APPENDIX G BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Garoo Solar Farm and BESS

Biodiversity Development Assessment Report

PREPARED FOR
The Trustee for Greenpulse Solar Farm and BESS Unit Trust.

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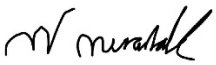
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Garoo Solar Farm and BESS

Biodiversity Development Assessment Report

0751705



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ACRONYMS AND ABBREVIATIONS

Acronym	Description
APZ	Asset Protection Zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
DBH	Diameter at Breast Height over bark
EC	Ecological Community listed under the EPBC Act
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EEC	Endangered Ecological Community
HTW	High Threat Weed
IBRA	Interim Biogeographic Regionalisation for Australia
KFH	Key Fish Habitat as identified under the *Fisheries Management Act 1994*
LLS Act	*Local Land Services Act 2013* (NSW)
MNES	Matters of National Environmental Significance
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NSW	New South Wales
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VEC	Vulnerable Ecological Community

DECLARATIONS

Certification under clause 6.15 Biodiversity Conservation Act 2016

I, Ashleigh McTackett, certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the ***Biodiversity Conservation Act 2016*** (BC Act).

Signature:	
Date:	29 January 2026

BAM Assessor Accreditation no: BAAS20028

Conflict of interest

I, Ashleigh McTackett (BAAS20028), declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

This declaration has been made in the interest of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature:	
Date:	29 January 2026

BAM Assessor Accreditation No: BAAS20028

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EXECUTIVE SUMMARY

OVERVIEW

The Trustee for Greenpulse Solar Farm and BESS Unit Trust (The Applicant) proposes to construct and operate the Garoo Solar Farm and Battery Energy Storage System (BESS) (the Project) within the rural locality of Garoo, New South Wales (NSW). The Applicant seeks development approval under Part 4 of the *Environmental Planning & Assessment Act 1979* (EP&A Act) as a State Significant Development (SSD), requiring preparation of a Biodiversity Development Assessment Report (BDAR) as the Project has the potential to cause a significant impact on biodiversity values (s7.14 of the *Biodiversity Conservation Act 2016* (BC Act)).

This BDAR has been prepared to assess impacts relating to the Project and to address matters raised in public and agency submissions, particularly agency advice provided by the Conservation Programs, Heritage and Regulation (CPHR).

THE PROJECT

The Project is situated at 291 Garoo Road, Garoo, approximately 40 kilometres (km) (by road) south of Tamworth and 370 km northwest of Sydney. Located entirely within the Tamworth Regional Local Government Area (LGA), the Project Area extends across approximately 369 hectares (ha). This comprises 17 freehold lots across three Deposited Plans (DPs). The land is currently used for agricultural activities, predominantly livestock grazing and irrigated cropping.

The Project will involve the construction, operation, maintenance and, where relevant, decommissioning of a solar farm and associated infrastructure, including:

- Solar array, with an estimated generated capacity of up to 133.76 Megawatts (MW) alternating current (AC);
- Electrical reticulation infrastructure, including a centralised large-scale BESS with a storage capacity of 360 MW / 1,440 Megawatt hours (MWh);
- Permanent associated and ancillary infrastructure; and
- Temporary construction facilities.

The Project proposes to connect to the national grid via the existing 330 kilovolt (kV) Liddell-Tamworth overhead transmission line, which traverses the Project Area in a general north-south alignment. Once operational, the solar component will provide enough electricity to power approximately 70,000 homes and the BESS will store up to four hours of electricity, released during peak demand to assist reliable power supply and grid stability.

The Development Footprint is approximately 305.43 ha. This represents the maximum area that will be directly impacted throughout the construction and operational life of the Project until decommissioning.

The final Project layout is subject to further design development and refinement. If the final Project design extends outside of the Project Area assessed in the Environmental Impact Statement (EIS) prepared for the Project, assessment of additional impacts would be detailed in an Amendment Report (prior to determination) or Modification Report (after determination).

AREA SUBJECT TO ASSESSMENT

A site-based assessment has been undertaken for the Project, as it is not considered to be a linear development. The Subject Land comprises 369.07 ha and includes impacts on vegetated and unvegetated lands. For the purposes of this BDAR, the Subject Land is defined as the overall project boundary, encompassing all lots and includes all areas of impact and areas of no impact, according to the Project design. The Development Footprint is defined as the area of direct impact on vegetated and unvegetated lands and totals 306.21 ha. The Development Footprint is located wholly within the Subject Land.

Large areas of the Subject Land consist of non-native vegetation, characterised by non-native grasslands and cropping for various cereal crops. The assessment has excluded the evaluation of direct impacts on these areas within the Development Footprint but has assessed the indirect and prescribed impacts on these lands within the Development Footprint in accordance with the Biodiversity Assessment Method 2020 (BAM).

METHODS

Impacts to biodiversity values have been assessed in accordance with the BAM (NSW DPIE, 2020a).

The initial site assessment was conducted by ERM ecologists between 24th September 2024 – 28th September 2024. Surveys across these dates included inspection of the scattered native trees and rapid vegetation assessment confirming the dominance of exotic groundcover species on the Subject Land.

The ground-truthing of vegetation, along with the mapping of vegetation at a high resolution (i.e. capture scale of 1:1,000 or better (Section 4.1 of the BAM)) has substantially assisted the identification of impact avoidance outcomes during the design process. The mapping of woody vegetation and determination of the scattered tree assessment extent, along with the identification of connections from areas of treeless grasslands (used for agricultural purposes) has resulted in the avoidance and minimisation of impacts to high Vegetation Integrity Score (VIS) vegetation cover. This is a core principle of the BAM to demonstrate impact avoidance (Section 7.1 of the BAM). Note that the scattered tree module cannot be applied on the category of sensitive regulated land or vulnerable land under the Native Vegetation Regulatory Map (NVRM) and therefore, has been appropriately excluded from any areas mapped as such on the Draft NVRM.

By directing impacts away from woody vegetation and riparian habitats, the high-resolution vegetation mapping used in this assessment has encouraged the Applicants design team to preferentially utilise low condition grasslands and avoid riparian habitats where possible. Courser vegetation mapping such as the State Vegetation Type Map (SVTM) is captured at a broader scale (e.g., 5 metres (m) pixel scale for woody vegetation) and is unsuitable for such purposes, as it generally overestimates the extent of woody vegetation cover. Such mapping is informative at a landscape scale but lacks the detail necessary to encourage the application of sensitive design principles. The Project design has incorporated considerable impact avoidance measures, which is reflected in the residual impact calculated for the Project.

Field surveys were undertaken over four events, by ERM Ecologists, as summarised in Table E-1.

TABLE E-1 SUMMARY OF SURVEY EVENTS

Season	Dates	Survey Methods
ERM		
Spring 2024	24th September 2024 – 28th September 2024	Habitat assessments of landscapes and habitat features, BAM plots to measure vegetation integrity plots, Land Category Assessment (LCA) transects to assess areas of non-native vegetation.
Spring 2024	28th October - 1st November 2024	Targeted 10 m parallel walking transects (flora surveys), Targeted nocturnal fauna surveys and targeted reptile surveys.
Summer 2025	13th January – 20th January 2025	Targeted nocturnal fauna surveys, Diurnal bird surveys, Targeted fauna surveys, Targeted flora transect surveys and Planted Native Vegetation (PNV) assessment.
Winter 2025	26th June 2025	Targeted flora surveys within Plant Community Type (PCT) 599 and opportunistic diurnal surveys.

BIODIVERSITY VALUES OF THE SUBJECT LAND

According to the rules specified in the BAM for mapping native vegetation, the Subject Land comprises 15.78 ha (4%) of native vegetation cover in varied states and 349.35 ha of non-native vegetation cover, including cropped areas and planted vegetation. The Development Footprint comprises approximately 305.43 ha of pasture grasslands predominantly non-native vegetation with a singular PCT present.

The Subject Land almost entirely consists of non-native pasture grasslands with cropping of Oats and Wheat, that have significantly disturbed the natural composition and structure, with several exotic species associated with agricultural practices present, including *Cirsium vulgare, Plantago lanceolata* and *Trifolium repens*. The native vegetation cover was often in the form of opportunistic ground cover species known to occupy disturbed habitats such as pastures and lawns. These included *Cynodon dactylon* and *Cotula australis*. A broad summary of this native vegetation cover is provided in Table E-2.

TABLE E-2 BROAD CHARACTERISATION OF NATIVE VEGETATION COVER

Native vegetation cover	Description	Area
Woody native vegetation cover	Landcover comprising plants of the tree or shrub lifeform and recognised as open woodland.	5.11 ha
Scattered Trees	Occurrences of scattered native trees as defined under Appendix B of the BAM.	1.94 ha
Moderate condition grassland	Landcover derived from a woody vegetation type but not comprising the structure or composition of trees or shrubs present in areas of woody native vegetation cover.	8.21 ha
Mixed composition	Recognised in this assessment as a matrix of natives associated with naturally occurring native vegetation with horticultural plantings for aesthetic and agricultural purpose, occurring on Category 2 – Regulated Lands.	0.47 ha

Field survey performed to aid aerial photography interpretation and vegetation mapping includes:

- 25 BAM Plots;
- 23 LCA transects; and
- 47 Scattered tree assessments

Mapping was performed at a capture scale of 1:1,000 or less. Great care was taken to map woody vegetation separately to non-woody vegetation. The woody matrix was subsequently mapped to better approximate woody vegetation patches in a highly fragmented cleared landscape. Accurate vegetation mapping was an important input into the design process as it aided meaningful decisions in the avoidance / minimisation of impacts on higher condition State native vegetation (i.e., intact woody patches with intact function attributes such as tree canopy and stems, hollows, fallen logs and leaf litter).

The BAM requires all lands comprising native vegetation to be included in the extent of native vegetation cover and accordingly assigned to the most appropriate PCT. The above-described native vegetation cover was further classified into one PCT as detailed in Table E-3.

TABLE E-3 PLANT COMMUNITY TYPES IN THE SUBJECT LAND

PCT	PCT Name	Area (ha)
599	Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	15.73

Multiple Vegetation Zones (VZs) for PCT 599 were established following the granular examination of vegetation cover to represent the varying condition states occurring within the Subject Land. A total of four VZs were identified and mapped using vegetation structure as the main discriminator (e.g. open woodlands, grasslands, scattered trees and planted vegetation) and the precautionary principal. The VZs of the Subject Land are listed in Table E-4 together with the VIS calculated from associated BAM plots. VZs emphasised in bold represent those with a low biodiversity value or where a VIS cannot be calculated (i.e. use of the scattered tree streamlined assessment module).

