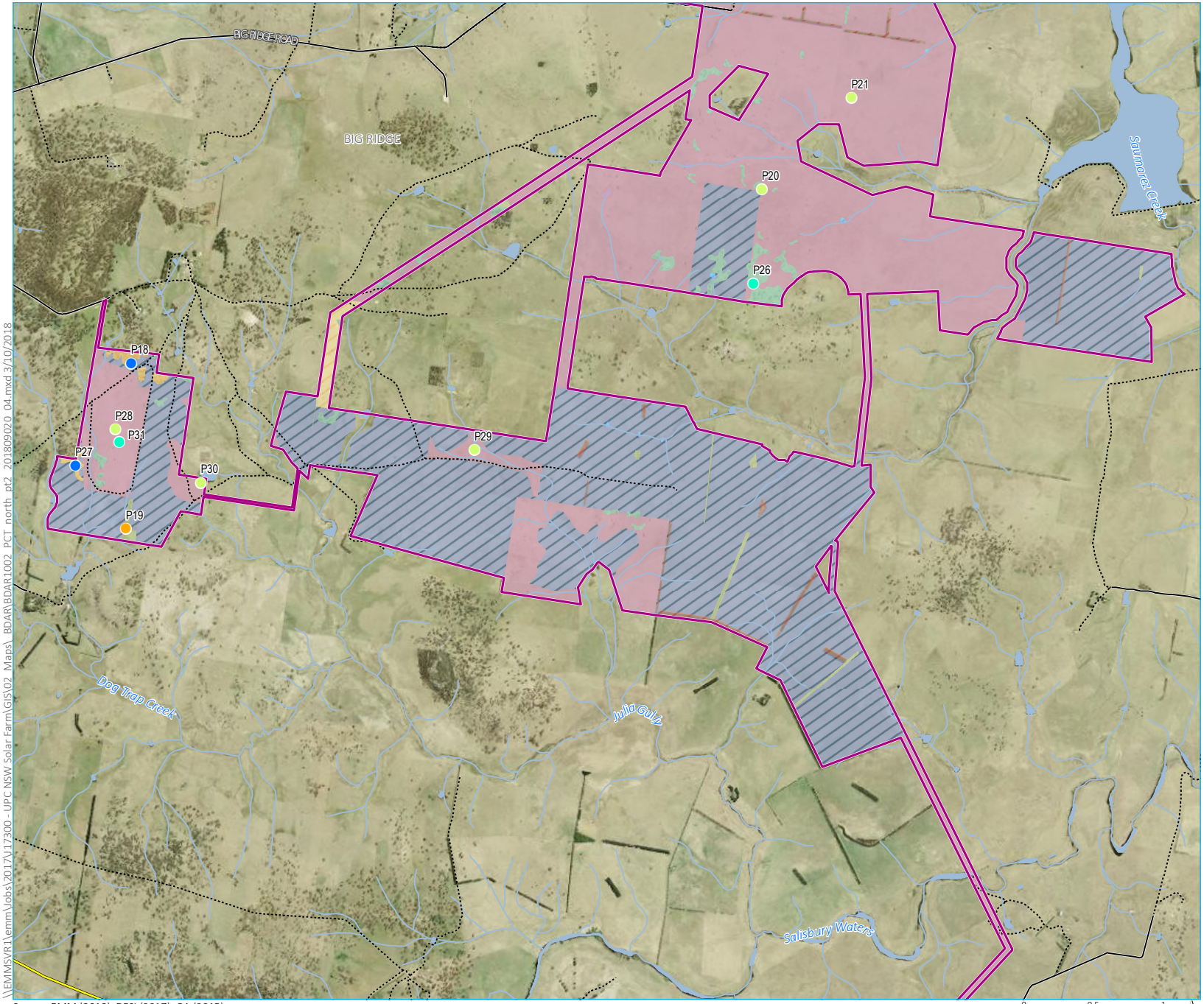

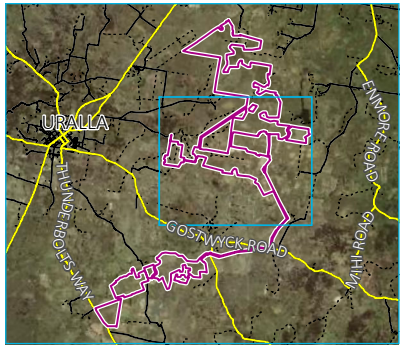

KEY

- Main road
- Local road
- Vehicular track
- Watercourse / drainage line
- Development site
- Waterbody

Plant community type

- PCT 1174 woodland
- PCT 510 pasture
- PCT 510 planted
- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping
- Dam

Plots included

- PCT 510 Woodland
- PCT 510 Planted
- PCT 510 Pasture
- PCT 1174 Woodland

Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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Plant community type and vegetation zone mapping within the development site, and plot locations

New England Solar Farm
Biodiversity development assessment
Figure 4.1.2

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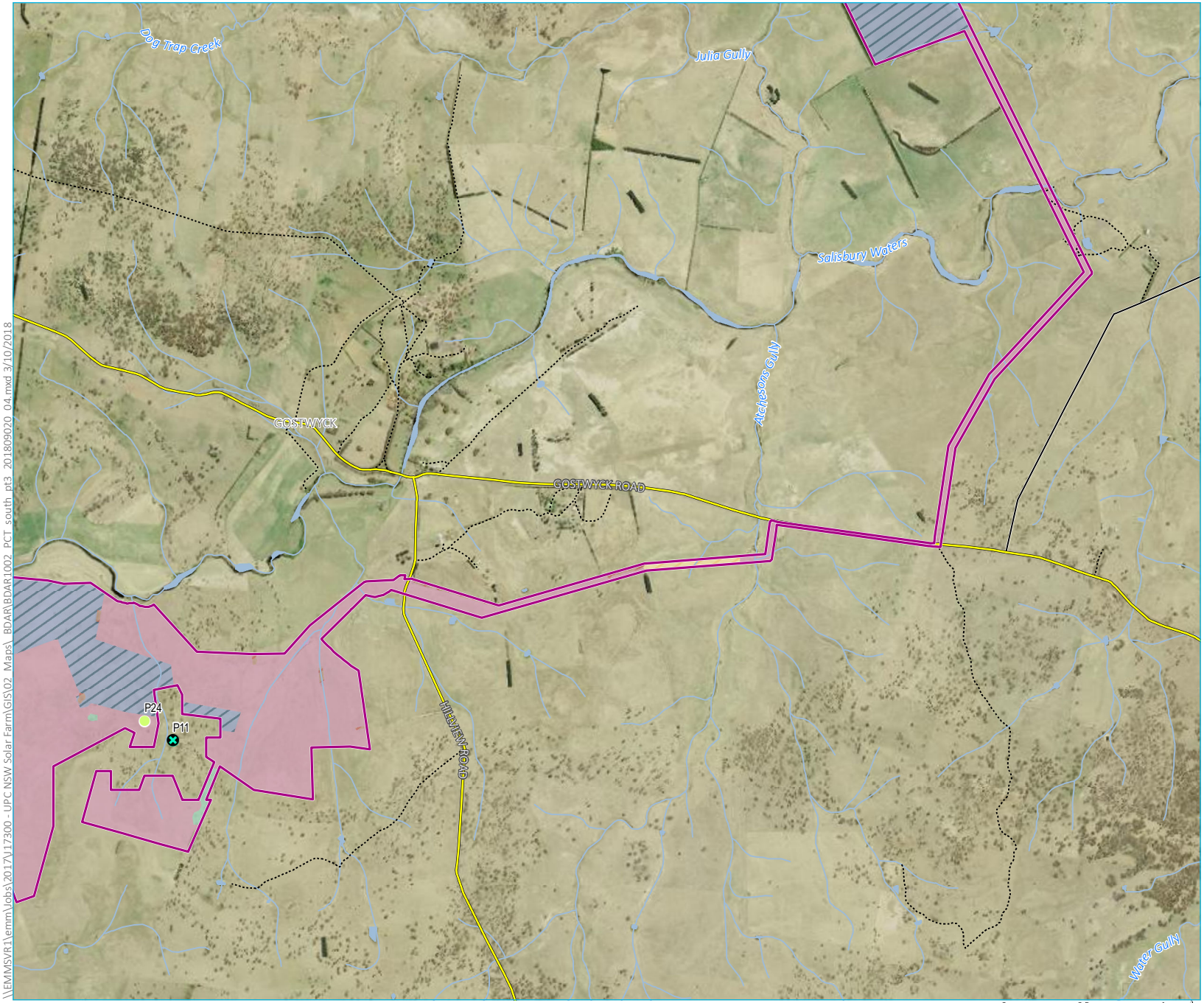

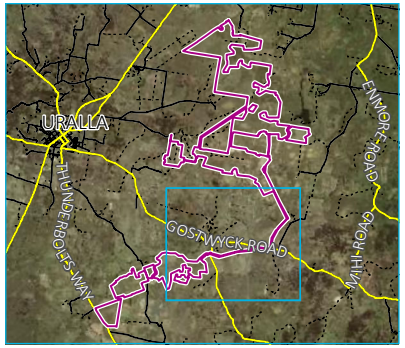

KEY

- Main road
- Local road
- Vehicular track
- Watercourse / drainage line
- Development site
- Waterbody

Plant community type

- PCT 510 pasture
- PCT 510 planted
- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping

Plots included

- PCT 510 Pasture

Plots not included

- PCT 510 Woodland

Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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Plant community type and vegetation zone mapping within the development site, and plot locations

New England Solar Farm
Biodiversity development assessment
Figure 4.1.3

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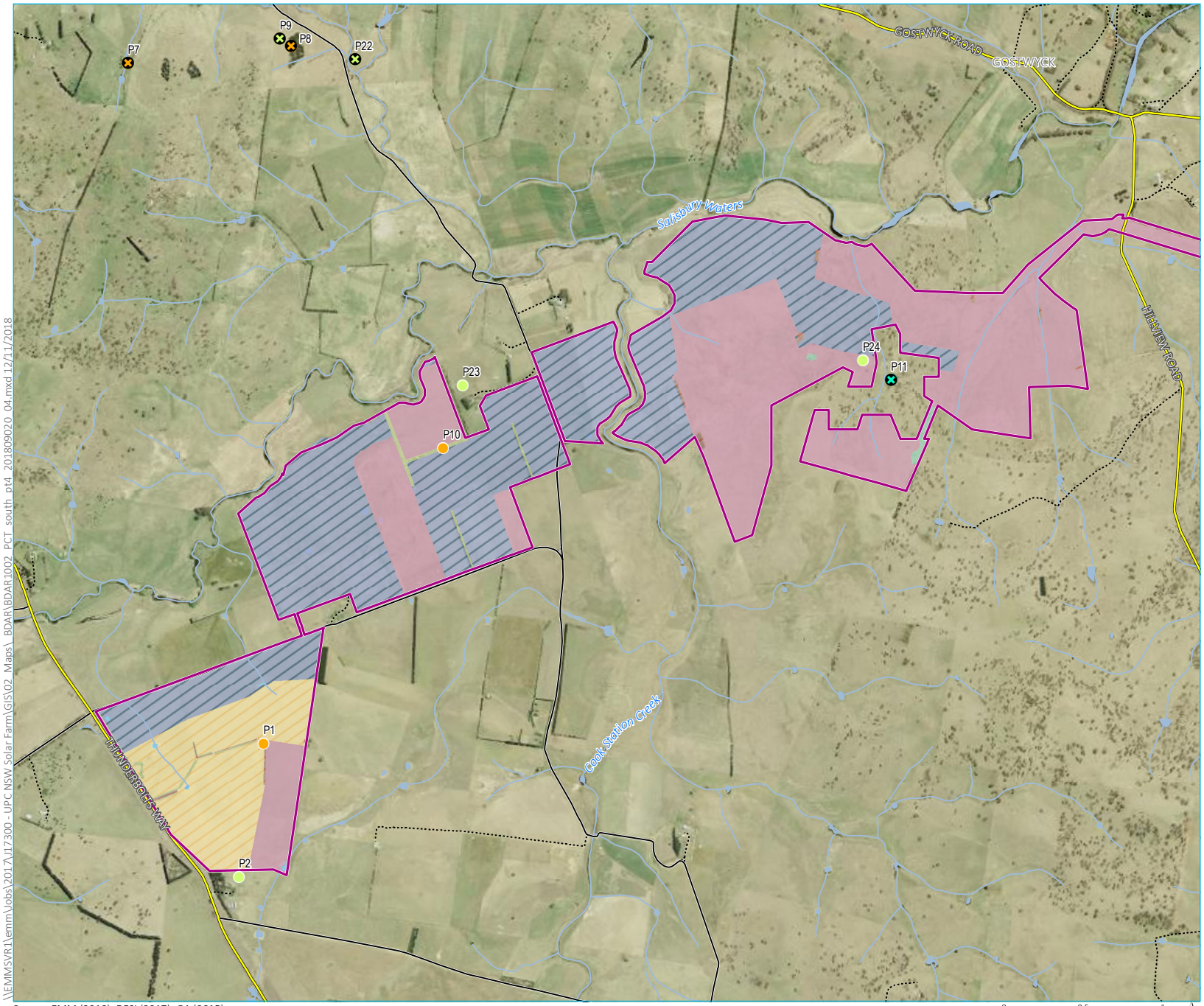

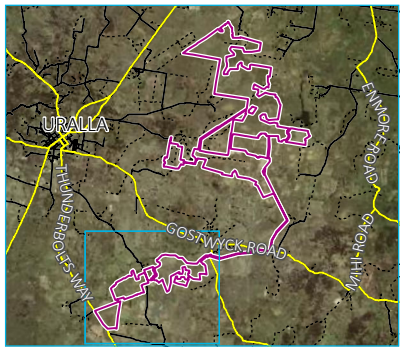

KEY

- Main road
- Local road
- Vehicular track
- Watercourse / drainage line
- Development site
- Waterbody

Plant community type

- PCT 510 pasture
- PCT 510 planted
- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping
- Dam

Plots included

- PCT 510 Planted
- PCT 510 Pasture

Plots not included

- PCT 510 Woodland
- PCT 510 Planted
- PCT 510 Pasture

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Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

Plant community type and vegetation zone mapping within the development site, and plot locations

New England Solar Farm
Biodiversity development assessment
Figure 4.1.4

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4.3.4 Vegetation zones

Each of the PCTs identified within the development site was stratified into vegetation zones based on broad condition state, as per the method outlined in Section 4.2.2, and allocated a condition class as per the descriptions in Table 4.2. This process identified four vegetation zones.

Table 4.2 Vegetation zones mapped within the development site

Vegetation zone	Plant community type	Condition	Area (ha)
1	510 - *Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion*	woodland	38.20
2	510 - *Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion*	pasture	1302.53
3	510 - *Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion*	planted	15.26
4	1174 - *Silvertop Stringybark open forest of the New England Tableland Bioregion*	woodland	5.67

In addition to the PCTs identified, areas dominated by exotic vegetation were also present, including cropping, exotic trees, and exotic grassland (exotic pasture). Descriptions of each vegetation zone and exotic vegetation types are provided in Table 4.3 – Table 4.9, with their locations shown on Figure 4.1 and Figure 4.1.1 to 4.1.4.

Table 4.3 Vegetation zone 1 description

Vegetation Zone 1 – 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland	
PCT ID	510
Common name	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Condition class	woodland
Extent within development site	38.2 ha (Figure 4.1)
Description	The canopy is dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and/or Rough-barked Apple (*Angophora floribunda*). More infrequent canopy species include Yellow Box (*E. melliodora*), Ribbon Gum (*E viminalis*) and Mountain Gum (*E. dalrympleana subsp heptantha*). The groundcover is dominated by exotic grasses including Sweet Vernal Grass (*Anthoxanthum odoratum*), Prairie Grass (*Bromus catharticus*), Cocksfoot (*Dactylis glomerata*), Lesser Canary Grass (*Phalaris minor*), Goose Grass (*Eleusine tristachya*). Exotic forbs include Black Mustard (*Brassica nigra*), Fat Hen (*Chenopodium album*), and Wireweed (*Polygonum aviculare*). The most prevalent native grasses are cosmopolitan species, with low palatability to stock such as Purple Wiregrass (*Aristida ramosa*), Slender Rat's Tail Grass (*Sporobolous creber*), Short Wallaby Grass (*Rytidosperma carphoides*) and Red Grass (*Bothriochloa macra*). A low diversity of native forbs are present in some areas, and where present usually limited to a low number of individuals and coverage. Species recorded include Yellow Buttons (*Chrysocephalum apiculatum*), Native Geranium (*Geranium solanderi*), Yellow Wood Sorrel (*Oxalis perennans*) and Tufted Bluebell (*Wahlenbergia communis*).

Table 4.3 Vegetation zone 1 description

Vegetation Zone 1 – 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland	
Survey effort	Five plots/transects within the development site (3, 14, 25, 26 and 31).
Condition description	This community occurs as discrete patches of open woodland surrounded by pasture. The canopy is substantially thinned with a partially cleared canopy and entirely cleared midstorey. The ground cover is typically of poorer condition than surrounding pasture, due to livestock utilising the shelter provided by the limited number of living trees. This has resulted in increased grazing pressure, nutrient enrichment (through droppings) and increased weed prevalence. Surrounding land use (mostly pasture) and associated edge impacts contribute even further to the existing condition of this zone. In many areas, extensive canopy dieback has occurred, with large swathes of the landscape with a far higher percentage of dead trees than living trees.
Characteristic species used for identification of PCT	PCT 510 is typically dominated by Rough-barked Apple, Yellow Box and/or Blakely's Red Gum according to the vegetation description in the BioNet Vegetation Classification. All of these species are present within the zone, with Rough-barked Apple and Blakely's Red Gum highly dominant. In addition, Ribbon Gum (*E. viminalis*) and Apple Box (*Eucalyptus bridgesiana*) are characteristic species of the PCT and were recorded as scattered trees within close proximity to mapped areas of PCT 510. It is likely that these areas were once part of continuous woodland. It is considered that the canopy species recorded are consistent with those characteristic of PCT 510. No midstorey species exist within the zone owing to historical clearance and ongoing pastoral land use. Several ground cover species which are characteristic of this PCT are present including; Purple Wiregrass, Weeping Grass (*Microlaena stipoides*) and Yellow Buttons. These species are fairly common in other similar grassy woodlands and therefore are not particularly useful in confirming the PCT. The floristically diverse understorey typically present in this PCT was absent due to the high levels of disturbance.
Justification of evidence used to identify the PCT	PCT 510 occurs on undulating areas at intermediate to high altitudes, which is consistent with the development site, at approximately 1000m elevation with gently sloping or flat topography. The development site occurs within the New England Tablelands IBRA bioregion, in which this PCT is known to occur. The PCT occupies deep, relatively fertile soils on a number of different geologies, but mainly sedimentary rocks and basalt. Site observations indicate that the PCT occurs on fairly deep soils, with limited rock outcropping present. Soil types within the development site include both sedimentary and basalt derived soils, providing further consistency with the PCT.

Table 4.3 Vegetation zone 1 description

Vegetation Zone 1 – 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland	
Status	Commonwealth EPBC Act: Not listed The zone was assessed against the potentially aligned White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Critically Endangered Ecological Community (CEEC) (EPBC Act policy statement 3.5 - White box - yellow box - Blakely's red gum grassy woodlands and derived native grasslands (Department of the Environment and Heritage (DEEH 2006)). This vegetation zone includes an overstorey without a substantially native understorey. Under the Commonwealth listing advice these areas are considered degraded and are no longer a viable part of the ecological community. Although some native species may remain, in most of these areas the native understorey is effectively irretrievable. In order for an area to be included in the listed ecological community, a patch must have a predominantly native understorey, which is not the case for this zone. NSW BC Act: Listed White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community (EEC). This PCT is directly aligned with the EEC and in contrast to the commonwealth listing the NSW guidelines (NPWS Undated) specifically include highly disturbed sites, where few or no native species are present. This is providing that vegetation, either understorey, or overstorey, or both, would under appropriate management, respond through natural regeneration. In the case of this zone, exclusion of the livestock would likely result in regeneration of the canopy species to some extent. Therefore this zone is considered to form part of the EEC under the BC Act.
Estimate of percent cleared value of PCT	79%
Photograph 4.1: Typical Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland (Plot 14).	

Table 4.4 Vegetation zone 2 description

Vegetation Zone 2 – 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_pasture	
PCT ID	510
Common name	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Condition class	pasture
Extent within development site	1,302.53 ha (Figure 4.1)
Description	This community is the most prevalent across the development sites and is highly modified, used for grazing of livestock include cattle and sheep. Canopy species are either absent or limited to scattered trees, which are assessed as paddock trees (refer to Section 4.3.6). No midstorey species are present. The ground cover is typically a mixture of native and exotic grasses, with the composition variable due to the proceeding management intensity and the timeframe since significant intervention. Judging from both observed management practices and discussion with landholders, agricultural practices were highly variable and ranged from minimal intervention, to ploughing, sowing of pasture grasses and improvement with fertilisers. Whilst these management practices have created a somewhat variable species composition, the zone is characterised by the dominance of a small number of native grass species, low native forb diversity and high grazing pressure. The most prevalent native grasses are cosmopolitan species, with low palatability to stock such as Purple Wiregrass (*Aristida ramosa*), Slender Rat's Tail Grass (*Sporobolous creber*), Short Wallaby Grass (*Rytidosperma carphoides*), Red Grass (*Bothriochloa macra*), Paddock Lovegrass (*Eragrostis leptostachya*) and Windmill Grass (*Chloris truncata*). A low diversity of native forbs are present and usually limited to a low number of individuals and coverage. Species recorded include Yellow Buttons (*Chrysocephalum apiculatum*), Native Geranium, Yellow Wood Sorrel (*Oxalis perennans*) and Bidgee-widgee (*Acaena novae-zelandiae*). Exotic grasses are common and highly abundant; species include Squirrel Tail Fescue (*Vulpia bromoides*) Paspalum (*Paspalum dilatatum*), Goosegrass and Soft Lovegrass (*Eragrostis pilosa*). Exotic forbs included Narrow-leaved Plantain (*Plantago lanceolata*), Cudweed (*Gamochaeta americana*), Catsear (*Hypocharis radicata*) and Narrow-leaved Plaintain (*Plantago lanceolata*).
Survey effort	Eleven plots/transects within the development site (2, 5, 15, 17, 20, 21, 23, 24, 28, 29 and 30).
Condition description	The community is generally in a low condition with no regeneration of canopy species and a highly modified groundcover.
Characteristic species used for identification of PCT	PCT 510 is typically dominated by Rough-barked Apple, Yellow Box and/or Blakely's Red Gum according to the vegetation description in the NSW VIS Classification Version 2.1 (OEH 2014). These species occur within the vegetation zone as paddock trees or in adjacent woodland. No midstorey species were found within the zone owing to historical clearance and ongoing pastoral land use. Several ground cover species that are characteristic of this PCT were recorded including; Purple Wiregrass, Weeping Grass (*Microlaena stipoides*) and Yellow Buttons. These species are fairly common in other similar grassy groundcovers and therefore are not particularly useful in assigning the PCT. The floristically diverse understorey typically present in this PCT was reduced due to the high levels of disturbance.
Justification of evidence used to identify the PCT	PCT 510 occurs on undulating areas at intermediate to high altitudes, which is consistent with the development site, at approximately 1000 m elevation with gently sloping or flat topography. The development site occurs within the New England Tablelands IBRA bioregion, in which this PCT is known to occur. The PCT occupies deep, relatively fertile soils on a number of different geologies, but mainly sedimentary rocks and basalt. Site observations indicate that the PCT occurs on fairly deep soils, with limited rock outcropping present. Soil types within the development site include both sedimentary and basalt derived soils, providing further consistency with the PCT.

Table 4.4 Vegetation zone 2 description

Vegetation Zone 2 – 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_pasture	
Status	Commonwealth EPBC Act: Not listed The zone was assessed against the potentially aligned White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Critically Endangered Ecological Community (CEEC). This vegetation zone does not meet the condition thresholds in the Commonwealth listing advice, as there is insufficient forb diversity to be considered the derived native grassland (DNG) variant. These areas are considered degraded and are no longer a viable part of the ecological community (DEEH 2006). NSW BC Act: Listed White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community (EEC). This PCT is directly aligned with the EEC and in contrast to the commonwealth listing, the NSW guidelines and the NSW Scientific Committee final determination (NPWS Undated, OEH 2002) specifically include highly disturbed sites which would under appropriate management respond to natural regeneration. Therefore this zone is considered EEC under the BC Act.
Estimate of percent cleared value of PCT	79%
Photograph 4.2: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_pasture – with a mix of native and exotic species	

Table 4.5 Vegetation zone 3 description

Vegetation Zone 3 – 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted	
PCT ID	510
Common name	510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted
Condition class	planted
Extent within development site	15.26 ha (Figure 4.1)
Description	This community occurs as planted windrows and in discrete revegetation areas. Historically the areas are likely to have been woodland. PCT 510 has been attributed based on the landscape position and due to its prevalence in the surrounding area. The canopy is composed of a mixture of eucalypt species including both indigenous and non-indigenous species. Indigenous species include Snow Gum (*Eucalyptus pauciflora*), Black Sally (*E. stellulata*), Ribbon Gum (*E. viminalis*), Wattle-leaved Peppermint (*E. acaciiformis*), and Broad-leaved Peppermint (*E. dives*). Non-indigenous species include Mountain Swamp Gum (*E. camphora* subsp*. humeana*) and Buxton Gum (*E. crenulata*). Midstorey species are largely limited to Red-stemmed Wattle (*Acacia rubida*), a Bottlebrush species (*Callistemon pungens*) and Tantoon (*Leptospermum polygalifolium*). The ground cover is dominated by introduced pasture species including Cocksfoot (*Dactylis glomerata*), Prarie Grass (*Bromus catharticus*), *Phalaris* species, and Paspalum (*Paspalum dilatatum*). Occasional native ground cover species included Yellow Wood-sorrel (*Oxalis perennans*), Paddock Lovegrass (*Eragrostis leptostachya*) and Weeping Grass (*Microlaena stipoides*). Native species were never dominant in the groundcover and largely absent in some areas.
Survey effort	Four plots/transects within the development site (1, 10, 13 and 19).
Condition description	The community has low native species diversity and is in poor condition. There is a high cover of introduced plant species due to past irrigation, cropping, soil modification and current cattle grazing activities. Surrounding land use (mostly cropping) and associated edge impacts contribute even further to the existing condition of this zone.
Characteristic species used for identification of PCT	Only one recorded canopy species, Ribbon Gum, aligns with the species upper stratum of PCT 510 listed in the BioNet Vegetation Classification. None of the midstorey species recorded within the PCT are listed as characteristic species in VIS. A single characteristic ground cover species, Weeping Grass, was recorded. Overall, this planted community does not reflect the typical species composition of PCT 510, and seemingly there was no attempt in the revegetation works to match a particular vegetation community, rather a mixture of canopy species from different communities and regions have been planted.
Justification of evidence used to identify the PCT	PCT 510 occurs on undulating areas at intermediate to high altitudes, which is consistent with the development site, at approximately 1000 m elevation with gently sloping or flat topography. The development site occurs within the New England Tablelands IBRA bioregion, in which this PCT is known to occur. The PCT occupies deep, relatively fertile soils on a number of different geologies, but mainly sedimentary rocks and basalt. On site observation, indicate that the PCT occurs on fairly deep soils, with limited rock outcropping present. Soil types within the development site include both sedimentary and basalt derived soils, providing further consistency with the PCT. PCT 510 is the most dominant vegetation community within the development site and based on the similar landscape position and soil types it is likely that the planted areas were once woodland characteristic of PCT 510.

Table 4.5 Vegetation zone 3 description

Vegetation Zone 3 – 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted	
Status	Commonwealth EPBC Act: Not listed The zone was assessed against the potentially aligned White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Critically Endangered Ecological Community (CEEC). This woodland no longer has species indicative of the PCT and this community has been irrevocably changed. NSW BC Act: Not listed The zone was assessed against the potentially aligned White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community (EEC). Whilst the guidelines specifically include highly disturbed sites the zone has been irrevocably altered, regenerating to a community which is dominated by Eucalypt species which are not characteristic of the PCT. Furthermore the ground cover is dominated by exotic grass. The community is not likely to respond to management and therefore is not considered part of the EEC.
Estimate of percent cleared value of PCT	79%
Photograph 4.3: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted (plot 1)	

Table 4.6 Vegetation zone 4 description

Vegetation Zone 4 – 1174 - Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland	
PCT ID	1174
Common name	Silvertop Stringybark open forest of the New England Tableland
Condition class	woodland
Extent within development site	5.67 ha (Figure 4.1)
Description	This community is limited to sloping areas in the west of the central and northern array. The canopy is dominated by a single species; Silvertop Stringybark (*Eucalyptus laevopinea*) with an entirely absent midstorey. Groundcover is dominated by a mixture of native and exotic grasses. Exotic grasses include Prairie Grass (*Bromus catharticus*) and Goose Grass. Native grasses include Slender Rat's Tail Grass, Weeping Grass and Couch (*Cynodon dactylon*). Native forbs include Yellow Wood-sorrel and Native Geranium.
Survey effort	Three plots have been conducted within the development site (12, 18 and 27).
Condition description	The community is generally in a poor condition with no regeneration of canopy species, and an entirely cleared midstorey. The ground cover is highly modified due to grazing, and weed invasion. Surrounding land use (mostly pasture) and associated edge impacts contribute even further to the existing condition of this zone.
Characteristic species used for identification of PCT	The dominance of Silvertop Stringybark was the key species used to identify this PCT (1174), given the lack of characteristic midstorey species and a highly modified ground cover. Native Geranium was the only species recorded which is listed as a characteristic ground cover species for the PCT (VIS map 524).
Justification of evidence used to identify the PCT	PCT 1174 often occurs on steep escarpment slopes, often on rich soils such as those derived from basalt, but also on sedimentary, acid volcanic and granitic substrates. At elevations 970 - 1300 m. The development site is within the elevation range for this PCT and the broad soil types does not preclude the PCT from occurring.
Status	Commonwealth EPBC Act: Not listed NSW BC Act: Not listed
Estimate of percent cleared value of PCT	50%
Photograph 4.4: Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland (plot 18)	

Table 4.7 Exotic - cropped

Cropped land	
PCT ID	N/A
Common name	Exotic - cropped
Condition class	N/A
Extent within the development site	112.17 ha (Figure 4.1)
Description	These areas are either ploughed or sown with crops. No native ground cover species are typically present, and if so limited to very low coverage. Occasional paddock trees are present which are considered in Section 4.3.6.
Survey effort	No plots/transects required as outlined within Section 4.2.2.
Condition description	This vegetation does not resemble any native vegetation communities due to historical clearing, cropping and dominance of exotic species.
Characteristic species used for identification of PCT	N/A
Justification of evidence used to identify the PCT	N/A
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT	N/A
Photograph 4.5: Cropped land with adjacent exotic wind break	

Table 4.8 Exotic - trees

Cropped land	
PCT ID	N/A
Common name	Exotic trees
Condition class	N/A
Extent within the development site	17.79 ha (Figure 4.1)
Description	Exotic trees occur as planted windbreaks typically with coniferous species or naturalised trees such as Hawthorn (*Crataegus monogyna*) and Willow Species (*Salix sp*) along watercourses. In these areas native ground cover is very low, with exotic groundcover species dominant.
Survey effort	No plots/transects required as outlined within Section 4.2.2.
Condition description	The community is in poor condition due to cropping.
Characteristic species used for identification of PCT	N/A
Justification of evidence used to identify the PCT	N/A
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed
Estimate of percent cleared value of PCT	N/A
Photograph	Refer to Photograph 5 for example of exotic wind break.

Table 4.9 Exotic – grassland

Cropped land	
PCT ID	N/A
Common name	Exotic - grassland
Condition class	N/A
Extent within the development site	1,288.83 ha (Figure 4.1)
Description	These grassland areas are dominated by exotic grass species, including Paspalum, Cocksfoot, Goose Grass, Meadow Fescue (*Festuca pratensis*) and *Phalaris* sp. Typically these areas had been ploughed, sown with exotic pasture species and improved with fertiliser. Native species, where present had a low coverage and diversity. Canopy species were limited to occasional paddock trees.
Survey effort	No plots/transects required as outlined within Section 4.2.2
Condition description	The community is in poor condition due to cropping.
Characteristic species used for identification of PCT	N/A
Justification of evidence used to identify the PCT	N/A
Status	Commonwealth EPBC Act: not listed NSW BC Act: not listed The zone was assessed against the potentially aligned White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community (EEC).Whilst the guidelines specifically include highly disturbed sites the zone has been irrevocably altered with an entirely modified groundcover. Trees are limited to isolated paddock trees and no longer represents a woodland community. The community is not likely to respond to management and therefore is not considered part of the EEC.
Estimate of percent cleared value of PCT	N/A
Photograph 4.6: Exotic grassland (foreground) with scattered paddock trees (Blakely's Red Gum) in the background.	

4.3.5 Assessment of patch size

None of the vegetation zones were considered intact vegetation, given that at least one of their strata were absent. Patch size is therefore zero for all zones.

4.3.6 Vegetation integrity score

The vegetation integrity score for each vegetation zone is presented in Table 4.10.

Table 4.10 Current vegetation integrity score for the vegetation zones

Vegetation zone	Plant community type	Ancillary code	Area (ha)	Vegetation integrity score
1	510 - *Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion*	woodland	38.2	11
2	510 - *Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion*	pasture	1,302.53	11.7
3	510 - *Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion*	planted	15.26	33.1
4	1174 - *Silvertop Stringybark open forest of the New England Tableland Bioregion*	woodland	5.67	27.6

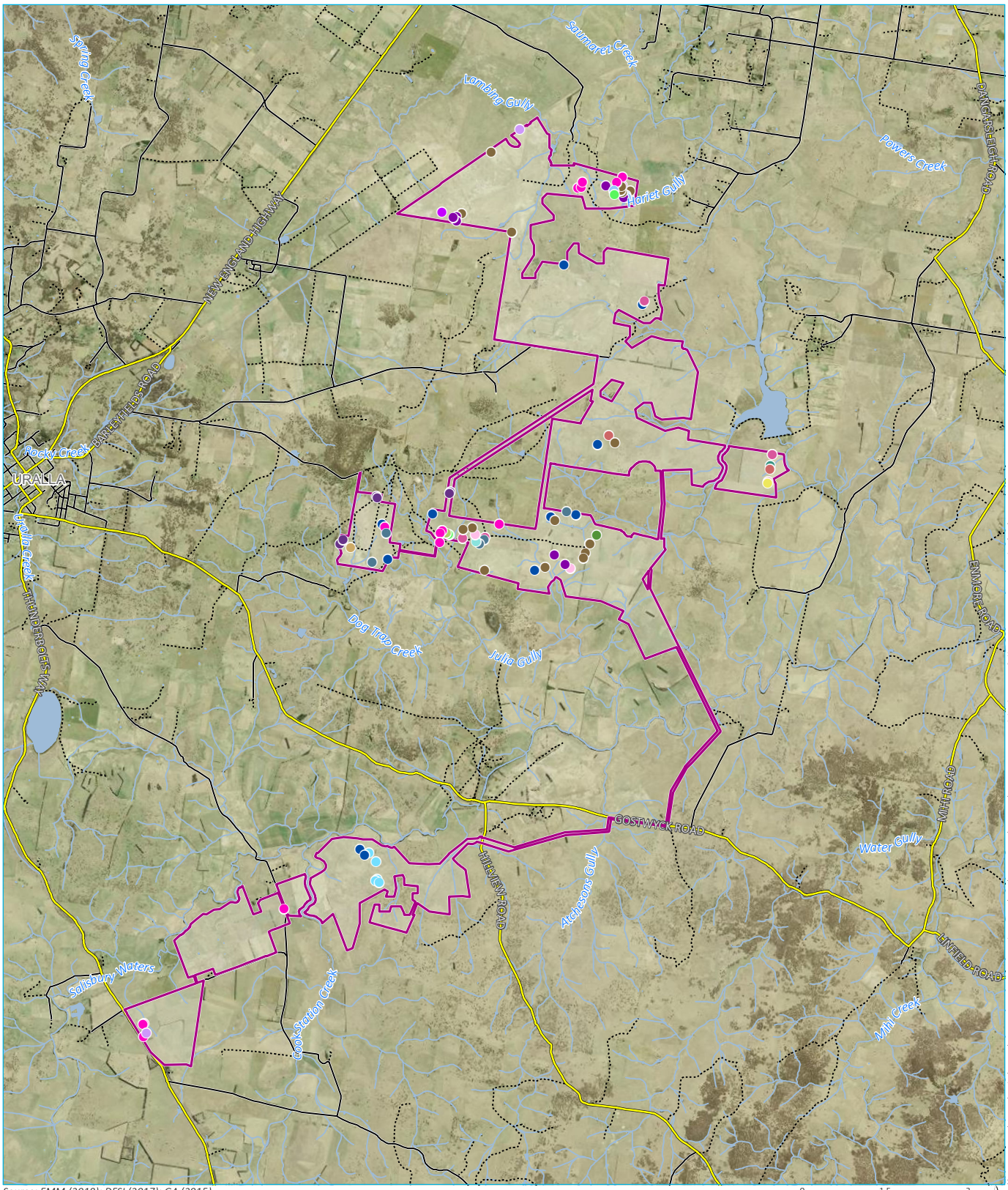
4.3.7 Paddock tree assessment

A total of 93 paddock trees were assessed, comprising 13 different species. The majority (86) of the paddock trees were assigned to PCT 510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion, with seven trees assigned to PCT 1174 Silvertop Stringybark open forest of the New England Tableland Bioregion. The large tree benchmark for both PCTs is 50 cm diameter at breast height (DBH).

A summary of the paddock trees categorised according to the BAM (OEH 2017a) is provided in Table 4.11, with the full results provided in Appendix C and displayed on Figure 4.2 and Figure 4.2.1 to 4.2.4.

Table 4.11 Paddock trees assigned in accordance with Appendix 1 of the BAM

Category	Non-hollow bearing	Hollow bearing trees	Total
PCT 510			
1 (0-<20cm DBH)	0	0	0
2 (20- <50 cm DBH)	18	0	18
3 (> 50 cm DBH)	59	9	68
PCT 1174			
1 (0-<20cm DBH)	1	0	1
2 (20- <50 cm DBH)	0	0	0
3 (>50 cm DBH)	6	0	6
Total	84	9	93



Source: EMM (2018); DFSI (2017); GA (2015)

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KEY

- Main road
- Local road
- Vehicular track
- Watercourse / drainage line
- Development site
- Waterbody

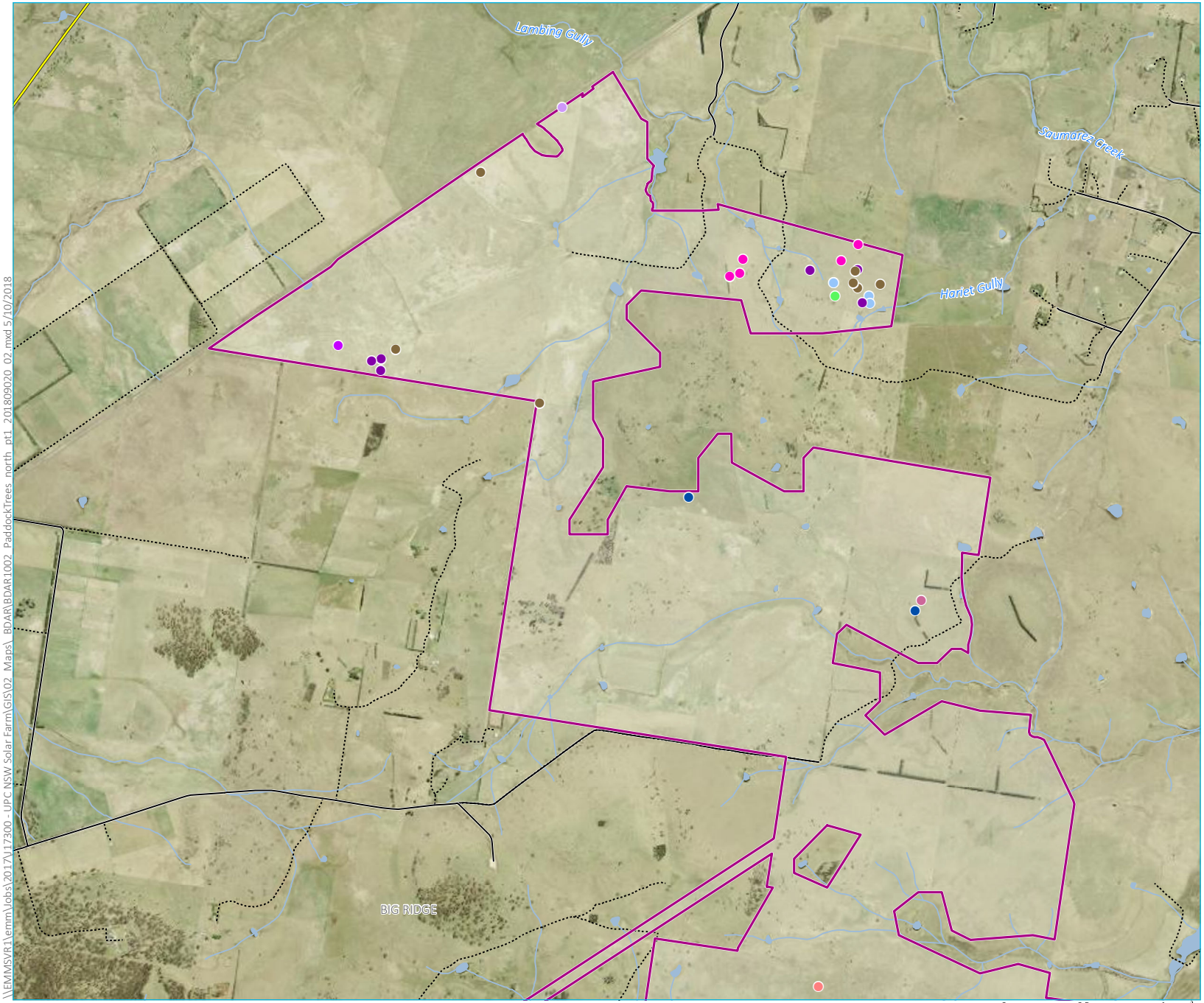
Species (category)

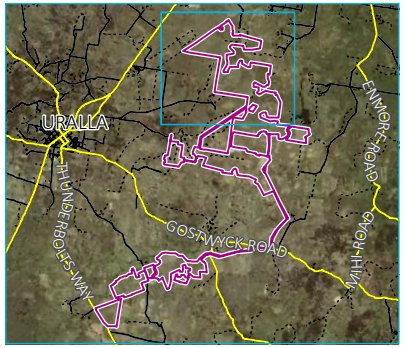
- *Angophora floribunda* (2)
- *Angophora floribunda* (3)
- *Banksia integrifolia subsp. monticola* (3)
- *Eucalyptus blakelyi* (2)
- *Eucalyptus blakelyi* (3)
- *Eucalyptus bridgesiana* (3)
- *Eucalyptus conica* (2)
- *Eucalyptus conica* (3)
- *Eucalyptus dalrympleana subsp. heptantha* (3)
- *Eucalyptus dives* (2)
- *Eucalyptus dives* (3)
- *Eucalyptus laevopinea* (1)
- *Eucalyptus laevopinea* (3)
- *Eucalyptus melliodora* (2)
- *Eucalyptus melliodora* (3)
- *Eucalyptus nova-anglica* (3)
- *Eucalyptus pauciflora* (2)
- *Eucalyptus pauciflora* (3)
- *Eucalyptus stellulata* (2)
- *Eucalyptus viminalis* (3)

Paddock trees within the development site

New England Solar Farm
Biodiversity development assessment
Figure 4.2

EMM creating opportunities





KEY

- Development site
- Waterbody
- Main road
- Local road
- Vehicular track
- Watercourse / drainage line

Species (category)

- *Angophora floribunda* (2)
- *Angophora floribunda* (3)
- *Eucalyptus blakelyi* (2)
- *Eucalyptus blakelyi* (3)
- *Eucalyptus bridgesiana* (3)
- *Eucalyptus dalrympleana subsp. heptantha* (3)
- *Eucalyptus dives* (2)
- *Eucalyptus melliodora* (2)
- *Eucalyptus melliodora* (3)
- *Eucalyptus nova-anglica* (3)

Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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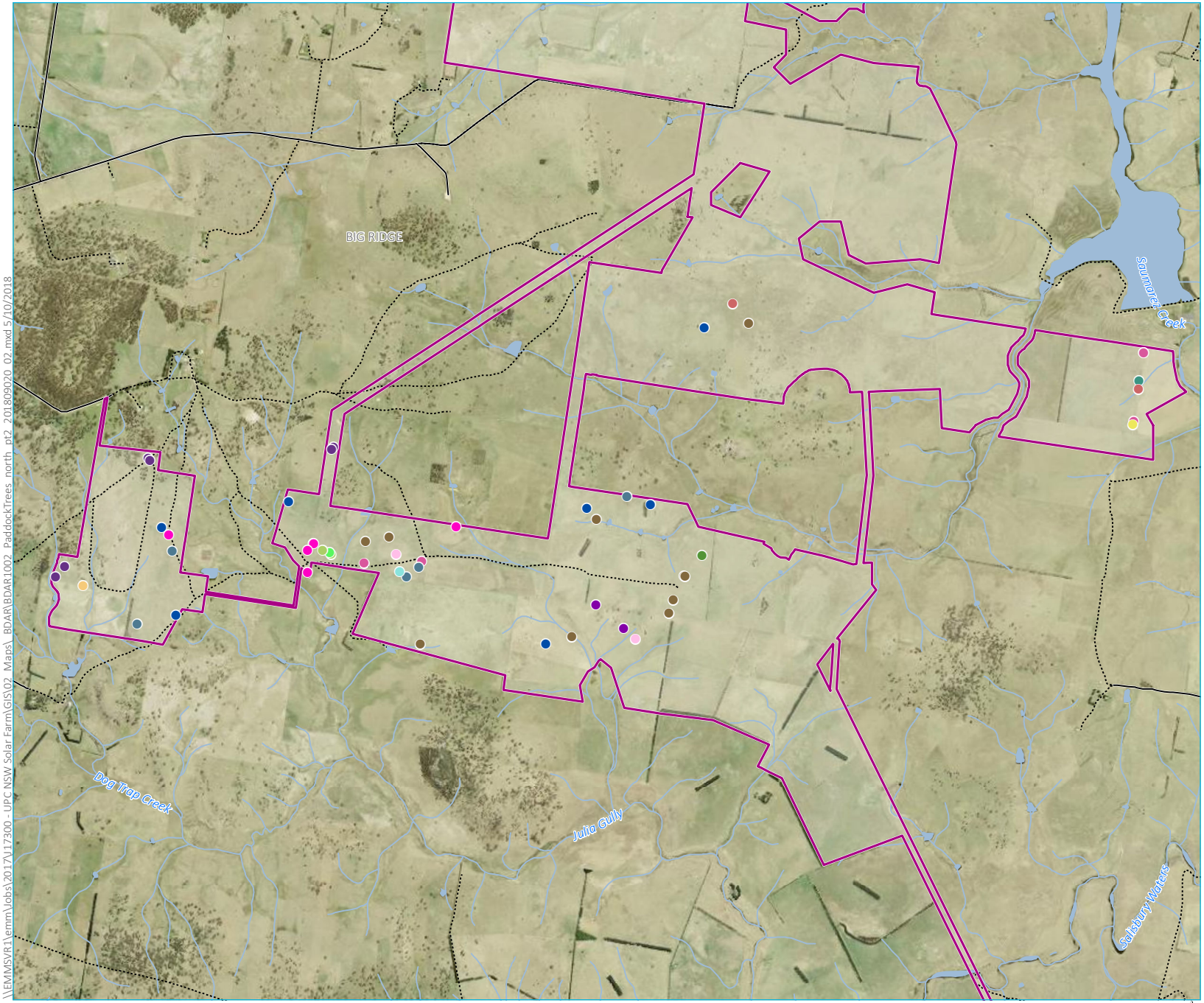
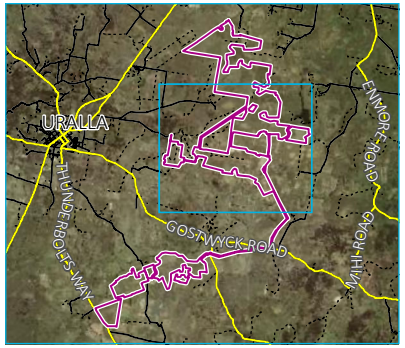
Paddock trees within the development site

New England Solar Farm
Biodiversity development assessment
Figure 4.2.1

EMM
creating opportunities





KEY

- Development site
- Waterbody
- Local road
- Vehicular track
- Watercourse / drainage line

Species (category)

- *Angophora floribunda* (2)
- *Angophora floribunda* (3)
- *Banksia integrifolia subsp. monicola* (3)
- *Eucalyptus blakelyi* (3)
- *Eucalyptus bridgesiana* (3)
- *Eucalyptus conica* (2)
- *Eucalyptus conica* (3)
- *Eucalyptus dalrympleana subsp. heptantha* (3)
- *Eucalyptus dives* (2)
- *Eucalyptus dives* (3)
- *Eucalyptus laevopinea* (1)
- *Eucalyptus laevopinea* (3)
- *Eucalyptus melliodora* (2)
- *Eucalyptus melliodora* (3)
- *Eucalyptus pauciflora* (2)
- *Eucalyptus pauciflora* (3)
- *Eucalyptus stellulata* (2)

Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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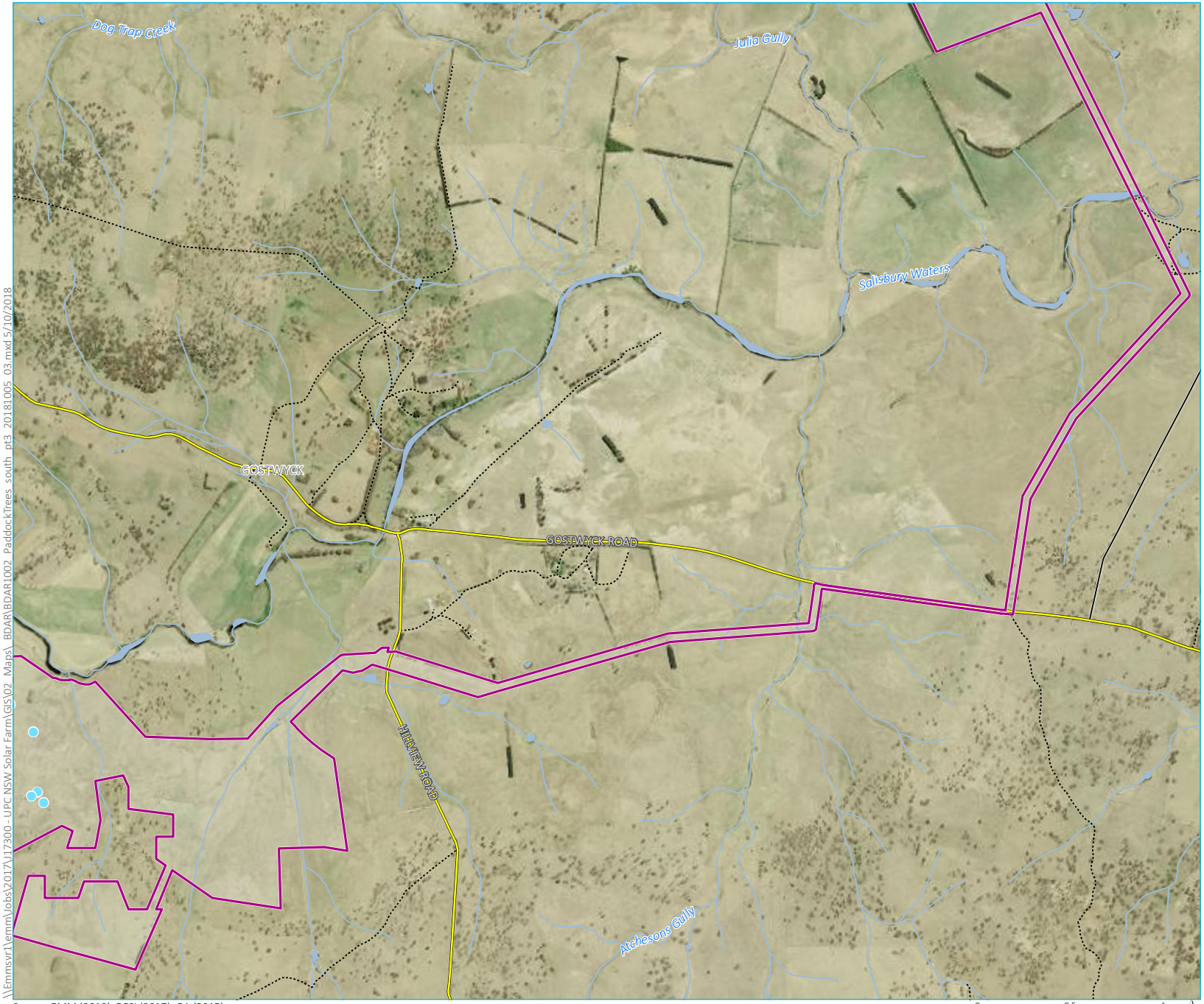
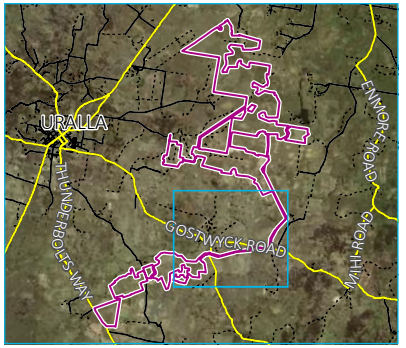
Paddock trees within the development site

New England Solar Farm
Biodiversity development assessment
Figure 4.2.2

EMM
creating opportunities





KEY

- Development site
- Waterbody
- Main road
- Local road
- Vehicular track
- Watercourse / drainage line

Species (category)

- *Eucalyptus viminalis* (3)

Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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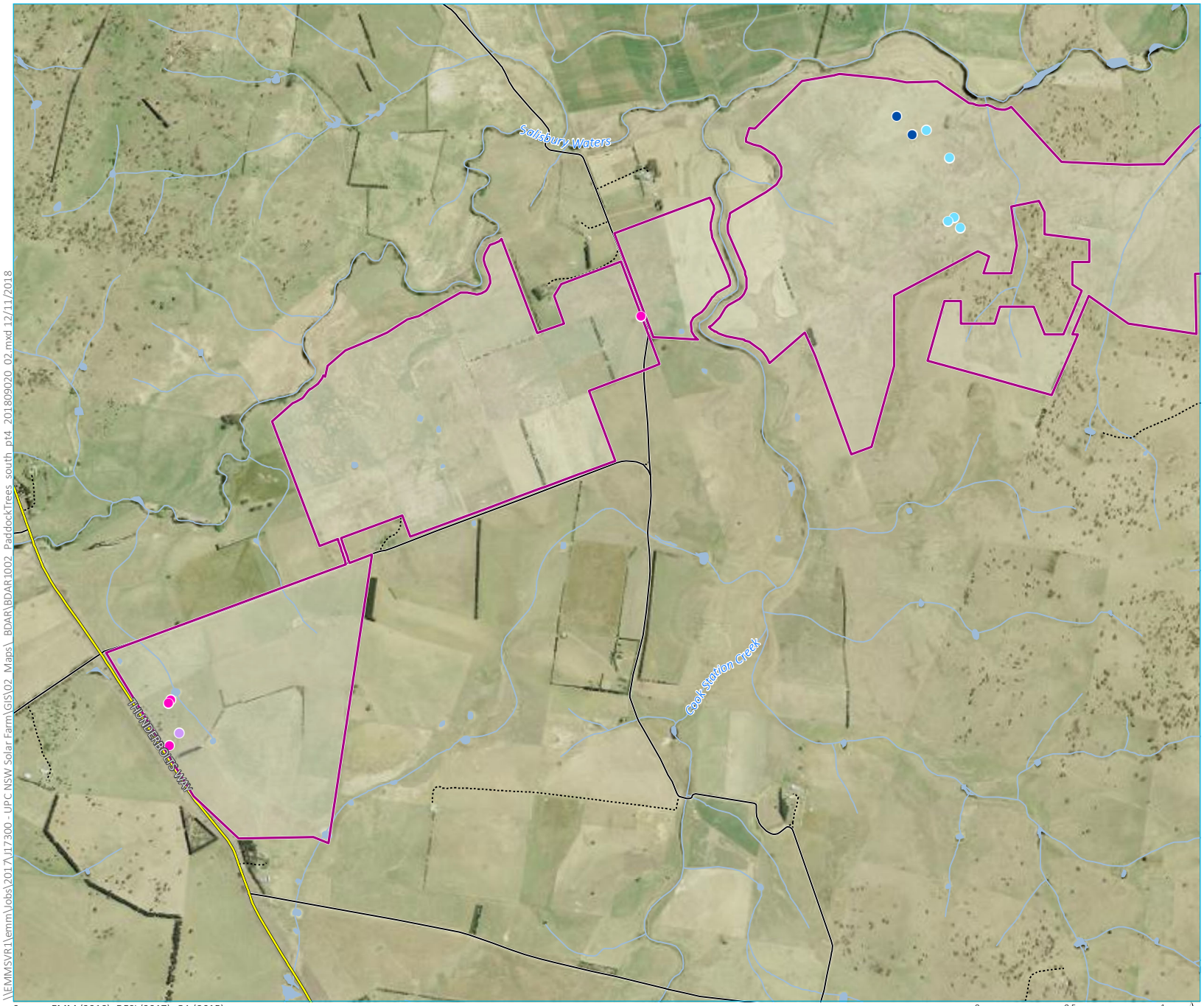
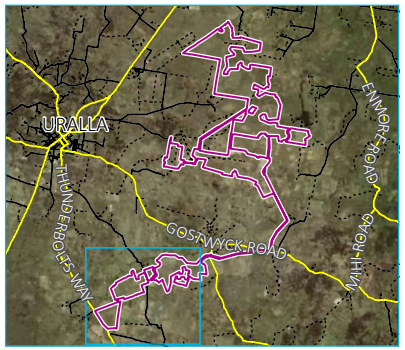
Paddock trees within the development site

New England Solar Farm
Biodiversity development assessment
Figure 4.2.3

EMM
creating opportunities





KEY

- Development site
- Waterbody
- Main road
- Local road
- Vehicular track
- Watercourse / drainage line

Species (category)

- *Angophora floribunda* (3)
- *Eucalyptus melliodora* (3)
- *Eucalyptus nova-anglica* (3)
- *Eucalyptus viminalis* (3)

Source: EMM (2018); DFSI (2017); GA (2015)

0 0.5 1 km

GDA 1994 MGA Zone 56

N

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Paddock trees within the development site

New England Solar Farm
Biodiversity development assessment
Figure 4.2.4

EMM
creating opportunities

5 Threatened species

5.1 Fauna habitat assessment

Concurrent with the vegetation mapping, a habitat assessment was undertaken seeking to identify the following fauna habitat features within the development site:

- habitat trees including large hollow-bearing trees;
- availability of flowering shrubs and feed tree species;
- waterway condition;
- quantity of ground litter and logs; and
- searches for indirect evidence of fauna.

This habitat assessment identified that the majority of the development site is highly disturbed, only supporting fauna species which are able to persist in highly modified agricultural landscapes.

The grassland (both native and exotic) and cropped areas have low habitat value, primarily providing foraging habitat for seed eating and insectivorous birds including Red-rumped Parrot (*Psephotus haematonotus*), Sulphur-crested Cockatoo (*Cacatua galerita*), Australasian Pipit (*Anthus novaeseelandiae*) and the exotic European Starling (*Sturnus vulgaris*). Predatory birds observed included the Australian Kestrel (*Falco cenchroides*), Brown Falcon (*Falco berigora*) and Whistling Kite (*Haliastur sphenurus*). A single native mammal species was observed, the Eastern Grey Kangaroo (*Macropus giganticus*), which is able to persist in open areas and cross fence lines. The European Hare (*Lepus europaeus*) was also moderately abundant.

Habitat resources within remnant woodland areas of the development site are largely limited to the trees themselves, given the highly grazed understorey, the absence of any midstorey species and lack of functional leaf litter. Woody debris including fallen limbs and trees was often present due to significant tree dieback (refer to Photograph 5.1), however the lack of any other supporting habitat features, such as dense tussock grasses and shrubs means that the understorey habitat is considered very poor and unlikely to support many species except those most disturbance tolerant.

Owing to the very poor connectivity and condition of woodland patches, birds were the main taxa observed utilising the remaining trees present and these were limited to medium to large species. No small woodland birds were observed, likely due to the scarcity of resources, low habitat complexity and competitive exclusion from Noisy Miner, which was fairly abundant. Other common species included Eastern Rosella (*Platycercus eximius*), Red-rumped Parrot and Sulphur-crested Cockatoo, which utilise the small to medium tree hollows for nesting. Few nectivorous species were recorded, largely limited to the somewhat omnivorous Noisy Miner (*Manorina melanocephala*) and Noisy Friarbird (*Philemon corniculatus*). It is noted that seasonal flowering events of Eucalypts, may attract highly mobile nectivorous species.

Koala SAT searches (refer to Section 5.3.3) were conducted in two woodland locations (refer Figure 5.2). These areas were selected due to their high relative connectivity to larger woodland areas and were considered the most optimal habitat for arboreal mammals within the development site. In addition to searches for koala scats around 60 trees, the method includes searches of 'poc' claw marks. Of the 60 trees searched, no Koala poc marks were recorded. Further, no scratches from any other taxa were observed. Typically scratches from non-threatened taxa such as the Common Brushtail Possum (*Trichosurus vulpecula*), Ringtail Possum (*Pseudocheirus peregrinus*) and Lace Monitor (*Varanus varius*) are frequently recorded within woodland areas. The majority of the trees surveyed were smooth-barked. Scratches are highly detectable on smooth-barked trees. The lack of signs of common arboreal mammals and reptiles is an indication of the poor habitat quality of the woodland within the development site.

Scattered trees within the development site provide similar fauna habitat to the remnant woodland albeit with further gaps between the trees. There is little functional difference given that both habitat types provide the same resources, largely limited to the trees themselves.

Planted native woodland provides different habitat features compared to remnant woodland. Trees were a mix of species occurring as dense and somewhat stunted low woodland. No hollows were present and nectar production is likely to be low given the small size of the trees. Despite a lack of fallen timber; shelter and structural complexity of the habitat was higher than other habitats due to the presence of some planted midstorey species and reduced spacing between trees. Most of the planted areas were also fenced, leading to a more structurally complex groundcover of exotic grasses. This increased complexity only resulted in a modest increase of fauna observed opportunistically; limited to two bird species; Rufous Whistler (*Pachycephala rufiventri*) and Yellow-rumped Thornbill (*Acanthiza chrysorrhoa*).

Photograph 5.1 Canopy dieback within the development site

Rock outcropping was largely limited to small igneous intrusions (dykes), which were utilised by Cunningham's Skink (*Egernia cunninghami*). Otherwise, the outcropping provided limited habitat for fauna as associated vegetation was limited to heavily grazed pasture.

A large number of farm dams exist within the development site which provide habitat for species such as the Eurasian Coot (*Fulica atra*), Australian Wood Duck (*Chenonetta jubata*), Australasian Grebe (*Tachybaptus novaehollandiae*) and White-faced Heron (*Egretta novaehollandiae*). The habitat quality is considered low considering the eroded banks and an absence of submerged, emergent and marginal aquatic vegetation (refer to Photograph 5.2).

Photograph 5.2 Typical farm dam within the development site

The majority of the mapped lower order (Strahler first and second order) streams within the development site have been so extensively modified by the construction of dams and retention banks that no channel or surface water is now evident. These watercourses are considered defunct from a fauna habitat perspective. More major watercourses have largely been avoided by the development site for the project.

As shown in Figure 1.1, there are five potential creek crossings proposed as part of the project. Subject to the detailed design of project infrastructure, creek crossings may be required across the following higher order streams that traverse the landscape outside of the development site:

- Cook Station Creek (fifth order stream) adjacent to two land parcels that form part of the southern array area;

- an unnamed third order stream adjacent to two land parcels that form part of the northern array area;

- two unnamed third order streams that are tributaries to Salisbury Waters and intersect the proposed site access corridor and ETL easement for the southern array area within proximity of the Hillview Road site access location; and

- an unnamed third order stream that is a tributary to Julia Gully and intersects the proposed site access corridor and ETL easement between two land parcels that form part of the central array area.

The first two water courses listed above are the most significant creeks with well defined channels. Cook Station Creek is ephemeral despite being listed as a fifth order stream (refer to Photograph 5.3). At the time of survey, the creek was largely dry with aquatic vegetation limited to isolated pools. Species identified include Spikerush (*Eleocharis sphacelata*) and Ribbonweed (*Vallisneria australis*).

The unnamed third order stream adjacent to two land parcels that form part of the northern array area is likely to be permanent; however, restricted flows were observed during survey, which is likely to have been a result of an extended dry period (refer to Photograph 5.4). The watercourse is highly disturbed with incised, eroded banks and evidence of trampling by cattle. High levels of filamentous algae were also present at the time of survey indicating high nutrient levels. Species identified include Narrow-leaved Cumbungi (*Typha domingensis*), *Juncus australis* and *Azolla* species.

Given the high levels of disturbance observed during survey, neither of these two watercourses are likely to be important for any threatened fish or frog species, with only cosmopolitan species recorded, such as the Eastern Common Froglet (*Crinia signifera*) and the exotic Eastern Mosquito Fish (*Gambusia holbrooki*).

The remaining three third order watercourses listed above have been extensively modified by the construction of farm dams and retention banks as part of the development site's historical land use. No channel or surface water was observed at these watercourses during survey. A representative photograph of the modified nature of these watercourses is provided in Photograph 5.5. These three watercourses no longer provide any habitat for aquatic species.

The only other significant watercourse observed within proximity of the development site is Salisbury Waters, which is proposed to be crossed as part of the potential ETL alignment between the central and southern array areas. It is anticipated that the watercourse will be spanned by the ETL and therefore no impacts are anticipated. Salisbury Waters consists of a series of deep, permanent pools connected by an ephemeral watercourse. The ephemeral nature of the watercourse is likely to reduce the habitat value for native fish species which require a permanent watercourse for migration. However, the pools are considered as having the potential to support native fish such as Long-finned Eel (*Anguilla reinhardtii*) and potentially introduced fish such as the Common Carp (*Cyprinus carpio*).

Any crossings proposed as part of the project should comply with the *Policy and Guidelines for Fish Friendly Waterway Crossing* (DPI undated).

Photograph 5.3 Cook Station Creek - a potential crossing point

Photograph 5.4 Unnamed third order stream adjacent to two land parcels that form part of the northern array area – a potential crossing point

Photograph 5.5 **Unnamed third order stream which intersects the proposed site access corridor and ETL easement between two land parcels that form part of the central array area**

5.2 Ecosystem credit species assessment

A list of ecosystem credit species predicted to occur within the development site, based on the PCTs present and generated by the calculator associated within the BAM (OEH 2017a) is provided in Table 5.1. The potential for these species to occur within the development site was assessed in accordance with Section 6.2 of the BAM (OEH 2017a).

Table 5.1 Assessment of ecosystem credit species within the development site

Scientific name	Common name	Justification for exclusion
Anthochaera phrygia	Regent Honeyeater (Foraging)	Excluded from PCT 510_planted and pasture as no suitable feed trees are present.
Calyptorhynchus lathami	Glossy Black-Cockatoo (Foraging)	Excluded from all habitat/vegetation types as there are no feed trees present.
Chthonicola sagittata	Speckled Warbler	Excluded from PCT 510_pasture as no woodland habitat present.
Climacteris picumnus victoriae	Brown Treecreeper	Excluded from PCT 510_pasture as no woodland habitat present.
Dasyurus maculatus	Spotted-tailed Quoll	Excluded from all habitat/vegetation types as habitat structure required is absent and connectivity is very poor.
Glossopsitta pusilla	Little Lorikeet	Excluded from PCT 510_pasture as no woodland habitat present.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	Not excluded.
Lathamus discolor	Swift Parrot (foraging)	Excluded from PCT 1174_woodland, PCT 510_pasture and PCT 510_planted as these habitats do not include preferred feed species.
Melanodryas cucullata cucullata	Hooded Robin	Excluded from PCT 510_pasture as no woodland habitat present.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat (Foraging)	Excluded from PCT 510_pasture as no woodland foraging habitat present.
Petroica boodang	Scarlet Robin	Not excluded.
Petroica phoenicea	Flame Robin	Excluded from PCT 510_pasture as no woodland habitat present.
Phascolarctos cinereus	Koala (foraging)	Excluded from PCT 1174_woodland and PCT 510_pasture as no primary or secondary feed trees are present.
Pteropus poliocephalus	Grey-headed Flying-fox	Excluded from PCT 510_pasture as no woodland foraging habitat present.
Stagonopleura guttata	Diamond Firetail	Not excluded.