TABLE E-4 VEGETATION ZONES IN THE SUBJECT LAND

VZ	PCT	Condition/vegetation zone name	Area (ha)	Area of impact (ha)	VIS
1	599	Open_Woodland	5.11	0.07	73.8
2	**599**	**Scattered_Trees**	**1.94**	**1.57**	**NA**
3	599	Derived_Grasslands	8.21	0.04	46.8
4	**599**	**Mixed_Plantings**	**0.47**	**0.0**	**NA**

THREATENED ECOLOGICAL COMMUNITIES

PCT 599 is associated with a Threatened Ecological Community (TEC) and has been mapped within the Subject Land. The total area of the TECs agnostic condition state is listed in Table E-5.

TABLE E-5 THREATENED ECOLOGICAL COMMUNITIES WITHIN THE SUBJECT LAND

TEC	PCT	Structure	Area (ha)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland/White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	599	VZ1_Open_Woodland	5.11
		VZ2_Scattered_Trees	1.94
		VZ3_Derived_Grass	8.21

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed as a Critically Endangered Ecological Community (CEEC) under the BC Act and is associated with the Commonwealth listing for critically endangered White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). Assemblages of native vegetation that meet key diagnostic characteristics are considered to form part of the nationally listed CEEC. Where assemblages of native species do not meet key diagnostic criteria, it is not considered part of the Commonwealth listing.

It is considered that this TEC, as listed under the EPBC Act, is found within the Project Area across areas of Open Woodland (VZ1) and Derived Grassland (VZ3). Areas of scattered trees (VZ2), and mixed plantings (VZ4) identified as conforming to this PCT are not considered to form part of the TEC listing under the EPBC Act. Through project design, impacts to this TEC have been avoided and excluded from the Development Footprint.

SCATTERED TREES

Scattered Trees associated with PCT 599 (VZ2) were assessed using the scattered tree assessment within the BAM Calculator (BAM-C). Scattered trees were observed in the field to determine the presence of hollows and to categorise each tree, or group of trees to be cleared as per Appendix B of the BAM. Impacts to scattered trees and their habitat class are shown in Table E-6 below.

TABLE E-6 SCATTERED TREE CLASSIFICATION

Class of Scattered Tree to be cleared	Description	Number of Impacted scattered trees	
		that contain hollows	that do not contain hollows
Class 1	Trees that are <20cm Diameter at Breast Height (DBH)and without hollows	NA	1
Class 2	Trees that are <20cm DBH and contain at least one hollow	0	NA
	Trees that are ≥20cm DBH and < large tree benchmark	0	3
Class 3	Trees that are ≥ large tree benchmark	31	5

Offset obligations for impacts to scattered trees within Class 2 and / or Class 3 have been calculated in accordance with Appendix B of the BAM. Impacts to Class 1 values are considered negligible and no further assessment or offset is required for these trees.

For scattered trees, where a Serious and Irreversible Impact (SAII) entity is recorded on the Subject Land, or considered likely through an expert report, an assessment must be undertaken in accordance with Chapter 5 of the BAM. If no SAII entities are present or likely to be present, then the scattered tree module can be applied. Assessment of scattered trees identified potential candidate species at risk of SAII. Surveys determined no SAII entities associated with scattered trees were present or considered likely to occur. Therefore, the use of the scattered tree assessment in accordance with Appendix B of the BAM was considered suitable for areas of the site where scattered trees occur.

The remaining area of the Subject Land consists of non-native vegetation, including cropping and pasture lands identified as Category 1 Exempt Lands and totalling approximately 352.66 ha. A small portion of the Subject Land associated with existing development also contains areas of plantings across 0.68 ha. These areas have been assessed under the PNV Streamlined Assessment within Appendix D of the BAM.

ECOSYSTEM CREDIT SPECIES

The suitability of scattered trees and PNV for use by threatened species was assessed and incidental sightings and evidence of threatened species were recorded, including instances where species were inhabiting (fauna) or formed part of the scattered trees and / or PNV (flora). For PNV, species credits are not required to offset proposed impacts. Targeted surveys for threatened species at risk of SAII were also performed. No threatened species were observed within areas of scattered trees or PNV on the Subject Land, nor was there any evidence of threatened species within scattered trees or PNV. However, three threatened microbat species were recorded on the Subject Land and adjoining vegetation, including two predicted species and one threatened species recognised as a candidate species, being the Eastern Cave Bat (*Vespadelus troughtoni*). No further threatened species were recorded. Table E-7 has summarised the predicted species recorded.

TABLE E-7 ECOSYSTEM CREDIT SPECIES RECORDED WITHIN THE SUBJECT LAND

Common Name	Scientific Name	Vegetation Type(s)
Corben's Long-eared Bat	*Nyctophilus corbeni*	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

Due to the limited species recorded, a precautionary approach has been used. Therefore, potential impacts to threatened species have been recognised and mitigation and management measures have been applied in accordance with Section 8.4 of the BAM to include areas of scattered trees and PNV.

SPECIES CREDIT SPECIES

Species polygons were established for threatened species classed as 'species credit species' in the Threatened Biodiversity Database Collection (TBDC) where they were recorded as occurring or assumed present within the Subject Land. Species polygons were developed for one candidate species, with the extent of habitat reflective of the VZ condition state, or extent of occurrence as outlined in Table E-8.

TABLE E-8 SPECIES CREDIT SPECIES POLYGON EXTENT

Species credit species	SAII	Associated VZ	Polygon extent
Bluegrass *(Dichanthium setosum)*	No	VZ1_Open_Woodland VZ3_Derived_Grasslands	Areas of VZ1 and VZ3, totaling 0.11 ha within the development footprint. Note that this species has been assumed present due to insufficient survey.
Euphrasia arguta	Yes	VZ1_Open_Woodland VZ3_Derived_Grasslands	Areas of VZ1 and VZ3, totaling 0.11 ha within the development footprint. Note that this species has been assumed present due to insufficient survey.
Finger Panic Grass *(Digitaria porrecta)*	No	VZ1_Open_Woodland VZ3_Derived_Grasslands	Areas of VZ1 and VZ3, totaling 0.11 ha within the development footprint. Note that this species has been assumed present due to insufficient survey.
Eastern Cave Bat (*Vespadelus troughtoni*)	No*	VZ1_Open_Woodland VZ3_Derived_Grasslands	Areas within 100 m of rocky areas, caves, overhangs crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds within the potential habitat. Note: no such breeding habitat features occur on site, therefore no polygon of breeding habitat can be mapped in accordance with BAM requirements. Instead, the extent of potential roosting habitat has been mapped, which includes caves, scarps, cliffs, rock overhangs and disused mines within 2 km.

**Any impacts on breeding habitat used by this species could be considered potentially serious and irreversible. When the species is present on the subject land and the proposed impact is not a potential SAII, standard species credits will be generated. In this instance, no potential breeding habitat occurs within the Subject Land. As such, it is considered that the presence of this species on site does not constitute the SAII entity.*

AQUATIC HABITAT SPECIES

Two named waterways as listed below, are situated within the Subject Land, with both being mapped as Key Fish Habitat (KFH) under the NSW Primary Industries (PI) mapping.

- Tamarang Creek
- Sugarloaf Creek

Impacts on these waterways have been minimised by limiting the number of crossings and utilising existing crossings, as well as maintaining minimum riparian buffer requirements according to the Strahler System. Limited impacts on these waterways are anticipated with no loss of fish passage anticipated.

PRESCRIBED IMPACTS

The Project is anticipated to have prescribed impacts as outlined below:

- The removal of human-made structures;
- Impacts to non-native vegetation; and
- Impacts to habitat connectivity.

Measures to mitigate these impacts will be implemented through a Construction Environmental Management Plan (CEMP), and include examples such as on-site educations, identifying and reporting hazards as they occur during construction and setting appropriate working hours and vehicle speeds.

CUMULATIVE IMPACTS

The assessment provided in this BDAR is in accordance with the BAM, involving application of the Mitigation Hierarchy (avoid, minimise, mitigate) and calculation of residual impacts. Entities at risk of SAII have also been assessed. The cumulative impacts of the Project are addressed through this assessment.

AVOID, MINIMISE AND MITIGATE

Through project design, impacts to native vegetation and habitats have been avoided to reduce impacts on biodiversity values identified and quantified through surveys and assessments performed in accordance with the BAM.

By area, 349.35 ha or 95% of the Subject Land consists of landcover with low conservation value, including 348.67 ha of Category 1 Exempt Lands with the purpose of cropping and agriculture, and representative of the land zone and the lands historical use for agriculture (i.e. livestock grazing and cropping). These permitted agricultural land uses have substantially modified the natural biodiversity values resulting in low native plant species richness and a higher exotic plant species cover, cultivated for agricultural benefit. A further 3.95 ha comprises farm dams and existing infrastructure. The remaining 15.78 ha comprises native vegetation with a VIS exceeding the specified BAM threshold for calculating residual impacts. The latter has been used to determine the residual impacts of the Project.

Though design refinement, the Project has been aligned with areas of low conservation value. The alignment of the Development Footprint to low conservation value lands demonstrates a significant impact avoidance outcome for locally occurring biodiversity values and maintains functionality available across the Subject Land.

Impacts (both temporary and permanent) to native vegetation and habitats have been minimised where possible, by utilising areas of low conservation value and existing roads. For this reason, impacts on the TEC are minimal and largely associated with the temporary construction of roads within the development footprint. The impact to the TEC is summarised in Table E-9.

TABLE E-9 UNAVOIDABLE IMPACTS TO NATIVE VEGETATION

TEC	PCT	Structure	Area of impact (ha)
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland / White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	599	VZ1_Open_Woodland	0.07
		VZ2_Scattered_Trees	1.57
		VZ3_Derived_Grass	0.04

The Subject Land will retain habitat functionality and will provide opportunities to improve habitats on the Subject Land with, riparian habitats and retention of scattered trees across the landscape. Direct and indirect impacts will be mitigated by measures designed to protect retained and adjacent vegetation and habitat during the construction, operation and decommissioning phases.

A Biodiversity Management Plan (BMP) will be prepared to the satisfaction of the Environment Agency Head for implementation prior to / during construction and through the operational period. Other plans implemented in conjunction with the BMP include a CEMP.

SERIOUS AND IRREVERSIBLE IMPACTS

Through detailed assessment and design analysis, impacts to SAII entities have been avoided. A total of three potential SAII entities were recorded or assumed present on the Subject Land, being:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland;
- *Euphrasia arguta*; and
- Eastern Cave Bat (*Vespadelus troughtoni)*.

Regarding the SAII entity Eastern Cave Bat (*Vespadelus troughtoni*), any impacts on breeding habitat used by this species could be considered potentially serious and irreversible. When the species is present on the subject land and the proposed impact is not a potential SAII, standard species credits will be generated. In this instance, no potential breeding habitat occurs within the Subject Land. As such, it is considered that the presence of this species on site does not constitute the SAII entity and it has been excluded from further SAII Assessment.

The extent of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland across the Subject Land that meets the definition of the listing of the CEEC under the BC Act and EPBC Act has been considered to represent the extent of SAII on the Subject Land, and totals 13.37 ha. The project will require the removal of 0.45 ha of TEC associated with the SAII entity in the form of open woodland and derived grasslands. This equates to 3% of the total extent of the

SAII entity available on the Subject Land, and less than half a percent (0.48%) of all native vegetation available within the assessment area. Impacts to these small areas of native vegetation are unavoidable and are largely the result of upgrade requirements to existing infrastructure (i.e. roads and waterway crossings).

The project has preferentially avoided impacts to native vegetation and where possible, directed impacts within areas containing non-native vegetation, including non-native grasslands and areas used for cropping of oats and wheat. Additional measures are proposed to address the localised loss of this SAII entity, including the preparation of a BMP to the satisfaction of the Environment Agency Head. The Applicant has the potential through appropriate management to improve the extent of SAII across the Subject Land and generate a no net loss of TEC in a woody condition state, whilst also improving the function of the available habitats. This positive conservation outcome may be achieved by:

- Revegetation of temporary impact areas;
- Restoration of habitats within derived grasslands; and
- Rehabilitation of KFH.

The additional measures will seek to improve the local patch size and connectivity across the Subject Land and broader landscape.

RESIDUAL IMPACTS AND BIODIVERSITY OFFSET LIABILITY

The VIS of each VZ was calculated using the BAM-C and BAM Plot data obtained from surveys of these VZs. Impacts to Scattered Trees were calculated using the BAM-C Scattered Tree Assessment Tool. Direct impacts on biodiversity values of the sole PCT (PCT 599) are outlined in Table E-10.

TABLE E-10 IMPACTS THAT REQUIRE OFFSETS – ECOSYSTEM CREDITS

Vegetation Zone	PCT	Condition	TEC/EEC	Impact area (ha)	Number of ecosystem credits required
1	599	Open_Woodland	Yes	0.07	3
2	599	Scattered_Trees	Yes	1.57	37
3	599	Derived_Grass	Yes	0.04	1

The residual impact calculated for candidate species is the extent of known or assumed presence following consideration of survey results, impact avoidance and application of species credit polygon rules. The residual impact for candidate species is tabulated in **Table E-11**.

TABLE E-11 IMPACTS THAT REQUIRE OFFSET – SPECIES CREDITS

Common Name	Scientific Name	Loss of habitat (ha)	Number of species credits required
Bluegrass	*Dichanthium setosum*	0.11	4
Euphrasia arguta	*Euphrasia arguta*	0.11	5
Finger Panic Grass	*Digitaria porrecta*	0.11	4
Eastern Cave Bat	*Vespadelus troughtoni*	0.11	5

OFFSET STRATEGY

The Applicant is developing a biodiversity offset strategy in parallel with the BDAR. This strategy will detail the offset approach to be undertaken to retire credit obligations and will be achieved by:

- Retiring 'like for like' credits as specified in Table E-10 and Table E-11 to the amount and from the regions indicated; and / or
- Funding a biodiversity conservation action instead of, or in combination with, the retirement of species credits; and / or
- In part or full payment into the Biodiversity Conservation Trust (BCT) in lieu of satisfying the offset liability specified in Table E-10 and Table E-11.

PREFACE

1. ASSESSMENT OVERVIEW

Environmental Resources Management Australia Pty Ltd (ERM) has prepared this Biodiversity Development Assessment Report (BDAR) for the Garoo Solar Farm and Battery Energy Storage System (BESS) on behalf of The Trustee for Greenpulse Solar Farm and BESS Unit Trust (the Applicant).

The Project is to be assessed under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as State Significant Development (SSD). This BDAR has been prepared in accordance with the Biodiversity Assessment Method 2020 (BAM), with consideration of Operational Manuals for Stage 1 and Stage 2 of the BAM, as the Biodiversity Offset Scheme (BOS) applies to the Project.

The assessment has used the Scattered Tree Streamlined Assessment module and the Planted Native Vegetation (PNV) Streamlined Assessment to form part of the assessment, as outlined in Appendix B and Appendix D of the BAM (NSW DPIE, 2020a). It also addresses responses provided by the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) (dated 21 January 2025) in relation to the Land Categorisation Assessment (LCA) prepared by ERM and submitted to DCCEEW in December 2024; and tThe Planning Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Primary Industries and Regional Development (DPIRD Fisheries) (SSD-79747209, dated 11 February 2025).

In support of the SSD application (SSD-79747209), an LCA Report was prepared for the Project (ERM, 2024) to determine the extent of vegetation appropriate for assessment under the SSD application. Additionally, A referral under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) for Matters of National Environmental Significance (MNES) has been prepared and submitted to the Australian DCCEEW.

1.1 RELEVANT LEGISLATION AND POLICIES

This BDAR addresses Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM and omits Stage 3 (Improving Biodiversity Values) as this is only required for Biodiversity Stewardship Site Assessment Reports (BSSAR). The BDAR also addresses the assessment requirements of the Commonwealth EPBC Act and relevant State Environmental Planning Policies (SEPPs).

1.1.1 ASSESSMENT FRAMEWORK

The Project requires approval under Part 4 of the EP&A Act. Section 1.7 of the EP&A Act specifies that the Act has effect subject to the provisions of Part 7 of *the Biodiversity Conservation Act 2016* (BC Act). Part 7 of the BC Act mandates the application of the BAM (DPIE 2020a) where the Project exceeds a biodiversity offsets scheme threshold (i.e., Section 7.2 of the BC Act) and / or is "likely to significantly affect threatened species" upon application of the test (Section 7.3 of the BC Act). In this case, these thresholds do not apply as the Project is declared SSD thus mandating the preparation of a BDAR (s7.14) in the absence of a successful BDAR waiver. The Minister for Planning must consider impacts on Serious and

Irreversible Impacts (SAIIs) and determine if any additional measures are required to minimise impacts to those entities (s7.16(3)).

1.1.2 NEED FOR A BDAR

The BOS applies to this project as it has been declared SSD (s7.14 of the BC Act). The applicant has engaged an independent accredited assessor without any conflicts of interest to apply the BAM to assess the impacts of the Project on biodiversity values.

1.1.3 APPLICATION OF THE BAM

1.1.3.1 CONTENT

This BDAR has been prepared in accordance with the relevant parts of the BAM, as required under the BC Act for development identified as "likely to significantly affect threatened species". The following streamline modules were applied in preparing this BDAR:

- Appendix B: Streamlined assessment module – Scattered Trees Assessment; and
- Appendix D: Streamlined assessment module – PNV Assessment.

The streamlined assessment modules for scattered trees and PNV may be used in conjunction with the full BAM to assess particular parts of the subject land under a single BDAR as per Section 2.2 of the BAM.

In relation to Scattered Trees, Appendix B of the BAM identified that the scattered tree module cannot be applied on the category of sensitive regulated land or vulnerable land under the Native Vegetation Regulatory (NVR) Map. Currently the Draft NVR Map identifies areas of vulnerable land being restricted to riparian lands associated with Tamarang Creek and Sugarloaf Creek and no sensitive regulated lands on the Subject Land. Additionally, the Draft NVR Map is not the finalised map. Therefore, on this basis, the scattered tree assessment module has been applied to areas of scattered trees.

The information supplied in this BDAR has been set out in accordance with the relevant requirements specified within Appendix K and Appendix L of the BAM, including:

- Table 24 (Stage 1 – Biodiversity Assessment);
- Table 25 (Stage 2 – Impact Assessment);
- Table 26 (Small Area Module – Scattered Tree Assessment); and
- Table 28 (Small Area Module – PNV Assessment).

1.1.3.2 CERTIFICATION

The BDAR is certified by the accredited assessor indicated on page 1 of this document as of the date corresponding with the signature. The BAM Calculator (BAM-C) reports associated with this BDAR were finalised within 14 days of the date of submission of this BDAR. BAM-C reports relevant to this project are provided in Table 1-1 below:

TABLE 1-1 BAM-C CASE AND ASSESSMENT INFORMATION

Case	Assessment	Date BAM-C finalised
00057908/BAAS20028/25/00057909/Revision 2	*Native vegetation*	29 January 2026
00057908/BAAS20028/25/00057994/Revision 1	*Scattered Trees*	29 January 2026

1.1.3.3 CHANGES TO THE BAM

Clause 6.31 of the *Biodiversity Conservation Regulation 2017* outlines how an accredited assessor can address changes to the BAM that occur whilst preparing a BDAR for a Project. This cause is reproduced below for clarity:

6.31 Changes in biodiversity assessment method

(1) If the biodiversity method is changed, a biodiversity assessment report may, during the designated period after the method is changed, be prepared on the basis of the method in force before the change, but only if the report states that it has been prepared on that basis.

(2) For the purpose of this clause, the designated period is –

> *(a) except as provided by this subclause – 6 months, or*
>
> *(b) in the case of a biodiversity development assessment report in respect of State significant development or State significant infrastructure – 12 months, or*
>
> *(c) in the case of a biodiversity certification assessment report for an application that is not a strategic biodiversity certification application – 12 months, or*
>
> *(d) in the case of a biodiversity certification assessment report for a strategic biodiversity certification application – 12 months or such a longer period as the Minister approves in a particular case.*

The BAM refers to the Threatened Biodiversity Data Collection (TBDC) and NSW BioNet Atlas as published databases that *must* be used in preparing a BDAR (see Section 1.4 of the BAM). Under this section, a change in these published databases has the effect of changing the BAM. Thus, such changes during the preparation of a BDAR for this Project may be interpreted as a change to the BAM. On this basis, and with reference to the specified designated periods above, the accredited assessor may prepare the BDAR based on the methods in force before the change and in so doing will state this as the case in the BDAR.

This BDAR contains site-based information capable of determining the Plant Community Types (PCTs) present within the Project Area and thus provides a sound basis for the generation of the Candidate Species applicable to the Project. Changes in the Candidate Species list after the publishing of this BDAR may represent a change in the BAM and, for this reason, these additional species may be excluded from the assessment. The BDAR will state this if the circumstance arises.

A change to survey methods for Candidate Species specified in the TBDC during the preparation of the BDAR is also interpreted as a change to the BAM. The accredited assessor may choose to apply the survey methods in force before the change and, if so, the decision to do so will be stated in the BDAR.

1.1.4 ADHERENCE TO SEARS AND AGENCY ADVICE

This BDAR addresses the Secretary's Environmental Assessment Requirements (SSD-79747209, issued 4 March 2025) for the Project as described in Table 1-2 and agency advice provided by in response to the Request for SEARs, specifically the agency advice received from the Conservation Programs, heritage and Regulation Group (CPHR) (see Section 1.1.4.1) dated 25 February 2025 and Tamworth Regional Council, dated 25 February 2025 (see Section 1.1.4.2).