5.3 Species credit species assessment

5.3.1 Habitat constraints assessment

An assessment of habitat constraints for threatened species was undertaken in accordance with Step 2 of Section 6.4 of the BAM (OEH 2017a). For those threatened species predicted to occur and for which habitat constraints are listed, an assessment was undertaken of the presence of the habitat features within the development site.

The species generated by the calculator with habitat constraints, as well as the results of the habitat constraints assessment, are shown in Table 5.2.

Table 5.2 Assessment of geographical features within the development site

Scientific name	Common name	Feature	Sensitivity to gain	Habitat constraint present and justification
Callitris oblonga	Pygmy Cypress Pine	East of Chandler River	High	The development site is west of the Chandler River. This species has not been considered further.
Myotis macropus	Southern Myotis	Hollow bearing trees; Within 200 m of riparian zone; Bridges, caves or artificial structures within 200 m of riparian zone	High	Two of the features, hollow bearing trees and habitat within 200 m of a riparian zone are present.

The Pygmy Cypress Pine has not been considered further as the development site is west of the Chandler River.

Southern Myotis has not been excluded on the basis of the identified habitat constraints. Further consideration is given to this species in Section 5.3.2.

5.3.2 Identifying candidate species credit species for further assessment

To develop a list of species credit species for further assessment, an assessment was undertaken in accordance with Step 3 of Section 6.4 of the BAM (OEH 2017a), as shown in Table 5.3.

Table 5.3 Species credit species and status and habitat suitability assessment

Common name	Scientific name	Candidate species	Justification
Flora			
Barrington Tops Ant Orchid	*Chiloglottis platyptera*	No	Grows in moist areas in tall open eucalypt forest with a grassy understorey, and also around rainforest edges. Found along the eastern edge of the New England Tablelands, from Ben Halls Gap to east of Tenterfield, and also in the Barrington Tops area. It generally occurs in rich brown loam soils. No suitable habitat exists within the development site given that mesic rich brown loam soils are absent from the development site. The high disturbance and grazing pressure also precludes this species from occurring.
Bluegrass	*Dichanthium setosum*	Yes	Bluegrass occurs on heavy basaltic black soils and red-brown loams with clay subsoil. It is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. Locally common or found as scattered clumps in broader populations. Given this species can occur in disturbed areas and suitable soils types are present, this species has the potential to occur within the development site.
Small Snake Orchid	*Diuris pedunculata*	No	The Small Snake Orchid grows on grassy slopes or flats. Often on peaty soils in moist areas and also on shale and trap soils, on fine granite, and among boulders. The development site is highly disturbed, with a poor diversity of forb species. The Small Snake Orchid is susceptible to grazing and with the high grazing pressure within the development site the species is unlikely to occur.
Northern Blue Box	*Eucalyptus magnificata*	Yes	Grassy open forest or woodland on shallow, sandy or loamy soils. Occurs on moderately hilly sites and at the edge of gorges, usually at altitudes from 900 - 1050 m. Known in NSW from only a few widely separate populations on the New England Tablelands, around Hillgrove east of Armidale and in the Glen Innes and Tenterfield region, where they occur individually or in small populations. This species cannot be excluded based on habitat basis alone.
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	Yes	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. This species cannot be excluded based on habitat basis alone.
Hawkweed	*Picris evae*	Yes	Where collected, the species abundance has been rare, locally occasional and locally frequent. All recent collections appear to come from modified habitats such as weedy roadside vegetation and paddocks. Its main habitat is open Eucalypt forest including a canopy of *Eucalyptus melliodora, E. crebra, E. populnea, E. albens, Angophora subvelutina, Allocasuarina torulosa*, and/or *Casuarina cunninghamiana* with a *Dichanthium* grassy understory. Soils are black, dark grey or red-brown (specified as shallow, stony soil over basalt for one collection) and reddish clay-loam or medium clay soils. The flowering and fruiting period is mainly October to January, with a few plants collected in flower or fruit until May. This species cannot be excluded based on habitat basis alone.
Silky Swainson-pea	*Swainsona sericea*	No	Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes, sometimes in association with cypress-pines *Callitris* spp. This species is not anticipated to occur given highly degraded nature of the groundcover and very poor forb diversity, largely due to pasture modification and heavy grazing.

Table 5.3 Species credit species and status and habitat suitability assessment

Common name	Scientific name	Candidate species	Justification
Austral Toadflax	*Thesium australe*	No	Austral Toadflax occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast, often in association with Kangaroo Grass (*Themeda australis)*. This species is a root parasite that takes water and some nutrients from other plants, especially Kangaroo Grass. This species is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands region. This species is not anticipated to occur given highly degraded nature of the groundcover, largely due to pasture modification and heavy grazing.
Fauna			
Regent Honeyeater (breeding)	*Anthochaera phrygia*	No	Mapped important areas are considered species credits under the BAM (OEH 2017a). These areas do not require survey. The closest mapped breeding area of the Regent Honeyeater is the Bundarra-Barraba, with the most eastern extent over 22 km north-east of the development site. The development site is not within or close to a known breeding area.
Glossy Black-Cockatoo (Breeding)	*Calyptorhynchus lathami*	No	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur (*Casuarina* and *Allocasuarina* species). Dependent on large hollow-bearing eucalypts for nest sites. No hollow bearing trees with sufficiently large hollows (26 cm wide and 1.4 m deep, NSW Scientific Committee (2008)) were observed within the development site. Furthermore no *Casuarina* and *Allocasuarina* were recorded within the entire development site or the surrounding landscape. The species needs to forage for much of the day in order to obtain sufficient food, especially during the breeding season (Garnett & Crowley 2000). Therefore the energetic demand of foraging over such large distances would negate breeding within the development site.
White-bellied Sea-eagle (breeding)	*Haliaeetus leucogaster*	No	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass. The only area of optimal foraging habitat for this species is Dangars Lagoon. The development site is approximately 4.3 km away from this resource and therefore unlikely to be selected as a breeding site. The dammed Saumarez Creek west of the development site may also provide foraging habitat for the species, however areas of the development site closest to this potential resource is devoid of trees and therefore will not provide suitable breeding habitat.
Swift Parrot (breeding)	*Lathamus discolor*	No	Mapped important areas are considered species credits under the BAM (OEH 2017a). These areas do not require survey. The development site is not within a mapped important area for the Swift Parrot, and breeding only occurs in Tasmania.

Table 5.4 Species credit species and status and habitat suitability assessment

Common name	Scientific name	Candidate species	Justification
Mammals			
Eastern Bentwing-bat (Breeding)	*Miniopterus schreibersii oceanensis*	No	Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. No caves habitat exists within the development site.
Southern Myotis	*Myotis macropus*	No	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Southern Myotis forages over streams and pools catching insects and small fish by raking their feet across the water surface. The development site is over 135 km inland and therefore the occurrence of the Southern Myotis is likely to be restricted to major rivers. The closest watercourse which has the potential to provide habitat is Salisbury Waters, which is a series of small ponds links by a narrow and ephemeral watercourse. This watercourse is not likely to provide habitat for the species given its small size and the low quality of habitat. The banks of the watercourse are largely unvegetated, with minimal roosting opportunities, and surrounded by pasture. The development site has avoided Salisbury Waters, though a crossing may be required for an ETL. Regardless there are no structures or hollow bearing trees within close proximity to Salisbury Waters which will be impacted by the project.
Squirrel Glider	*Petaurus norfolcensis*	No	The Squirrel Glider inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. The species prefers mixed species stands with a shrub or Acacia mid-storey. The species relies on large old trees with hollows for breeding and nesting; however, trees need to be less than 50 m apart. Box Gum woodland within the development site is highly disturbed, with a thinned canopy, and poor connectivity between patches. Midstorey species are absent throughout all of the remnant woodland patches with a pasture understorey, therefore insufficient foraging resources are present to support the species. Midstorey species including acacia species are present in some of the planted windrows however these areas do not have support any mature trees with hollows and is considered unsuitable for the species. The Box-Gum woodland and planted areas are disjunct from one another, therefore they are considered as separate habitats, with an inability to support the species. The development site has no connectivity to any areas of known or potential Squirrel Glider habitat.

Table 5.3 Species credit species and status and habitat suitability assessment

Common name	Scientific name	Candidate species	Justification
Koala (breeding)	*Phascolarctos cinereus*	Yes	Koala inhabits eucalypt woodlands and forests, feeding on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. The development site is within the northern tablelands koala management area. One primary food tree was recorded within the development site, Ribbon Gum (*Eucalyptus viminalis*). This species was largely restricted to planted windrows and was typically found in a stunted and poor condition. These areas were in disjunct patches (< 5ha) and are not likely to support the Koala. Ribbon Gum was also an occasional component of PCT 510_woodland, occurring as a thinned remnant community in small patches or as scattered trees. Ribbon Gum is the only Schedule 2 feed tree species (SEPP 44) recorded within the development site. Several secondary feed trees were recorded within the development site, including; Fuzzy Box, Yellow box, New England Peppermint, Snow Gum, Blakely's Red Gum and Mountain Gum. Typically these trees occur as scattered paddock trees and when occurring as part of a woodland are in small, disjunct patches with a large distance between individual trees. No Koala have been recorded within the development site, likely due to the very small patch sizes of woodland and lack of connectivity across the large cleared and agricultural landscape. The closest record of Koala to the development site is 1.5 km south east of the ETL connecting the southern and central array, which was recorded in 2004. Under the BAM (OEH 2017a) 'important' habitat is defined by the density of Koalas and quality of habitat determined by on-site survey. The quality of the habitat is considered low, given the small disjunct patches of woodland and less than 15% of the total number trees comprised of Schedule 2 feed trees (SEPP44). In order to confirm that the development site is not important for Koala, field survey will be conducted to assess density of feed trees.
Grey-headed Flying-fox (Breeding)	*Pteropus poliocephalus*	No	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, for giving birth and rearing young. Treed habitat within the development site is limited to open woodland and planted eucalypt vegetation. No vegetated gullies are present, nor are any areas of dense vegetation present, therefore and suitable roosting habitat is considered absent from the development site. Treed areas of the development sites have been visited during other surveys (vegetation mapping and floristic plots) and no roosts have been observed.

Table 5.5 Species credit species and status and habitat suitability assessment

Common name	Scientific name	Candidate species	Justification
Frogs			
Tusked Frog population in the Nandewar and New England Tableland Bioregions	*Adelotus brevis* - endangered population	No	Inhabits rainforests, wet forests and flooded grassland and pasture. They are usually found near creeks, ditches and ponds, and call while hidden amongst vegetation or debris. The species breeds from Spring through to Summer, with a peak during late Spring. Eggs are deposited in nests under leaf litter or other cryptic sites such as old yabbie burrows near or in water. Aquatic habitat within the development site is largely limited to dams, which are too degraded to support the species, typically with an absence of aquatic and emergent vegetation, with no leaf litter. Furthermore surrounding foraging habitat is limited to grazed pasture.

This assessment identified the following species as candidate species requiring further assessment:

- Bluegrass;
- Northern Blue Box;
- Narrow-leaved Black Peppermint;
- Hawkweed; and
- Koala.

Targeted surveys were undertaken, and the presence or absence of these species in the development site determined, in accordance with Section 6.4 of the BAM (OEH 2017a). Survey methods and outcomes are discussed further below.

5.3.3 Targeted surveys methods

i Targeted flora surveys

Targeted flora surveys have been undertaken in accordance with OEH (2016c) and DoE (2013) guidelines, and included systematic parallel transects spaced at intervals of 10 m. Targeted flora survey locations are illustrated in Figure 5.1 for both Bluegrass and Hawkweed. The survey effort shown in Figure 5.1 represents a single track from a handheld GPS. A second person walked parallel at approximately 10 m separation distance.

a. Northern Blue Box (*Eucalyptus magnificata*) and Narrow-leaved Black Peppermint (*Eucalyptus nicholii*)

Each patch of woodland was visited during the habitat and vegetation mapping conducted from January to August 2018. Particular attention was paid to any trees with box-peppermint type bark, with all encountered trees identified to species level. All scattered trees outside of woodland areas were assessed as paddock trees, identified to species level and their locations mapped across the entire development site (refer to Section 4.3.6).

b. Bluegrass (*Dicanthium setosum*)

Bluegrass occurs on heavy basaltic black soils and red-brown loams with clay subsoil. It is often found in moderately disturbed areas, including pasture.

It is considered very unlikely that Bluegrass could persist in the areas of exotic grassland, owing to the intensive agricultural practices used and dominance of exotic species. These areas are considered substantially degraded and no longer provide habitat for the species. Woodland vegetation is also considered unlikely to provide habitat for Bluegrass as groundcover is typically in much lower condition than the surrounding grassland areas. Livestock have favoured the treed areas for shelter resulting in groundcover which is highly enriched, predominately exotic and grazed close to ground level. In addition, planted areas were typically dominated by exotic grass species and therefore considered unfavourable habitat.

The only zone considered as having potential to support the species is PCT 510_pasture, which contains several native grass species. This potential habitat was refined further by intersecting suitable soil landscapes 9,236ir, 9,236po, 9,236ba and 9,236kp (OEH Soil Landscapes of Central and Eastern NSW (OEH 2017b)). Given the scale of the development site and the sub-optimal nature of the habitat, a representative sampling approach was adopted, which included:

- areas mapped as native pasture with underlying basalt or red loam soils were targeted, especially those derived from Basalt, a total of 569 ha has been mapped within the development site;
- survey effort was conducted within a representative 10% of the total area of native pasture with suitable soil types;
- the survey area of 57 ha was stratified across the development site to ensure spatial spread and to capture variation within the pasture between different landholders and differing management practices;
- linear transects were walked with a 10 m spacing, which equates to 124 km of survey effort; and
- the survey was conducted in 10-12 April 2018, within the required BAM survey timeframe (December to May).

The above approach was provided to OEH on 4 April 2018 via email. Dimitri Young confirmed that OEH supported the approach on the same day.

Associate Professor Ralph (Wal) Whalley of University of New England (UNE), who is a recognised expert on the species, provided the location of a reference site at Apple Tree Hill Drive, Armidale. This site was checked on 9 April 2018, with both *Dichanthium setosum* and *D. sericeum* (non-threatened) observed in flower.

It should be noted that the field assessment was undertaken prior to the refinement of the development site. Survey effort within the development site equates to approximately 75 km, which exceeds the targeted 10% of the 569 ha of suitable soil types for the species.

c. Hawkweed (*Picris evae*)

Hawkweed typically occurs north of the Inverell area, in the north-western slopes and plains regions. The closest records to the development site are outliers to the main species distribution, approximately 10 km to the east of the development site (dated 1990) and 65 km to the south east (dated 1993). The Inverell population is approximately 100 km north of the development site. Hawkweed usually occurs on dark grey/black soils, however the species is also known to occur on red-brown and reddish clay-loam or medium clay soils. Whilst its main habitat is open Eucalypt forest, recent collections have been from modified habitats such as weedy roadside vegetation and paddocks. This species is likely to be susceptible to grazing. Given the scale of the development site and the sub-optimal nature of the habitat, a representative sampling approach was adopted, which included:

- areas mapped as native pasture with underlying basalt or red loam soils were targeted, especially those derived from basalt, which represented a total area of 569 ha within the development site;
- survey effort was conducted within greater than 10% of the total area (ie 57 ha) of native pasture with suitable soil types;

- the survey area of 57 ha was stratified across the development site to ensure spatial spread and to capture variation within the pasture between different project landholders and differing management practices;

- a potential reference site was visited on 24 September 2018 in Inverell (approximately 90 km north of the development site), with a second reference site visited on 27 September 2018 near Swan Brook, Swan Vale (approximately 90 km north of the development site);

- the survey was conducted between 25-27 September 2018, within the required BAM survey timeframe (September to February); and

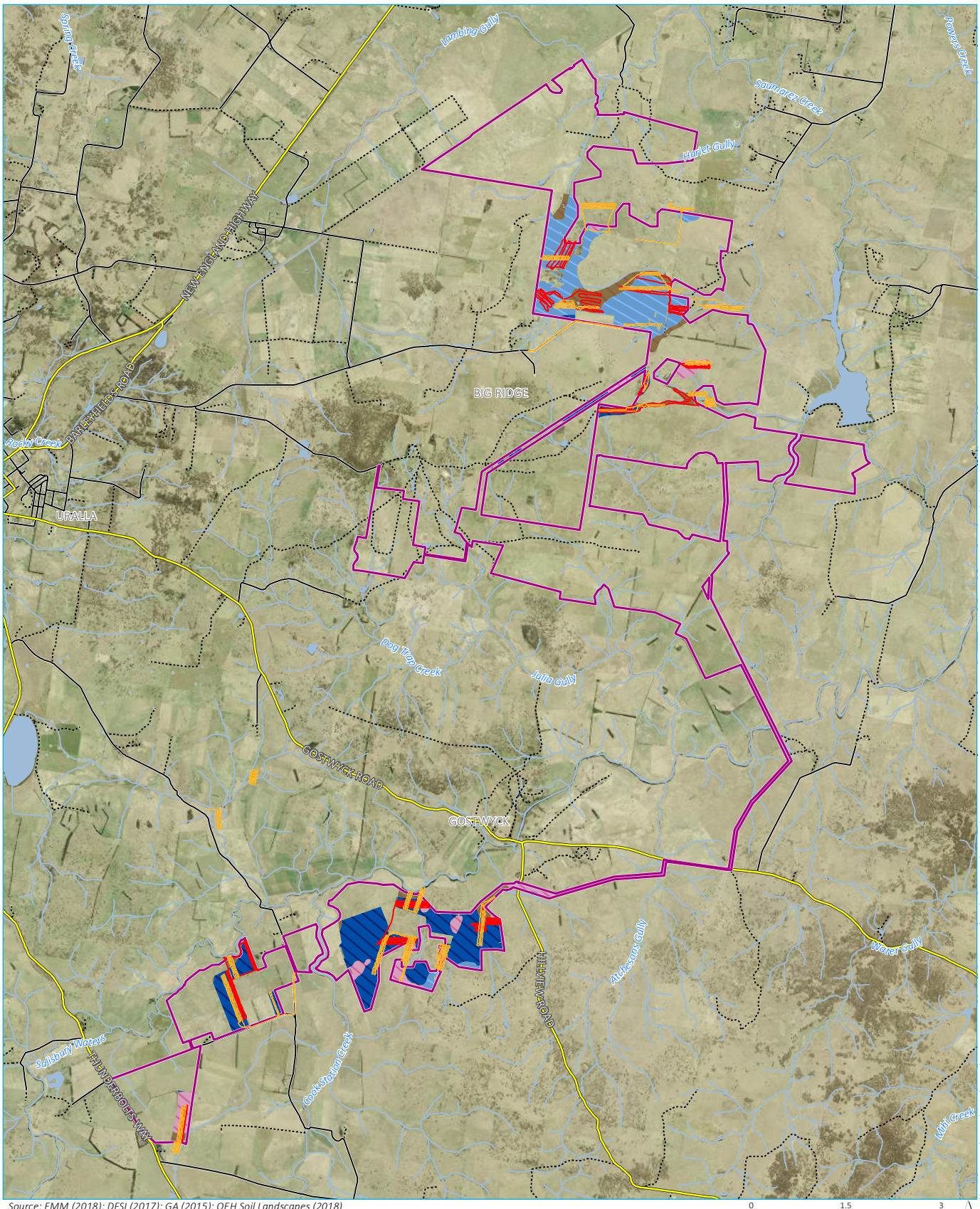
- linear transects were walked with a 10 m spacing, over a total of 86.3 km.

This approach was provided to OEH on 11 September via email, with acceptance of the approach provided on 20 September 2018.

ii Targeted koala surveys

Searches for Koala scats were based on the SAT Koala Survey Methodology (Phillips and Callaghan 2011), and were undertaken on 25 September 2018. Two SAT locations were selected in areas where the relative chance of detection were highest; taking into account patch size, connectivity and the amount of primary (Ribbon Gum) and secondary feed tree (Fuzzy Box, Yellow box, New England Peppermint, Snow Gum, Blakely's Red Gum and Mountain Gum) species present. In concurrence with the scat surveys, diurnal searches of trees for Koala were also conducted.

Targeted koala survey locations are illustrated in Figure 5.2.



Source: EMM (2018); DFSI (2017); GA (2015); OEH Soil Landscapes (2018)

0 1.5 3 km

GDA 1994 MGA Zone 56

N

KEY

- Survey effort targeting Bluegrass
- Survey effort targeting Hawkweed
- Main road
- Local road
- Vehicular track
- Watercourse / drainage line
- Waterbody
- Development site

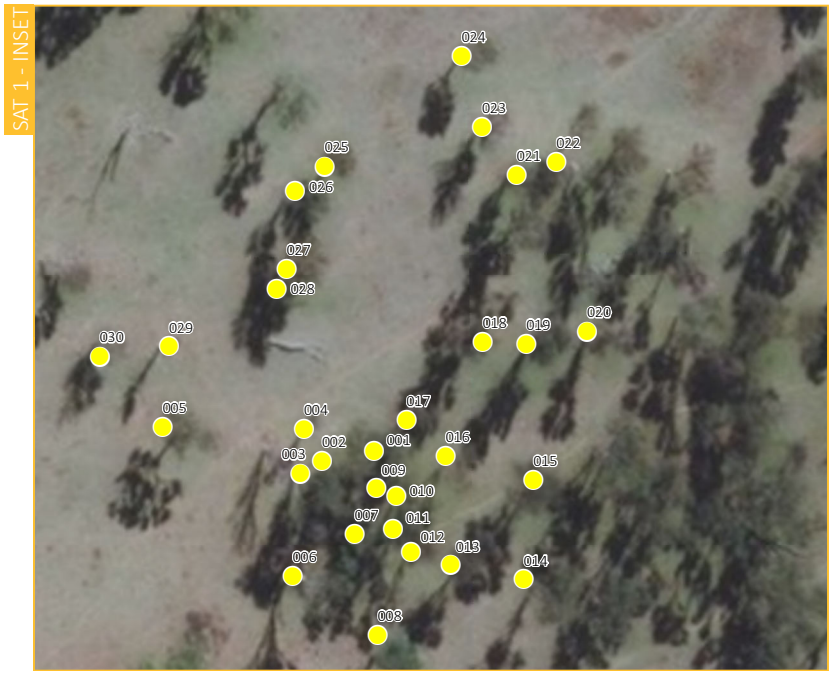
Soil landscape (soil code)

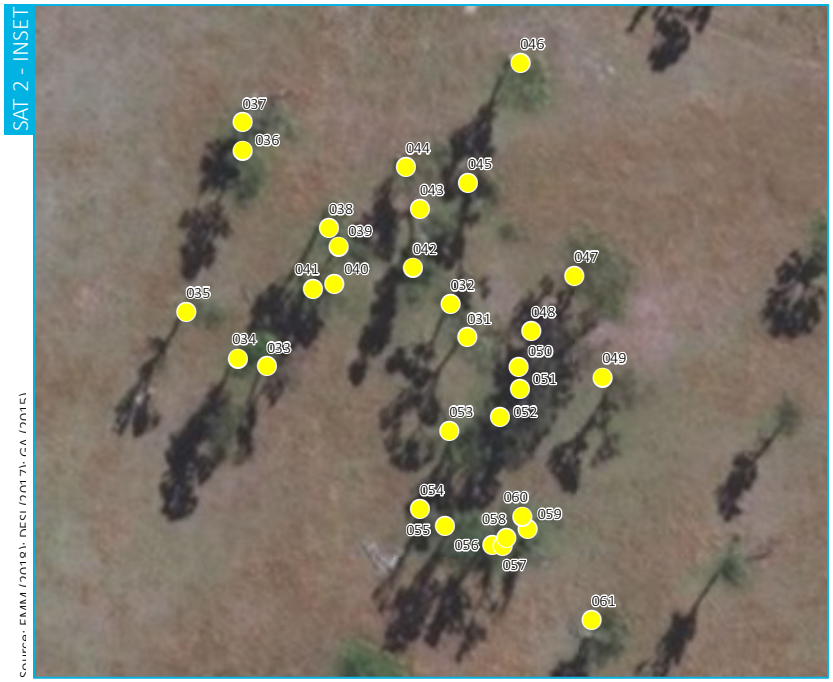
- Bald Knob (9236ba)
- Ironstone (9236ir)
- Kellys Plains (9236kp)
- Powers Creek (9236po)

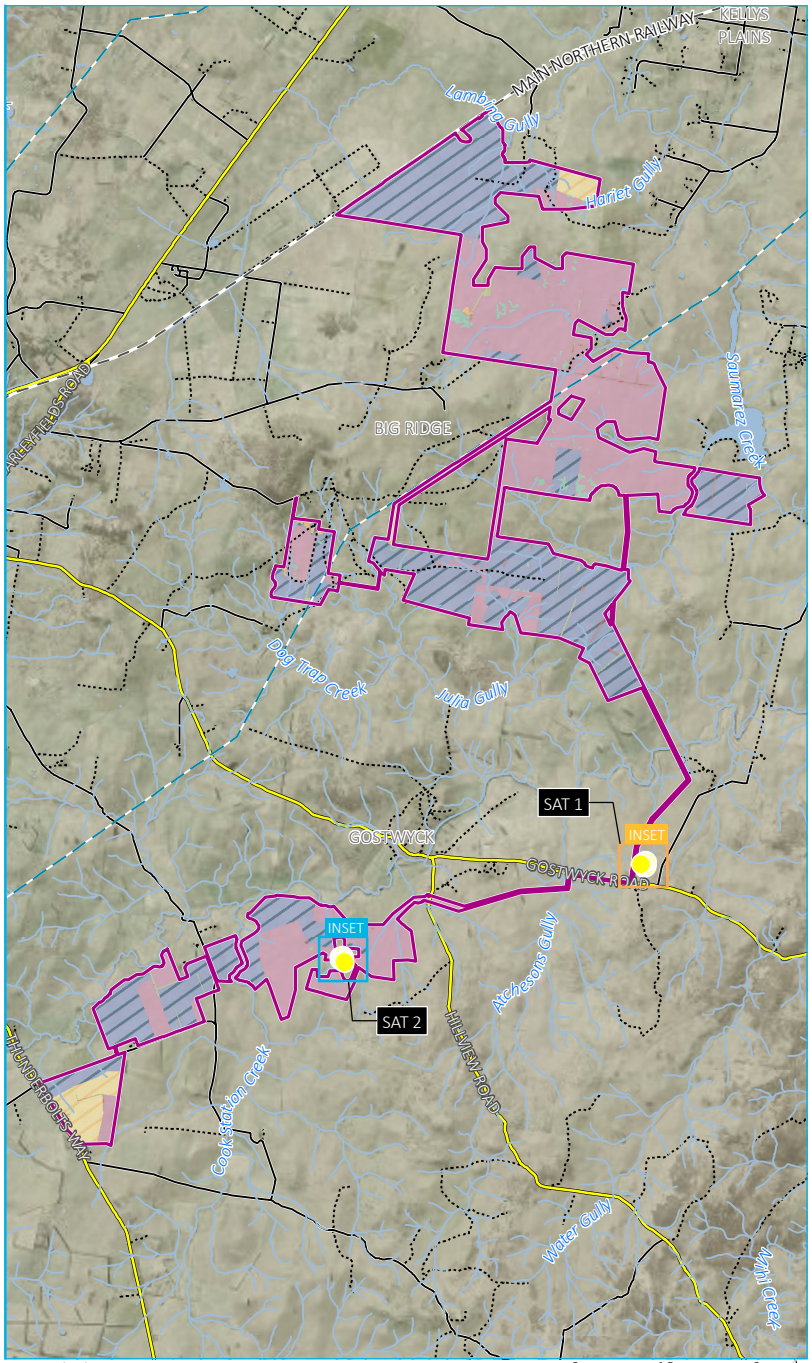
Targeted survey effort for Bluegrass *(Dichanthium setosum)* and Hawkweed *(Picris evae)*

New England Solar Farm
Biodiversity development assessment
Figure 5.1

EMM creating opportunities







KEY

- 330 kV transmission line
- Rail line
- Watercourse / drainage line
- Main road
- Local road
- Vehicular track
- Development site

Plant community type

- PCT 1174 woodland
- PCT 510 pasture
- PCT 510 planted
- PCT 510 woodland
- Exotic - trees
- Exotic - grassland
- Exotic - cropping
- Dam
- Waterbody
- Spot Assessment Technique (SAT) locations

Source: EMM (2018); DEC (2017); GA (2015)

\\Emmsvr1\emm\Jobs\2017\J17300 - UPC NSW Solar Farm\GIS\02_Maps_BDAR\BDAR1006_TargetedSvyKoala_20180104_04.mxd 4/10/2018

0 1.5 3 km

GDA 1994 MGA Zone 56

N

Targeted survey effort for Koala *(Phascolarctos cinereus)*

New England Solar Farm
Biodiversity development assessment
Figure 5.2

EMM
creating opportunities

5.3.4 Targeted survey results

No threatened species were recorded within the development site opportunistically or during targeted surveys.

5.3.5 Species credit species

A summary of species credit species predicted to occur within the development site, based on the PCTs present and as predicted by the credit calculator, along with an assessment of whether the development site provides suitable habitat and whether the species will be impacted by the development is provided within Table 5.4. The potential for a species to occur within the development site was assessed in accordance with Step 3 of Section 6.4 of the BAM (OEH 2017a).

Of the threatened species surveys Northern Blue Box, Narrow-leaved Black Peppermint and Koala are detectable at any time of the year and sufficient field investigations were undertaken to conclude that the species are unlikely to occur within the development site. A reference site was checked close to Armidale at the time of the Bluegrass targeted surveys on 9 April 2018, the species was found to be detectable and flowering, verifying the validity of the subsequent survey.

Identifying a representative reference site for Hawkweed was problematic given the scarcity of records within the New England Tablelands region. The closest record of the species is from approximately 10 km to the east of the development site (dated 1990). This location is within the Oxley Wild Rivers National Park, close to Dangars Falls and is not considered a suitable reference site as the record is 28 years old. Further, personal communications with Botanist Lachlan Copeland indicated that despite searches for the species in the location of the original record, it has not been detected.

The distribution and occurrence provided for Hawkweed on NSW Flora Online (PlantNET) notes that the species occurs north of the Inverell area. The closest collection of records exists within the Inverell area. A high density of records exists from Bimbadeen Drive and Orchard Place. These records are dated from 2006. This area was visited and searched; however, the area is now regularly mown and Hawkweed was not detected.

The location of a second reference site was provided by Lachlan Copeland. This reference site was near Swan Brook, Swan Vale. The area was searched; however, it had been recently slashed and no evidence of Hawkweed was found.

Targeted surveys for Hawkweed at the development site were conducted in mid September. There is a chance that surveys were completed at a time when the species may not have been detectable (despite being surveyed within the required survey season (ie September to February)). Given that the development site is greater than 90 km south of the species' core range of occurrence and the relatively high altitude of the development site, it is likely that if the species was present it may flower later in the season. This may also be compounded by the relatively dry winter and spring preceding the survey. Despite this uncertainty regarding detectability, it is considered very unlikely that the species occurs within the development site for the following reasons:

- the species is predominantly found distributed through northern NSW and southern Queensland with records south of the Inverell region (approximately 90 km north of the site) very sparse and considered outliers;

- the limited Hawkweed records south of the Inverell region are historic (ie dated 1999 or earlier); and

- the development site is heavily grazed with a highly modified ground cover characterised by a very low diversity and coverage of native forbs.

Table 5.6 Species credit species, habitat suitability and targeted survey results

Common name	Scientific name	Biodiversity risk weighting	Habitat present within the development site	Recorded during field surveys	Impacted by development	Justification
Flora						
Bluegrass	*Dichanthium setosum*	2	Yes, sub-optimal habitat present within four soil landscapes within PCT 510_pasture.	No	No	Not recorded during targeted surveys.
Northern Blue Box	*Eucalyptus magnificata*	2	Yes, sub-optimal habitat exists	No	No	Not recorded during targeted surveys.
Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	2	Yes, sub-optimal habitat exists	No	No	Not recorded during targeted surveys.
Hawkweed	*Picris evae*	2	Yes, however outside of core range, most frequently recorded near to and north of Inverell which is approximately 90 km north of the development site.	No	No	Not recorded during targeted surveys.
Fauna						
Koala	*Phascolarctos cinereus*	2	Habitat is of low quality and unlikely to be important to Koala.	No	No	No important habitat present based on lack of species occurrence and habitat assessment.

PART B

Stage 2: Impact Assessment

6 Impact Assessment (biodiversity values)

This chapter identifies the potential impacts of the project on the biodiversity values of the development site. Measures taken to date to avoid and minimise impacts are summarised and recommendations are provided, which will assist UPC to design a development that further avoids, minimises and mitigates impacts.

6.1 Potential direct, indirect and prescribed impacts

The main direct impacts of projects are generally associated with direct impacts arising from the clearing of native vegetation communities and loss of species habitat, and associated indirect impacts. Potential direct impacts that could arise from the project, prior to any avoidance, minimisation or mitigation, include:

- clearing of native vegetation and threatened species habitat; and
- disturbance of watercourse beds and banks during crossing construction.

Unmitigated, the project has the potential to result in minor indirect or minor prescribed impacts. Prescribed impacts, as per Section 8.2.1.2 of the BAM (OEH 2017a), that could occur as a result of project include:

- fauna vehicle strike;
- impacts to surface water quality and quantity due to sediment runoff and/or contaminant runoff into adjacent watercourses;
- impacts to groundwater water quality and quantity due to sediment runoff and/or contaminant runoff into adjacent watercourses;
- fragmentation of habitats and associated impacts to connectivity and fauna movement.

Unmitigated indirect impacts that could occur as a result of the project include:

- increased noise, vibration and dust levels;
- artificial lighting impacting nocturnal species behaviour; and
- increase in weeds and pathogens.

Increased vehicle movements associated with the project have the potential to result in increased fauna vehicle strikes and associated fauna mortality. The risk of significant impacts is considered very minor given the lack of threatened fauna recorded and the low general fauna abundance. Mitigation measures outlined in Section 6.2 will reduce this risk.