TABLE 1-2 ADHERENCE TO SEARS

SEARS Biodiversity Requirement	Section in BDAR addressing requirement
• 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) (BC Act) having regard to the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must:	
° Be prepared using the approved BDAR template;	This BDAR has been prepared in accordance with the Guidance for the Biodiversity Development Assessment Report Template provided by the Department of Planning and Environment (2022).
° Document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM;	See Section 7 of this report.
° Assess the impacts associated with all ancillary infrastructure, including the transport route road upgrades;	See Section 8 of this report.
° Include an assessment for serious and irreversible impacts (SAII) in accordance with Section 9.1 of the BAM;	See Section 9.1 of this report
° Include a strategy to offset any residual impacts of the development in accordance with the BC Act; and	See Section 10 of this report.
° Be finalised by an accredited assessor as BAM-compliant within 14 days of submission;	The BDAR was completed and the BAM-C case was finalised within 14 days of submission by the accredited assessor.
Unless Conservation Programs, Heritage and Regulation Group (CPHR) and DPHI determine the proposed development is not likely to have any significant impacts on biodiversity values;	This BDAR has been prepared to assist the decision-maker in the final decision for the proposed development.
• 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;	The Aquatic Assessment has been provided in Appendix L of this report.
• A cumulative impact assessment of biodiversity values in the region from nearby developments; and	See Section 8.4 of this report.
• If an offset is required, details of the measures proposed to address the offset obligations.	An offset strategy is provided in Section 10.2 of this report.

1.1.4.1 AGENCY ADVICE – CPHR

Agency advice received from CPHR on the 25 February 2025 identified recommended SEARs in Attached A of the agency advice that have been duplicated and addressed in Table 1-3.

TABLE 1-3 AGENCY ADVICE FROM CPHR

CPHR SEARS Requirement	Section in BDAR addressing requirement
Ancillary Development Components The assessment should include all components of the proposal, including any ancillary activities such as road/track widening to enable transport of infrastructure components, connecting pipelines and transmission lines etc	This BDAR has addressed all components of the proposed development and has assessed the direct, indirect and prescribed impacts associated with the proposal in accordance with the Biodiversity Assessment Method 2020.
Native Vegetation Regulatory Map – Land Categorisation Clearing of native vegetation on land that meets the definition of Category 1 - Exempt Land (as defined under the LLS Act) does not require assessment or offsetting under the BC Act, however the following must still be considered: • Prescribed impacts as outlined in chapter 6 of the BAM. E.g. there are threatened fauna species whose habitat may include land which meets Category 1- Exempt criteria. Fauna survey on Category 1 – Exempt Land may be necessary to meet the requirements of the BAM. • Potential impacts to Matters of National Environmental Significance under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) on Category 1 – Exempt Land must also be considered. Section 60F of the LLS Act provides the transitional arrangements that are in place until a comprehensive NVR Map is published. During the 'transitional period' assessors can make a reasonable approximation of land categorisation for unpublished layers, in consultation with the landholder. Where a reasonable approximation is required, it is recommended that: • assessors first identify whether land meets criteria for Category 2 - Regulated Land, prior to Category 1 - Exempt Land. ◦ In some circumstances, land may meet multiple map criteria i.e. criteria for Category 2 - Regulated Land, AND Category 1 - Exempt Land ◦ In most circumstances' Category 2 - Regulated Land criteria will determine the categorisation of the land, rather than Category 1 - Exempt Land criteria.	A Land Categorisation Assessment (LCA) was undertaken and submitted to CPHR for review. The LCA Report is provided in Appendix A. Prescribed Impacts have been assessed under Section 8.3 of this Report. Matters of National Environmental Significance have been considered under Section 9.2.4 of this report. A formal referral under the EPBC Act was made (EPBC 2025/02758) and is under assessment. Engagement with CPHR was undertaken by the Applicant and ERM consultants with a site meeting held between all parties on the 4 July 2025 to discuss the LCA Report and project scale.

CPHR SEARS Requirement	Section in BDAR addressing requirement
A statewide draft NVR map is publicly available for proposals that affect rural land as defined under Part 5A of the LLS Act. This map as it relates to the development site must be referred to during preparation of the BDAR and prior to the BDAR being submitted to the consent authority. The draft map is available here: Geocortex Viewer for HTML5 (nsw.gov.au). Where Category 2 – Regulated land is mapped as present on a development site, this will be identified on the draft map and is land where the BAM must be applied. However, there are some Category 2 criteria for which state-wide comprehensive mapping is not currently incorporated within the draft map. **Please note that the draft NVR map is transitional and does not have regulatory effect for Category 1 mapped land.** Where the draft map indicates that Category 1 – Exempt Land is present on a development site, early engagement with CPHR is encouraged. To confirm at the site scale whether the criteria for Category 1 – Exempt Land is met: • Site-based floristic assessment is required to verify the presence or absence of CEECs, critically endangered plants and threatened grasslands • Review of any Environmental Planning and Assessment Act 1979 development consents or approvals applicable to the land is required to demonstrate whether the land has an existing obligation to be set aside for nature conservation; revegetation of native vegetation; or as a native vegetation offset. Prior to the BDAR being submitted to the consent authority, the accredited assessor may submit a proposed land categorisation method to the CPHR North West Planning team at rog.nw@environment.nsw.gov.au for review. For more information, see Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme.	
<u>Biodiversity</u> 1. Biodiversity impacts related to the proposed project are to be assessed in accordance with Section 7.9 of the BC Act, the BAM and documented in a BDAR unless: a) a BDAR waiver is granted, or b) the site is on biodiversity certified land. 2. The BDAR must apply the avoid, minimise, and offset framework; including assessing all direct, indirect, uncertain and prescribed impacts in accordance with the BAM. 3. The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix K of the BAM.	This BDAR has been prepared to accompany the application for the proposed development and has addressed impacts in accordance with the BAM 2020 and has addressed comments received during the site inspection held on the 4 July 2025. Section 8 addresses impacts, including direct, indirect, prescribed and cumulative impacts. The spatial data package for this project has been uploaded to BOAMs and is available for case parties to review.

CPHR SEARS Requirement	Section in BDAR addressing requirement
4. The BDAR must include details of the measures proposed to address the offset obligation as follows: a. The total number and classes of biodiversity credits required to be retired for the development/project; b. The number and classes of like-for-like biodiversity credits proposed to be retired; c. The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; d. Any proposal to fund a biodiversity conservation action; e. Any proposal to make a payment to the Biodiversity Conservation Fund. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits. 5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the BC Act 6. The EIS must contain a summary of the commitments set out in the BDAR to avoid, minimise and mitigate the biodiversity impacts of development that are to be implemented, post approval, by their inclusion in a Biodiversity Management Plan (BMP)). The preparation of a BMP to fulfil the avoid and minimise requirements of the BDAR must be included as a condition of consent/approval, unless otherwise agreed with CPHR. The BMP must include detailed measures to minimise impacts on biodiversity, monitoring and reporting requirements, proposed adaptive management measures, performance criteria recommended to meet states outcomes, remedial actions to be undertaken of actions fail to achieve stated outcomes, and any additional actions relevant to the management of biodiversity. NOTE – A BDAR template and guidance document has been created to assist accredited assessors to prepare a BDAR. It has been developed in accordance with best practice, the minimum information requirements, and to support BDAR reviewers. The BDAR Template can be found here and the Guidance for the BDAR Template can be found here. Residual Prescribed Impacts within the BAM 2020 Prescribed impacts can be difficult to quantify as they may result in discrete impacts, spatially undefined impacts, ecological regime shifts and/or impact cascades over time. Consequently,	An offset strategy is provided in Section 10.2 of this report.

CPHR SEARS Requirement	Section in BDAR addressing requirement
avoiding or minimising such impacts is critical and will likely be a key consideration for the consent authority in determining conditions of approval for relevant proposals. If avoidance and mitigation measures are not applicable or will not result in the complete reduction of prescribed impacts occurring, the assessor and proponent will need to consider options to compensate for unavoidable residual prescribed impacts. The Biodiversity Assessment Method Calculator (BAM-C) does not calculate biodiversity credits to offset a prescribed impact. However, the consent authority has the discretion to increase the number of biodiversity credits to be retired (or other conservation measures to be undertaken), under a planning approval. The assessment and calculation of a predicted offset obligation for any prescribed impacts must be presented prior to project determination and any impact occurring, in accordance with Section 7.14 of the BC Act. The purpose of this requirement is to ensure: • commitments to proposed mitigation measures for residual prescribed impacts are • described and can be captured in the projects consent conditions; and • the total offset obligation can be embedded in the project approval It is recommended that the proponent and assessor consult with CPHR during the assessment process on prescribed impact assessment and calculation, when required. <u>Cumulative Impacts</u> Cumulative impacts should be assessed through application of the Cumulative Impact Assessment for State Significant Projects Guidance (DPE, Oct 2022).	
<u>Controlled Actions under the Commonwealth EPBC Act</u> If the proposed development is likely to be a 'Controlled Action' under the EPBC Act, the accredited assessor should contact the CPHR North West Planning team at rog.nw@environment.nsw.gov.au prior to submission of the EIS. The CPHR North West Planning team can provide guidance on the minimum information requirements for the EIS for any entities that have been or are likely to be deemed a 'Controlled Action'	A formal referral under the EPBC Act was made (EPBC 2025/02758). Notification of referral decision is the Project is not a controlled action.

1.1.4.2 AGENCY ADVICE – TAMWORTH REGIONAL COUNCIL

Agency advice received from Tamworth Regional Council on the 25 February 2025 identified the following recommendations associated with biodiversity:

- Council recommends to update 'cumulative impact assessment of biodiversity values in the region from nearby development'; to require transparency of distance cumulative impact has been assessed for and proposed mitigation measures to address cumulative impact.
- Council recommends to include options for additional local offsetting within vicinity of the project and how this could be covered in the proposed planning agreement / benefit sharing program.

Cumulative impacts have been addressed in Section 8.4 of this report within mitigation measures to address associated impacts provided in Section 8.5. The proposed offset strategy is provided in Section 10.2 of this report.

1.1.5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, and heritage places, defined as MNES.

A EPBC referral was submitted by ERM on behalf of the Applicant to the Commonwealth Department of Agriculture, Water and the Environment (EPBC 2025/02758). The referral identified potential for significant impacts to EPBC Act list MNES, which are likely to occur or use habitat within the Project Area and be impacted by the Project. The application has been reviewed by DCCEEW (Commonwealth). Notification of referral decision is the Project is not a controlled action. Therefore, the Project does not require further assessment and approval under the EPBC Act before it can proceed.