Construction activities that take place in the vicinity of watercourses have the potential to impact on aquatic ecology by the release of sediment-laden water that could arise on-site following mobilisation of soils/sediments. Mobilisation of soils/sediments may occur during inclement weather over disturbed soils and sediments in areas where vegetation has been cleared and/or areas where soil and construction material has been stockpiled. Reduction in watercourse bank stability following any nearby construction and any clearing of riparian vegetation could also result in bank erosion and input of sediments into watercourses.

The majority of watercourses have been avoided through iterative design, with buffers applied to larger watercourses (third order and above). This will significantly reduce the risk of the potential impacts described above. Furthermore, watercourses within the development site are highly disturbed being heavily grazed, eroded and subject to eutrophication.

Most mapped watercourses within the development site no longer have any discernible channel and have no surface water present for the majority of the time, due to extensive damming and diversion with contour banks. Any original riparian vegetation is also non-existent, having been historically cleared. No threatened species are anticipated to be associated with the aquatic habitats present within the development site. The project is unlikely to significantly worsen the aquatic habitat, and the change in land use may improve habitats by reducing stocking rate. This has potential to reduce the level of erosion, eutrophication and overgrazing, although the original species composition is likely to have been irrevocably altered.

Higher order watercourses, such as Salisbury Waters, which have been avoided by the development site's three array areas may require crossing by one or more ETLs and/or site access tracks. Any crossing points required as part of the project (refer Figure 1.1) should be assessed during detailed design and an appropriate crossing type constructed in accordance with the *Policy and Guidelines for Fish Friendly Crossings* (DPI undated).

With the exception of diesel, the project does not require large inputs or storage of chemicals/liquids which pose a risk to groundwater contamination. Potential impacts are limited to low volume sources such as fuel and oil from construction equipment. Appropriate procedures will be included in the construction environmental management plan (CEMP) to reduce the chance of any spill occurring and minimise potential impacts if they were to occur.

Up to six diesel generator skids may be required to service the power requirements of the CAV (should it be required). Storage of diesel within the development footprint will conform with AS 1940:2017 The storage and handling of flammable and combustible liquids and will be placed away from environmentally sensitive areas where possible.

The project is not likely to impact groundwater during construction, operation and decommissioning due to the estimated depth to groundwater within the project boundary and the limited amount of subsurface disturbance activities required during the installation and decommissioning of project infrastructure.

The project will not require access to groundwater resources outside of the development site and will not impact licensed water users within the vicinity of the three array areas.

The removal of native vegetation has the potential to result in fragmentation of fauna habitat, with resultant effects on fauna species movement, reproduction and gene flow. The impact of vegetation clearance on fragmentation is anticipated to be negligible, given that no significant fauna movement corridors currently exist within the development site, which is a result of high levels of existing fragmentation and small patch sizes.

Construction activities may result in increased levels of noise and vibration. No significant impacts are anticipated as the fauna abundance is low across the development site and largely limited to highly mobile species. No threatened species are anticipated to rely on any of the habitats currently present and no sensitive receptors have been identified.

The project will require limited permanent night lighting, most likely for the O&M buildings and substations or the construction accommodation village (should it be required). Temporary, localised night lighting may be required during general maintenance activities conducted during the operation stage of the project. Lighting has the potential to impact species behaviour. Any impacts are anticipated to be highly localised and are not anticipated to be significant given the low diversity and abundance of fauna recorded within the development site. Mitigation measures are outlined in Section 6.2.

Increased movement of vehicles has the potential to transport weeds and pathogens into the development site and adjacent vegetation. Given the high levels of disturbance within the development site, there is also the risk that weeds may be transported off-site. Mitigation measures to reduce the chance of weed spread are outlined in Section 6.2.

Infection of native plants by *Phytophthora cinnamomi* is listed as a key threatening process under the BC Act and EPBC Act. *P.cinnamomi* can lead to death of trees and shrubs, resulting in devastation of native ecosystems (DECC 2008). As described by DoE (2014), infection of susceptible communities with *P.cinnamomi* can lead to:

- changes in the structure and composition of native plant communities;
- a significant reduction in primary productivity and functionality; and
- habitat loss and degradation for dependent flora and fauna.

P. cinnamomi is known to occur within the Northern Tablelands region; however, it remains unknown if it currently exists within the development site. High levels of tree die back have been recorded throughout the development site; however, it remains unknown if *P. cinnamomii* is responsible, with the causes likely multifaceted.

This list of potential impacts may occur if the activities associated with the development site are not avoided, minimised and mitigated.

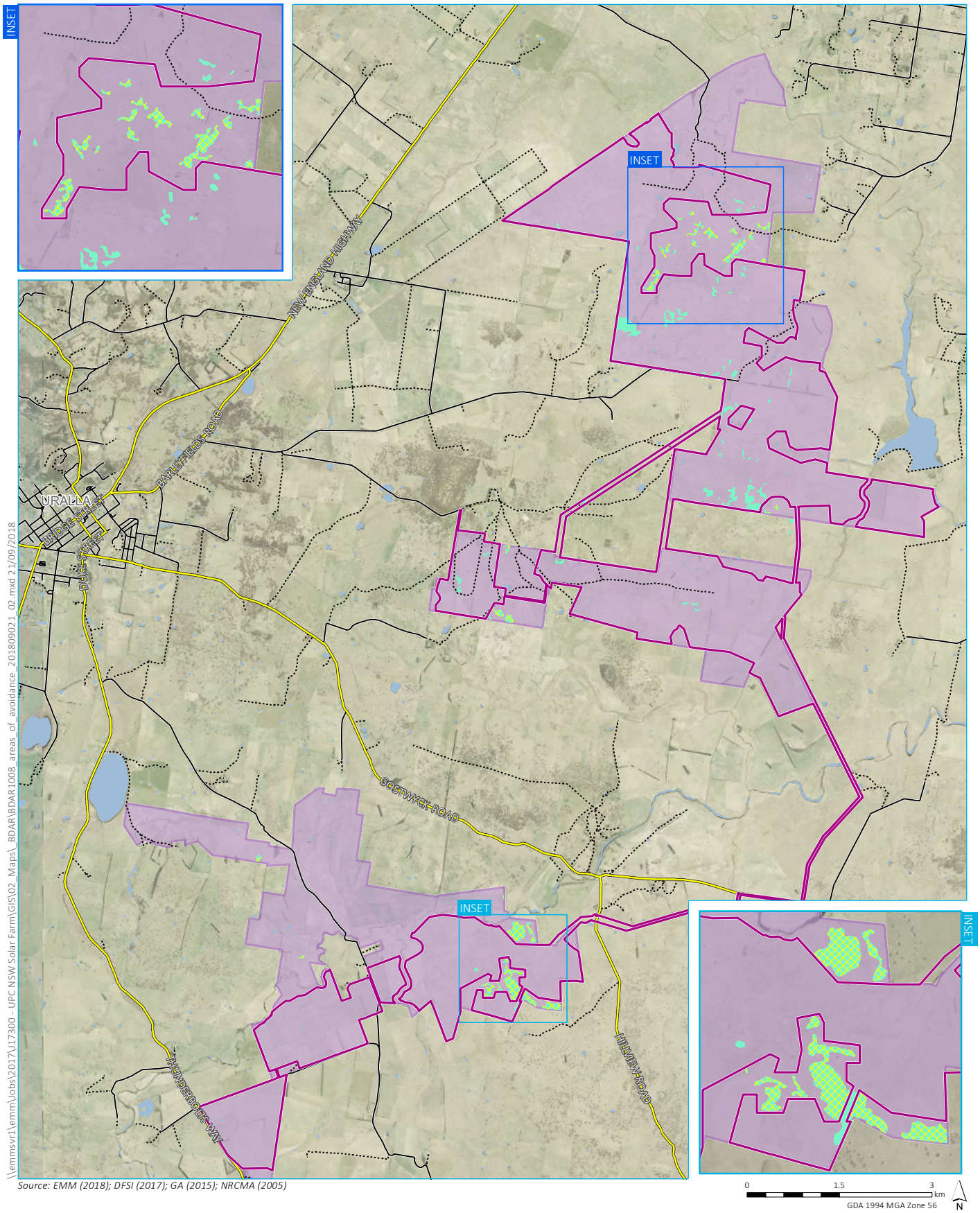
6.2 Measures to avoid, minimise and mitigate impacts

UPC, in consultation with EMM, has undertaken significant steps to avoid, minimise and mitigate impacts, as per the process outlined below:

- identification of biodiversity values through comprehensive, rigorous and thorough biodiversity surveys;
- communication of identified values to the project team, including UPC;
- consultation between the design team and project ecologists to consider direct and indirect impacts and work through an iterative design process, with multiple iterations of design footprint to achieve a feasible project with least biodiversity impact; and
- consultation with OEH, to seek input and discuss measures proposed to avoid and minimise impacts.

The original project assessment area presented as part of the preliminary environmental assessment (PEA) in April 2018 occupied approximately 4,244 ha, for which a biodiversity constraints assessment was completed, including vegetation mapping, habitat mapping and BAM plots. The detailed vegetation plots provided an estimate of the vegetation integrity score, which was used to assess the quality of vegetation present, in addition to the habitat based assessment for threatened species.

Overall, the development site is considered to have low constraints with the highest biodiversity values associated with PCT 510_woodland. This PCT, despite being degraded, represents a Threatened Ecological Community (TEC) and also has the potential to support several threatened species. EMM provided advice to UPC on areas which were of the highest priority for avoidance; ie those which had the largest patch size, highest density of trees remaining and the highest level of connectivity. This led to areas of PCT 510_woodland being avoided, particularly in the south-east of the southern array area and the north-east of the northern array area (refer to the insets provided in Figure 6.1). The alignment of the ETL between the southern and central array areas has also been refined to avoid potential impacts to PCT 510_woodland that were identified between the southern and central array areas.



KEY

- Main road
- Local road
- Vehicular track
- Waterbody
- Development site
- Site boundary presented in PEA

Plant community type

- PCT 510 woodland
- PCT 510 woodland avoidance

Key areas of avoidance

New England Solar Farm
Biodiversity development assessment
Figure 6.1

EMM
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Additional recommendations, including measures to mitigate residual impacts after all measures to avoid and minimise impacts have been considered, are provided in Table 6.1.

A site specific CEMP will be prepared prior to the commencement of any construction or clearing works to ensure that impacts are minimised. This should include the measures outlined in Table 6.1.

Table 6.1 Recommended mitigation measures for direct impacts and indirect impacts

Impact	Action and outcome	Responsibility	Timing
Direct impact/prescribed impact			
Clearing of native vegetation - PCT 510_woodland, PCT 510_planted and PCT 1174_woodland.	Avoid and minimise clearing impacts to these PCTs where possible. Clearing limits will be clearly marked to prevent unnecessary clearing beyond the extent of the development site. Tree clearing and disturbance will be limited to the development site. Appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' should be installed. Identify the location of any 'No Go Zones' in site inductions.	Construction site manager.	Prior to and during vegetation clearing.
Clearing of hollow bearing trees/habitat trees, resulting in fauna injury and mortality	Limit removal of trees (including dead trees) to that required within the development site in support of the installation of project infrastructure. A clearing procedure will be implemented during the clearing of the development site, as follows: • preclearance surveys will be completed to determine if any nesting birds are present; and • a suitably trained fauna handler will be present during hollow-bearing tree (including dead hollow-bearing trees) clearing to rescue and relocate displaced fauna if found on-site. Installation of appropriate exclusion fencing around trees and woodland to be retained within the development site whilst construction is occurring. The radius of tree protection zone (TPZ) is calculated for each tree by multiplying its diameter at breast height (DBH) by 12 in accordance with the Standards Australia Committee (2009). Appropriate education should be provided to site personnel in site inductions regarding the purpose of exclusion fencing or no go zones.	Construction site manager and suitably trained fauna handler.	Prior to and during tree clearing.
Vehicle collision with fauna	Speed limits within the development site will be limited to 40 km/hr and stated in the CEMP.	Construction site manager.	During construction and operation.

Table 6.1 Recommended mitigation measures for direct impacts and indirect impacts

Impact	Action and outcome	Responsibility	Timing
Direct impact/prescribed impact			
Disturbance of river/creek beds and banks during crossing construction (including construction of creek crossings).	Source controls, such as mulching, matting and sediment fences, will be utilised where appropriate. An erosion and sediment control (ESC) plan will be prepared in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) prior to commencement of construction. Disturbed areas will be stabilised and rehabilitated as soon as possible to reduce the exposure period. A specific creek crossing sub-plan will be included as part of the CEMP. All creek crossings are to comply with the *Policy and Guidelines for Fish Friendly Waterway Crossings* (DPI undated).	Construction site manager.	Design stage, during vegetation clearing and construction.
Indirect impact			
Transfer of weeds and pathogen to and from site.	Appropriate wash down facilities will be available to clean vehicles and equipment prior to arrival and when leaving site. In particular, ensure soils and seed material isn't transferred in accordance with the measures outlined in the CEMP.	Construction site manager.	Design stage, during vegetation clearing and construction.
Artificial lighting impacting fauna behaviour	Lighting to comply with Australian standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting.	Construction site manager.	During construction and operation.

6.3 Serious and irreversible impacts

White Box Yellow Box Blakely's Red Gum Woodland is considered a potential entity to meet the serious and irreversible impacts (SII) principle (refer *Appendix 3 - Guidance to assist a decision-maker to determine a serious and irreversible impact* of the BAM (OEH 2017a)).

Two zones of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion; PCT510_woodland and PCT510_pasture; meets the TEC listing of White Box Yellow Box Blakely's Red Gum Woodland.

PCT 510_pasture and PCT 510_woodland have a vegetation integrity score of 11.7 and 11, respectively, which are both below the threshold condition regarding SII and therefore need no further consideration.

6.4 Identification of impacts requiring offsets

This section provides an assessment of the impacts requiring offsetting in accordance with Section 10 of the BAM (OEH 2017a).

6.4.1 Impacts on native vegetation

Impacts to native vegetation requiring offsets include:

- direct impacts on 15.26 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted;
- direct impacts on 5.67 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland;
- direct impacts to 86 paddock trees assigned to PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion; and
- direct impacts to 6 paddock trees assigned to PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion (noting this is exclusive of one paddock tree which did not require offsets as it was assigned to Class 1 – refer to Table 4.11).

A summary of the ecosystem credits required for all vegetation zones and paddock trees, including changes in vegetation integrity score, is provided in Table 6.2. A total of 393 ecosystem credits are required to offset the residual impacts of the project. A credit report for area offsets and paddock trees is provided in Appendix D.

Offsets will be provided in accordance with the biodiversity offset framework outlined in Section 6.5.

Table 6.2 Summary of ecosystem credits required for all vegetation zones for the development site

PCT	Vegetation zone name	Area (ha)	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	510_planted	15.3	28.8	0.0	-28.8	252
1174-Silvertop Stringybark open forest of the New England Tableland Bioregion	1174_woodland	5.7	24	0.0	-24	68
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Paddock trees	-	-	-	-	68
1174-Silvertop Stringybark open forest of the New England Tableland Bioregion	Paddock trees	-	-	-	-	5

6.4.2 Impacts on threatened species

No species credit species were recorded within the development site or are anticipated to occur; therefore no species credits are required.

6.4.3 Impacts not requiring offsets

A number of vegetation zones were found to be in degraded condition. In line with the requirements of Section 10.3.2.2 of the BAM (OEH 2017a), impacts to the vegetation zones in Table 6.3 do not require offsets.

Table 6.3 Summary of impacts not requiring offsets – native vegetation

PCT	Zone	Area (ha)	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	510_pasture	1,302.5	11.7	0.0	-11.5	0
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	510_woodland	38.2	11	0.0	-11	0

Areas not requiring assessment in accordance with Section 10.4 of the BAM (OEH 2017a) include:

- existing roads;
- exotic vegetation,
- cleared and highly disturbed land, particularly associated with cropping; and
- watercourses/dams.

6.5 Biodiversity offset framework

The following section outlines several methods which UPC can use to compensate the projects impacts. The development of the overall offset strategy for the project is yet to be achieved, though UPC are committed to satisfying all offset requirements before any impacts for the project occur. UPC may use a single method or a combination of the four methods outlined below.

Preparation of this strategy has considered the following steps:

1. Identifying if suitable credits are available on the market to meet offset requirements.
2. Finding potential on-site or off-site offset sites with the biodiversity values required to compensate for the project's impacts.
3. Payment into the Biodiversity Conservation Trust.

6.5.1 Purchasing credits

Providing suitable credits are available, UPC may be able to purchase existing credits available on the market and retire these to satisfy offset obligations. Initially, like-for-like options should be fully investigated before any variation criteria is explored under clause 6.2 of the BC Regulation. Like-for-like attributes for each of the PCTs are outlined below.

Both PCT 510 and PCT 1174 require hollows to be present in the offset vegetation. Additional criteria include:

- the community needs to be within any IBRA subregion that is within 100 km of the outer edge of the development site; or in one of the following IBRA subregions; Armidale Plateau, Bundarra Downs, Coffs Coast and Escarpment, Eastern Nandewars, Ebor Basalts, Glenn Innes-Guyra Basalts, Macleay Gorges, Moredun Volcanics, Round Mountain, Walcha Plateau, Wongwibinda Plateau and Yarrowyck-Kentucky Downs; and

- PCT 510 can be offset with PCTs which meet the White Box Yellow Box Blakely's Red Gum Woodland TEC (including PCT's 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695 and 1698); and

- PCT 1174 can be offset with PCTs in the New England Grassy Woodland class (including PCT's 488, 489, 496, 501, 510, 533, 539, 567, 571, 704, 734, 853, 1118, 1171, 1174, 1331, 1332 and 1512).

6.5.2 Payment into the Biodiversity Conservation Trust

Payment into the Biodiversity Conservation Trust (BCT) can be achieved once conditions of consent are provided, which specify the number and type of credits to be retired. This option is low risk and removes any further obligation for UPC, once payment is made. It also removes any risk of the project not being able to meet offset obligations, other than any financial constraints. An administration fee and a risk loading are applied to credits purchased through the BCT, which may result in higher per credit costs.

The BAM calculator provides a current credit price for the ecosystem credits required. Two credit types are required for the project (PCT 510 and PCT 1174), both of which generate the same price per credit of $2409.58 (based on pricing obtained in October 2018). A total of 393 credits are required to offset the project, therefore the total payment required is $946,964.94. Note that these credit prices are market based and may fluctuate, typically updated on a quarterly basis.

6.5.3 Establishment of a biodiversity stewardship site

UPC may wish to establish a biodiversity stewardship agreement by acquiring suitable land or using any existing land holdings. This involves permanent conservation and management of the biodiversity values on the land. This is likely to be the most onerous option for UPC and the longest to implement; however, it may result in the least expensive method of meeting offset obligations.

7 Assessment of biodiversity legislation

7.1 Environment Protection and Biodiversity Conservation Act 1999

An assessment of the impacts of the project on MNES within the development site was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required. Matters of MNES relevant to the development site are summarised in Table 7.1.

A likelihood of occurrence assessment considering each entity individually is provided in Appendix E. Five assessments of significance have been completed for three threatened species; Regent Honeyeater, Painted Honeyeater and Swift Parrot and two migratory species; White-throated Needletail and Fork-tailed Swift (Appendix F). All assessments concluded that no significant impacts on threatened entities are predicted to result from the project. Referral of the project to the Commonwealth Minister for the Environment for assessment is not required.

Table 7.1 Assessment of the project against the EPBC Act

MNES	Project specifics	Potential for significant impact
Threatened species	Eleven flora species and 14 fauna species have been recorded or are predicted to occur within the locality. The majority of these species are considered unlikely to occur within the development site owing to the high levels of disturbance present. Sup-optimal foraging habitat is considered present for three threatened species; Regent Honeyeater, Painted Honeyeater and Swift Parrot; however, impacts were concluded not significant.	Significant impact unlikely to result from the project.
Threatened ecological communities	No threatened ecological communities, as listed under the EPBC Act, were recorded within the development site. PCT 510_woodland has the potential to meet the critically endangered aligned White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, Critically Endangered Ecological Community (CEEC). However, the community within the development site is considered too degraded and is no longer a viable part of the ecological community, therefore not meeting the listing.	Significant impact unlikely to result from the project.
Migratory species	Thirteen migratory species have been recorded or are predicted to occur within the locality. The development site does not provide important habitat for an ecologically significant proportion of any of these species.	Significant impact unlikely to result from the project.
Wetlands of international importance	The development site does not flow directly into a Ramsar site and the project is not likely to result in a significant impact. The nearest Ramsar wetland is the Gwydir wetlands, approximately 224 km, north-west of the development site.	Significant impact unlikely to result from the project.

7.2 Environmental Planning and Assessment Act 1979

7.2.1 SEPP No 44

One Koala feed tree species, as defined within Schedule 1 of the SEPP, was identified within the development site. Ribbon Gum comprises considerably less than 15% of the tree species within the development site, which has been verified during vegetation mapping, BAM plots and paddock tree assessments. Of the 275 trees identified during paddock tree assessments, 10 were Ribbon Gum or 3.6%.

Therefore, the vegetation within the development site is not considered potential Koala habitat as defined under SEPP 44. Furthermore, patch sizes of woodland within the development site are very small and poorly connected. Scat surveys (SAT tests) in the most optimal areas did not reveal any evidence of Koala and the species is not anticipated to occur within the development site.

8 Conclusion

This assessment has been completed in accordance with the BAM (OEH 2017a) on behalf of UPC.

The development site is situated in a heavily cleared agricultural landscape dominated by cropped areas, exotic pasture and native pasture. Woodland areas within the development site are fragmented and highly disturbed.

Measures to avoid and minimise impacts to vegetation were considered during the initial design stages of the project, resulting in avoidance of significant biodiversity values and minimisation of impacts on other areas of native vegetation. Particular efforts were made to avoid those woodland areas with larger patch size and greater connectivity to other areas of habitat outside of the development site.

Two native vegetation zones (ie PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_woodland and PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_pasture) were below the vegetation integrity score threshold and offsets are not required for impacts to this vegetation.

Impacts to native vegetation requiring offsets include:

- 15.26 ha of PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted, generating 252 credits;
- 5.67 ha of PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland, generating 68 credits; and
- direct impacts to 92 paddock trees, generating 73 credits, including:
    - 86 paddock trees assigned to PCT 510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion_planted; and
    - 6 paddock trees assigned to PCT 1174-Silvertop Stringybark open forest of the New England Tableland Bioregion_woodland.

The total number of ecosystem credits required to offset the project is 393.

Based on both habitat assessments and field surveys, the development site is not likely to be important habitat for either threatened flora or fauna species and no species credits would be required to offset the project.

One TEC and candidate for SII, White Box Yellow Box Blakely’s Red Gum Woodland was recorded within the development site; however, the vegetation integrity score for this community was below threshold, hence the vegetation zone does not meet the criteria for SII.

An assessment of the impacts of the project on MNES within the development site was prepared to determine whether referral of the project to the Commonwealth Minister for the Environment is required. The assessment concluded that no significant impacts on threatened entities are predicted to result from the project. Referral of the project to the Commonwealth Minister for the Environment for assessment is not required.

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Appendix A

Vegetation integrity assessment - datasheets

BAM Site – Field Survey Form

Plot ID:	**1**	**Date:**	05/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	359211	**Plot dimensions:**	20m x 50m		**Midline bearing:**	180
Datum:	GDA94	**Northing:**	6599322	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Planted
Vegetation Class:			New England Grassy Woodlands		**EEC:**	No	**Confidence:**	High

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:**	3
	Shrubs:	2
	Grasses etc.:	0
	Forbs:	0
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	40
	Shrubs:	2.3
	Grasses etc.:	0
	Forbs:	0
	Ferns:	0
	Other:	0
High Threat Weed cover:		6

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	3	0	0
20 – 29 cm:	10	0	0
10 – 19 cm:	7	0	0
5 – 9 cm:	1	0	0
< 5 cm:	9	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	15	65	20	45	95
Average of the 5 subplots:	48				

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		**Lf Element**		**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Smooth	**Soil Colour**	Light brown	**Soil Depth**	Moderate
Slope	Slight	**Aspect**	NW	**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe		
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:	Severe	greater than 10yo	
Grazing (identify native/stock):	Moderate	3 to 10yo	
Fire damage:	Light	less than 3yo	
Storm damage:	Light		
Weediness:	Severe	greater than 10yo	
Other:	Moderate	greater than 10yo	Planted

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

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	05/03/18	Plot ID:	1	Recorders:	ED & ACM

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
	Avena fatua	E	0.1	5		
Shrub (SG)	*Callistemon pungens*	N	2	4		
	Dactylis glomerata	E	35	1000		
Tree (TG)	*Eucalyptus pauciflora*	N	20	10		
Tree (TG)	*Eucalyptus stellulata*	N	15	6		
Tree (TG)	*Eucalyptus camphora subsp. humeana*	N	5	4		
Shrub (SG)	*Leptospermum polygalifolium*	N	0.3	1		
	Paspalum dilatatum	HTE	6	40		
	Phalaris minor	E	5	100		
	Phalaris sp.	E	15	300		

BAM Site – Field Survey Form

Plot ID:	**2**	**Date:**	05/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	359058	**Plot dimensions:**	20m x 50m		**Midline bearing:**	90
Datum:	GDA94	**Northing:**	6598483	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Pasture
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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.:	5
	Forbs:	0
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	0
	Shrubs:	0
	Grasses etc.:	11.2
	Forbs:	0
	Ferns:	0
	Other:	0
High Threat Weed cover:		0.1

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	3	5	2	3	3
Average of the 5 subplots:	3.2				

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

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

Morphological Type		**Lf Element**	Agricultural land, flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Silty-clayed soil	**Soil Surface Texture**	Fine	**Soil Colour**	Light brown	**Soil Depth**	Moderate
Slope	Slight	**Aspect**	E	**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):	Severe	3 to 10yo	
Soil erosion:	Moderate	3 to 10yo	
Firewood / CWD removal:			
Grazing (identify native/stock):	Severe	greater than 10yo	
Fire damage:			
Storm damage:			
Weediness:	Severe	greater than 10yo	
Other:			

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

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	05/03/18	Plot ID:	2	Recorders:	ED & ACM

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
	Anthoxanthum odoratum	E	10	500		
Grass & grasslike (GG)	*Aristida ramosa*	N	0.1	8		
	Avena fatua	E	0.1	10		
Grass & grasslike (GG)	*Bothriochloa decipiens*	N	5	140		
	Bromus catharticus	E	40	1000		
	Cirsium vulgare	E	0.2	15		
	Conzya sp.	E	0.1	12		
Grass & grasslike (GG)	*Eragrostis leptostachya*	N	1	40		
	Gamochaeta americana	E	0.1	30		
	Hypocharis radicata	E	0.1	15		
Grass & grasslike (GG)	*Juncus australis*	N	0.1	13		
	Paspalum dilatatum	HTE	0.1	30		
	Phalaris sp.	E	25	500		
	Plantago lanceolata	E	0.1	10		
Grass & grasslike (GG)	*Sporobolus creber*	N	5	200		
	Trifolium repens	E	0.1	5		
	Vulpia bromoides	E	1	60		

BAM Site – Field Survey Form

Plot ID:	**3**	**Date:**	06/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	364014	**Plot dimensions:**	20m x 50m		**Midline bearing:**	313
Datum:	GDA94	**Northing:**	6613764	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Woodland
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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:**	1
	Shrubs:	0
	Grasses etc.:	0
	Forbs:	0
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	6
	Shrubs:	0
	Grasses etc.:	0
	Forbs:	0
	Ferns:	0
	Other:	0
High Threat Weed cover:		0

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	2	0	0
20 – 29 cm:	2	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	12		

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 (%)**				
Subplot score (% in each):	1	0	0	1	2
Average of the 5 subplots:	0.8				

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		**Lf Element**	Valley flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Brown	**Soil Depth**	Moderate
Slope	Slight	**Aspect**	NW	**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	Severe	greater than 10yo	
Fire damage:			
Storm damage:			
Weediness:	Severe		
Other:			

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

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	06/03/18	Plot ID:	3	Recorders:	ED & ACM

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
Tree (TG)	*Angophora floribunda*	N	6	4		
	Brassica nigra	E	10	300		
	Bromus catharticus	E	15	500		
	Chenopodium album	E	5	200		
	Cirsium vulgare	E	0.1	2		
	Malva neglecta	E	2	200		
	Phalaris minor	E	20	1000		
	Polygonum aviculare	E	0.5	100		
	Verbena bonariensis	E	0.1	3		

BAM Site – Field Survey Form

Plot ID:	**5**	**Date:**	06/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	366595	**Plot dimensions:**	20m x 50m		**Midline bearing:**	157
Datum:	GDA94	**Northing:**	6613278	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Pasture
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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.:	3
	Forbs:	4
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	0
	Shrubs:	0
	Grasses etc.:	75
	Forbs:	5.3
	Ferns:	0
	Other:	0
High Threat Weed cover:		2.1

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	3	7	3	5	5
Average of the 5 subplots:	4.6				

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		**Lf Element**	Valley flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Silty clay	**Soil Surface Texture**	Fine	**Soil Colour**	Brown	**Soil Depth**	Moderate
Slope	Slight	**Aspect**	SE	**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):	Light	less than 3yo	
Soil erosion:	Light	less than 3yo	
Firewood / CWD removal:			
Grazing (identify native/stock):	Moderate	greater than 10yo	
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)

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	06/03/18	Plot ID:	5	Recorders:	ED & ACM

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
Forb (FG)	*Acaena novae-zelandiae*	N	0.1	14		
	Acetosella vulgaris	E	0.1	2		
	Chenopodium album	E	5	40		
Forb (FG)	*Cymbonotus lawsonianus*	N	0.1	2		
Grass & grasslike (GG)	*Cynodon dactylon*	N	5	300		
	Dactylis glomerata	E	2	50		
	Eleusine tristachya	E	5	200		
Grass & grasslike (GG)	*Eragrostis leptostachya*	N	30	1000		
Forb (FG)	*Hypericum gramineum*	N	5	300		
	Paspalum dilatatum	HTE	2	50		
	Polygonum aviculare	E	0.1	20		
	Rumex brownii (FG)	E	0.1	1		
Grass & grasslike (GG)	*Sporobolus creber*	N	40	1000		

BAM Site – Field Survey Form

Plot ID:	**10**	**Date:**	07/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm			**Recorders:**	ED & ACM
Zone:	56	**Easting:**	360339	**Plot dimensions:**	20m x 50m			**Midline bearing:**	239
Datum:	GDA94	**Northing:**	6601177	**IBRA region:**	New England Tablelands			**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			**Confidence:**	High	**Condition Class**	Planted
Vegetation Class:			New England Grassy Woodlands			**EEC:**	No	**Confidence:**	High

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:**	5
	Shrubs:	1
	Grasses etc.:	1
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	32
	Shrubs:	3
	Grasses etc.:	0.1
	Forbs:	0.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		1

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	3	0	0
30 – 49 cm:	7	0	0
20 – 29 cm:	5	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	2	0	0
< 5 cm:	7	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	15	90	60	5	10
Average of the 5 subplots:	36				

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		**Lf Element**	Plain	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Light brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**	SW	**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):			
Fire damage:			
Storm damage:			
Weediness:			
Other:	Severe	greater than 10yo	Planted Wind row

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	07/03/18	Plot ID:	10	Recorders:	ED & ACM

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
Shrub (SG)	*Acacia rubida*	N	3	5		
	Cirsium vulgare	E	0.1	3		
	Conzya sp.	E	0.1	18		
Grass & grasslike (GG)	*Cynodon dactylon*	N	0.1	10		
	Dactylis glomerata	E	40	1000		
Forb (FG)	*Dichondra repens*	N	0.1	4		
Tree (TG)	*Eucalyptus acaciiformis*	N	2	3		
Tree (TG)	*Eucalyptus crenulata*	N	2	3		
Tree (TG)	*Eucalyptus pauciflora*	N	10	5		
Tree (TG)	*Eucalyptus stellulata*	N	8	2		
Tree (TG)	*Eucalyptus camphora subsp. humeana*	N	10	7		
	Hypocharis radicata	E	0.1	15		
Forb (FG)	*Oxalis perennans*	N	0.1	5		
	Paronychia brasiliana	E	0.1	2		
	Paspalum dilatatum	HTE	1	35		
	Phalaris minor	E	30	1000		
	Plantago lanceolata	E	1	75		

BAM Site – Field Survey Form

Plot ID:	**12**	**Date:**	07/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	365222	**Plot dimensions:**	20m x 50m		**Midline bearing:**	74
Datum:	GDA94	**Northing:**	6612282	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			1174: Silvertop Stringybark open forest of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Woodland
Vegetation Class:			New England Grassy Woodlands		**EEC:**	No	**Confidence:**	High

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:**	1
	Shrubs:	0
	Grasses etc.:	1
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	12
	Shrubs:	0
	Grasses etc.:	40
	Forbs:	0.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		0

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	2	0	0
30 – 49 cm:	3	0	0
20 – 29 cm:	3	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	4		

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 (%)**				
Subplot score (% in each):	15	7	10	7	5
Average of the 5 subplots:	8.8				

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		**Lf Element**	Hillslope	**Lf Pattern**	Hills	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Dark brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
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)

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	07/03/18	Plot ID:	12	Recorders:	ED & ACM

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
	Cirsium vulgare	E	0.4	11		
Grass & grasslike (GG)	*Cynodon dactylon*	N	40	1000		
	Dysphania pumilio	E	0.1	7		
	Eleusine tristachya	E	20	400		
Tree (TG)	*Eucalyptus laevopinea*	N	12	4		
Forb (FG)	*Geranium solanderi*	N	0.1	6		
Forb (FG)	*Oxalis perennans*	N	0.1	18		
	Paronychia brasiliana	E	0.1	1		
	Sida rhombifolia	E	0.1	2		

BAM Site – Field Survey Form

Plot ID:	**13**	**Date:**	08/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	365587	**Plot dimensions:**	20m x 50m		**Midline bearing:**	182
Datum:	GDA94	**Northing:**	6612584	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Planted
Vegetation Class:			New England Grassy Woodlands		**EEC:**	No	**Confidence:**	High

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:**	5
	Shrubs:	1
	Grasses etc.:	5
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	28
	Shrubs:	1
	Grasses etc.:	40.6
	Forbs:	0.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		0

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	1	0	0
20 – 29 cm:	27	0	0
10 – 19 cm:	4	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	60	20	20	40	25
Average of the 5 subplots:	33				

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		**Lf Element**	Valley flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Light brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	Native veg replaced
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):			
Fire damage:			
Storm damage:			
Weediness:			
Other:	Severe	greater than 10yo	Planted window row

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

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	08/03/18	Plot ID:	13	Recorders:	ED & ACM

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
Tree (TG)	*Angophora floribunda*	N	2	1		
Shrub (SG)	*Callistemon pungens*	N	1	1		
Grass & grasslike (GG)	*Cynodon dactylon*	N	15	200		
	Ehrharta erecta	E	5	150		
Grass & grasslike (GG)	*Eragrostis leptostachya*	N	5	100		
Tree (TG)	*Eucalyptus caliginosa*	N	10	6		
Tree (TG)	*Eucalyptus stellulata*	N	6	3		
Tree (TG)	*Eucalyptus viminalis*	N	5	2		
Tree (TG)	*Eucalyptus radiata subsp. sejuncta*	N	5	2		
Forb (FG)	*Euchiton involucratus*	N	0.1	15		
Grass & grasslike (GG)	*Juncus australis*	N	0.1	30		
Grass & grasslike (GG)	*Microlaena stipoides*	N	20	600		
	Paspalum dilatatum	E	10	250		
	Rumex brownii (FG)	E	0.1	4		
Grass & grasslike (GG)	*Sporobolus creber*	N	0.5	100		

BAM Site – Field Survey Form

Plot ID:	**14**	**Date:**	08/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	365820	**Plot dimensions:**	20m x 50m		**Midline bearing:**	341
Datum:	GDA94	**Northing:**	6612256	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Woodland
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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:**	1
	Shrubs:	0
	Grasses etc.:	4
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	12
	Shrubs:	0
	Grasses etc.:	45
	Forbs:	0.3
	Ferns:	0
	Other:	0
High Threat Weed cover:		0

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	1	0	0
50 – 79 cm:	1	0	0
30 – 49 cm:	3	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	2		

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 (%)**				
Subplot score (% in each):	5	5	7	3	3
Average of the 5 subplots:	4.6				

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		**Lf Element**	Valley flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Light brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	Native veg replaced
Cultivation (inc. pasture):	Moderate	3 to 10yo	
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)

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	08/03/18	Plot ID:	14	Recorders:	ED & ACM

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
Tree (TG)	*Angophora floribunda*	N	12	3		
Forb (FG)	*Chrysocephalum apiculatum*	N	0.1	8		
	Cirsium vulgare	E	0.2	10		
	Ehrharta erecta	E	12	3		
	Eleusine tristachya	E	20	1000		
Grass & grasslike (GG)	*Eragrostis leptostachya*	N	20	800		
	Eragrostis pilosa	E	10	400		
Forb (FG)	*Geranium solanderi*	N	0.1	15		
	Hypocharis radicata	E	0.1	7		
Grass & grasslike (GG)	*Microlaena stipoides*	N	5	200		
	Paronychia brasiliana	E	0.1	4		
	Rumex brownii (FG)	E	0.1	5		
Grass & grasslike (GG)	*Rytidosperma carphoides*	N	10	400		
Grass & grasslike (GG)	*Sporobolus creber*	N	10	300		
	Vulpia bromoides	E	15	500		

BAM Site – Field Survey Form

Plot ID:	**15**	**Date:**	08/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm			**Recorders:**	ED & ACM
Zone:	56	**Easting:**	365821	**Plot dimensions:**	20m x 50m			**Midline bearing:**	70
Datum:	GDA94	**Northing:**	6611446	**IBRA region:**	New England Tablelands			**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			**Confidence:**	High	**Condition Class**	Pasture
Vegetation Class:			New England Grassy Woodlands			**EEC:**	Yes	**Confidence:**	High

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:	2
	Grasses etc.:	4
	Forbs:	4
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	0
	Shrubs:	0.3
	Grasses etc.:	81.1
	Forbs:	5.4
	Ferns:	0
	Other:	0
High Threat Weed cover:		1

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	1	1	0	0	0
Average of the 5 subplots:	0.4				

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		**Lf Element**	Valley flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	roadside
Cultivation (inc. pasture):			
Soil erosion:	Moderate	greater than 10yo	roadside
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)

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	08/03/18	Plot ID:	15	Recorders:	ED & ACM

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
Forb (FG)	*Acaena novae-zelandiae*	N	5	400		
Grass & grasslike (GG)	*Aristida ramosa*	N	0.1	30		
Forb (FG)	*Brachyscome nova-anglica*	N	0.2	60		
Forb (FG)	*Chrysocephalum apiculatum*	N	0.1	10		
	Daucus carota	E	0.1	50		
	Dysphania pumilio	E	0.1	30		
Grass & grasslike (GG)	*Eragrostis leptostachya*	N	1	80		
Forb (FG)	*Euchiton involucratus*	N	0.1	20		
	Euphobia prostrata	E	0.1	12		
	Paronychia brasiliana	E	0.1	8		
	Paspalum dilatatum	HTE	1	45		
Shrub (SG)	*Pimelea linifolia*	N	0.2	14		
	Plantago lanceolata	E	5	200		
Shrub (SG)	*Pultenaea microphylla*	N	0.1	5		
	Rosa rubiginosa	E	0.1	1		
Grass & grasslike (GG)	*Sporobolus creber*	N	15	500		
Grass & grasslike (GG)	*Themeda australis*	N	65	1000		

BAM Site – Field Survey Form

Plot ID:	**17**	**Date:**	08/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	368161	**Plot dimensions:**	20m x 50m		**Midline bearing:**	147
Datum:	GDA94	**Northing:**	6612109	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Pasture
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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:	1
	Grasses etc.:	6
	Forbs:	4
	Ferns:	0
	Other:	1
Sum of Cover of native vascular plants by growth form group	**Trees:**	0
	Shrubs:	0.1
	Grasses etc.:	55.7
	Forbs:	0.4
	Ferns:	0
	Other:	0.1
High Threat Weed cover:		0

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	2	5	10	3	4
Average of the 5 subplots:	4.8				

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		**Lf Element**	Hill slope	**Lf Pattern**	Low hills	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Brown	**Soil Depth**	Shallow/moderate
Slope	Slight	**Aspect**	SE	**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	roadside
Cultivation (inc. pasture):			
Soil erosion:	Moderate	greater than 10yo	roadside
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)*

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	08/03/18	Plot ID:	17	Recorders:	ED & ACM

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
Grass & grasslike (GG)	*Aristida ramosa*	N	15	400		
	Carthamus lanatus	E	0.1	10		
Forb (FG)	*Chrysocephalum apiculatum*	N	0.1	7		
	Cirsium vulgare	E	0.1	10		
	Eleusine tristachya	E	10	200		
Grass & grasslike (GG)	*Eragrostis leptostachya*	E	20	1000		
	Eragrostis pilosa	E	15	800		
Forb (FG)	*Euchiton involucratus*	N	0.1	30		
Grass & grasslike (GG)	*Fimbristylis dichotoma*	E	0.1	10		
Other (OG)	*Glycine tabacina*	N	0.1	10		
	Hypocharis radicata	E	0.4	100		
Grass & grasslike (GG)	*Lomandra multiflora*	N	0.1	30		
Forb (FG)	*Oxalis perennans*	N	0.1	20		
	Paronychia brasiliana	E	0.1	15		
	Paspalum dilatatum	E	5	100		
Shrub (SG)	*Pimelea linifolia*	N	0.1	1		
	Rumex brownii (FG)	E	0.1	5		
Grass & grasslike (GG)	*Sporobolus creber*	N	20	500		
Grass & grasslike (GG)	*Themeda australis*	N	0.5	50		

BAM Site – Field Survey Form

Plot ID:	**18**	**Date:**	08/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	362603	**Plot dimensions:**	20m x 50m		**Midline bearing:**	331
Datum:	GDA94	**Northing:**	6608757	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			1174: Silvertop Stringybark open forest of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Woodland
Vegetation Class:			New England Grassy Woodlands		**EEC:**	No	**Confidence:**	High

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

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees:	1
	Shrubs:	0
	Grasses etc.:	4
	Forbs:	6
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	25
	Shrubs:	0
	Grasses etc.:	30.1
	Forbs:	1
	Ferns:	0
	Other:	0
High Threat Weed cover:		10

BAM Attribute (1000 m^2 plot) DBH			
DBH	Stem count (euc)	Stem count (non-euc)	Stems with Hollows
80 + cm:	2	0	0
50 – 79 cm:	1	0	0
30 – 49 cm:	4	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	1	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	22		

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 (%)				
Subplot score (% in each):	3	3	5	7	65
Average of the 5 subplots:	16.6				

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		**Lf Element**		**Lf Pattern**	Low hills	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Brown	**Soil Depth**	Moderate
Slope	Slight	**Aspect**	NW	**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging):	Severe	greater than 10yo	roadside
Cultivation (inc. pasture):	Moderate	3 to 10yo	
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)

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	08/03/18	Plot ID:	18	Recorders:	ED & ACM

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
	Bromus catharticus	E	10	400		
	Cirsium vulgare	E	0.5	30		
Forb (FG)	*Cymbonotus lawsonianus*	N	0.1	5		
Grass & grasslike (GG)	*Cynodon dactylon*	N	10	400		
Forb (FG)	*Dichondra repens*	N	0.1	5		
	Ehrharta erecta	HTE	10	300		
	Eleusine tristachya	E	15	200		
Tree (TG)	*Eucalyptus laevopinea*	N	25	4		
Forb (FG)	*Geranium solanderi*	N	0.1	8		
	Hypocharis radicata	E	0.1	12		
Grass & grasslike (GG)	*Juncus australis*	N	0.1	7		
Grass & grasslike (GG)	*Microlaena stipoides*	N	15	600		
Forb (FG)	*Oxalis perennans*	N	0.1	10		
	Polygonum aviculare	E	0.1	3		
	Rumex brownii (FG)	E	0.1	5		
Grass & grasslike (GG)	*Sporobolus creber*	N	5	300		
Forb (FG)	*Urtica incisa*	N	0.5	25		

BAM Site – Field Survey Form

Plot ID:	**19**	**Date:**	08/03/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & ACM
Zone:	56	**Easting:**	362565	**Plot dimensions:**	20m x 50m		**Midline bearing:**	2
Datum:	GDA94	**Northing:**	6607571	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Planted
Vegetation Class:			New England Grassy Woodlands		**EEC:**	No	**Confidence:**	High

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:**	6
	Shrubs:	4
	Grasses etc.:	6
	Forbs:	5
	Ferns:	1
	Other:	1
Sum of Cover of native vascular plants by growth form group	**Trees:**	32
	Shrubs:	17
	Grasses etc.:	30.1
	Forbs:	0.6
	Ferns:	0.1
	Other:	0.1
High Threat Weed cover:		2

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	2	0	0
20 – 29 cm:	10	0	0
10 – 19 cm:	13	0	0
5 – 9 cm:	0	0	0
< 5 cm:	3	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	70	20	15	25	40
Average of the 5 subplots:	34				

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		**Lf Element**	Valley flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology	Clay	**Soil Surface Texture**	Fine	**Soil Colour**	Light orange/brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):			
Fire damage:			
Storm damage:			
Weediness:			
Other:	Severe	greater than 10yo	Planted window row

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

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	08/03/18	Plot ID:	19	Recorders:	ED & ACM

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
	Acetosella vulgaris	HTE	2	80		
Forb (FG)	*Asperula conferta*	N	0.1	10		
Shrub (SG)	*Callistemon pungens*	N	3	4		
Shrub (SG)	*Callistemon sieberi*	N	4	6		
	Centaurium erythraea	E	0.1	10		
Fern (EG)	*Cheilanthes sieberi*	N	0.1	2		
Grass & grasslike (GG)	*Chloris truncata*	N	5	50		
Other (OG)	*Convolvulus angustissimus*	N	0.1	4		
	Conzya sp.	E	0.2	40		
	Dactylis glomerata	E	15	1000		
	Eleusine tristachya	E	2	200		
Grass & grasslike (GG)	*Eragrostis leptostachya*	N	10	200		
Tree (TG)	*Eucalyptus acaciiformis*	N	10	7		
Tree (TG)	*Eucalyptus caliginosa*	N	6	5		
Tree (TG)	*Eucalyptus pauciflora*	N	5	4		
Tree (TG)	*Eucalyptus stellulata*	N	3	3		
Tree (TG)	*Eucalyptus viminalis*	N	1	1		
Tree (TG)	*Eucalyptus camphora subsp. humeana*	N	7	6		
Forb (FG)	*Euchiton involucratus*	N	0.1	12		
Forb (FG)	*Geranium solanderi*	N	0.1	12		
Shrub (SG)	*Leptospermum polyanthum*	N	6	10		
Shrub (SG)	*Leptospermum polygalifolium*	N	4	6		
Grass & grasslike (GG)	*Lomandra multiflora*	N	0.1	1		
Grass & grasslike (GG)	*Microlaena stipoides*	N	5	300		
Forb (FG)	*Oxalis perennans*	N	0.2	40		
	Phalaris minor	E	10	200		
	Rumex brownii (FG)	E	0.1	10		
Grass & grasslike (GG)	*Rytidosperma carphoides*	N	5	100		
Grass & grasslike (GG)	*Rytidosperma racemosum var. racemosum*	N	5	150		
	Solanum nigrum	E	0.1	3		

BAM Site – Field Survey Form

Plot ID:	**20**	**Date:**	10/01/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & DR
Zone:	56	**Easting:**	367129	**Plot dimensions:**	20m x 50m		**Midline bearing:**	91
Datum:	GDA94	**Northing:**	6610008	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Pasture
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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.:	11
	Forbs:	4
	Ferns:	0
	Other:	1
Sum of Cover of native vascular plants by growth form group	**Trees:**	0
	Shrubs:	0
	Grasses etc.:	89. 5
	Forbs:	0.6
	Ferns:	0
	Other:	0.1
High Threat Weed cover:		0.3

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	5	10	5	20	5
Average of the 5 subplots:	9				

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		**Lf Element**	Hillslope	**Lf Pattern**	Low hills	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine, grey loam	**Soil Colour**	Grey	**Soil Depth**	Moderate
Slope	Minor	**Aspect**		**Site Drainage**	Good	**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	felled trees, derived grassland
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	Moderate	greater than 10yo	Cow pats, sheep scat
Fire damage:			
Storm damage:			
Weediness:	Moderate	greater than 10yo	
Other:			

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	10/01/18	Plot ID:	20	Recorders:	ED & DR

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
Grass & grasslike (GG)	*Aristida ramosa*	N	2	30		
	Bothriochloa decipiens (GG)	N	10	300		
	Brizia minor	E	2	50		
	Carthamus lanatus	HTE	0.3	10		
Grass & grasslike (GG)	*Chloris truncata*	N	5	100		
Forb (FG)	*Daucus glochidiatus*	N	0.1	10		
	Eleusine tristachya	E	1	80		
Grass & grasslike (GG)	*Eragrostis leptostachya*	N	20	600		
Forb (FG)	*Euchiton involucratus*	N	0.1	10		
Grass & grasslike (GG)	*Fimbristylis dichotoma*	N	10	200		
Other (OG)	*Glycine tabacina*	N	0.1	4		
Grass & grasslike (GG)	*Juncus australis*	N	0.5	5		
Grass & grasslike (GG)	*Lomandra multiflora*	N	2	80		
Forb (FG)	*Oxalis perennans*	N	0.1	5		
Grass & grasslike (GG)	*Panicum effusum*	N	5	100		
	Paronychia brasiliana	E	0.1	20		
Forb (FG)	*Rumex brownii*	N	0.3	50		
Grass & grasslike (GG)	*Rytidosperma racemosum var. racemosum*	N	5	100		
Grass & grasslike (GG)	*Sporobolus creber*	N	25	1000		
Grass & grasslike (GG)	*Themeda australis*	N	5	50		

BAM Site – Field Survey Form

Plot ID:	**21**	**Date:**	10/01/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & DR
Zone:	56	**Easting:**	367774	**Plot dimensions:**	20m x 50m		**Midline bearing:**	240
Datum:	GDA94	**Northing:**	6610665	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Pasture
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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.:	4
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	0
	Shrubs:	0
	Grasses etc.:	77
	Forbs:	0.3
	Ferns:	0
	Other:	0
High Threat Weed cover:		0.5

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	25	5	5	15	5
Average of the 5 subplots:	11				

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		**Lf Element**	Hillslope	**Lf Pattern**	Low hills	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine, grey loam	**Soil Colour**	Grey	**Soil Depth**	Moderate
Slope	Slight	**Aspect**		**Site Drainage**	Good	**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	No tree cover
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	Severe	greater than 10yo	Cow pats, sheep scat
Fire damage:			
Storm damage:			
Weediness:	Moderate	greater than 10yo	
Other:			

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

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	10/01/18	Plot ID:	21	Recorders:	ED & DR

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
	Anthosachne scabra	E	5	300		
Grass & grasslike (GG)	*Austrostipa scabra*	N	10	400		
Grass & grasslike (GG)	*Bothriochloa decipiens*	N	25	1000		
	Bromus hordeaceus	E	2	100		
	Carthamus lanatus	HTE	0.5	5		
Grass & grasslike (GG)	*Chloris truncata*	N	2	200		
	Cirsium vulgare	E	0.1	4		
	Eleusine tristachya	E	1	100		
	Eragrostis pilosa	E	1	100		
Forb (FG)	*Euchiton involucratus*	N	0.1	10		
	Hypocharis radicata	E	0.1	20		
	Phalaris minor	E	1	100		
	Rumex brownii (FG)	E	0.1	2		
Grass & grasslike (GG)	*Rytidosperma racemosum var. racemosum*	N	40	1000		
	Vulpia bromoides	E	5	400		
Forb (FG)	*Wahlenbergia communis*	N	0.1	20		

BAM Site – Field Survey Form

Plot ID:	**23**	**Date:**	11/01/18	**Survey Name:**	J17300 - UPC NSW Solar Farm		**Recorders:**	ED & DR
Zone:	56	**Easting:**	360464	**Plot dimensions:**	20m x 50m		**Midline bearing:**	305
Datum:	GDA94	**Northing:**	6601572	**IBRA region:**	New England Tablelands		**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	Pasture
Vegetation Class:			New England Grassy Woodlands		**EEC:**	Yes	**Confidence:**	High

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.:	7
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	0
	Shrubs:	0
	Grasses etc.:	47.6
	Forbs:	0.5
	Ferns:	0
	Other:	0
High Threat Weed cover:		5

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	15	15	1	15	5
Average of the 5 subplots:	10.2				

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

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

Morphological Type		**Lf Element**	Hillslope	**Lf Pattern**	Low hills	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine loam	**Soil Colour**	Light brown	**Soil Depth**	Moderate
Slope	Minor	**Aspect**		**Site Drainage**	Good	**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	No original communitiy features
Cultivation (inc. pasture):	Severe	greater than 10yo	Improved pasture
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	Moderate	greater than 10yo	Cow pats
Fire damage:			
Storm damage:			
Weediness:	Moderate	greater than 10yo	
Other:			

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

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

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	11/01/18	Plot ID:	23	Recorders:	ED & DR

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
	Anthosachne scabra	E	10	500		
Grass & grasslike (GG)	*Austrostipa scabra*	N	10	400		
	Avena fatua	E	5	200		
Grass & grasslike (GG)	*Bothriochloa decipiens*	N	15	1000		
	Bromus hordeaceus	E	10	500		
Grass & grasslike (GG)	*Eragrostis alveiformis*	N	10	800		
	Eragrostis pilosa	E	10	1000		
Grass & grasslike (GG)	*Fimbristylis dichotoma*	N	0.5	30		
	Gamochaeta americana	E	0.2	80		
Forb (FG)	*Hypericum gramineum*	N	0.1	5		
Grass & grasslike (GG)	*Juncus australis*	N	0.1	10		
	Paspalum dilatatum	HTE	5	100		
	Rumex brownii (FG)	E	0.3	300		
Grass & grasslike (GG)	*Rytidosperma carphoides*	N	10	600		
Grass & grasslike (GG)	*Rytidosperma racemosum var. racemosum*	N	2	200		
Forb (FG)	*Tricoryne elatior*	N	0.1	5		
	Vulpia bromoides	E	5	300		

BAM Site – Field Survey Form

Plot ID:	**24**	**Date:**	25/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm	**Recorders:**	ED & CK
Zone:	56	**Easting:**	362977	**Plot dimensions:**	20m x 50m	**Midline bearing:**	200
Datum:	GDA94	**Northing:**	6601728	**IBRA region:**	New England Tablelands	**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:** High	**Condition Class**	pasture
Vegetation Class:			New England Grassy Woodlands		**EEC:** No	**Confidence:**	High

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

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	3
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	45
	Forbs:	12.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		0

BAM Attribute (1000 m^2 plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot score (% in each):	2	10	10	15	10
Average of the 5 subplots:	9.4				

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		**Lf Element**	Hillslope	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	Dark brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)*

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm						
		Date:	25/09/18	Plot ID:	24	Recorders:	ED & CK

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
	Anthosachne scabra	E	5	100		
	Bromus sp. 1	E	60	1000		
Grass & grasslike (GG)	*Chloris truncata*	N	15	200		
	Cirsium vulgare	E	0.5	5		
Forb (FG)	*Cotula australis*	N	5	100		
Forb (FG)	*Cymbonotus lawsonianus*	N	0.1	4		
Grass & grasslike (GG)	*Cynodon dactylon*	N	10	100		
	Dysphania pumilio	E	0.2	50		
	Eleusine tristachya	E	25	500		
	Euphobia prostrata	E	0.1	5		
	Festuca pratensis	E	10	200		
	Gamochaeta americana	E	1	100		
Forb (FG)	*Geranium solanderi*	N	0.1	5		
	Hypocharis radicata	E	3	10		
	Paronychia brasiliana	E	0.1	50		
	Plantago lanceolata	E	2	100		
	Polygonum aviculare	E	0.1	5		
	Sonchus sp 2.	E	3	300		
	Sonchus sp 1.	E	2	200		
Grass & grasslike (GG)	*Sporobolus creber*	N	30	400		
	Trifolium repens	E	0.2	10		

BAM Site – Field Survey Form

Plot ID:	**25**	**Date:**	26/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm	**Recorders:**	ED & CK
Zone:	56	**Easting:**	367068	**Plot dimensions:**	20m x 50m	**Midline bearing:**	120
Datum:	GDA94	**Northing:**	6609328	**IBRA region:**	New England Tablelands	**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:** High	**Condition Class**	woodland
Vegetation Class:			New England Grassy Woodlands		**EEC:** yes	**Confidence:**	High

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

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees:	1
	Shrubs:	0
	Grasses etc.:	1
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	40
	Shrubs:	0
	Grasses etc.:	2
	Forbs:	0.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		10

BAM Attribute (1000 m^2 plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	1	0	0
30 – 49 cm:	1	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	27		

27Counts 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 (%)				
Subplot score (% in each):	5	60	7	30	5
Average of the 5 subplots:	21.4				

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		**Lf Element**	Hillcrest	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	brown	**Soil Depth**	Moderate
Slope		**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	26/09/18	Plot ID:	25	Recorders:	ED & CK

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
Tree (TG)	*Angophora floribunda*	N	40	5		
	Cirsium vulgare	E	0.1	5		
Forb (FG)	*Dichondra repens*	N	0.1	10		
	Ehrharta erecta	HTE	10	200		
Grass & grasslike (GG)	*Microleana stipoides*	N	2	50		
Forb (FG)	*Oxalis perennans*	N	0.1	5		
	Plantago lanceolata	E	0.1	20		
	Euphobia prostrata	E	0.1	5		
	Festuca pratensis	E	10	200		
	Gamochaeta americana	E	1	100		
Forb (FG)	*Geranium solanderi*	N	0.1	5		
	Hypocharis radicata	E	3	10		
	Paronychia brasiliana	E	0.1	50		
	Plantago lanceolata	E	2	100		
	Polygonum aviculare	E	0.1	5		
	Sonchus sp 2.	E	0.1	8		
	Taraxacum officinale	E	0.1	20		

BAM Site – Field Survey Form

Plot ID:	**26**	**Date:**	26/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm	**Recorders:**	ED & CK
Zone:	56	**Easting:**	365035	**Plot dimensions:**	20m x 50m	**Midline bearing:**	22
Datum:	GDA94	**Northing:**	6612305	**IBRA region:**	New England Tablelands	**Zone ID:**	
Plant Community Type:		510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		**Confidence:**	High	**Condition Class**	woodland
Vegetation Class:		New England Grassy Woodlands		**EEC:**	No	**Confidence:**	High

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

BAM Attribute (400 m^2 plot)		**Sum values**
Count of Native Richness	**Trees:**	1
	Shrubs:	0
	Grasses etc.:	4
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	10
	Shrubs:	0
	Grasses etc.:	10.7
	Forbs:	10.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		15

BAM Attribute (1000 m^2 plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	1	0	0
30 – 49 cm:	1	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1		

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 (%)**				
Subplot score (% in each):	5	1	2	2	2
Average of the 5 subplots:	2.4				

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		**Lf Element**	Hillcrest	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	Dark brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)*

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm						
		Date:	26/09/18	Plot ID:	26	Recorders:	ED & CK

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
Tree (TG)	*Angophora floribunda*	N	2	10		
	Bromus hordeaceus	E	30	500		
Grass & grasslike (GG)	*Chloris truncata*	N	15	200		
Forb (FG)	*Cotula australis*	N	10	200		
Forb (FG)	*Cymbonotus lawsonianus*	N	0.1	8		
Grass & grasslike (GG)	*Cynodon dactylon*	N	0.5	50		
	Ehrharta erecta	HTW	15	200		
	Eleusine tristachya	E	30	400		
	Eragrostis pilosa	E	10	100		
	Festuca pratensis	E	10	200		
Forb (FG)	*Geranium solanderi*	N	0.1	2		
	Hypocharis radicata	E	0.1	40		
Grass & grasslike (GG)	*Microlaena stipoides*	N	0.1	20		
	Paronychia brasiliana	E	0.1	20		
	Sonchus sp 2.	E	0.1	30		
Grass & grasslike (GG)	*Sporobolus creber*	N	0.1	3		
	Taraxacum officinale	E	0.1	30		

BAM Site – Field Survey Form

Plot ID:	**27**	**Date:**	27/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm	**Recorders:**	ED & CK
Zone:	56	**Easting:**	362518	**Plot dimensions:**	20m x 50m	**Midline bearing:**	15
Datum:	GDA94	**Northing:**	6608189	**IBRA region:**	New England Tablelands	**Zone ID:**	
Plant Community Type:			1174: Silvertop Stringybark open forest of the New England Tableland Bioregion			**Confidence:** High	**Condition Class** woodland
Vegetation Class:			New England Grassy Woodlands			**EEC:** No	**Confidence:** High

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

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees:	1
	Shrubs:	0
	Grasses etc.:	3
	Forbs:	7
	Ferns:	0
	Other:	1
Sum of Cover of native vascular plants by growth form group	Trees:	30
	Shrubs:	0
	Grasses etc.:	7
	Forbs:	0.7
	Ferns:	0
	Other:	0.1
High Threat Weed cover:		0.1

BAM Attribute (1000 m^2 plot) DBH			
DBH	Stem count (euc)	Stem count (non-euc)	Stems with Hollows
80 + cm:	0	0	0
50 – 79 cm:	1	0	0
30 – 49 cm:	1	0	0
20 – 29 cm:	1	0	0
10 – 19 cm:	1	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	15		

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 (%)				
Subplot score (% in each):	35	3	8	3	70
Average of the 5 subplots:	17.2				

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

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

Morphological Type		**Lf Element**	Hillslope	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	Dark brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)*

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	27/09/18	**Plot ID:**	27	**Recorders:**	ED & CK

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
	Acetosella vulgaris	HTE	0.1	8		
	Avena fatua	E	5	80		
	Chenopodium album	E	0.1	5		
Forb (FG)	*Chrysocephalum apiculatum*	N	0.1	12		
	Cirsium vulgare	E	0.1	1		
Forb (FG)	*Cotula australis*	N	40	0.1		
Forb (FG)	*Cymbonotus lawsonianus*	N	0.1	6		
Grass & grasslike (GG)	*Cynodon dactylon*	N	0.5	50		
	Eleusine tristachya	E	15	500		
Tree (TG)	*Eucalyptus laevopinea*	N	30	14		
	Festuca pratensis	E	10	150		
	Gamochaeta americana	E	0.1	10		
Forb (FG)	*Geranium solanderi*	N	0.1	4		
Other (OG)	*Glycine tabacina*	N	0.1	5		
Grass & grasslike (GG)	*Microlaena stipoides*	N	1	50		
Forb (FG)	*Oxalis perennans*	N	0.1	5		
	Paronychia brasiliana	E	0.1	20		
	Plantago lanceolata	E	0.1	2		
	Poa annua	E	5	100		
	Polygonum aviculare	E	0.1	15		
Forb (FG)	*Rumex brownii*	N	0.1	7		
Grass & grasslike (GG)	*Rytidosperma carphoides*	N	4	80		
Grass & grasslike (GG)	*Sporobolus creber*	N	2	80		
Forb (FG)	[illegible]	E	0.1	8		

BAM Site – Field Survey Form

Plot ID:	**28**	**Date:**	27/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm			**Recorders:**	ED & CK
Zone:	56	**Easting:**	363103	**Plot dimensions:**	20m x 50m			**Midline bearing:**	355
Datum:	GDA94	**Northing:**	6607900	**IBRA region:**	New England Tablelands			**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			**Confidence:**	High	**Condition Class**	pasture
Vegetation Class:			New England Grassy Woodlands			**EEC:**	No	**Confidence:**	High

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.:	8
	Forbs:	1
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	
	Shrubs:	0
	Grasses etc.:	45.1
	Forbs:	2
	Ferns:	0
	Other:	0
High Threat Weed cover:		5

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	**Litter cover (%)**				
Subplot score (% in each):	3	2	1	4	1
Average of the 5 subplots:	2.2				

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

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

Morphological Type		**Lf Element**	Hillcrest	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	Dark brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)*

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm						
		Date:	27/09/18	Plot ID:	28	Recorders:	ED & CK

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
Grass & grasslike (GG)	*Aristida ramosa*	N	15	800		
Grass & grasslike (GG)	*Austrostipa scabra*	N	5	400		
Grass & grasslike (GG)		N	5	300		
Grass & grasslike (GG)		N	30	2		
Forb (FG)	*Cotula australis*	N	2	100		
Forb (FG)	*Cymbonotus lawsonianus*	N	0.1	6		
Grass & grasslike (GG)	*Cynodon dactylon*	N	3	50		
	Eleusine tristachya	E	10	200		
	Hypocharis radicata	E	0.5	20		
Grass & grasslike (GG)	*Juncus australis*	N	0.1	2		
	Medicago sp.	E	15	500		
	Paspalum dilatatum	HTW	5	80		
	Poa annua	E	5	400		
Grass & grasslike (GG)		N	5	100		
Grass & grasslike (GG)	*Sporobolus creber*	N	10	300		
	Trifolium repens	E	10	200		

BAM Site – Field Survey Form

Plot ID:	29	**Date:**	27/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm	**Recorders:**	ED & CK
Zone:	56	**Easting:**	362489	**Plot dimensions:**	20m x 50m	**Midline bearing:**	300
Datum:	GDA94	**Northing:**	6608283	**IBRA region:**	New England Tablelands	**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	**Confidence:**	High	**Condition Class**	pasture
Vegetation Class:			New England Grassy Woodlands	**EEC:**	yes	**Confidence:**	High

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

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	6
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	32
	Forbs:	2.1
	Ferns:	0
	Other:	0
High Threat Weed cover:		0.1

BAM Attribute (1000 m^2 plot) DBH			
DBH	Stem count (euc)	Stem count (non-euc)	Stems with Hollows
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot score (% in each):	15	5	20	5	2
Average of the 5 subplots:	9.4				

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		**Lf Element**	Hillcrest	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	Dark brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)*

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm						
		Date:	27/09/18	Plot ID:	29	Recorders:	ED & CK

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
	Acetosella vulgaris	HTE	3	40		
	Anthoxanthum odoratum	E	5	80		
Grass & grasslike (GG)	*Aristida ramosa*	N	10	250		
	Avena fatua	E	15	250		
Grass & grasslike (GG)	*Bothriochloa decipiens*	N	2	30		
Grass & grasslike (GG)	*Chloris truncata*	N	5	60		
	Cirsium vulgare	E	2	30		
	Gamochaeta americana	E	0.5	50		
	Hypocharis radicata	E	10	200		
Grass & grasslike (GG)	*Juncus australis*	N	2	30		
Forb (FG)	*Oxalis perennans*	N	0.1	5		
	Paronychia brasiliana	E	0.1	10		
		E	5	100		
Forb (FG)	*Rumex brownii*	N	2	50		
Grass & grasslike (GG)	*Rytidosperma carphoides*	N	10	200		
Grass & grasslike (GG)	*Sporobolus creber*	N	10	150		
	Taraxacum officinale	E	5	100		

BAM Site – Field Survey Form

Plot ID:	**30**	**Date:**	27/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm			**Recorders:**	ED & CK
Zone:	56	**Easting:**		**Plot dimensions:**	20m x 50m			**Midline bearing:**	105
Datum:	GDA94	**Northing:**	6608137	**IBRA region:**	New England Tablelands			**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			**Confidence:**	High	**Condition Class**	pasture
Vegetation Class:			New England Grassy Woodlands			**EEC:**	yes	**Confidence:**	High

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

BAM Attribute (400 m^2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	7
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	36
	Forbs:	0.3
	Ferns:	0
	Other:	0
High Threat Weed cover:		5.1

BAM Attribute (1000 m^2 plot) DBH			
DBH	Stem count (euc)	Stem count (non-euc)	Stems with Hollows
80 + cm:	0	0	0
50 – 79 cm:	0	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		

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

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot score (% in each):	1	5	1	1	1
Average of the 5 subplots:	1.8				

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		**Lf Element**	Valley flat	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	Severity code	Age code	Observational evidence
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)*

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm				
Date:	27/09/18	Plot ID:	30	Recorders:	ED & CK

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
	Acetosella vulgaris	HTE	0.1	5		
	Anthoxanthum odoratum	E	5	80		
Grass & grasslike (GG)	*Aristida ramosa*	N	200	10		
Grass & grasslike (GG)		E	200	10		
Grass & grasslike (GG)	*Bothriochloa decipiens*	N	5	60		
Grass & grasslike (GG)	*Chloris truncata*	N	5	60		
		E	30	800		
Forb (FG)	*Chrysocephalum apiculatum*	N	0.1	2		
	Cirsium vulgare	E	0.1	4		
Grass & grasslike (GG)	*Cynodon dactylon*	N	2	30		
	Dactylis glomerata	N	1	50		
	Hypocharis radicata	E	5	100		
Grass & grasslike (GG)	*Juncus australis*	N	1	30		
		HTW	5	40		
	Poranthera microphylla	E	0.1	10		
Forb (FG)	*Rumex brownii*	N	0.1	2		
Grass & grasslike (GG)	*Rytidosperma carphoides*	N	5	50		
Grass & grasslike (GG)	*Sporobolus creber*	N	3	40		

BAM Site – Field Survey Form

Plot ID:	**31**	**Date:**	27/09/18	**Survey Name:**	J17300 - UPC NSW Solar Farm			**Recorders:**	ED & CK
Zone:	56	**Easting:**	362203	**Plot dimensions:**	20m x 50m			**Midline bearing:**	120
Datum:	GDA94	**Northing:**	6608022	**IBRA region:**	New England Tablelands			**Zone ID:**	
Plant Community Type:			510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			**Confidence:**	High	**Condition Class**	woodland
Vegetation Class:			New England Grassy Woodlands			**EEC:**	No	**Confidence:**	High

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:**	1
	Shrubs:	0
	Grasses etc.:	4
	Forbs:	4
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	**Trees:**	15
	Shrubs:	0
	Grasses etc.:	14
	Forbs:	1.4
	Ferns:	0
	Other:	0
High Threat Weed cover:		0

BAM Attribute (1000 m² plot) DBH			
DBH	**Stem count (euc)**	**Stem count (non-euc)**	**Stems with Hollows**
80 + cm:	0	0	0
50 – 79 cm:	1	0	0
30 – 49 cm:	0	0	0
20 – 29 cm:	0	0	0
10 – 19 cm:	0	0	0
5 – 9 cm:	0	0	0
< 5 cm:	0	0	0
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1		

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 (%)**				
Subplot score (% in each):	2	1	1	1	1
Average of the 5 subplots:	1.2				

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

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

Morphological Type		**Lf Element**	Hillcrest	**Lf Pattern**	Plain	**Microrelief**	
Lithology		**Soil Surface Texture**	Fine	**Soil Colour**	Brown	**Soil Depth**	Moderate
Slope	Flat	**Aspect**		**Site Drainage**		**Distance to nearest water and type**	

Plot Disturbance	**Severity code**	**Age code**	**Observational evidence**
Clearing (inc. logging):	Severe	greater than 10yo	
Cultivation (inc. pasture):			
Soil erosion:			
Firewood / CWD removal:			
Grazing (identify native/stock):	High	greater than 10yo	
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)

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, ...