The assessment requirements include (but are not limited to) the EPBC Act Referral identifying each EPBC Act listed threatened species and community, and migratory species likely to be impacted by the action. This must include a description of the impacts, habitat, survey methodologies and avoidance, mitigation and offset measures.

The threatened species and communities identified in the EPBC Act Referral for consideration are provided in Table 1-4. Further assessment of MNES entities is provided in the EPBC Act Referral Assessment appended to this report.

TABLE 1-4 MNES IDENTIFIED IN THE DECISION ON REFERRAL

MNES	Status	Section Addressed
Potential Significant Impact		
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	**Referral required.** This Endangered Ecological Community (EEC) is present within the Subject Land as identified in Section 4.1.6. Avoidance has been implemented where practicable and appropriate credits have been generated as detailed in Section 9.2.1 and Section 10.1.1 Mitigation measures for indirect impacts are discussed in Section 8.5.

MNES	Status	Section Addressed
Euphrasia arguta	Critically Endangered	**Referral required.** This species has been assumed present due to inadequate survey. A species polygon of potential habitat has been created as discussed in Section 5.1.2. Mitigation measures for indirect impacts are discussed in Section 8.5.
Koala (*Phascolarctos cinereus*) (combined populations of Queensland, NSW and the Australian Capital Territory)	Endangered	Referral not required. Survey for this species was conducted as detailed in Section 2.2.4. The species was not recorded during surveys. Possible impacts to foraging resources are likely and a referral has been made. Indirect impacts have been considered and mitigation measures have been discussed in Section 8.5
Austral Toadflax, Toadflax (*Thesium australe*)	Vulnerable	Referral not required but recommended. Survey for this species was conducted as detailed in Section 2.2.4. The species was not recorded during surveys. Indirect impacts have been considered and mitigation measures have been discussed in Section 8.5.
Diamond Firetail (*Stagonopleura guttata*)	Vulnerable	Referral not required but recommended. This species has been assessed for Ecosystem credits. Ecosystem credits are detailed in Section 9.2.1 and Section 10.1.1. Indirect impacts have been considered and mitigation measures have been discussed in Section 8.5.
Booroolong Frog (*Litoria booroolongensis*)	Endangered	Referral not required but recommended. Survey for this species was conducted as detailed in Section 2.2.4. The species was not recorded during surveys. Indirect impacts have been considered and mitigation measures have been discussed in Section 8.5.
Grey-headed Flying-fox (*Pteropus poliocephalus*)	Vulnerable	Referral not required but recommended. This species has been assessed for Ecosystem credits. No suitable breeding habitat was recorded during survey. Ecosystem credits are detailed in Section 9.2.1 and Section 10.1.1. Indirect impacts have been considered and mitigation measures have been discussed in Section 8.5.
South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*)	Vulnerable	Referral not required but recommended. This species has been excluded from assessment within the BAM due to the lack of suitable foraging habitat available land the lack of resources required to support breeding potential. Further detail is provided in Section 5.1.2
Bluegrass (*Dichanthium setosum*)	Vulnerable	Referral required. This species has been assumed present due to inadequate survey although surveys for this species were conducted as detailed in Section 2.2.4. Indirect impacts have been considered and mitigation measures have been discussed in Section 8.5.

1.2 BIODIVERSITY CREDIT AND CLASSES

The BAM uses biodiversity credits to measure:

- The residual impacts of a Project on biodiversity values; or
- Gains in biodiversity values at biodiversity stewardship sites.

In this application, the BDAR is measuring the direct impacts of the Project on biodiversity values using two kinds of credits, being 'ecosystem credits' and 'species credits'.

Each ecosystem credit is assigned up to seven attributes that are used to distinguish the type of biodiversity values represented by the credit and to determine whether a credit within a class is 'like' another credit.

Each species credit is assigned four attributes. The matching of attributes is used to apply the 'like-for-like' rules and variation rules as set out in the *Biodiversity Conservation Regulation 2017* (BC Regulation).

1.3 ACCREDITED PERSON

A BDAR, which documents the assessment and 'No Net Loss' outcomes, must be prepared by a person accredited under Section 6.10 of the BC Act. An accredited person is referred to as an assessor.

This BDAR was authorised by Ashleigh McTackett (Lead) with contributions from Gabriella Drakopoulos and Jemma Boyce. The BDAR was reviewed and certified by Ashleigh McTackett (Accredited BAM Assessor – BAAS20028) on the 29 January 2026.

The Assessment provided in the report is based on the BAM-C (current classification (live-default) (82)) with BAM data last updated on the 5 August 2025 and linked to a Development Assessment Case created in the BAM-C. The BAM-C was finalised on the 29 January 2026 as part of certifying this BDAR.

1.4 DATA AND INFORMATION USED

The full list of information sources referred to in this report is provided in Section12. Digital shapefiles for all maps and spatial data have been submitted with this report. Information sources included (but were not necessarily limited to) the following:

- Proposal layers and concept designs provided by the Applicant;
- DCCEEW EPBC Protected Matters Search Tool (PMST) (http://www.environment.gov.au/epbc/protectedmatters- search-tool) (Cwth DCCEEW, 2025a);
- DCCEEW Species Profiles and Threats (SPRAT) database; (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl) (Cwth DCCEEW, 2025b);
- Interim Biogeographical Regionalisation for Australia (IBRA) and IBRA sub-regions v7 (http://www.environment.gov.au/land/nrs/science/ibra) (Cwth DCCEEW, 2025c);
- NSW Department of Planning, Industry and Environment (DPIE) Threatened Species Database Collection (http://www.environment.nsw.gov.au/threatenedspeciesapp/) (NSW DPIE, 2025);
- DPIE Guidance to assist a decision-maker to determine a serious and irreversible impact (NSW DPE, 2019);

- NSW Biodiversity Values Map (https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap) (NSW DCCEEW, 2025a);
- NSW Department of Planning and Environment (DPE) Guidance for the Biodiversity Development Assessment Report Template (NSW DPE, 2022a);
- DPIE State Vegetation Type Mapping Version C2.0M2.0 (https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map);
- DPIE BioNet Atlas of NSW database (NSW DCCEEW, 2025b);
- DPIE Threatened Biodiversity Data Collection (TBDC) database (NSW DCCEEW, 2022);
- DPIE BioNet Vegetation Classification database (NSW DPIE, 2021a);
- NSW Office of Environment and Heritage (OEH) BAM Calculator (BAM-C) (https://www.lmbc.nsw.gov.au/bamcalc) (NSW OEH, 2024);
- BAM 2020 (NSW DPIE, 2020a);
- NSW Mitchell Landscapes map and descriptions (NPWS, 2003);
- Groundwater Dependent Ecosystem Atlas (BoM, 2023);
- Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (NSW DPIE, 2021b);
- Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (NSW DPIE, 2020b);
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (NSW DEC, 2004);
- Survey Guidelines for Australia's Threatened Mammals (Department of Sustainability, Environment, Water, Population & Communities (Cwth DEWHA, 2011);
- NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (NSW DPIE, 2020c);
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (NSW DPE, 2022b);
- Garoo Solar Farm and BESS EPBC Assessment Referral, application 02758 (ERM, 2025a);
- Garoo Solar Farm LCA Report, dated 4th June 2025 (ERM, 2025b); and
- NSW Spatial Collaboration Portal (SDT Explorer, 2025).

1.5 BIODIVERSITY VALUES NOT ASSESSED

The BAM does not assess biodiversity values for:

- Marine mammals;
- Wandering seabirds;
- Biodiversity that is endemic to Lord Howe Island; and / or
- Native vegetation and loss of habitat on Category 1-exempt land (within the meaning of Part 5A of the Local Land Services Act 2013 (LLS Act)), other than the additional biodiversity impacts under clause 6.1 of the BC Regulation (referred to as prescribed impacts in the BAM).

This BDAR does not include an assessment of these matters. The extent of Category 1-Exempt Land is outlined in the following section.

1.6 CATEGORY 1-EXEMPT LAND

The Subject Land comprises rural zoned land and is thus regulated under the LLS Act. Under the LLS Act, three land categories are defined relating to vegetation clearing:

- Category 1 – 'Exempt Land', land not subject to clearing approval;
- Category 2 - 'Regulated Land', land on which clearing of native vegetation may be carried out with or without approval in accordance with an 'allowable activity' or 'code' under the LLS Act; and
- 'Excluded Land' – Land not categorised in the Regulatory Maps and to which the LLS Act does not apply.

The Draft NVR Map (NSW DCCEEW, 2025c) identifies the Subject Land as containing Category 1 (exempt land) and Category 2 (regulated land). The mapped extent of the land categories as defined by the Draft NVR Map is shown in Figure 1-1.

A LCA Report has been prepared for the land within the Project Boundary. The assessment identified land categorisation for Category 1 – exempt land and Category 2 - regulated land within the Subject Land. Areas of the Subject Land that showed evidence of significant disturbance through agricultural activity have been mapped as Category 1 – exempt land. Areas containing patches of native woody vegetation, inclusive of scattered native trees are currently mapped as Category 2 – Regulated land. The mapped extent of land categories as determined through ground-truthing is shown in Figure 1-2.

Further surveys and BAM vegetation integrity plots confirmed that the area is dominated by non-native vegetation. The extent of proposed land categorisation has been considered in this BDAR by way of mapping condition states among non-woody vegetation cover (e.g., grasslands) to produce Vegetation Zones (VZs) generally distinguishing between grasslands likely to be in a moderate condition (i.e., Category 2) or low condition (i.e., Category 1) state. Vegetation Integrity Scores (VIS) have been calculated for each VZ to evaluate any requirement to offset (i.e., residual impacts on native vegetation and habitat).

Legend

- Project Area
- Development Footprint
- Local Road
- Local Track-Vehicular
- Major Watercourse

Draft Native Vegetation Regulatory (NVR) Map

- Category 1 - Exempt (draft)
- Category 2 - Regulated Land (draft)
- Vulnerable regulated land

SUGARLOAF CREEK

GAROO ROAD

BULLS ROAD

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 400m

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F1-1 Draft Native Vegetation Regulatory Map

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Legend

- Project Area
- Development Footprint
- Local Road
- Local Track-Vehicular
- Lots

Transmission Lines (existing)

- 330kV

ERM Proposed Land Categorisation

- Category 1 - Exempt Land
- Category 2 - Regulated Land
- Dam
- Infrastructure

SUGARLOAF CREEK

Muswellbrook 330 to Tamworth

BULLS ROAD

GAROO ROAD

Liddell to Tamworth

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

F1-2 Proposed Land categorisation of the subject land

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1.7 STRUCTURE OF THE BDAR

A BDAR requires completion of Stages 1 and 2 of the BAM (NSW DPIE, 2020a). The stages are as follows:

- Stage 1 establishes a consistent approach to assessing biodiversity values of the land; and
- Stage 2 outlines the guidance and requirements to apply the hierarchy of avoid, minimise and offset for assessing direct, indirect or prescribed impacts on biodiversity values arising from the proposed development, activity, clearing or biodiversity certification. Stage 2 also provides guidance on the use of migration measures where there is uncertainty on the timing or extent of impacts.