Survey Name:	J17300 - UPC NSW Solar Farm						
		Date:	27/09/18	Plot ID:	31	Recorders:	ED & CK

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
Grass & grasslike (GG)	*Bothriocloa decipiens*	N	1	30		
	Bromus hordeaceus	E	15	300		
Forb (FG)	*Cotula australis*	N	1	200		
Forb (FG)	*Cymbonotus lawsonianus*	N	1	200		
Grass & grasslike (GG)	*Cynodon dactylon*	N	2	100		
	Eleusine tristachya	E	60	200		
Tree (TG)	*Eucalyptus blakelyi*	T	15	2		
	Poranthera microphylla	E	0.2	40		
Forb (FG)	*Rumex brownii*	N	0.1	3		
Grass & grasslike (GG)	*Rytidosperma carphoides*	N	1	20		
	Sonchus sp 2.	E	0.1	10		
Grass & grasslike (GG)	*Sporobolus creber*	N	10	200		

Appendix B

Vegetation integrity assessment – plot data

Species cover and abundance matrix

Scientific Name	Common Name	BAMGrowthForm	BAMGrowthFormGroup	HighThreatWeed	Plot 1	Plot 1	Plot 2	Plot 2	Plot 3	Plot 3	Plot 4	Plot 4	Plot 5	Plot 5	Plot 6	Plot 6	Plot 7	Plot 7	Plot 8	Plot 8	Plot 9	Plot 9	Plot 10	Plot 10	Plot 11	Plot 11	Plot 12	Plot 12	Plot 13	Plot 13	Plot 14	Plot 14	Plot 15	Plot 15	Plot 16	Plot 16	Plot 17	Plot 17	Plot 18
	abbundace				Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'
Acacia leucoclada	Northern Silver Wattle	Shrub	Shrub (SG)	#N/A															72	60																		
Acacia rubida	Red-stemmed Wattle	Shrub	Shrub (SG)	#N/A													3	4					5	3														
Acaena novae-zelandiae	Bidgee-widgee	Forb	Forb (FG)	#N/A									14	0.1																			400	5				
Acetosella vulgaris	Sheep Sorrel	Exotic	Exotic	Yes									2	0.1																								
Amaranthus powellii	Powell's Amaranth	Exotic	Exotic	#N/A													10	0.1																				
Angophora floribunda	Rough-barked Apple	Tree	Tree (TG)	#N/A					4	6	1	3							10	0.1									1	2	3	12						
Anthosachne scabra	Common Wheatgrass	Exotic	Exotic	#N/A															10	0.1																		
Anthoxanthum odoratum	Sweet Vernal Grass	Exotic	Exotic	#N/A			500	10			200	5																										
Aristida ramosa	Purple Wiregrass	Tussock Grass	Grass & grasslike (GG)	#N/A			8	0.1			300	3									30	0.1											30	0.1			400	15	
Asperula conferta	Common Woodruff	Forb	Forb (FG)	#N/A																																		
Austrostipa scabra	Speargrass	Tussock Grass	Grass & grasslike (GG)	#N/A																					40	1												
Avena fatua	Wild Oats	Exotic	Exotic	#N/A	5	0.1	10	0.1																	45	1												
Bothriochloa decipiens	Red Grass	Tussock Grass	Grass & grasslike (GG)	#N/A			140	5													400	10			1000	30												
Brachyscome nova-anglica	New England Daisy	Forb	Forb (FG)	#N/A																													60	0.2				
Brassica nigra	Black Mustard	Exotic	Exotic	#N/A					300	10																												
Brizia minor	Lesser Quaking-grass	Exotic	Exotic	#N/A																																		
Bromus cathariticus	Prairie Grass	Exotic	Exotic	#N/A			1000	40	500	15					1000	20	1000	70							200	10												400
Bromus hordeaceus	Soft Broome	Exotic	Exotic	#N/A							100	2																										
Bromus sp. 1	Brome sp.	Exotic	Exotic	#N/A																																		
Callistemon pungens	A Bottlebrush sp.	Shrub	Shrub (SG)	#N/A	4	2																							1	1								
Callistemon sieberi	River Bottlebrush	Shrub	Shrub (SG)	#N/A																																		
Calocephalus citreus	Lemon Beauty-heads	Forb	Forb (FG)	#N/A																																		
Carex appressa	Tall Sedge	Sedge	Grass & grasslike (GG)	#N/A																					3	0.1												
Carthamus lanatus	Saffron Thistle	Exotic	Exotic	Yes							10	0.1																									10	0.1	
Cenchrus setaceus	Fountain Grass	Exotic	Exotic	#N/A																																		
Centaurium erythraea	Common Centuary	Exotic	Exotic	#N/A																																		
Cheilanthes sieberi	Poison Rock Fern	Fern and fern allies	Fern (EG)	#N/A																																		
Chenopodium album	Fat Hen	Exotic	Exotic	#N/A					200	5			40	5	15	0.8																						
Chloris truncata	Windmill Grass	Tussock Grass	Grass & grasslike (GG)	#N/A																	100	5																
Chrysocephalum apiculatum	Yellow Buttons	Forb	Forb (FG)	#N/A																					6	0.1					8	0.1	10	0.1			7	0.1	
Cirsium vulgare	Spearthistle	Exotic	Exotic	#N/A			15	0.2	2	0.1	20	0.2			30	2			4	0.1			3	0.1	7	0.1	11	0.4			10	0.2			20	0.5	10	0.1	30
Convolvulus angustissimus		Vine	Other (OG)	#N/A																																		
Conzya sp.	Fleabane	Exotic	Exotic	#N/A			12	0.1							200	5	10	0.1	10	0.1			18	0.1														
Cotula australis	Carot Weed	Forb	Forb (FG)	#N/A																																		
Cymbonotus lawsonianus	Bears Ears	Forb	Forb (FG)	#N/A									2	0.1																								5
Cynodon dactylon	Couch	Other Grass	Grass & grasslike (GG)	#N/A							400	5	300	5	1000	2							10	0.1			1000	40	200	15					800	15		400
Dactylis glomerata	Cocksfoot	Exotic	Exotic	#N/A	1000	35					500	15	50	2									1000	40											200	15		
Daucus carota	Wild Carrot	Exotic	Exotic	#N/A																													50	0.1				
Daucus glochidiatus	Native Carrot	Forb	Forb (FG)	#N/A																															10	0.2		
Dichondra repens	Kidney Weed	Forb	Forb (FG)	#N/A							4	0.1											4	0.1	4	0.1												5
Dysphania pumilio	Small Crumbweed	Exotic	Exotic	#N/A													10	0.1									7	0.1					30	0.1				
Ehrharta erecta	Panic Veldtgrass	Exotic	Exotic	Yes													25	0.1	5	0.1									150	5	3	12			1000	35		300
Eleusine tristachya	Goose Grass	Exotic	Exotic	#N/A							500	15	200	5			400	2			400	20			500	15	400	20			1000	20				200	10	200
Eragrostis alveiformis	A lovegrass	Tussock Grass	Grass & grasslike (GG)	#N/A																																		
Eragrostis leptostachya	Paddock Lovegrass	Tussock Grass	Grass & grasslike (GG)	#N/A			40	1			250	5	1000	30			500	5	100	2	150	5			150	5			100	5	800	20	80	1	80	3	1000	20	
Eragrostis pilosa	Soft Lovegrass	Exotic	Exotic	#N/A																					150	5					400	10					800	15	
Eucalyptus acaciiformis	Wattle-leaved Peppermint	Tree	Tree (TG)	#N/A											6	10							3	2														
Eucalyptus blakelyi	Blakely's Red Gum	Tree	Tree (TG)	#N/A							1	2							1	0.5					5													
Eucalyptus caliginosa	Broad-leaved Stringybark	Tree	Tree (TG)	#N/A																									6	10								
Eucalyptus crenulata	Buxton Gum	Tree	Tree (TG)	#N/A																			3	2														
Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	Tree	Tree (TG)	#N/A							1	3																										
Eucalyptus dives	Broad-leaved Peppermint	Tree	Tree (TG)	#N/A																																		
Eucalyptus laevopinea	Silver Top Stringybark	Tree	Tree (TG)	#N/A																							4	12										4
Eucalyptus pauciflora	Snow Gum	Tree	Tree (TG)	#N/A	10	20									4	10							5	10														
Eucalyptus stellulata	Black Sally	Tree	Tree (TG)	#N/A	6	15									8	30							2	8					3	6								
Eucalyptus viminalis	Ribbon Gum	Tree	Tree (TG)	#N/A													4	6											2	5								
Eucalyptus camphora subsp. humeana	Mountain Swamp Gum	Tree	Tree (TG)	#N/A	4	5																	7	10														
Eucalyptus radiata subsp. sejuncta	Narrow-leaved Peppermint	Tree	Tree (TG)	#N/A																									2	5								
Euchiton involucratus	Star Cudweed	Forb	Forb (FG)	#N/A																					5	0.1			15	0.1			20	0.1			30	0.1	
Euphobia prostrata	Red Caustic Creeper	Exotic	Exotic	#N/A																	60	0.2											12	0.1				
Festuca pratensis	Meadow Fescue	Exotic	Exotic	#N/A																																		
Fimbristylis dichotoma	Common Fringe-sedge	Sedge	Grass & grasslike (GG)	#N/A																	25	0.1															10	0.1	
Gamochaeta americana	Cudweed	Exotic	Exotic	#N/A			30	0.1			10	0.1																							10	0.1		
Geranium solanderi	Native Geranium	Forb	Forb (FG)	#N/A							14	0.1							20	0.1	50	0.1			5	0.1	6	0.1			15	0.1			8	0.1		8
Glycine tabacina	Variable Glycine	Vine	Other (OG)	#N/A															20	0.1	30	0.1			6	0.1									10	0.1		
Hypericum gramineum	Small St. John's Wort	Forb	Forb (FG)	#N/A									300	5																								
Hypocharis radicata	Catsear	Exotic	Exotic	#N/A			15	0.1			20	0.1			100	1					80	0.5	15	0.1							7	0.1			40	0.2	100	0.4	12
Juncus australis		Rush	Grass & grasslike (GG)	#N/A			13	0.1																					30	0.1					8	0.1		7
Leptospermum polyanthum		Shrub	Shrub (SG)	#N/A																																		
Leptospermum polygalifolium	Tantoon	Shrub	Shrub (SG)	#N/A	1	0.3																																
Lomandra longifolia		Rush	Grass & grasslike (GG)	#N/A															2	0.1																		
Lomandra multiflora	Many-flowered Matt-rush	Rush	Grass & grasslike (GG)	#N/A																																	30	0.1	
Luzula densiflora		Rush	Grass & grasslike (GG)	#N/A							5	0.1																										
Malva neglecta	Dwarf Mallow	Exotic	Exotic	#N/A					200	2																												
Medicago sp.		Exotic	Exotic																																			
Microlaena stipoides	Weeping Grass	Tussock Grass	Grass & grasslike (GG)	#N/A											200	4					100	0.5			100	1			600	20	200	5			100	5			600
Oxalis perennans	Yellow Wood-sorrel	Forb	Forb (FG)	#N/A							40	0.1			10	0.1			15	0.1	150	0.2	5	0.1	10	0.1	18	0.1							20	0.1	10
Panicum effusum	Hairy Panic	Tussock Grass	Grass & grasslike (GG)	#N/A																	15	0.1																
Paronychia brasiliana	Brazilian Whitlow	Exotic	Exotic	#N/A																			2	0.1	3	0.1	1	0.1			4	0.1	8	0.1			15	0.1	
Paspalum dilatatum	Paspalum	Exotic	Exotic	Yes	40	6	30	0.1					50	2	500	15	30	0.5			20	0.2	35	1	30	1			250	10			45	1			100	5	
Phalaris minor	Lesser Canary Grass	Exotic	Exotic	#N/A	100	5			1000	20					1000	15	200	2					1000	30														
Phalaris sp.		Exotic	Exotic	#N/A	300	15	500	25																														
Pimelea linifolia	A Rice Flower	Shrub	Shrub (SG)	#N/A																													14	0.2			1	0.1	
Pinus radiata	Radiata pine	Exotic	Exotic	#N/A															1	1																		
Plantago lanceolata	Narrow-leaved Plantain	Exotic	Exotic	#N/A			10	0.1			40	0.5							400	15	20	0.1	75	1	4	0.1							200	5	50	0.3			
Poa annua	Winter Grass	Exotic	Exotic	#N/A																																		
Polygonum aviculare	Wireweed	Exotic	Exotic	#N/A					100	0.5			20	0.1	10	0.1	8	0.1	10	0.1																		3
Poranthera microphylla	Small Poranthera	Forb	Forb (FG)	#N/A																																		
Portulaca oleracea	Common Purslane	Forb	Forb (FG)	#N/A													20	0.1																				
Pultenaea microphylla		Shrub	Shrub (SG)	#N/A																													5	0.1				
Rosa rubiginosa	Sweet Briar	Exotic	Exotic	Yes																													1	0.1				
Rubus anglocandicans	Blackberry	Exotic	Exotic	#N/A											20	3			5	10	1	0.5																
Rumex brownii	Swamp Dock	Forb	Forb (FG)	#N/A									1	0.1					6	0.1					5	0.1			4	0.1	5	0.1			12	0.1	5	0.1	5
Rumex obtusifolius	Broadleaf Dock	Exotic	Exotic	#N/A											50	1																						
Rytidosperma carphoides	Short Wallaby Grass	Tussock Grass	Grass & grasslike (GG)	#N/A							100	5													400	10					400	10			150	2		
Rytidosperma racemosum var. racemosum		Tussock Grass	Grass & grasslike (GG)	#N/A																					400	10												
Sida rhombifolia	Paddy's Lucerne	Exotic	Exotic	#N/A																							2	0.1										
Solanum nigrum		Exotic	Exotic	#N/A													5	0.1	15	0.1																		
Sonchus sp 2.		Exotic	Exotic	#N/A																																		
Sonchus sp. 1		Exotic	Exotic	#N/A																																		
Sporobolus creber	Slender Rat's Tail Grass	Tussock Grass	Grass & grasslike (GG)	#N/A			200	5			1000	20	1000	40							1000	30							100	0.5	300	10	500	15	200	5	500	20	300
Taraxacum officinale	Common Dandelion	Exotic	Exotic	#N/A																																		
Themeda australis	Kangaroo Grass	Tussock Grass	Grass & grasslike (GG)	#N/A															5	0.1	1000	25											1000	65			50	0.5	
Tricoryne elatior	Yellow Rush-lilly	Forb	Forb (FG)	#N/A																																		
Trifolium repens	White Clover	Exotic	Exotic	#N/A			5	0.1																											10	0.1		
Urtica incisa	Stinging Nettle	Forb	Forb (FG)	#N/A																																		25
Verbascum virgatum	Twiggy Mullein	Exotic	Exotic	#N/A															5	0.1	40	2																
Verbena bonariensis	Purpletop	Exotic	Exotic	#N/A					3	0.1																									3	0.1		
Vulpia bromoides	Squirrel Tail Fescue	Exotic	Exotic	#N/A			60	1																							500	15						
Wahlenbergia communis	Tufted Bluebell	Forb	Forb (FG)	#N/A							10	0.1									6	0.1			10	0.1												

Species cover and abundance matrix

Scientific Name	Common Name	BAMGrowthForm	BAMGrowthFormGroup	HighThreatWeed	Plot 18	Plot 19	Plot 19	Plot 20	Plot 20	Plot 21	Plot 21	Plot 22	Plot 22	Plot 23	Plot 23	Plot 24	Plot 24	Plot 25	Plot 25	Plot 26	Plot 26	Plot 27	Plot 27	Plot 28	Plot 28	Plot 29	Plot 29	Plot 30	Plot 30	Plot 31	Plot 31
	abbundace				Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover
Acacia leucoclada	Northern Silver Wattle	Shrub	Shrub (SG)	#N/A																											
Acacia rubida	Red-stemmed Wattle	Shrub	Shrub (SG)	#N/A																											
Acaena novae-zelandiae	Bidgee-widgee	Forb	Forb (FG)	#N/A																											
Acetosella vulgaris	Sheep Sorrel	Exotic	Exotic	Yes		80	2															8	0.1			40	3	5	0.1		
Amaranthus powellii	Powell's Amaranth	Exotic	Exotic	#N/A																											
Angophora floribunda	Rough-barked Apple	Tree	Tree (TG)	#N/A														5	40	2	10										
Anthosachne scabra	Common Wheatgrass	Exotic	Exotic	#N/A						300	5			500	10	100	5														
Anthoxanthum odoratum	Sweet Vernal Grass	Exotic	Exotic	#N/A																						250	10	100	10		
Aristida ramosa	Purple Wiregrass	Tussock Grass	Grass & grasslike (GG)	#N/A				30	2															800	15	100	3	200	10		
Asperula conferta	Common Woodruff	Forb	Forb (FG)	#N/A		10	0.1																								
Austrostipa scabra	Speargrass	Tussock Grass	Grass & grasslike (GG)	#N/A						400	10			400	10									400	5			200	10		
Avena fatua	Wild Oats	Exotic	Exotic	#N/A										200	5							80	5			250	15				
Bothriochloa decipiens	Red Grass	Tussock Grass	Grass & grasslike (GG)	#N/A				300	10	1000	25	1000	30	1000	15									300	5	30	2	60	5	30	1
Brachyscome nova-anglica	New England Daisy	Forb	Forb (FG)	#N/A																											
Brassica nigra	Black Mustard	Exotic	Exotic	#N/A																											
Brizia minor	Lesser Quaking-grass	Exotic	Exotic	#N/A				50	2																						
Bromus cathariticus	Prairie Grass	Exotic	Exotic	#N/A	10																										
Bromus hordeaceus	Soft Broome	Exotic	Exotic	#N/A						100	2			500	10					500	30							800	30	300	15
Bromus sp. 1	Brome sp.	Exotic	Exotic	#N/A												1000	60														
Callistemon pungens	A Bottlebrush sp.	Shrub	Shrub (SG)	#N/A		4	3																								
Callistemon sieberi	River Bottlebrush	Shrub	Shrub (SG)	#N/A		6	4																								
Calocephalus citreus	Lemon Beauty-heads	Forb	Forb (FG)	#N/A								2	0.1																		
Carex appressa	Tall Sedge	Sedge	Grass & grasslike (GG)	#N/A																											
Carthamus lanatus	Saffron Thistle	Exotic	Exotic	Yes				10	0.3	5	0.5																				
Cenchrus setaceus	Fountain Grass	Exotic	Exotic	#N/A																											
Centaurium erythraea	Common Centuary	Exotic	Exotic	#N/A		10	0.1					15	0.1																		
Cheilanthes sieberi	Poison Rock Fern	Fern and fern allies	Fern (EG)	#N/A		2	0.1																								
Chenopodium album	Fat Hen	Exotic	Exotic	#N/A																		5	0.1								
Chloris truncata	Windmill Grass	Tussock Grass	Grass & grasslike (GG)	#N/A		50	5	100	5	200	2	1000	30			50	5							30	2	60	5				
Chrysocephalum apiculatum	Yellow Buttons	Forb	Forb (FG)	#N/A																		12	0.1					2	0.1		
Cirsium vulgare	Spearthistle	Exotic	Exotic	#N/A	0.5					4	0.1	25	2			5	0.5	5	0.1			1	0.1			30	2	4	0.1		
Convolvulus angustissimus		Vine	Other (OG)	#N/A		4	0.1																								
Conzya sp.	Fleabane	Exotic	Exotic	#N/A		40	0.2					20	0.1																		
Cotula australis	Carot Weed	Forb	Forb (FG)	#N/A												400	12			200	10	40	0.1	100	2					200	1
Cymbonotus lawsonianus	Bears Ears	Forb	Forb (FG)	#N/A	0.1											4	0.1			8	0.1	6	0.1							4	0.1
Cynodon dactylon	Couch	Other Grass	Grass & grasslike (GG)	#N/A	10											100	10			50	0.5			50	3			30	2	100	2
Dactylis glomerata	Cocksfoot	Exotic	Exotic	#N/A		1000	35																					50	1		
Daucus carota	Wild Carrot	Exotic	Exotic	#N/A								10	1																		
Daucus glochidiatus	Native Carrot	Forb	Forb (FG)	#N/A				10	0.1			5	0.1																		
Dichondra repens	Kidney Weed	Forb	Forb (FG)	#N/A	0.1													10	0.1												
Dysphania pumilio	Small Crumbweed	Exotic	Exotic	#N/A												50	0.2														
Ehrharta erecta	Panic Veldtgrass	Exotic	Exotic	Yes	10													200	10	200	15										
Eleusine tristachya	Goose Grass	Exotic	Exotic	#N/A	15	200	2	80	1	100	1	100	2			500	25	2000	10	400	30	500	15	200	10					1000	60
Eragrostis alveiformis	A lovegrass	Tussock Grass	Grass & grasslike (GG)	#N/A										800	10																
Eragrostis leptostachya	Paddock Lovegrass	Tussock Grass	Grass & grasslike (GG)	#N/A		200	10	600	20											100	10										
Eragrostis pilosa	Soft Lovegrass	Exotic	Exotic	#N/A						100	1		5	1000	10																
Eucalyptus acaciiformis	Wattle-leaved Peppermint	Tree	Tree (TG)	#N/A		7	10																								
Eucalyptus blakelyi	Blakely's Red Gum	Tree	Tree (TG)	#N/A																										2	15
Eucalyptus caliginosa	Broad-leaved Stringybark	Tree	Tree (TG)	#N/A		5	6																								
Eucalyptus crenulata	Buxton Gum	Tree	Tree (TG)	#N/A																											
Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	Tree	Tree (TG)	#N/A																											
Eucalyptus dives	Broad-leaved Peppermint	Tree	Tree (TG)	#N/A																											
Eucalyptus laevopinea	Silver Top Stringybark	Tree	Tree (TG)	#N/A	25																	14	30								
Eucalyptus pauciflora	Snow Gum	Tree	Tree (TG)	#N/A		4	5																								
Eucalyptus stellulata	Black Sally	Tree	Tree (TG)	#N/A		3	3																								
Eucalyptus viminalis	Ribbon Gum	Tree	Tree (TG)	#N/A		1	1																								
Eucalyptus camphora subsp. humeana	Mountain Swamp Gum	Tree	Tree (TG)	#N/A		6	7																								
Eucalyptus radiata subsp. sejuncta	Narrow-leaved Peppermint	Tree	Tree (TG)	#N/A																											
Euchiton involucratus	Star Cudweed	Forb	Forb (FG)	#N/A		12	0.1	10	0.1	10	0.1	10	0.1																		
Euphobia prostrata	Red Caustic Creeper	Exotic	Exotic	#N/A		10	0.1									5	0.1														
Festuca pratensis	Meadow Fescue	Exotic	Exotic	#N/A												200	10			200	10	150	10								
Fimbristylis dichotoma	Common Fringe-sedge	Sedge	Grass & grasslike (GG)	#N/A				200	10			50	0.4	30	0.5																
Gamochaeta americana	Cudweed	Exotic	Exotic	#N/A								300	3	80	0.2	100	1					10	0.1			50	0.5				
Geranium solanderi	Native Geranium	Forb	Forb (FG)	#N/A	0.1	12	0.1									5	0.1			2	0.1	4	0.1								
Glycine tabacina	Variable Glycine	Vine	Other (OG)	#N/A				4	0.1													5	0.1								
Hypericum gramineum	Small St. John's Wort	Forb	Forb (FG)	#N/A								20	0.1	5	0.1																
Hypocharis radicata	Catsear	Exotic	Exotic	#N/A	0.1					20	0.1	50	1			100	3			40	0.1			20	0.5	200	10	100	5		
Juncus australis		Rush	Grass & grasslike (GG)	#N/A	0.1			5	0.5			30	0.8	10	0.1									2	0.1	30	2	30	1		
Leptospermum polyanthum		Shrub	Shrub (SG)	#N/A		10	6																								
Leptospermum polygalifolium	Tantoon	Shrub	Shrub (SG)	#N/A		6	4																								
Lomandra longifolia		Rush	Grass & grasslike (GG)	#N/A																											
Lomandra multiflora	Many-flowered Matt-rush	Rush	Grass & grasslike (GG)	#N/A		1	0.1	80	2																						
Luzula densiflora		Rush	Grass & grasslike (GG)	#N/A																											
Malva neglecta	Dwarf Mallow	Exotic	Exotic	#N/A																											
Medicago sp.		Exotic	Exotic																					500	15						
Microlaena stipoides	Weeping Grass	Tussock Grass	Grass & grasslike (GG)	#N/A	15	300	5											50	2	20	0.1	50	1								
Oxalis perennans	Yellow Wood-sorrel	Forb	Forb (FG)	#N/A	0.1	40	0.2	5	0.1									5	0.1			5	0.1			5	0.1				
Panicum effusum	Hairy Panic	Tussock Grass	Grass & grasslike (GG)	#N/A				100	5																						
Paronychia brasiliana	Brazilian Whitlow	Exotic	Exotic	#N/A				20	0.1							50	0.1			20	0.1	20	0.1			10	0.1				
Paspalum dilatatum	Paspalum	Exotic	Exotic	Yes										100	5									80	5			40	5		
Phalaris minor	Lesser Canary Grass	Exotic	Exotic	#N/A		200	10			100	1															100	5				
Phalaris sp.		Exotic	Exotic	#N/A																											
Pimelea linifolia	A Rice Flower	Shrub	Shrub (SG)	#N/A																											
Pinus radiata	Radiata pine	Exotic	Exotic	#N/A																											
Plantago lanceolata	Narrow-leaved Plantain	Exotic	Exotic	#N/A								30	0.5			100	2	20	0.1			2	0.1								
Poa annua	Winter Grass	Exotic	Exotic	#N/A																		100	5	400	5						
Polygonum aviculare	Wireweed	Exotic	Exotic	#N/A	0.1											5	0.1					15	0.1								
Poranthera microphylla	Small Poranthera	Forb	Forb (FG)	#N/A																								10	0.1	40	0.2
Portulaca oleracea	Common Purslane	Forb	Forb (FG)	#N/A																											
Pultenaea microphylla		Shrub	Shrub (SG)	#N/A																											
Rosa rubiginosa	Sweet Briar	Exotic	Exotic	Yes																											
Rubus anglocandicans	Blackberry	Exotic	Exotic	#N/A																											
Rumex brownii	Swamp Dock	Forb	Forb (FG)	#N/A	0.1	10	0.1	50	0.3	2	0.1			300	0.3							7	0.1			50	2	2	0.1	3	0.1
Rumex obtusifolius	Broadleaf Dock	Exotic	Exotic	#N/A																											
Rytidosperma carphoides	Short Wallaby Grass	Tussock Grass	Grass & grasslike (GG)	#N/A		100	5					100	1	600	10							80	4	100	5	200	10	50	5	20	1
Rytidosperma racemosum var. racemosum		Tussock Grass	Grass & grasslike (GG)	#N/A		150	5	100	5	1000	40			200	2																
Sida rhombifolia	Paddy's Lucerne	Exotic	Exotic	#N/A																											
Solanum nigrum		Exotic	Exotic	#N/A		3	0.1																								
Sonchus sp 2.		Exotic	Exotic	#N/A												300	3	8	0.1	30	0.1									10	0.1
Sonchus sp. 1		Exotic	Exotic	#N/A												200	2														
Sporobolus creber	Slender Rat's Tail Grass	Tussock Grass	Grass & grasslike (GG)	#N/A	5			1000	25			500	10			400	30			3	0.1	80	2	300	10	150	10	40	3	200	10
Taraxacum officinale	Common Dandelion	Exotic	Exotic	#N/A														20	0.1	30	0.1					100	5				
Themeda australis	Kangaroo Grass	Tussock Grass	Grass & grasslike (GG)	#N/A				50	5																						
Tricoryne elatior	Yellow Rush-lilly	Forb	Forb (FG)	#N/A								5	0.1	5	0.1																
Trifolium repens	White Clover	Exotic	Exotic	#N/A								25	0.2			10	0.2							200	10						
Urtica incisa	Stinging Nettle	Forb	Forb (FG)	#N/A	0.5																	8	0.1								
Verbascum virgatum	Twiggy Mullein	Exotic	Exotic	#N/A																											
Verbena bonariensis	Purpletop	Exotic	Exotic	#N/A																											
Vulpia bromoides	Squirrel Tail Fescue	Exotic	Exotic	#N/A						400	5	100	2	300	5																
Wahlenbergia communis	Tufted Bluebell	Forb	Forb (FG)	#N/A						20	0.1																				

Plot Summary

plot	pct	area	patchsize	ndition cla	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to10	funTreeStem10to20	funTreeStem20to30	funTreeStem30to50	funTreeStem50to80	funTreeRegen	funHighThreatExotic
1	510	15.3	0	planted	56	359211	6599322	180	3	2	0	0	0	0	40	2.3	0	0	0	0	0	0	48	0	1	7	10	3	0	1	6
2	510	1293.1	0	pasture	56	359058	6598483	90	0	0	5	0	0	0	0	0	11.2	0	0	0	0	0	3.2	0	0	0	0	0	0	0	0.1
3	510	38.2	0	woodland	56	364014	6613764	313	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0.8	12	0	0	2	2	0	0	0
5	510	1293.1	0	pasture	56	366595	6613278	157	0	0	3	4	0	0	0	0	75	5.3	0	0	0	0	4.6	0	0	0	0	0	0	0	2.1
10	510	15.3	0	planted	56	360339	6601177	239	5	1	1	2	0	0	32	3	0.1	0.2	0	0	0	0	36	0	2	0	5	7	3	1	1
12	1174	5.7	0	woodland	56	365222	6612282	74	1	0	1	2	0	0	12	0	40	0.2	0	0	0	1	8.8	4	0	0	3	3	2	0	0
13	510	15.3	0	planted	56	365587	6612584	182	5	1	5	2	0	0	28	1	40.6	0.2	0	0	0	0	33	0	0	4	27	1	0	0	15
14	510	38.2	0	woodland	56	365820	6612256	341	1	0	4	3	0	0	12	0	45	0.3	0	0	1	0	4.6	2	0	0	0	3	1	0	12
15	510	1293.1	0	pasture	56	365821	6611446	70	0	2	4	4	0	0	0	0.3	81.1	5.4	0	0	0	0	0.4	0	0	0	0	0	0	0	1.1
17	510	1293.1	0	pasture	56	368161	6612109	147	0	1	6	4	0	1	0	0.1	55.7	0.4	0	0.1	0	0	4.8	0	0	0	0	0	0	0	5.1
18	1174	5.7	0	woodland	56	362603	6608757	331	1	0	4	6	0	0	25	0	30.1	1	0	0	2	0	16.6	22	0	1	0	4	1	0	10
19	510	15.3	0	planted	56	362565	6607571	2	6	4	6	5	1	1	32	17	30.1	0.6	0.1	0.1	0	0	34	0	0	13	10	2	0	1	2
20	510	1293.1	0	pasture	56	367129	6610008	91	0	0	11	4	0	1	0	0	89.5	0.6	0	0.1	0	0	9	29	0	0	0	0	0	0	0.3
21	510	1293.1	0	pasture	56	367774	6610665	240	0	0	4	3	0	0	0	0	77	0.3	0	0	0	0	11	0	0	0	0	0	0	0	0.5
23	510	1293.1	0	pasture	56	360464	6601572	305	0	0	7	3	0	0	0	0	47.6	0.5	0	0	0	0	10.2	0	0	0	0	0	0	0	5
24	510	1293.1	0	pasture	56	362977	6601728	200	0	0	3	3	0	0	0	0	45	12.2	0	0	0	0	9.4	0	0	0	0	0	0	0	0
25	510	38.2	0	woodland	56	367068	6609328	120	1	0	1	2	0	0	40	0	2	0.2	0	0	1	0	21.4	27	0	0	0	1	1	0	10
26	510	38.2	0	woodland	56	365035	6612305	22	1	0	4	3	0	0	10	0	10.7	10.2	0	0	0	0	2.4	1	0	0	0	1	1	0	15
27	1174	5.7	0	woodland	56	362518	6608189	15	1	0	3	7	0	1	30	0	7	0.7	0	0.1	0	0	17.2	15	0	1	1	1	1	0	0.1
28	510	1293.1	0	pasture	56	363103	6607900	355	0	0	8	1	0	0	0	0	45.1	2	0	0	0	0	2.2	0	0	0	0	0	0	0	5
29	510	1293.1	0	pasture	56	362489	6608283	300	0	0	6	2	0	0	0	0	32	2.1	0	0	0	0	9.4	0	0	0	0	0	0	0	3
30	510	1293.1	0	pasture	56	365067	6608137	105	0	0	7	3	0	0	0	0	36	0.3	0	0	0	0	1.8	0	0	0	0	0	0	0	5.1
31	510	38.2	0	woodland	56	362203	6608022	340	1	0	4	4	0	0	15	0	14	1.4	0	0	0	0	1.2	0	0	0	0	2	0	0	0