The structure of BDAR follows the corresponding BAM sections to assist readability for compliance with the BAM. Thus, in omitting the Stage 3 assessment, the BDAR section structuring ends with the last section in Stage 2 (Section 10 Applying the no net loss standard).

This BDAR has also utilised Small Area modules Appendix B (Scattered Tree Assessment) and Appendix D (PNV) of the BAM to appropriately assess impacts. The Scattered Tree Assessment has been embedded within this BDAR. Assessment of PNV and the use of the decision-key has been included within the appendices.

Documents appended to this BDAR include:

- APPENDIX A – ERM LCA REPORT
- APPENDIX B - PNV DECISION-KEY
- APPENDIX C – SPECIES OBSERVATION LIST (FLORA AND FAUNA)
- APPENDIX D – SCATTERED TREE ASSESSMENT DATA
- APPENDIX E – BAM PLOT DATA AND BAM FLORISTIC DATA
- APPENDIX F – BAM PREDICTED SPECIES REPORT
- APPENDIX G – BAM CANDIDATE SPECIES REPORT
- APPENDIX H – BAT CALL ANALYSIS REPORT
- APPENDIX I – EPBC ACT MNES REFERRAL ASSESSMENT
- APPENDIX J – BAM CREDIT SUMMARY REPORT
- APPENDIX K – BAM CREDIT SUMMARY REPORT (SCATTERED TREES)
- APPENDIX L – AQUATIC HABITAT ASSESSMENT

1.8 BDAR VERSION HISTORY

This BDAR has been prepared in accordance with the BAM 2020 through contributions made by accredited and non-accredited persons since 2024. Contributors to the preparation of the BDAR are listed on Page 2 of this BDAR.

This version of the BDAR assesses the impact of the Project in accordance with Stage 1 and Stage 2 of the BAM. Amendments to this version of the BDAR have the potential to affect the offset liability generated.

STAGE 1 BIODIVERSITY ASSESSMENT

2. INTRODUCTION

The Project Area is situated in the rural locality of Garoo NSW 2340, within the Tamworth Regional LGA. The Project is approximately 370 km northwest of Sydney, 40 km south of Tamworth and 14 km west of Wallabadah. It is not located within an area designated as a Renewable Energy Zone (REZ).

The existing land uses surrounding the Project Area are predominantly agricultural and primarily used for grazing and irrigated copping. The Project Area covers approximately 369.08 ha and the proposed Development Footprint is 305.43 ha.

The Project Area is made up of the main Solar Farm, interconnecting roads and a BESS, along with a transmission line easement that extends to the north and south along the western side of the Subject Land.

2.1 PROPOSED DEVELOPMENT

2.1.1 LOCATION

The Project Area is located on the eastern side of the New England Highway, with a minor unsealed road running through the Project Area in a northeast-southwest alignment, linking Bulls Road with Garoo Road. Garoo Road is a link road between the New England Highway and Lindsays Gap Road. An existing 330 kV overhead transmission line also traverses the Project Area, running in a north-south alignment.

The Project Area has elevations ranging from approximately 640 metres (m) near the south-west boundary, to approximately 566 m in the northern area around Tamarang Creek, which runs through the Project Area. The creek is a tributary of Sugarloaf Creek, which traverses the western boundary of the Project Area. There are no national parks or conservation areas in the immediate vicinity of the Project, with all closest protected areas located to the south and southeast.

2.1.1.1 ASSESSMENT AREA

The assessment area for a site-based assessment, such as the one undertaken for the Project is all lands within a 1500 m buffer of the Subject Land boundary, as shown in Figure 2-1. The Assessment Area comprises areas of land zoned RU1 Primary Production, under Tamworth Local Environmental Plan 2010 (LEP). No residential or commercial lands occur within the Assessment Area.

2.1.1.2 THE SUBJECT LAND

The term ‘Subject Land’ is land to which the BAM is applied and includes the area of direct impacts and is therefore synonymous with the term ‘Development Footprint’.

The Subject Land is defined as per the BAM, that is the land subject to the development. It excludes the assessment area which surrounds the Subject Lands. The Subject Land is synonymous with Project Boundary in this report.

The extent of the Subject Land is shown in Figure 2-2.

2.1.1.3 DEVELOPMENT FOOTPRINT

For the purposes of the BDAR, the term 'Development Footprint' is the same as defined in the BAM and is used hereafter to refer to the area to be directly impacted during the construction and operational phases of the Project. The Development Footprint is also taken to include the clearing footprint. The Development Footprint covers an area of 305.43 ha and is inclusive of the Solar Farm components, including ancillary infrastructure.

Legend

- Project Area
- Development Footprint
- Assessment Area
- LGA
- IBRA Subregions
- Water body
- Primary Road
- Local Road
- Local Track-Vehicular
- Railway
- Major Watercourse
- Minor Watercourse



GAROO ROAD

NEW ENGLAND HIGHWAY

GAROO ROAD

BULLS ROAD

LINDSAYS GAP ROAD

LINDSAYS GAP ROAD

TAMWORTH REGIONAL

LIVERPOOL PLAINS

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB/VN

Drawing Size: A3

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F2-1 Location Map (with 1500m assessment area)

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2.1.1.4 PROPERTIES

The properties included in the Project Area are listed in Table 2-1. Additional areas of impact assessed in this BDAR include access roads to the transmission line and switching station and roads requiring upgrade along the proposed haul route.

TABLE 2-1 LOT AND DP DETAILS

Lot	DP	Title
1, 2, 14, 15, 16, 17, 19, 20, 22	755341	Freehold
2, 3, 4, 5, 6, 7	1108524	Freehold
3, 4	114643	Freehold

Legend

- Project Area
- Development Footprint
- Lots
- Major Watercourse
- Local Road
- Local Track-Vehicular

78/DP755341
7005/DP96516
21/DP755341
5/DP755341
39/DP755341
34/DP755341
36/DP755341
38/DP755341
33/DP755341
1/DP1108524
1/DP130318
3/DP114643
4/DP114643
66/DP755341
28/DP755341
41/DP755341
42/DP755341
12/DP114643
1/DP322520
114643
BULLS ROAD
3/DP1108524
2/DP1108524
15/DP755341
14/DP755341
2/DP755341
5/DP1108524
4/DP1108524
6/DP1108524
7/DP1108524
1/DP33146
17/DP755341
22/DP755341
81/DP1046675
82/DP1046675
16/DP755341
1/DP755341
19/DP755341
20/DP755341
1/DP37636
GAROO ROAD

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56
Date: 18/08/2025
Created By: NB
Drawing Size: A3
0 400m
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F2-2 Site Map

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GreenPulse Solar Farm and BESS Unit Trust

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2.1.2 DEVELOPMENT DESCRIPTION

The Project layout for which approval is sought is shown in Figure 2-3 with components further discussed in Table 2-2.

TABLE 2-2 PROJECT COMPONENTS

Project Component	Description
Energy generation	• Solar Photovoltaic (PV panels) • Maximum installed capacity up to 133.76 Megawatts (MW) • Solar arrays mounted.
Power Conversion Units	Up to 44 Power Conversion Units (PCU) for the solar farm and 142 PCUs for the BESS Plant with the same brand and technology, measuring approximately 2815 millimetres (mm) / 1588 mm / 1588 mm (W / H / D).
Electrical Reticulation Network	• On-site substation and Switching Station • New high voltage substation including 330 kV switching station, BESS substation and associated structures. • Maximum occupied area of 145 m x 450 m for all facilities. • Proposed location within the Project Area near the intersection of the existing 330 kV transmission line, subject to final design. • Internal electrical reticulation network (Medium Voltage) • Electrical reticulation will generally follow rows of panels and internal access routes to reach the step-up substation (33 / 330 kV) for the Project. • The Project will connect into the substation (33 / 330 kV) on-site directly via underground cables (33 kV, internal reticulation voltage). • The Project will be connected to the Grid by Switching Station (330 kV) located on-site boundary. • BESS • Capacity of 360 MW / 1,440 Megawatt hours (MWh) with up to 4 hours duration of storage. • Approximate footprint of 14 ha. • Associated electrical equipment providing connection to the existing 330 kV transmission network.
Access Roads	• Access to the Project Area will be from Garoo Road, subject to assessment in the EIS phase. • Internal access tracks
Emergency Access	• There are two emergency access points, one will be via Garoo Road, at the northwest corner of the Project Area and the second emergency access will be via Bulls Road from the southwest corner of the Project Area.
Ancillary activities and infrastructure	• Temporary on-site infrastructure, including construction compounds, concrete batching plants, borrow pits, laydown, storage areas and temporary workers accommodation camp (capacity 250 FTE), which will be operational for 15 months • Permanent Operations & Maintenance (O&M) and associated infrastructure; • Proposed location to be within development footprint of the proposed solar farm. Design and locations to be confirmed during EIS preparation.

The following temporary elements will be required during the construction phase of the Project:

- Site buildings and facilities for construction contractors / equipment, including site offices, car parking and amenities for the construction workforce;
- Mobile concrete batching plant/s to supply concrete for Solar footings and substation construction works;
- Rock crushing facilities for the generation of suitable aggregates for concrete batching and/or for access track and hardstand construction;
- Hardstand laydown areas for the storage of construction materials, plant, and equipment;
- Groundwater supply, subject to appropriate licensing, and storage for concrete batching and construction activities;
- Temporary workers accommodation camp (capacity 250 FTE), which will be operational for 15 months; and
- Beneficial reuse of materials won from within the development footprint during cut and fill and foundation excavation works for use in access track, hardstands and foundation material.

SUGARLOAF CREEK

R5

R3

GAROO ROAD

Liddell to Tamworth

R1

TAMARANG CREEK

Muswellbrook 330 to Tamworth

BULLS ROAD

R4

R2b

R2a

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Legend

- Project Area
- Development Footprint
- Preferred access point
- Emergency Access point
- Transmission Lines (existing)
- Maintained Existing Water Dams
- Avoidance Area
- Associated Dwelling
- Non-Associated Dwelling
- PV (Mounting Structure - Half Table)
- PV (Mounting Structure - Full Table)
- Internal Road
- Parking and Laydown Area
- Customer Substation Area
- Transgrid Substation Area
- Inverters
- Bridge
- PCS Station
- OHL Interconnection
- BESS Container
- Strategic Road Upgrade
- Fence
- O&M Building
- Bridge Piers
- Noise Walls - PCS Stations
- Noise Wall - High Voltage Transformer
- Mitigation Planting Areas
- Local Road
- Local Track-Vehicular

Coordinate System:
GDA2020 MGA Zone 56

Date: 04/11/2025

Created By: NB

Drawing Size: A3

0 400m

1:12,000

F2-3 Project Layout
Map 1 of 7

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ERM

Muswellbrook-330 to Tamworth

R1

TAMARANG CREEK

BULLS ROAD

R2b

R2a

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Legend

- Project Area
- Development Footprint
- Transmission Lines (existing)
- Maintained Existing Water Dams
- Avoidance Area
- Associated Dwelling
- Non-Associated Dwelling
- PV (Mounting Structure - Half Table)
- PV (Mounting Structure - Full Table)
- Internal Road
- Inverters
- Bridge
- PCS Station
- OHL Interconnection
- BESS Container
- Fence
- Bridge Piers
- Mitigation Planting Areas
- Local Road
- Local Track-Vehicular

Coordinate System:
GDA2020 MGA Zone 56

Date: 04/11/2025

Created By: NB

Drawing Size: A3

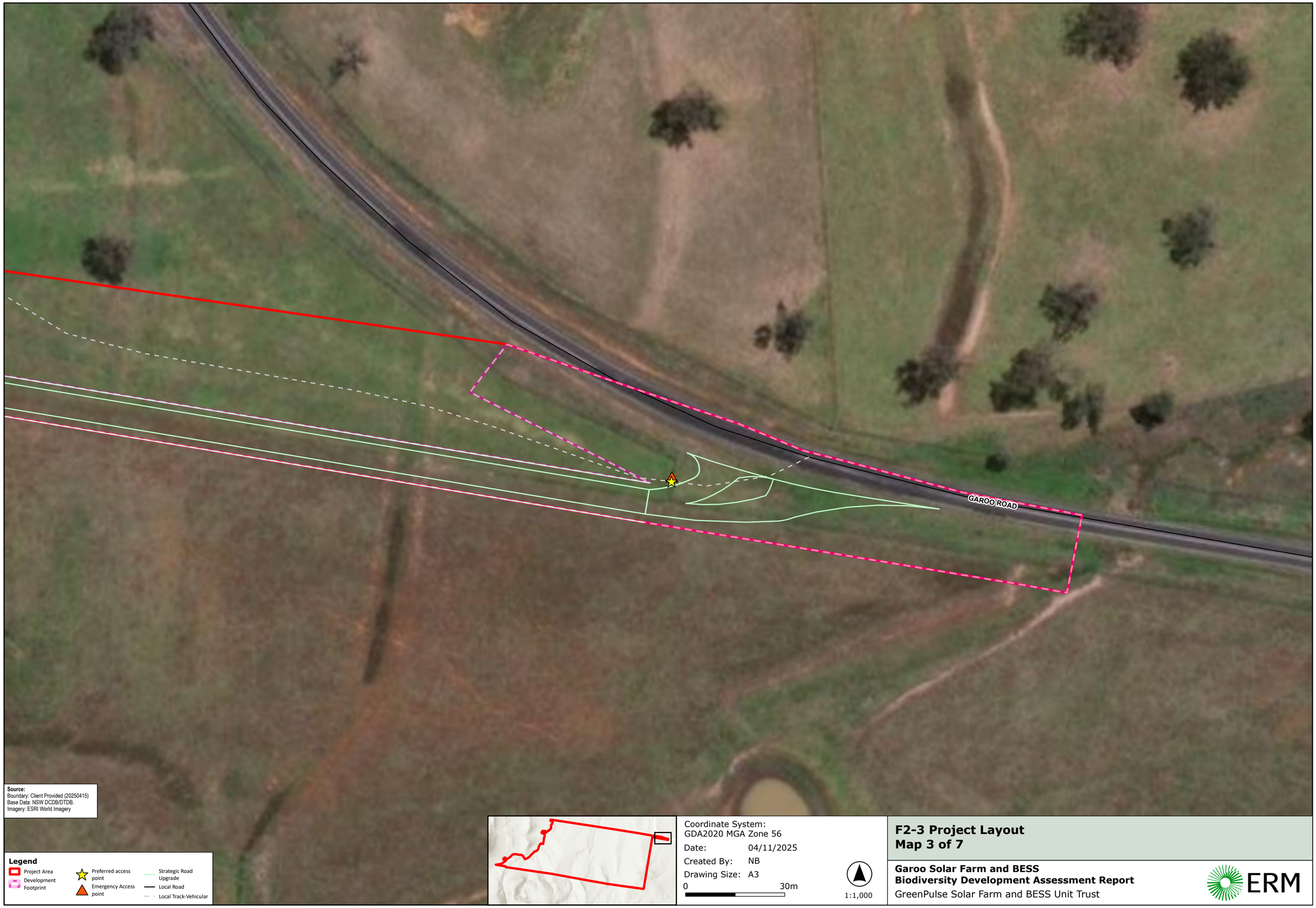
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F2-3 Project Layout
Map 2 of 7

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM



Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Legend

- Project Area
- Development Footprint
- Preferred access point
- Emergency Access point
- Strategic Road Upgrade
- Local Road
- Local Track-Vehicular

Coordinate System:
GDA2020 MGA Zone 56

Date: 04/11/2025

Created By: NB

Drawing Size: A3

0 30m

1:1,000

F2-3 Project Layout
Map 3 of 7

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

GAROO ROAD

Liddell to Tamworth

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Legend

- Project Area
- Development Footprint
- Transmission Lines (existing)
- Avoidance Area
- PV (Mounting Structure - Half Table)
- PV (Mounting Structure - Full Table)
- Internal Road
- Parking and Laydown Area
- Customer Substation Area
- Transgrid Substation Area
- Inverters
- Strategic Road Upgrade
- Fence
- O&M Building
- Noise Wall - High Voltage Transformer
- Local Road
- Local Track-Vehicular

Coordinate System:
GDA2020 MGA Zone 56

Date: 04/11/2025
Created By: NB
Drawing Size: A3

0 60m

1:2,000

F2-3 Project Layout
Map 4 of 7

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

Liddell to Tamworth

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Legend

- Project Area
- Development Footprint
- Transmission Lines (existing)
- PV (Mounting Structure - Half Table)
- PV (Mounting Structure - Full Table)
- Internal Road
- Parking and Laydown Area
- Customer Substation Area
- Transgrid Substation Area
- Inverters
- PCS Station
- OHL Interconnection
- BESS Container
- Fence
- O&M Building
- Noise Walls - PCS Stations
- Noise Wall - High Voltage Transformer
- Local Track-Vehicular

Coordinate System:
GDA2020 MGA Zone 56
Date: 04/11/2025
Created By: NB
Drawing Size: A3
0 60m
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F2-3 Project Layout
Map 5 of 7

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Legend

- Project Area
- Development Footprint
- PV (Mounting Structure - Half Table)
- PV (Mounting Structure - Full Table)
- Internal Road
- Parking and Laydown Area
- Customer Substation Area
- Transgrid Substation Area
- Inverters
- Bridge
- PCS Station
- OHL Interconnection
- BESS Container
- Fence
- O&M Building
- Bridge Piers
- Noise Walls - PCS Stations
- Noise Wall - High Voltage Transformer
- Local Track-Vehicular

Coordinate System:
GDA2020 MGA Zone 56

Date: 04/11/2025

Created By: NB

Drawing Size: A3

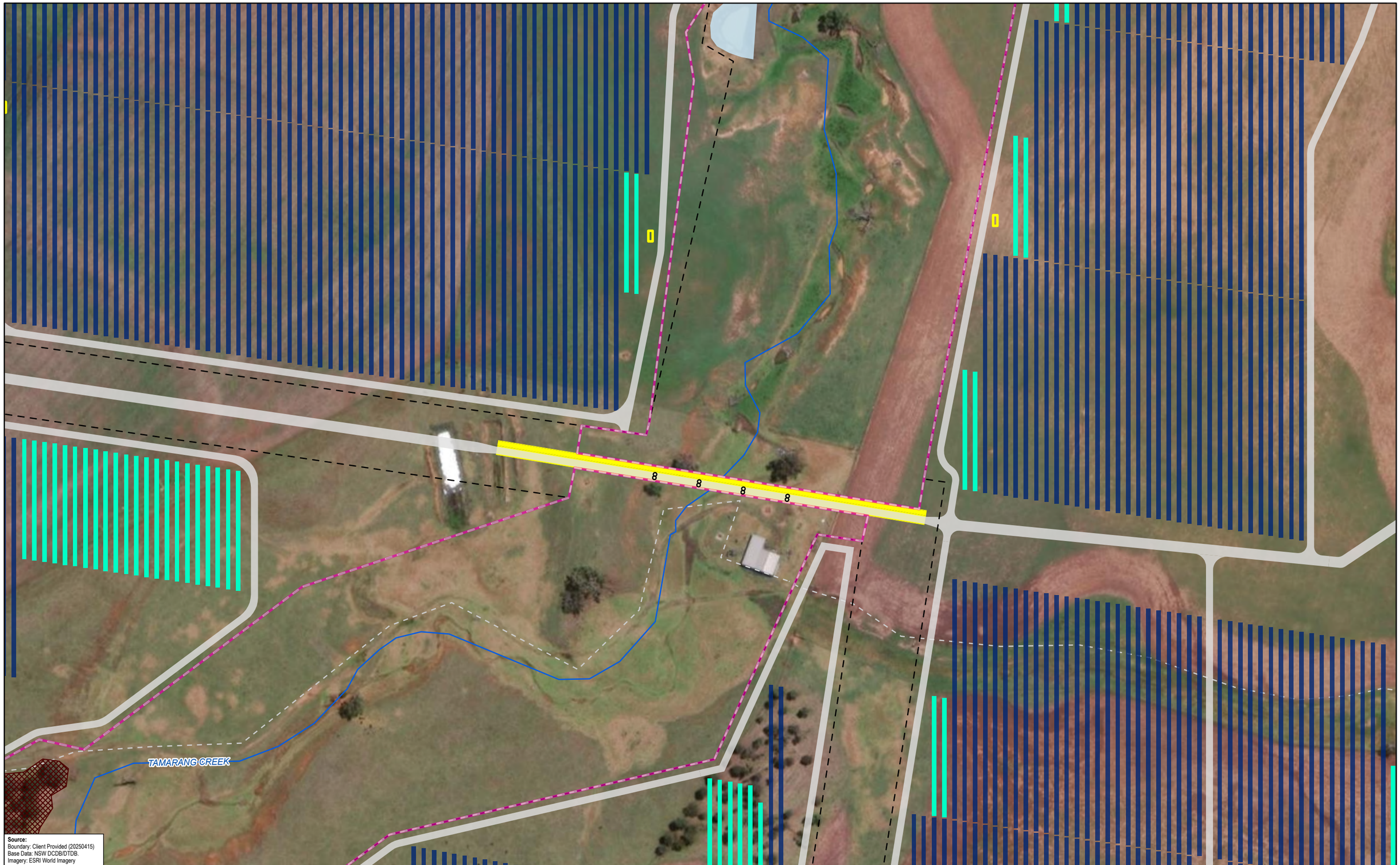
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F2-3 Project Layout
Map 6 of 7