Appendix C

Paddock trees results

Number	Identifier	Scientific name	Common name	BAM Category	DBH	Hollow bearing tree	Latitude	Longitude
1	7	Angophora floribunda	Rough-barked Apple	3	69	no	-30.60846	151.603089
2	38	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	70	yes	-30.59568	151.611196
3	39	Eucalyptus blakelyi	Blakely's Red Gum	3	62	no	-30.59651	151.615786
4	40	Eucalyptus blakelyi	Blakely's Red Gum	2	46	no	-30.59721	151.615044
5	41	Eucalyptus blakelyi	Blakely's Red Gum	2	38	no	-30.59761	151.615108
6	42	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	56	no	-30.59758	151.614606
7	43	Eucalyptus blakelyi	Blakely's Red Gum	3	115	yes	-30.59672	151.61431
8	44	Eucalyptus blakelyi	Blakely's Red Gum	3	103	no	-30.59644	151.61404
9	45	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	87	no	-30.59566	151.614328
10	46	Eucalyptus blakelyi	Blakely's Red Gum	3	87	no	-30.59578	151.614165
11	47	Eucalyptus melliodora	Yellow Box	3	103	no	-30.59425	151.614363
12	48	Eucalyptus melliodora	Yellow Box	3	87	no	-30.59514	151.613264
13	49	Eucalyptus blakelyi	Blakely's Red Gum	2	28	no	-30.5964	151.612731
14	50	Eucalyptus blakelyi	Blakely's Red Gum	2	35	no	-30.59641	151.612749
15	51	Angophora floribunda	Rough-barked Apple	2	35	no	-30.59715	151.612818
16	57	Eucalyptus melliodora	Yellow Box	3	55	no	-30.59598	151.605939
17	58	Eucalyptus melliodora	Yellow Box	3	81	no	-30.59581	151.606586
18	59	Eucalyptus melliodora	Yellow Box	3	71	no	-30.595	151.606834
19	64	Eucalyptus blakelyi	Blakely's Red Gum	3	54	no	-30.60305	151.593371
20	65	Eucalyptus blakelyi	Blakely's Red Gum	3	70	no	-30.59989	151.58399
21	66	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	77	no	-30.60041	151.583038
22	67	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	71	yes	-30.60105	151.583006
23	68	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	73	no	-30.60053	151.582403
24	69	Eucalyptus melliodora	Yellow Box	2	48	no	-30.59961	151.580242
25	70	Eucalyptus blakelyi	Blakely's Red Gum	3	55	no	-30.58991	151.589713
26	71	Eucalyptus nova-anglica	New England Peppermint	3	72	no	-30.5863	151.595102
27	79	Eucalyptus laevopinea	Silver Top Stringybark	3	109	no	-30.64523	151.581163
28	80	Eucalyptus laevopinea	Silver Top Stringybark	3	74	no	-30.6454	151.581028
29	86	Eucalyptus pauciflora	Snow Gum	3	51	no	-30.65792	151.603611
30	90	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	76	no	-30.65719	151.60271
31	100	Eucalyptus dalrympleana subsp. heptantha	Mountain Gum	3	92	no	-30.65565	151.600651
32	110	Angophora floribunda	Rough-barked Apple	3	76	yes	-30.65813	151.596883
33	114	Eucalyptus blakelyi	Blakely's Red Gum	3	52	no	-30.65772	151.598835
34	115	Banksia integrifolia subsp. monicola	White Mountain Banksia	3	74	no	-30.65252	151.608667
35	116	Eucalyptus blakelyi	Blakely's Red Gum	3	63	no	-30.65387	151.607305
36	117	Eucalyptus blakelyi	Blakely's Red Gum	3	80	no	-30.65387	151.607364
37	118	Eucalyptus blakelyi	Blakely's Red Gum	3	76	no	-30.65542	151.606472
38	119	Eucalyptus blakelyi	Blakely's Red Gum	3	63	no	-30.65625	151.606121
39	120	Angophora floribunda	Rough-barked Apple	3	68	no	-30.64922	151.604852
40	121	Eucalyptus conica	Fuzzy Box	3	105	no	-30.64864	151.60309
41	122	Angophora floribunda	Rough-barked Apple	3	50	no	-30.64942	151.600082
42	123	Eucalyptus blakelyi	Blakely's Red Gum	3	77	no	-30.65011	151.600789
43	124	Eucalyptus melliodora	Yellow Box	3	78	no	-30.6505	151.590279
44	125	Eucalyptus blakelyi	Blakely's Red Gum	3	65	no	-30.65807	151.587481
45	126	Eucalyptus dives	Broad-leaved Peppermint	2	36	no	-30.65269	151.587651
46	127	Eucalyptus conica	Fuzzy Box	3	62	no	-30.65305	151.587448
47	128	Eucalyptus conica	Fuzzy Box	3	56	no	-30.65368	151.586517
48	129	Eucalyptus dives	Broad-leaved Peppermint	3	51	no	-30.65336	151.585972
49	130	Eucalyptus pauciflora	Snow Gum	3	111	no	-30.65223	151.585748
50	131	Eucalyptus blakelyi	Blakely's Red Gum	3	51	no	-30.65108	151.585237
51	132	Eucalyptus dives	Broad-leaved Peppermint	2	38	no	-30.65277	151.583344
52	133	Eucalyptus blakelyi	Blakely's Red Gum	3	75	no	-30.65136	151.583458
53	134	Eucalyptus conica	Fuzzy Box	2	41	no	-30.65215	151.580888
54	135	Angophora floribunda	Rough-barked Apple	2	42	no	-30.65204	151.580769
55	136	Eucalyptus conica	Fuzzy Box	2	48	no	-30.6519	151.580262
56	137	Eucalyptus melliodora	Yellow Box	2	34	no	-30.65148	151.579555
57	138	Eucalyptus melliodora	Yellow Box	3	90	no	-30.65148	151.579576
58	139	Angophora floribunda	Rough-barked Apple	3	66	no	-30.64873	151.577756
59	140	Eucalyptus melliodora	Yellow Box	3	89	no	-30.65189	151.579116
60	141	Eucalyptus melliodora	Yellow Box	3	92	no	-30.65333	151.579087
61	147	Angophora floribunda	Rough-barked Apple	3	76	no	-30.65028	151.568221
62	148	Eucalyptus melliodora	Yellow Box	3	76	no	-30.65076	151.568728
63	150	Angophora floribunda	Rough-barked Apple	3	80	no	-30.65596	151.569179
64	151	Eucalyptus conica	Fuzzy Box	3	56	no	-30.65651	151.566274
65	153	Eucalyptus laevopinea	Silver Top Stringybark	1	18	no	-30.654	151.562268
66	154	Eucalyptus laevopinea	Silver Top Stringybark	3	76	no	-30.65339	151.560204
67	155	Eucalyptus laevopinea	Silver Top Stringybark	3	84	no	-30.65274	151.560883
68	162	Eucalyptus laevopinea	Silver Top Stringybark	3	59	no	-30.64577	151.567274
69	163	Eucalyptus laevopinea	Silver Top Stringybark	3	59	no	-30.64593	151.56739
70	165	Eucalyptus viminalis	Ribbon Gum	3	61	yes	-30.70815	151.566473
71	166	Eucalyptus viminalis	Ribbon Gum	3	120	yes	-30.70524	151.566269
72	167	Eucalyptus viminalis	Ribbon Gum	3	57	yes	-30.70388	151.564991
73	168	Angophora floribunda	Rough-barked Apple	3	115	no	-30.70318	151.56333
74	169	Angophora floribunda	Rough-barked Apple	3	119	no	-30.70411	151.564186
75	171	Eucalyptus viminalis	Ribbon Gum	3	113	yes	-30.70833	151.566125
76	172	Eucalyptus viminalis	Ribbon Gum	3	70	no	-30.70864	151.566811
77	189	Angophora floribunda	Rough-barked Apple	3	65	no	-30.61507	151.61782
78	190	Eucalyptus dives	Broad-leaved Peppermint	2	35	no	-30.61449	151.618215
79	200	Eucalyptus conica	Fuzzy Box	3	55	no	-30.65181	151.568964
80	202	Eucalyptus melliodora	Yellow Box	3	87	no	-30.73108	151.522078
81	203	Eucalyptus melliodora	Yellow Box	3	67	no	-30.73125	151.521966
82	204	Eucalyptus melliodora	Yellow Box	3	107	no	-30.73331	151.521975
83	205	Eucalyptus nova-anglica	New England Peppermint	3	79	no	-30.73272	151.522554
84	206	Eucalyptus melliodora	Yellow Box	3	70	no	-30.71275	151.548813
85	229	Angophora floribunda	Rough-barked Apple	3	89	no	-30.6378	151.609049
86	230	Eucalyptus bridgesiana	Apple Box	3	68	no	-30.63627	151.61119

Number	Identifier	Scientific name	Common name	BAM Category	DBH	Hollow bearing tree	Latitude	Longitude
87	231	Eucalyptus blakelyi	Blakely's Red Gum	3	88	yes	-30.63753	151.612357
88	232	Eucalyptus dives	Broad-leaved Peppermint	2	26	no	-30.63977	151.641926
89	233	Eucalyptus dives	Broad-leaved Peppermint	2	21	no	-30.63978	151.641934
90	238	Eucalyptus stellulata	Black Sally	2	29	no	-30.64157	151.641556
91	239	Eucalyptus bridgesiana	Apple Box	3	51	no	-30.64211	151.641501
92	240	Eucalyptus dives	Broad-leaved Peppermint	2	29	no	-30.64418	151.641109
93	241	Eucalyptus pauciflora	Snow Gum	2	29	no	-30.6444	151.64104

Appendix D

Credit report

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00010375/BAAS17009/18/00012638	J17300 UPC Solar Farm	24/02/2018
Assessor Name	**Report Created**	**BAM Data version ***
Eugene Dodd	02/11/2018	3
Assessor Number		
BAAS17009		

* 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
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			
2	False	2.0	1
3	False	10.0	8
3	True	1.0	1
3	False	1.0	1
2	False	4.0	2
3	False	15.0	11
3	True	2.0	2
3	False	2.0	2
2	False	2.0	1
3	False	6.0	5
3	True	2.0	2
2	False	7.0	4
3	False	1.0	1
2	False	2.0	1
3	False	14.0	11
3	False	2.0	2
2	False	1.0	1
3	False	2.0	2
2	False	1.0	1
3	False	1.0	1
3	True	4.0	4
3	False	5.0	4

BAM Credit Summary Report

			68
1174-Silvertop Stringybark open forest of the New England Tableland Bioregion			
3	False	6.0	5
			5
			73

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00010375/BAAS17009/18/00010391	UPCs New England Solar Farm project	24/02/2018

Assessor Name	Report Created	BAM Data version *
Eugene Dodd	02/11/2018	3

Assessor Number

BAAS17009

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

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

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion								
2	510_planted	33.1	15.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	252
3	510_woodland	11.0	38.2	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
4	510_pasture	11.7	1302.5	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0

							Subtotal	**252**
Silvertop Stringybark open forest of the New England Tableland Bioregion								
1	1174_woodland	27.6	5.7	0.25	High Sensitivity to Potential Gain	1.75		68
							Subtotal	**68**
							Total	**320**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits

Appendix E

EPBC Act protected matters likelihood of occurrence

Table E.1 Likelihood of occurrence assessment – threatened ecological communities

Threatened Ecological Community	EPBC Act status	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands	CE	CE	Negligible	The ecological community occurs in northern NSW in the New England Tablelands. The tree canopy is typically dominated or co-dominated by New England Peppermint. Other associated tree species that may be present, and may be co-dominant are Snow Gum (*Eucalyptus pauciflora*) and Mountain Gum (*Eucalyptus dalrympleana* subsp. *heptantha*). Understorey is made up of a dense, species-rich ground layer of grasses and herbs. Shrubs are typically sparse to absent. This ecological community mostly occupies sites in valley bottoms, flats or lower slopes, often in areas subject to cold air drainage. It may occur on basaltic, granitic or sedimentary substrates.	The species composition of the vegetation within the development site is not consistent with this TEC. The PCT's within the development site are not associated with this TEC.
Upland Wetlands of the New England Tablelands (New England Tableland Bioregion) and the Monaro Plateau (South Eastern Highlands Bioregion)	E	E	Negligible	The ecological community occurs in closed, high altitude topographic depressions that are not connected to rivers or streams. These wetlands occur on undulating, mostly basalt plateau with organic soils, forming in the lagoons, over dark chocolate loam. The distinguishing factor from other similar wetlands is the absence or near absence of peat underlying the vegetation, and the absence of heath through the wetland floor. Associated vegetation of this ecological community includes closed to mi-dense sedgeland and grassland. Deep lagoons tend to have vegetation on shores and shallow reaches whereas shallow wetlands have vegetation across the depression.	The species composition of the vegetation within the development site is not consistent with this TEC. The PCT's within the development site are not associated with this TEC.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	E	Negligible	This ecological community occurs along the western slopes and tablelands of the Great Diving Range through NSW in the New England Tableland. This ecological community can occur either as woodland or derived grassland. The ecological community must be, or have previously been, dominated or co-dominated by one or more of the following overstorey species: White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) or Blakely's Red Gum (*E. blakelyi*). The community must have a predominately native understorey with 12 or more understorey species, shrubs are generally sparse or absent.	The development site contains PCT 510, associated with this TEC. However the vegetation within the development site does not meet the conditions outlined within the EPBC for the TEC. Therefore this TEC does not occur within the development site.

Table E.2 Likelihood of occurrence assessment – threatened flora

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	Rationale
Bertya ingramii	Narrow-leaved Bertya	E	E	Unlikely	This species only occurs on the New England Tablelands of NSW. It grows among rocks or in thin soils close to cliff-edges in dry woodland with She-oak (*Allocasuarina* spp.), Wattle (*Acacia* spp.) and Tea-tees (*Leptospermum* spp.). Flowering occurs from August to November.	The development site lacks suitable cliff-edges with woodland. The development site is highly grazed with small patches of sparse woodland. Suitable habitat is not present. Therefore it is unlikely this species is present within the development site.
Callistemon pungens		V	-	Unlikely	The species occurs from Inverell to the eastern escarpment in New England National Park. It occurs along rocky watercourses usually with sandy granite (or occasionally basalt) creek beds, and generally among naturalised species. Habitats range from riparian areas dominated by *Casuarina cunninghamiana* subsp. *cunninghamiana* to woodland and rocky shrubland. Flowering occurs over spring and summer, mostly in November.	The development site lacks suitable rocky watercourses or sandy creek beds. Watercourses within the development site lack suitable woodland or shrubland and are highly disturbed. This species was not recorded and is unlikely to occur within the development site.
Dichanthium setosum	Bluegrass	V	V	Unlikely	Bluegrass occurs on the New England Tablelands. The species is associated with heavy basaltic black soils and stony red-brown hard-setting loam with clay subsoil. It is often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture. Habitat is generally variously grazed, nutrient-enriched and water-enriched. The species overlaps the TEC White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.	Given this species can occur in disturbed areas and suitable soils types are present, this species has the potential to occur within the development site. This species was not recorded during surveys.
Diuris pedunculata	Small Snake Orchid	E	E	Unlikely	The Small Snake Orchid is confined to north east NSW, mainly found on the New England Tablelands. The species prefers moist areas, and has been found growing in open areas of dry sclerophyll forests with grassy understories, in riparian forests, swamp forests, and in sub-alpine grasslands and herbfields. It is not often found in dense forests or heavily shrubby areas. Soils are well-structure red-brown clay loams, although can also be found on peaty soils, or on shale and trap soils, on fine granite, and among boulders. Flowering occurs during August to October.	The development site is highly disturbed with a poor diversity of forb species. High grazing pressure occurs within the development site and the species is not anticipated to occur due to the highly degraded condition of the development site.

Table E.2 Likelihood of occurrence assessment – threatened flora

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	Rationale
Eucalyptus mckieana	McKie's Stringybark	V	V	Unlikely	The McKie's Stringybark is confined to the drier western side of the New England Tablelands of NSW. It is found in grassy open forest or woodland on poor sandy loams, most commonly on gently sloping or flat sites. It o grows on a range of soil types, including deep clay loams but more commonly on sandy loams. The species overlaps the TEC White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.	The development site is not on the drier western side of the New England Tablelands and therefore is out of the main species distribution, furthermore targeted surveys did not detect the species.
Eucalyptus nicholii	Narrow-leaved Peppermint	V	V	Unlikely	Narrow-leaved Peppermint is sparsely distributed on the New England Tablelands. It occurs in grassy or sclerophyll woodland in association with many other eucalypts that grow in the area. It is often found on shallow soils of slopes and ridges, on infertile soils derived from granite or metasedimentary rock.	Potential habitat for this species occurs within the development site. However targeted surveys did not record the species.
Euphrasia arguta		CE	CE	Unlikely	The species is known in the NSW north western slopes and tablelands. It grows in grassy areas near rivers at elevations up to 700 m above sea level, with an annual rainfall of 600 mm or regrowth vegetation following clearing of a firebreak.	The development site is out of the known range of the species. No suitable understorey vegetation is present. The development site is heavily grazed and disturbed, therefore the species is unlikely to occur within the development site.
Haloragis exalata subsp. *Velutina*	Tall Velvet Sea-berry	V	V	Unlikely	Tall Velvet Sea-berry occurs on the north coast of NSW. It often occurs in damp places near watercourses and in woodland on steep rocky slopes. It is associated with the TEC White Box-Yellow Box-Blakely's Gum Grassy Woodland and Derived Native Grassland.	The development site is highly disturbed as a result of historical grazing. Dams within the development site are highly disturbed, lacking suitable habitat for this species.
Pelargonium sp. *Striatellum*	Omeo Stork's-bill	E	E	Unlikely	Omeo Stork's-bill is known to occur in habitat usually just above the high-water level of irregularly inundated or ephemeral lakes, in the transition zone between surrounding grassland or pasture and the wetland or aquatic communities.	Suitable aquatic vegetation does not occur within the development site. Dams are highly disturbed, lacking suitable understorey vegetation.

Table E.2 Likelihood of occurrence assessment – threatened flora

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	Rationale
Picris evae	Hawkweed	V	V	Unlikely	Hawkweed occurs north of the Inverell area, in the north-western slopes and plains regions. Its main habitat is open Eucalypt forest including a canopy of *Eucalyptus melliodora*, *E. crebra, E. populnea, E. albens, Angophora subvelutina, Allocasuarina torulosa* , and/or *Casuarina cunninghamiana* with a *Dichanthium* grassy understory. Commonly found on soils of black, dark grey or red-brown and reddish clay-loam or medium clay soils. Flowering occurs between October to January. Collection have been made along roadsides and in cultivated areas, such as paddocks.	The developed site contains potential suitable habitat for Hawkweed. However the development site is heavily grazed and disturbed. The species was not recorded during targeted surveys.
Thesium australe	Austral Toadflax	V	V	Unlikely	Austral Toad-flax is found in very small populations scattered across eastern NSW. It occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. It is often found in associated with Kangaroo Grass (*Themeda australis*).	The development site is highly degraded lacking suitable groundcover for this species. It is therefore unlikely this species will occurring with the development site, considering heavy grazing and pasture modification.

Notes: 1. EPBC and BC Act status: CE- critically endangered, E – endangered

Table E.3 Likelihood of occurrence assessment – threatened fauna

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
Birds						
Anthochaera Phrygia	Regent Honeyeater	CE	CE	Potential	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. These birds are also found in drier coastal woodlands and forests in some years. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany (*Eucalyptus robusta*) and Spotted Gum (*Corymbia maculata*) forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast.	The development site is considered to contain suboptimal foraging habitat for the Regent Honeyeater. It is considered the species could potentially occur. Refer to the assessment of significance for the Regent Honeyeater (Appendix F).
Calidris ferruginea	Curlew Sandpiper	CE	E	Unlikely	The Curlew Sandpiper is distributed around most of the Australian coastline, particularly in the Hunter Estuary within NSW. It mainly occurs on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters.	The development site does not contain suitable wetland or estuarine habitat. Dams within the development are highly degraded, lacking suitable vegetation. It is unlikely this species occurs within the development site.
Erythrotriorchis radiatus	Red Goshawk	V	CE	Unlikely	The Red Goshawk is endemic to Australia, sparsely distributed through northern and eastern Australia. It inhabits open woodland and forest, preferring a mosaic of vegetation types, large populations of birds (prey), and permanent water. They are often found in riparian habitats along or near watercourses or wetlands. Preferred habitats include mixed subtropical rainforest, *Melaleuca* swamp forest and riparian *Eucalyptus* forest of coastal rivers. Nests are made in tall trees within 1 km of a watercourse or wetland.	The development site does not contain suitable permanent watercourses with suitable vegetation layers including mid-storey and understorey species.

Table E.3 Likelihood of occurrence assessment – threatened fauna

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
Grantiella picta	Painted Honeyeater	V	V	Potential	The species is sparsely distributed from south-eastern Australia to north-western Queensland, with its greatest concentrations and breeding locations occurring on the inland slopes of the Great Dividing Range in NSW. It inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of Black Box (E. largiflorens) and River Red Gum (E. camaldulensis), Box-Ironbark-Yellow Gum woodlands, Acacia-dominated woodlands, Paperbarks, Casuarina, Callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips although it breeds in quite narrow roadside strips if ample mistletoe fruit is available.	The development site is considered to contain suboptimal habitat for the Painted Honeyeater. It is considered the species could potentially occur. Refer to the assessment of significance for the Painted Honeyeater (Appendix F).
Lathamus discolour	Swift Parrot	CE	E	Potential	The Swift Parrot breeds in Tasmania during spring and summer, then migrates in the autumn and winter months to south-eastern Australia. In NSW, it mostly occurs on the coast and south-west slopes in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood (*C. gummifera*), Mugga Ironbark and White Box. Commonly used lerp infested trees include Inland Grey Box, Grey Box (*E. moluccana*) and Blackbutt (*E. pilularis*).	The development site is considered to contain suboptimal habitat for the Swift Parrot. It is considered the species could potentially occur. Refer to the assessment of significance for the Swift Parrot (Appendix F).
Rostratula australis	Australian Painted-snipe	E	E	Unlikely	The Australian Painted Snipe is restricted to Australia, most records from the south east, particularly the Murray Darling Basin. The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. The species also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Nests are made on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	The development site does not contain suitable wetland habitat. Dams are highly degraded lacking understorey vegetation. Therefore it is unlikely this species occurs within the development site.

Table E.3 Likelihood of occurrence assessment – threatened fauna

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
Frogs						
Litoria castanea	Yellow-spotted Tree Frog	E	CE	Unlikely	The Yellow-spotted Tree Frog is known from the New England Tableland. The species requires large permanent ponds or slow flowing 'chain-of-ponds' streams with abundant emergent vegetation such as bulrushes and aquatic vegetation. During breeding season, males call at night from the open water. During autumn and winter the Yellow-spotted Tree Frog shelters under fallen timber, rocks, other debris or thick vegetation.	The development site is highly degraded due to historical grazing. Ponds within the development site lack necessary aquatic vegetation and understorey vegetation. As such, this species is considered unlikely to occur within the development site.
Mammals						
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Unlikely	In NSW this species has been recorded from a large range of vegetation types including: dry and wet sclerophyll forest; Cyprus Pine (Callitris glauca) dominated forest; tall open eucalypt forest with a rainforest sub-canopy; sub-alpine woodland; and sandstone outcrop country. The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging.	The development site does not contain suitable roosting habitat, lacking caves and sandstone cliffs. Vegetation within the development site is sparse and scattered, lacking suitable vegetation cover. Therefore it is unlikely the species occurs within the development site.
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	E	V	Unlikely	This species has been recorded from a wide range of habitats, including: coastal heathlands, open and closed eucalypt woodlands, wet sclerophyll and lowland forests (OEH, 2017l). Unlogged forest or forest that has been less disturbed by timber harvesting is preferable. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rocky outcrops or caves. Individuals require an abundance of food, such as birds and small mammals, and large areas of relatively intact vegetation through which to forage. Home ranges are estimated to be 620–2,560 ha for males and 90–650 ha for females.	The development site does not contain any suitable den habitat for the Spotted-tailed Quoll. The development site is highly disturbed with severe grazing. No suitable den sites were observed during the surveys.

Table E.3 Likelihood of occurrence assessment – threatened fauna

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	Unlikely	Inhabits a variety of vegetation types, including mallee, Bull Oak and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Roosts in tree hollows, crevices, and under loose bark. A slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground. The species has also been found to be much more abundant in habitats that have a distinct tree canopy and a dense, cluttered understorey layer.	Corben's Long-eared Bat requires dense vegetation within woodlands with a distinct tree canopy. The development site does not contain suitable mid storey or understorey within the sparse patches of woodlands. The development site is highly degraded due to grazing with patches of woodland. It is unlikely the species will occur within these patches as key habitat features are missing.
Petauroides volans	Greater Glider	V	-	Unlikely	The Greater Glider is restricted to eastern Australia. The Greater Glider is an arboreal nocturnal marsupial largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. During the day it shelters in tree hollows, with a particular selection for large hollows in large, old trees.	The Greater Glider is unlikely to occur within the development site as they favour moist eucalypt forests with dense cover and old trees. The development site is highly degraded and grazed lacking vegetation cover and large patches of suitable eucalypt forest. As such, this species is considered unlikely to occur within the development site.

Table E.3 Likelihood of occurrence assessment – threatened fauna

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
Petrogale penicillata	Brush-tailed Rock-wallaby	V	E	Unlikely	In NSW the Brush-tailed Rock Wallaby occurs from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. This species occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. The Brush-tailed Rock Wallaby browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. The Brush-tailed Rock Wallaby is most active at night, spending day time sheltering/basking in rock crevices, caves and overhangs.	The development site lacks rocky escarpments and cliffs with complex structures. Vegetation within the development site is highly disturbed by grazing, lacking shrubs and dense understorey. Therefore it is unlikely the Brush-tailed Rock-wallaby is present within the development site.
Phascolarctos cinereus	Koala	V	V	Unlikely	The Koala has a fragmented distribution throughout eastern Australia. Within NSW it mainly occurs on the central and north costs with some populations in the west of the Great Diving Range. Koalas inhabit a range of temperate, sub-tropical and topical forest, woodland and semi-arid communities dominated by Eucalypt species (DoEE 2012). Koalas feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (OEH 2018). Distribution is affected by altitude, temperature and leaf moisture.	The development site contains one primary food tree, Ribbon Gum (*Eucalytpus viminalis*). This eucalypt species is restricted to planted windrows and was typically found in a stunted and poor condition. Food trees are not in dense patches of vegetation and occur sparsely throughout the development site. Targeted surveys were conducted for the Koala concluding no records of the species within the development site.
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Unlikely	The Grey-headed Flying-fox is generally found within 200 km of the eastern coast of Australia. They occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. This species feeds on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia*, and fruits of rainforest trees and vines.	Tree habitat within the development site is limited to open woodland and planted eucalypt vegetation. Woodlands within the development site are sparse, lacking areas of dense vegetation. No roosts were observed during surveys. As such, this species is considered unlikely to occur within the development site.

Table E.3 Likelihood of occurrence assessment – threatened fauna

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
Reptiles						
Uvidicolus sphyrurus	Border Thick-tailed Gecko	V	V	Unlikely	The Border Thick-tailed Gecko is found only on the tablelands and slopes of northern NSW and southern Queensland. The species is most common in the granite country of the New England Tablelands. This species often occurs on steep rocky or scree slops, especially granite. Favouring forest and woodland areas with boulders, rock slabs, fallen timber and deep leaf litter. Commonly found in areas which often have a dense tree canopy, helping create a sparse understorey. The Border Thick-tailed Gecko is active during the night, sheltering by day under rock slabs, in or under logs, and under the bark of standing trees.	The development site lacks suitable dense vegetation for the Border Thick-tailed Gecko. The development site is highly disturbed from historical grazing, missing sufficient understorey and leaf litter. As such, this species is considered unlikely to occur within the development site.
Wollumbinia belli	Bell's Turtle	V	-	Unlikely	Within NSW, the species is found in the upper reaches of the Namoi, Gwydir and MacDonald Rivers on the North West Slopes. The Bell's Turtle inhabits narrow sections of rivers in granite country, preferring shallow to deep pools in upper reaches or small tributaries of major rivers. Favoured pools are generally less than 3 m deep, where there is a sandy or rocky substrate with small patches of weed. Much of the species habitat is now in grazing land where introduced willow trees grow alongside gum trees on the river banks. Nests are dug out in riverbanks of sand or loam between September and January.	The development site does not contain suitable aquatic habitat for the species. Nearby watercourses are outside of the known catchments where this species occurs. As such, this species is considered unlikely to occur within the development site.

Table E.3 Likelihood of occurrence assessment – threatened fauna

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference	Rationale
Fish						
Maccullochella peelii	Murray Cod	V	-	Unlikely	The Murray Cod is endemic to the Murray-Darling River system in south-eastern Australia. It occurs in a range of flowing and standing waters, from small, clear rocky streams on the inland slopes and uplands of the Great Dividing Range, to the large turbid, meandering slow-flowering rivers, creeks, anabranches, and lakes and larger billabongs, of the inland plains of the Murray Darling Basin. Within these habitats they are often associate with complex structural cover such as large rocks, large snags and smaller structural woody habitat, undercut banks and over-hanging vegetation.	The development site is outside mapped habitat for the species. No suitable aquatic habitat is present within the development site. As such, this species is considered unlikely to occur within the development site.

Notes: 1. EPBC and BC Act status: CE- critically endangered, E – endangered, V – vulnerable

Table E.4 Likelihood of occurrence assessment – migratory species

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	
Migratory Marine Birds						
Apus pacificus	Fork-tailed Swift	Mi, M	-	Potential	The Fork-tailed Swift has been recorded in all regions within NSW. Many records occur east of the Great Divide, however some populations have been found west. The Fork-tailed Swift is almost exclusively aerial. Within Australia they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands. Habitats include riparian woodland and tea-tree swamps, low scrub and heathland or saltmarsh. Sometimes they can occur above rainforests, wet sclerophyll forest or open forest.	The species does not breed within Australia. The cleared patches of woodland do not contain understorey or mid-storey suitable for roosting habitat. Sub-optimal foraging habitat occurs within the development site; therefore the species could potentially occur. Refer to the assessment of significance (Appendix F).
Migratory Terrestrial Species						
Hirundapus caudacutus	White-throated Needletail	Mi, M	-	Potential	The White-throated Needletail is widespread in eastern and south-eastern Australia. In NSW this species extends inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. In Australia, the White-throated Needletail is almost exclusively aerial, recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland.	The species does not breed within Australia. The cleared patches of woodland do not contain understorey or midstorey suitable for roosting habitat. Sub-optimal foraging habitat occurs within the development site; therefore the species could potentially occur. Refer to the assessment of significance (Appendix F).
Monarcha melanopsis	Black-faced Monarch	Mi, M	-	Unlikely	The Black-faced Monarch occurs around the eastern slopes and tablelands of the Great Divide. It mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland and warm temperate rainforest. It is also found in nearby open eucalypt forests, including in gullies with a dense, shrubby understorey as well as in dry sclerophyll forests and woodlands, often with a patchy understorey.	The development site is highly disturbed lacking suitable dense shrubby forests. Eucalypt woodlands are sparse within grazed paddocks. As such, this species is considered unlikely to occur within the development site.

Table E.4 Likelihood of occurrence assessment – migratory species

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	
Motacilla flava	Yellow Wagtail	Mi, M	-	Unlikely	This species occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra.	Dams within the development site are highly degraded, no understorey vegetation is present. As such, this species is considered unlikely to occur within the development site.
Myiagra cyanoleuca	Satin Flycatcher	Mi, M	-	Unlikely	The Satin Flycatcher is widespread in eastern Australia and vagrant to New Zealand. Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands. They also occur in eucalypt woodlands with open understorey and grass grund cover, and are generally absent from rainforest. The species is mainly recorded in eucalypt forests dominated by Brown Barrel (*Eucalypt fastigata*), Mountain Gum (*E. Dalrympleana*), Mountain Grey Gum, Narrow-leaved Peppermint, Messmate or Manna Gum, or occasionally Mountain Ash (*E. Regnans*). Such forests usually have a tall shrubby understorey of tall acacias, for example Blackwood (*Acacia melanoxylon*) .	The development site is highly degraded due to historical grazing. The development site is not suitable for the Satin Flycatcher as it lacks mid storey and understorey vegetation. As such, this species is considered unlikely to occur within the development site.
Rhipidura rufifrons	Rufous Fantail	Mi, M	-	Unlikely	In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns.	The development site is highly degraded due to historical grazing. The development site does not contain suitable wet sclerophyll forests or dense vegetated understorey. As such, this species is considered unlikely to occur within the development site.

Table E.4 Likelihood of occurrence assessment – migratory species

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	
Migratory Wetlands Species						
Actitis hypoleucos	Common Sandpiper	Mi, M	-	Unlikely	The Common Sandpiper is found along all coastlines of Australia and in many areas inland. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper forages in shallow water and on bare soft mud at the edges of wetlands. Roosting sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species is also associated with mangroves, and sometimes found in areas of mud littered with rocks or snags.	The development site lacks suitable wetlands habitat. The development site is highly degraded due to historical grazing, lacking suitable vegetation for roosting. As such, this species is considered unlikely to occur within the development site.
Calidris acuminata	Sharp-tailed Sandpiper	Mi, M	-	Unlikely	The Sharp-tailed Sandpiper spends its non-breeding season in Australia. During this time the species is widespread along much of the coast and is very sparsely scattered inland, particularly in central and south-western regions. Within Australia the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast. They also use flooded paddocks, sedgelands and other ephemeral wetlands. Roosting occurs at the edges of wetlands, on wet open mud or sand, in shallow water or in sparse vegetation.	The development site is highly degraded, lacking suitable wetland habitat for the Sharp-tailed Sandpiper. The sick lacks understorey as a result of grazing. As such, this species is considered unlikely to occur within the development site.
Calidris ferruginea	Curlew Sandpiper	CE, Mi, M	-	Unlikely	Mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters.	The development site is outside mapped habitat for the species. No suitable aquatic habitat is present within the development site. Dams are highly degraded and no optimal foraging habitat is within the development site. As such, this species is considered unlikely to occur within the development site.

Table E.4 Likelihood of occurrence assessment – migratory species

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	
Calidris melanotos	Pectoral Sandpiper	Mi, M	-	Unlikely	The Pectoral Sandpiper prefers shallow fresh to saline wetlands. It is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. They forage in shallow water or soft mud at the edge of wetlands.	The development site is highly degraded and lacks suitable wetland habitat for the Pectoral Sandpiper. As such, this species is considered unlikely to occur within the development site.
Gallinago hardwickii	Latham's Snipe	Mi, M	-	Unlikely	Latham's Snipe extends inland over the eastern tablelands in south-eastern Queensland and to west of the Great Dividing Range in NSW. Within Australia it occurs in permanent and ephemeral wetlands, usually favouring open, freshwater wetlands with low, dense vegetation. They also occur in habitats with saline or brackish water, in modified or artificial habitats and areas located close to humans. It occurs in temperate and tropical regions of Australia. Foraging occurs in areas of mud and some form of cover. Roosting occurs on the ground near foraging areas, usually in sites providing some ditches or plough marks, among boulders or in shallow water.	The development site is highly degraded. The development site lacks dense vegetation due to historical grazing. As such, this species is considered unlikely to occur within the development site.
Pandion haliaetus	Osprey	Mi, M		Unlikely	The Osprey is found right around the Australian coastline, common around the northern coast on rocky shorelines, islands and reefs. The species favours coastal areas, especially the mouths of large rivers, lagoons and lakes. The Osprey occurs in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia. They require extensive areas of open fresh, brackish or saline water for foraging.	The development site is outside mapped habitat for the species. No suitable aquatic habitat is present within the development site. Dams are highly degraded. As such, this species is considered unlikely to occur within the development site.

Table E.4 Likelihood of occurrence assessment – migratory species

Scientific name	Common name	EPBC Act status[1]	BC Act status[2]	Likelihood of occurrence	Habitat preference and rationale	
Tringa nebularia	Common Greenshank	Mi, M		Unlikely	The Common Greenshank has been recorded within NSW in most coastal regions. It is widespread west of the Great Dividing Range. The species is found in a variety of inland wetlands and sheltered coastal habitats, varying in salinity. Habitats include embayments, harbours, river estuaries, deltas and lagoons. The edges of the wetlands occupied are generally of mud or clay, occasionally of sand, and may be bare of with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves .	The development site is highly degraded, lacking suitable understorey vegetation for the Common Greenshank. As such, this species is considered unlikely to occur within the development site.

Notes: 1. EPBC and BC Act status: CE- critically endangered, Mi – migratory, M – marine.

Appendix F

EPBC Act Assessments of Significance

This section includes an assessment of the potential direct and indirect impacts of the proposed action on MNES. The direct impact of the project is the clearance of vegetation. The impact assessment for this project assumes complete disturbance/removal of:

- 38.2 ha of vegetation (Box Gum Grassy Woodland containing occasional Yellow Box trees) and 275 Paddock Trees which represents potential foraging habitat for the Regent Honeyeater, Swift Parrot, and Painted Honeyeater; and
- a development site of 2,784 ha which provides potential foraging habitat for the Fork-tailed swift and White-throated Needletail.

The following section provides the criteria that must be considered in the assessment of all threatened species listed under the EPBC Act.

F.1 Significance impact guidelines

In determining the significance of impact associated with the project, the relevant criteria listed in the *Matters of National Environmental Significance – Significance Impact Guidelines 1.1* (DoE) dated 2013 was applied. This assessment has been undertaken for the following MNES values:

- critically endangered species: Regent Honeyeater and Swift Parrot;
- vulnerable species: Painted Honeyeater; and
- migratory species: Fork-tailed swift and White-throated Needletail.

F.1.1 Significant impact criteria for critically endangered and endangered species

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population;
- reduce the area of occupancy of the species;
- fragment an existing population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of a population;
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;
- introduce disease that may cause the species to decline; or
- interfere with the recovery of the species.

F.1.2 Significant impact criteria for vulnerable species

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;
- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

F.1.3 Significant impact criteria for migratory species

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species
- result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
- seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

F.2 Assessments of significance

Significant impact assessments have been prepared for species listed under the EPBC Act, in accordance with the criteria above.

F.2.1 Regent Honeyeater (*Anthochaera phrygia)* – critically endangered

The Regent Honeyeater (*Anthochaera phrygia*) is endemic to mainland south-east Australia and is listed as a critically endangered species under the EPBC Act. The species has an extremely patchy distribution which extends from south-east Queensland, through New South Wales and the Australian Capital Territory, to central Victoria. However, it is highly mobile, occurring only irregularly in most sites, and in variable numbers, often with long periods with few observations anywhere.

Within the current distribution, there are four known key breeding areas where the species is regularly recorded. These are the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria (DoE 2016). The project is closest to the Bundarra-Barraba breeding area. The eastern-most point of the Bundarra-Barraba breeding area is approximately 22 km north-east of the development site.

The species typically nest in the canopy of mature trees with rough bark, e.g. ironbarks, sheoaks (*Casuarina*) and rough-barked Apple (*Angophora*). A cup-shaped nest is constructed in which two to three eggs are laid. Nests may be near or far from food resources; one nest has been recorded 700 m from a resource tree (Geering & French, 1998, cited in DoE 2016). Pairs now mostly nest solitarily, but historical records show in the past they often nested in loose aggregations (DoE 2016).

The Regent Honeyeater comprises a single population, with some exchange of individuals between regularly used areas (Garnett et al. 2011 cited in DoE 2016). The species can undertake large-scale nomadic movements in the order of hundreds of kilometres (OEH 2017c). Despite the ability of this species to migrate over large area it is likely that many historically used areas are no longer utilised due to the loss of important foraging habitat or habitat fragmentation resulting in the inability of regent honeyeaters to access these areas and because the areas have been colonised by larger more aggressive honeyeaters, such as the noisy miner.

There are no records of this species within the development site, with two records occurring adjacent to one another, approximately 8 km to the north east of the development site. These are from within the Imbota nature reserve and dated from 1984 and 2000. The next closest records are the City of Armidale approximately 10 km to the north. More broadly, very few records are found within the locality of the development site, likely due to the over-cleared and agricultural landscape.

The species often inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes, targeting those which flower most profusely. Key eucalypt species identified in the National Recovery Plan for the Regent Honeyeater (DoE 2016) comprise Mugga Ironbark (*Eucalyptus sideroxylon*), Yellow Box (*E. melliodora*), White Box (*E. albens*), Yellow Gum (*E. leucoxylon*), Spotted Gum , Swamp Mahogany (*E. robusta*), Needle-leaf Mistletoe (*Amyema cambagei*) which grows on River Oak (*Casuarina cunninghamiana*), Box Mistletoe (*A. miquellii*) and Long-flower Mistletoe (*Dendropthoe vitellina*). Other tree species may be regionally important. For example the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events of Regent Honeyeaters. Flowering of associated species such as Thin-leaved stringybark (*E.* eugenioides), other stringybark species, and Broad-leaved Ironbark (*E.fibrosa*) can also contribute important nectar flows at times.

The species has the potential to fly over or utilise seasonal foraging resources within the development site on a transient basis. Table F.1 provides an assessment of significance for the removal of 38.2 ha of potential foraging habitat in accordance with the relevant assessment criteria (Section F.1.1).

Table F.1 Assessment of significance for the Regent Honeyeater

Criteria	Discussion
1: long-term decrease in population size	The Regent Honeyeater occurs as a single, contiguous population (DoE 2016). An action that would lead to a long-term decrease of the Regent Honeyeater population would be one that is undertaken in a breeding area, or one that removes important foraging habitat. As the proposed action is not located in a known breeding area for the species, it is not expected to result in a long-term decrease in population size. The development site includes Yellow Box, identified as a key eucalypt species in the National Recovery Plan for the Regent Honeyeater (DoE 2016). However, potential foraging is likely to be limited owing to the relatively low dominance of the species within the landscape and the small patches of sparse woodland present overall, which would require the species to fly large distances between trees to forage. It is unlikely that the species is reliant on foraging resources within the development site, nor are any substantial numbers of the species likely to occur within the development site. As such, there is not likely to be any population level impacts.
2: reduce area of occupancy	The Regent Honeyeater has not been recorded within the development site, with very occasional records in the surrounding locality; most of them historic and all in excess of an 8 km radius. The species is considered having potential to occur based on the presence of a key feed tree species, Yellow Box. The foraging habitat is considered sub-optimal based on the low densities of the species occurring. A total of 38.2 ha of potential (sub-optimal) foraging habitat will be removed, which if utilised by the species is only likely to occur on a transient basis. It is unlikely that the loss of a small area of sub-optimal foraging habitat will significantly reduce the occupancy of the species. The development site is not likely to contain breeding habitat and is not within any key breeding area, as identified in the recovery plan. The impact of the project on the occupancy of this species is considered negligible.
3: fragment a population	The Regent Honeyeater occurs as a single, contiguous population (DoE 2016). This species is highly mobile and able to cross open areas in order to exploit seasonal foraging resources. The development site exists within a highly cleared landscape with very poor existing landscape connectivity. If the species is already able to persist in such an over-cleared landscape it is unlikely that the loss small patches of woodland (totalling 38.2 ha) will cause any effect of the ability of this species to move across the landscape.

Table F.1 Assessment of significance for the Regent Honeyeater

Criteria	Discussion
4: adversely affect critical habitat	Habitat critical to the survival of the Regent Honeyeater includes, any breeding or foraging habitat in areas where the species is likely to occur (as defined in Figure 1 of the National Recovery Plan (DoE 2016)); and any newly discovered breeding or foraging locations. The development site is located over 22 km from the Bundarra-Barraba breeding area and is not listed within any of the associated subsidiary areas as listed in the Recovery Plan (DoE 2016). The species is known to utilise Rough-barked Apple, which occurs within the development site, for nest construction, however it is unlikely that the development site would be selected for breeding, owing to lack of shelter and the sparse foraging resources. Most records of regent honeyeaters come from box-ironbark eucalypt associations, where the species seems to prefer more fertile sites with higher soil water content, including creek flats, broad river valleys and lower slopes. A single key tree species listed in the recovery plan, Yellow Box, occurs within the development site. This species is scattered through the development site in low densities, typically only remaining on slopes and low ridgelines, with the most fertile areas completely cleared. The foraging habitat is considered poor, due to the sparse nature of the trees within the predominately cleared landscape. The large distance between trees would make foraging energetically inefficient and the lack of any shelter between paddock trees would likely leave the species vulnerable to competitive exclusion from Noisy Miner (*Manorina melanocephala*). If the Regent Honeyeater occurs within the project are it is likely to be an occasional occurrence. Furthermore it is likely to be a transient occurrence, whilst seeking more optimal areas of foraging habitat such as movements between coastal foraging areas and the Box-Ironbark communities on the western slopes. It is unlikely that the species is reliant on foraging resources within the development site, nor are any substantial numbers of the species likely to occur within the development site. Therefore, the project will not affect any habitat critical to the survival of the Regent Honeyeater.
5: disrupt the breeding cycle of a population	The development site is not within a known breeding area for the species, with the closest key breeding area, the Bundarra-Barraba, 22 km to the north east. Considering that foraging habitat within the development sites is sub-optimal at best and that there are no optimal areas of foraging habitat immediately adjacent to the development site, it is unlikely that the species would select the area for breeding. The energetic expenditure of foraging across large areas to supply enough food to raise chicks is likely to be prohibitive to breeding. Furthermore the sparse, thinned and patchy woodland, with a complete absence of any small trees or shrubs is unlikely to provide sufficient protection for chicks from the aggressive Noisy Miner, which is listed as key threatening process. The woodland within development site is not likely to be important in enabling the species to reach breeding condition given the sub-optimal nature of the foraging habitat. The project is not anticipated to have any impact on the breeding cycle of the Regent Honeyeater, considering that breeding is not likely to occur and foraging resources are considered unimportant for species.
6: decrease availability or quality of habitat	The species has not been recorded within the development site and if it does occur, it is likely to be on a transient basis only, passing through to more optimal areas of foraging habitat. With the majority of Box-Gum woodland areas avoided by iterative design, the clearance of 38.2 ha of sub-optimal foraging habitat is not likely to cause any discernible impact to the species, and the species will remain largely unaffected by the project.
7: result in invasive species	Without management, the increased machinery required during the construction of the project, has the potential to introduce novel weeds to the area. Weed control protocols will be undertaken in accordance with a construction and environmental management plan (CEMP), in order to minimise this risk. Currently there are few habitat values in the development site, relevant to the Regent Honeyeater, which are likely to be impacted by invasive species. For example, potential foraging resources are limited to remnant trees, with no recruitment occurring owing to grazing and management practices. Weed invasion would not result in any increased completion as there is no regeneration occurring.

Table F.1 Assessment of significance for the Regent Honeyeater

Criteria	Discussion
8: introduce disease	This species is not known to be particularly susceptible to disease and the project will not introduce any disease relevant to the Regent Honeyeater.
9: interfere with recovery	The recovery of the Regent Honeyeater is closely linked the extent and quality of habitat, and recovery actions include the protection of intact (high quality) areas of Regent Honeyeater breeding and foraging habitat (DoE 2016). The development site is not within a known breeding or foraging area, and is unlikely to provide breeding habitat. The development site cannot be considered intact either, given that it is highly fragmented with small patches of sparse Box Gum woodland present and paddock trees. Although the habitat within the development site to be removed provides a potential foraging resource; it is not considered high quality as the key eucalypt feed species, Yellow Box, is sparely distributed across the landscape and does not occur in fertile valley areas, which are typically the most productive. The potential habitat to be removed is small in area and at best, will only be utilised transiently basis. Therefore it is unlikely that any individuals are reliant on the habitat and its removal will have no impact on the recovery of the species.
Conclusion	The project is unlikely to have a significant impact on the Regent Honeyeater as: • the development site is not within a known breeding area, and does not provide optimal breeding habitat for the species; and • if the species does occur, it is likely to be on a transient basis only, passing through to more optimal areas of foraging habitat.

F.2.2 Swift Parrot (*Lathamus discolor*) – critically endangered

The Swift Parrot (*Lathamus discolor*) is listed as a critically endangered species under the EPBC Act. This species migrates from its Tasmanian breeding grounds to south-eastern Australia in the autumn and winter months. In NSW, the species mostly occurs on the coast and south-west slopes in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations (OEH 2017). The species is not typically associated with the northern tablelands of NSW and detailed information within the national recovery plan (Saunders and Tzaros 2011) regarding regional distributions, is largely restricted to the Western Slopes and coastal areas.

Records of the Swift Parrot are largely absent from the southern and eastern portions of the Northern Tablelands, with a single record existing within a 10 km radius of the development site. This record was within the Imbota Nature Reserve, approximately 8 km north-east of the development site.

Favoured feed trees in NSW include Grey Box (*Eucalyptus microcarpa*), Yellow Box (*E. melliodora*), Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Blackbutt (*E. pillularis*), Mugga Ironbark (*E. sideroxylon*), and White Box (*E. albens*).

The Swift Parrot is not considered to be dependent on habitat in the development site and optimal habitat is likely to include areas with a higher density of larger preferred feed trees. However, the species has been assessed as having the potential to occur given the presence of feed trees identified in the species recovery plan (Birds Australia 2011).

A total of 38.2 ha of Box Gum woodland containing Yellow Box, a favoured feed tree, will be removed as part of the project. Table F.2 provides an assessment of significance for the removal of this potential foraging habitat, in accordance with the relevant assessment criteria (Section C.1.1).

Table F.2 Assessment of significance for the Swift Parrot

Criteria	Discussion
1: long-term decrease in population size	Foraging habitat is largely limited to sparse Yellow Box trees existing within a largely cleared agricultural landscape. It unlikely that the species would preference the area for foraging given the energetic expenditure of moving large distances between trees. Furthermore the sparse, thinned and patchy woodland, with a complete absence of any small trees or shrubs is unlikely to provide sufficient protection from the aggressive Noisy Miner. It is unlikely that the species is reliant on foraging resources within the development site, nor are any substantial numbers of the species likely to occur within the development site. Further, the species does not breed on mainland Australia, and hence there is no potential for breeding habitat to be impacted. As such, there is not likely to be any population level impacts.
2: reduce area of occupancy	A total area of 38.2 ha of sub-optimal potential foraging habitat will be removed as a result of the project. This species is wide ranging foraging within much of south east NSW, typically occurring in areas where profuse flowering of feed trees is occurring. It is unlikely that the loss of 38.2 ha of poor quality foraging habitat will significantly reduce the occupancy of the species. The species has not previously been recorded within the development site, with very sparse records existing within the region.
3: fragment a population	This species exists as a single population, is highly mobile and is able to cross open areas. The loss of 38.2 ha of potential foraging habitat, which occurs in an already highly fragmented landscape, will not cause any significant fragmentation effects.
4: adversely affect critical habitat	Habitats of particular importance to the Swift Parrot are outlined in the recovery plan for the species (Saunders 2011); including: • for nesting; • by large proportions of the Swift Parrot population; • repeatedly between seasons (site fidelity), or • for prolonged periods of time (site persistence). As the development site is within mainland Australia, there is no potential for nesting occur. The species has not been recorded within the p development site, with a single historical record existing within the locality (10 km buffer of the development site). There is no evidence of prolonged occurrence, repeat use or large number of the species occurring within the development site or surrounding locality. Furthermore the only feed tree, Yellow Box, exists as scattered trees. Therefore, the project will not affect any habitat critical to the survival of the Swift Parrot.
5: disrupt the breeding cycle of a population	The Swift Parrot breeds within Tasmania and has no potential to breed within the development site.
6: decrease availability or quality of habitat	The species has not been recorded within the development site and if it does occur is likely to be on a transient basis only, passing through to more optimal areas of foraging habitat. The Swift Parrot is not considered to be dependent on habitat in development site and the clearance of 38.2 ha of sub-optimal foraging habitat is not likely to cause any discernible impact to the Swift Parrot, and the species will remain largely unaffected by the project.

Table F.2 Assessment of significance for the Swift Parrot

Criteria	Discussion
7: result in invasive species	Weed invasion impacting on habitat regeneration and health, and aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners are two key threats that invasive species pose on the Swift Parrot. Noisy Miners are already abundant within the development site and likely to be a resident feature in the highly cleared landscape. The project is not anticipated to exacerbate the occurrence of Noisy Miners however. Without management, the increased machinery required during the construction of the project, has the potential to introduce novel weeds to the area. Weed control protocols will be undertaken in accordance with a construction and environmental management plan (CEMP), in order to minimise this risk. Currently there are few habitat values in the development site, relevant to the Swift Parrot, which are likely to be impacted by invasive species. For example, potential foraging resources are limited to remnant trees, with no recruitment currently occurring owing to grazing and management practices. Weed invasion would not result in any increased completion as there is no regeneration occurring.
8: introduce disease	This species is vulnerable to Psittacine Beak and Feather Disease however the proposed activity does not play a role in the introduction of this threat.
9: interfere with recovery	The key action within the recovery plan for the Swift Parrot (Saunders 2011), which is relevant to the project, is the management and protection of Swift Parrot habitat at the landscape scale. The habitat within the development site is unlikely to be important for this species and there is expected to be no impact on its recovery as the result of the project.
Conclusion	It is unlikely that the species is reliant on foraging resources within the development site. Therefore, the habitat to be removed is unlikely to be important for the species and the project is not anticipated to have a significant impact on the Swift Parrot.

F.2.3 Painted Honeyeater (*Grantiella picta*) – Vulnerable

The Painted Honeyeater is endemic to Australia, ranging from north-eastern South Australia, through Victoria and New South Wales, and up to north-western Queensland and eastern Northern Territory (DoE 2015). Many of the species move to semi-arid regions after breeding season. The species is considered to have a single population (DoE 2015).

The Painted Honeyeater occurs within eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks casuarinas, callitris, and trees on farmland. Mistletoe is one of the key factors for the species habitat as their diet mainly consists of mistletoe fruits. However they also feed on nectar from flowering eucalypts, as well as arthropods (DoE 2015). Favoured habitat is generally woodlands with higher numbers of mature trees containing mistletoes. The Painted Honeyeater is more commonly known to occur in wider blocks of remnant woodland rather than in narrow strips (DoE 2015).

Breeding occurs between October to March, within vegetation where mistletoe prevalence is high. Nests are made from plant-fibre, particularly mistletoe, spiders' webs and rootlets. Nests are placed in the outer foliage of trees, and can sometimes be found in narrow roadside strips of vegetation where mistletoe fruit is available (DoE 2015).

Key threats to the Painted Honeyeater include clearing of breeding habitat, particularly in box-ironbark and boree woodlands. Grazing on private land inhabits tree recruitment, ultimately resulting in an uneven age structure of mistletoe host trees leading to the depletion of them. The presence of invasive species also affects the Painted Honeyeater, including competition with the Noisy miner (*Manorina melanocephala*), predation by the Black rat (*Rattus rattus*). Other threats include collision with road vehicles, decline in habitat trees through pasture activities and nest predation by other birds such as Pied Currawongs (*Strepera graculina*), pied and grey butcherbirds (*Cracticus nigrogularis* and *Cracticus torquatus*), and crows and ravens (*Corvidae*). Degradation of habitat by infestation of weeds is also a threat to the Painted Honeyeater (OEH 2017c).

The Painted Honeyeater has the potential to fly over the development site or utilise scarce foraging resources infrequently. Table F.3 provides an assessment of significance for the removal of 38.2 ha of potential foraging habitat in accordance with the relevant assessment criteria (Section F.2.31).

Table F.3 Assessment of significance for the Painted Honeyeater

Criteria	Discussion
1: long-term decrease in population size	The Painted Honeyeater occurs as a single, contiguous population (DoE 2015). An action that would lead to long-term decrease of the population would be one within breeding area or removing important foraging habitat. The Painted Honeyeater requires mistletoe for breeding and foraging habitat. Considering mistletoe is largely absent within the development site, it is considered that the development site does not contain breeding habitat as the species largely relies on the abundance of mistletoe. The development site contains cleared patches of woodland with sub-optimal roosting and foraging habitat. These sparse patches are within heavily grazed agricultural areas, lacking mid storey and understorey vegetation. The development site will remove a total of 2.9 ha of sub-optimal roosting and foraging habitat. The development site does not contain important roosting or breeding habitat for the Painted Honeyeater. It is unlikely the isolated patches of woodland within the development site are favourable or necessary for the species. Therefore it is unlikely the development site will result in a long-term decrease in the Painted Honeyeaters population size.
2: reduce area of occupancy	The Painted Honeyeater has not been recorded within the development site, with very occasional records in the surrounding locality; most of which are historic. The foraging habitat is considered sub-optimal based on low records of the species and mistletoe being largely absent from the development site. A total of 38.2 ha of potential (sub-optimal) foraging and roosting habitat will be removed. It is considered if this area is utilised by the species it is only likely to occur on a transient basis. It is unlikely that the loss of the small isolated patches of habitat will significantly reduce the occupancy of the species. The development site is not likely to contain breeding habitat lacking wide blocks of woodland with an abundance of mistletoe. The impact of the project on the occupancy of this species is considered negligible.
3: fragment a population	The Painted Honeyeater occurs as a single, contiguous population (DoE 2015). This species is highly mobile, travelling across most of the eastern side of Australia. The Painted Honeyeater can cross open areas in search for woodlands with ample mistletoe available. It is unlikely that the species population will become fragmented as a result of the development site considering the species is already able to disperse across agricultural landscapes.

Table F.3 Assessment of significance for the Painted Honeyeater

Criteria	Discussion
4: adversely affect critical habitat	Habitat considered critical to the survival of the Painted Honeyeater includes breeding or foraging habitat. The development site is within highly disturbed agricultural landscape. Small isolated patches of woodland exist on within the area include eucalypt species. The Painted Honeyeater inhabits eucalypt forests prevalent with mistletoe. Considering mistletoe is largely absent within the development site, and vegetation cover is sparse due to historical grazing, habitat within the development site is considered as sub-optimal foraging habitat. The cleared patches of woodland are not considered to be optimal breeding habitat as they lack abundant mistletoe. The small patches of woodland within the development site are sparse within the landscape. The Painted Honeyeater is more common within wider blocks of woodland (DoE 2015), providing more suitable foraging habitat. The Painted Honeyeater has not been recorded within the development site, should it occur it is likely to be an occasional occurrence considering vegetation within the development site does not provide critical foraging habitat. The vegetation within the development site is not considered critical habitat, therefore it is unlikely that the development site will adversely affect habitat critical to the survival of a species.
5: disrupt the breeding cycle of a population	The Painted Honeyeater favours breeding habitat with an abundance of mistletoe. The development site does not contain the sufficient amounts of mistletoe to support the species during breeding season, therefore it is unlikely the development site will disrupt the breeding cycle of the population.
6: modify, destroy or decrease availability or quality of habitat	The species has not been recorded within the development site, and is likely to occasionally occur passing through to more optimal foraging areas in the surrounding area. Woodland habitat is sparse providing only sub-optimal foraging habitat for the species. The removal of 38.2 ha of potential foraging habitat is unlikely to cause the decline of the species.
7: result in invasive species	The Painted Honeyeater is susceptible to the effects of invasive species including the introduction of weeds potentially degrading critical habitat, competition from Noisy Miners and predation by the Black Rat. The development site contains large numbers of exotic weed species. Potential foraging resources within the development site are limited to remnant trees within large cleared patches. No regeneration of vegetation is occurring as a result of historical grazing. Mitigations will be implemented to ensure no invasive weeds are introduced or spread within the development site. A CEMP will be prepared to outline weed control protocols in order to minimise the risk. Noisy Miners are abundant within the development site. However it is unlikely development site will exacerbate the abundance of the Noisy Minter within the area. Similarly, black rats are potentially within the development site however it is unlikely the development site will exacerbate the abundance of them.
8: introduce disease	The Painted Honeyeater is not known to be susceptible to any disease and the project is unlikely to introduce a harmful disease to the Painted Honeyeater.
9: interfere with recovery	The Painted Honeyeater currently does not have a Recovery Plan.
Conclusion	The project is unlikely to have a significant impact on the Painted Honeyeater as the development site is limited to small patches of highly degraded vegetation. No optimal breeding habitat occurs within the development site. If the species does occur it is likely to be on a transient basis considering foraging habitat is sparse and lacking abundance of mistletoe. Therefore it is considered the habitat to be removed is unlikely to have any significant effect on the Painted Honeyeater.

F.2.4 Migratory species

The following migratory species, as listed under the EPBC Act, have the potential to forage or roost within the study area:

- Fork-tailed Swift (*Apud pacificus*) – migratory, marine; and
- White-throated Needletail (*Hirundapus caudacutus*) – migratory, marine.

The Fork-tailed Swift is known to occur throughout Australia. Within NSW the species has been recorded in all regions. The White-throated Needletail is widespread in eastern and south-eastern Australia. The species is known to extend to the western slopes of the Great Dividing Range (DoEE 2018a). Fork-tailed Swift occurs within a wide range of habitats include dry or open woodland, tea-tree swamps, within low scrub, heathland, saltmarsh, grassland, sandplains, open farmland and coastal sand-dune. Occasionally they will occur about rainforests and wet sclerophyll forest. The Fork-tailed Swift feeds on insects aerially among tree-tops in open forest (DoEE 2018a).

The White-throated Needletail occurs above most types of habitat, with the most common being woodland and heathland. The species is less often to occur within grasslands or swamps as they lack trees. the species forages aerially above a variety of habitats. The species will occasionally forage over recent disturbed areas. The White-throated Needletail roost in trees in forests and woodlands, among dense foliage in the canopy or in hollows (DoEE 2018b).

Both migratory species do not breed within Australia and are almost exclusively aerial, occurring over most habitat types.

The development site does not contain any areas of 'important habitat' for the two migratory species. The development site exists within a predominantly cleared agricultural landscape, highly prevalent in NSW. Potential foraging habitat includes cleared isolated patches of woodland with large numbers of exotic flora species.

The development site contains potential (sub-optimal) foraging habitat for the Fork-tailed Swift and White-throated Needletail. The development site lacks mid-storey and understorey dense foliage for optimal roosting habitat.

Table F.4 Assessment of significance for migratory species: Fork-tailed Swift and White-throated Needletail

Criteria	Discussion
1: substantially modify, destroy or isolate an area of important habitat	The development site does not contain any important habitat for the migratory species. Land is predominantly a cleared agricultural landscape. The development site will remove sub-optimal foraging habitat only.
2: result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat	Within the development site are a large number of exotic flora species. development site is unlikely to result in a substantial increase in weed species. Weed control protocols will be undertaken in accordance with CEMP to minimise any risk. Considering the development site does not contain any important habitat for these migratory species and mitigation measures will be in place, the development site will have a negligible impact on important habitat for the migratory species.
3: seriously disrupt the lifecycle of an ecologically significant proportion of the population	The Fork-tailed Swift and White-throated Needletail do not breed within Australia. Dense understorey and mid-storey vegetation does not exist within the woodlands as a result of historical grazing. Therefore the vegetation within the development site does not contain optimal roosting habitat. Sub-optimal foraging habitat occurs within the sparse patches of woodland, however these cleared patches are not considered important foraging habitat. Therefore it is considered the development site will have a negligible serious impact on a proportion of their populations.
Conclusion	The development site is unlikely to have a significant impact on these migratory species considering there is no important habitat within the development site. Sub-optimal foraging habitat potentially exists, however its removal woodland is likely to have a negligible effect on the species.

Appendix G

Protected Matters Search Tool Results

EPBC Act Protected Matters Report

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

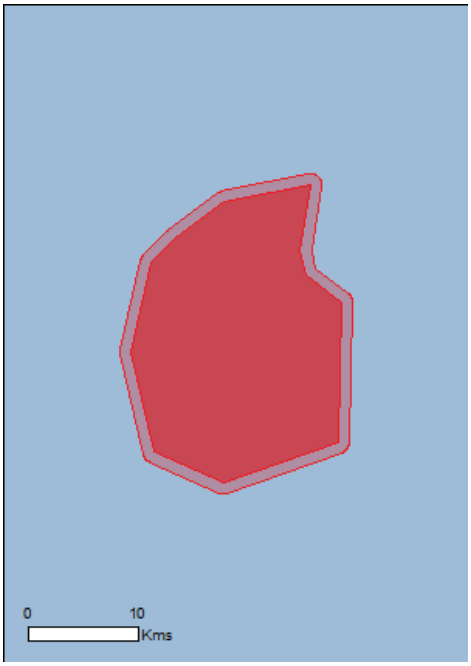
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 12/09/18 16:06:16

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



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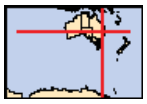

Summary

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:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	28
Listed Migratory Species:	13

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	20
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:	1
Invasive Species:	30
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Banrock station wetland complex	1100 - 1200km
Gwydir wetlands: gingham and lower gwydir (big leather) watercourses	200 - 300km upstream
Riverland	1000 - 1100km
The coorong, and lakes alexandrina and albert wetland	1200 - 1300km

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
New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands	Critically Endangered	Community may occur within area
Upland Wetlands of the New England Tablelands (New England Tableland Bioregion) and the Monaro Plateau (South Eastern Highlands Bioregion)	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat 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 habitat may occur within area
Frogs		

Name	Status	Type of Presence
Litoria castanea Yellow-spotted Tree Frog, Yellow-spotted Bell Frog [1848]	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 habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may 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 known to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Bertya ingramii a shrub [21383]	Endangered	Species or species habitat known to occur within area
Callistemon pungens [55581]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Diuris pedunculata Small Snake Orchid, Two-leaved Golden Moths, Golden Moths, Cowslip Orchid, Snake Orchid [18325]	Endangered	Species or species habitat likely to occur within area
Eucalyptus mckieana McKie's Stringybark [20199]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus nicholii Narrow-leaved Peppermint, Narrow-leaved Black Peppermint [20992]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area
Haloragis exalata subsp. velutina Tall Velvet Sea-berry [16839]	Vulnerable	Species or species habitat may occur within area
Pelargonium sp. Striatellum (G.W.Carr 10345) Omeo Stork's-bill [84065]	Endangered	Species or species habitat may occur within area
Picris evae Hawkweed [10839]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Uvidicolus sphyrurus		
Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	Vulnerable	Species or species habitat likely to occur within area
Wollumbinia belli		
Bell's Turtle, Western Sawshelled Turtle, Namoi River Turtle, Bell's Saw-shelled Turtle [86071]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known 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 known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known 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 known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat may occur within

Name	Threatened	Type of Presence area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land - Commonwealth Scientific & Industrial Research Organisation

Listed Marine Species [Resource Information]

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

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

Name	Threatened	Type of Presence
		area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known 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 known 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 known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Extra Information

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

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		

Name	Status	Type of Presence
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
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
Equus caballus Horse [5]		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

Name	Status	Type of Presence
		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		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
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

Nationally Important Wetlands [Resource Information]

Name	State
New England Wetlands	NSW

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-30.761521 151.51686,-30.691281 151.49832,-30.628671 151.5148,-30.612126 151.534026,-30.586121 151.573852,-30.573707 151.645263,-30.620399 151.637023,-30.637534 151.641829,-30.656437 151.670669,-30.755031 151.667922,-30.78335 151.573852,-30.761521 151.51686

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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