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

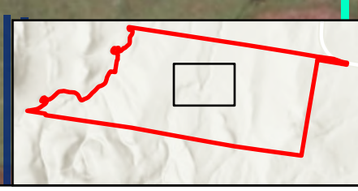
ERM



Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Legend

- Project Area
- Development Footprint
- Maintained Existing Water Dams
- Avoidance Area
- PV (Mounting Structure - Half Table)
- PV (Mounting Structure - Full Table)
- Internal Road
- Inverters
- Bridge
- Fence
- Bridge Piers
- Local Track-Vehicular



Coordinate System:
GDA2020 MGA Zone 56

Date: 04/11/2025
Created By: NB
Drawing Size: A3

0 60m

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F2-3 Project Layout
Map 7 of 7

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GreenPulse Solar Farm and BESS Unit Trust

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2.2 METHODOLOGY

2.2.1 SITE CONTEXT

2.2.1.1 LANDSCAPE FEATURES

Landscape features requiring consideration were initially determined via desktop assessment. Field surveys undertaken in September 2024, November 2024, January 2025 and June 2025 sought to verify the following landscape features (in accordance with Sections 3.1.3 of the BAM);

- IBRA bioregions and subregions, NSW Landscape region and area (ha);
- Native vegetation extent and cleared areas within the buffer area;
- Rivers and streams (classified according to stream order);
- Wetlands within, adjacent to and downstream of the Subject Land;
- Habitat connectivity features;
- Areas of geological significance and soil hazard features;
- Areas of Outstanding Biodiversity Value (AOBV);
- Site context components, including:
    - Identification of method applied (i.e. linear or site-based); and
    - Percent native vegetation cover in the Assessment Area.

2.2.1.2 NATIVE VEGETATION COVER

A desktop assessment was initially conducted to determine the extent (ha) of vegetation cover on the Subject Land and within the Assessment Area (1500 m buffer of Subject Land). The following resources were used:

- Historic aerial imagery (NSW Spatial Services, 2025);
- NSW Landuse 2017 dataset v1.5 (NSW DCCEEW, 2017);
- Transitional NVR Map (NSW DCCEEW, 2025c);
- NSW Environmental Planning Instrument – Land Zoning (NSW DPHI, 2024);
- NSW Woody Vegetation Extent & FPC 2011 (NSW DCCEEW, 2016); and
- NSW State Vegetation Type Map (NSW DCCEEW, 2024a).

Desktop and field surveys conducted between September 2024 and January 2025 confirmed the extent and condition of native vegetation cover on the subject land.

Native vegetation in the Assessment Area, situated outside of the Subject Land was not ground-truthed in its entirety and in some areas, relies on state vegetation mapping that may be inaccurate and / or outdated. Consequently, there may be some minor additional or omissions to the actual extent of native vegetation as defined in the BAM.

2.2.2 NATIVE VEGETATION, THREATENED ECOLOGICAL COMMUNITIES AND VEGETATION INTEGRITY

Sections of the BAM relevant to vegetation mapping are:

- Section 4.1 Map native vegetation extent on subject land;
- Section 4.2 Identify and map PCTs and TECs;

- Section 4.3 Map VZs and assessment of vegetation integrity (vegetation condition);
- Appendix B Scattered Trees; and
- Appendix D PNV.

The State Vegetation Type Map (SVTM) (NSW DCCEEW, 2024a) and BioNet Vegetation Classification (BioNet VIS) system were used to identify candidate PCTs and TECs that may be present within the Subject Land. This was used as the basis for survey design as part of preparing a site-specific vegetation map identifying PCTs and condition states (i.e., vegetation zones).

Recent high-resolution imagery (ESRI basemaps) was used in ArcMap at a scale of 1:1,000 to generate vector data (i.e., polygons) to describe variation in vegetation structure, character and condition. Field-based data was obtained to assign vegetation classification and calculate condition states.

The following sections outline the approach taken in generating the vegetation map for the Subject land.

2.2.2.1 PLOT-BASED VEGETATION SURVEY

A plot-based vegetation survey (BAM Plot) of the Subject Land is required to identify the most likely PCTs on the subject land. BAM Plots were conducted in accordance with Section 4.2.1 of the BAM. BAM plots were established by walking a random distance into the VZ and establishing the plot on a random bearing. Each BAM Plot was established around a central 50 m transect and each included:

- Unless otherwise specified, a 20 m x 20 m plot was used to sample for the presence of flora species. The plots were carefully examined to identify all flora species present. This search continued until it was confident that all flora species within the plot were detected. Data collected for each species included:
  - Stratum and layers in which each species occurs;
  - Growth form for each species;
  - Scientific and common name for each species;
  - Percentage Foliage Cover (PFC) across the plot, of each species rooted in or overhanging the plot;
  - Abundance rating for each species;
- One 1000 m² (20 m x 50 m unless otherwise specified) plot to assess the function attributes being:
  - Number of large trees;
  - Stem size class;
  - Tree regeneration;
  - Length of fallen logs; and
- Five 1 m² sub-plots to assess average litter cover (and other groundcover components).

During the September 2024 survey event 25 BAM Plots were completed to assess the vegetation integrity, along with 23 LCA transects and rapid vegetation assessments which are represented in Figure 2-4.

2.2.2.2 LAND CATEGORY ASSESSMENT TRANSECT

A transect-intercept was used to assess if the vegetation is native or exotic by estimating the percentage cover of exotic perennial / annual and native vegetation. This was done by:

- Establishing a transect, a straight line that runs along a compass bearing
- Placing a vertical pin at each meter along the transect
- Recording if the species the pin lands on are native or exotic by classifying into the following:
  - Native vegetation
  - Exotic perennial species
  - Exotic annual species
- Totalling the number of "hits" for each class at each meter
- Using the total number of hits to estimate the cover of each class

The LCA transects conducted across the Subject Land are shown in Figure 2-4with the LCA Assessment provided at Appendix A of this report.

2.2.2.3 SCATTERED TREE ASSESSMENT

Scattered trees within the Subject Land meet definition C, given in Appendix B of the BAM for scattered trees. The scattered trees can be defined as:

- are three or fewer trees that have a Diameter at Breast Height (DBH) of greater than or equal to 5 cm and are within a distance of 50 m of each other, that in turn, are greater than 50 m away from the nearest living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human made surfaces or bare ground.

This means that the scattered tree assessment module can be used to assess the impacts of the proposal. Therefore, it is considered appropriate to apply the Scattered Tree Module for areas identified as scattered trees.

The streamline scattered tree assessment was completed and recorded the following attributes in accordance with Appendix B of the BAM:

1. The genus and species of each tree, and
2. Whether the trees are on ‘Category 2’ land surrounded by ‘Category 1’ land,
3. The percentage canopy foliage cover and if it is less than 25% of the benchmark
4. The class for each tree to be cleared:
   - Class 1: trees that are <20 cm DBH and without hollows
   - Class 2: trees that are ≥20 cm DBH and less than the large tree benchmark for the most likely plant community type or trees that are <20 cm DBH that contain at least one hollow
   - Class 3: trees that are greater than or equal to the large tree benchmark for the most likely PCT
5. The height and DBH of each tree and dimension of any hollows present
6. Any sightings (e.g. in hollows) or evidence (e.g. scats) of threatened species (flora or fauna) using the scattered trees were recorded.

Scattered trees with negligible biodiversity value are those trees identified as Class 1, that is trees that are less than 20 cm DBH and without tree hollows. No further assessment or offset is required for these trees. The BAM-C Scattered Tree module generated a list of candidate species at risk of SAII in accordance with Appendix B of the BAM for areas where this assessment approach was considered valid.

The assessment required a visual assessment for hollows; presence of important habitat features and habitat suitability for threatened species to be undertaken for each scattered tree where trees offer habitat for candidate species at risk of SAII. If candidate SAII species are recorded as present, the scattered tree module must not be applied, and the species must be assessed using Chapter 5 of the BAM and BAM-C development module.

2.2.2.4 RAPID VEGETATION ASSESSMENT

Rapid Vegetation Assessments (RVA) were conducted to supplement BAM plots when determining PCT occurrence. Recording the remnant vegetation cover, dominant characteristic species and also noting if any threatened species were present. The RVAs conducted across the Subject Land are shown in Figure 2-4

2.2.2.5 PLANTED NATIVE VEGETATION ASSESSMENT

The PNV streamline assessment provides a framework for the assessment of PNV using the BAM. The framework provided in Appendix D of the BAM was applied to the row of planted native trees on the southern boundary, to ensure the streamlined assessment was applicable and the full BAM assessment was not required. The PNV Assessment has been provided in Appendix B.

Following this, the planted vegetation was assessed for threatened species habitat, looking out for:

- suitability of the PNV for use by threatened species,
- any incidental sightings or evidence (e.g. scats, stick nests) of threatened species credit species (flora and fauna) using, inhabiting or being part of the PNV.

2.2.2.6 VEGETATION ZONES

Vegetation analysis using the above methodologies resulted in the identification of vegetation across the Subject Land and development footprint. A VZ is an area of native vegetation that is the same PCT and has a similar broad condition state (NSW DPIE, 2020a). The VZs were defined during field assessments and detailed in spatial analysis across the Subject Land between October 2024 and January 2025. Table 2-3summarises the plot requirements based on the area (ha) and number of VZs.

TABLE 2-3 BAM PLOT REQUIREMENTS AND VEGETATION ZONES

Vegetation Zones	PCT	Condition	Code	Area (ha) within Development Footprint	Minimum Plots Required	Plots Used in Assessment
1	599	Open Woodlands	VZ01_599	0.07	1	BAMa_LM BAMb_LM BAMd_LM
2	599	Scattered Trees	VZ02_599	1.57	0	Scattered Tree Assessment module used
3	599	Derived Grassland	VZ03_599	0.04	1	BAMc_LM
4	599	Mixed Planted	VZ04_599	0.0	1	PNV Streamlined Assessment Module

Legend

- Project Area
- Development Footprint
- NSW BAM Plot
- Rapid Vegetation Assessment
- Major Watercourse
- Local Road
- Local Track-Vehicular

PCT

- 0 - Non-Native Grassland
- 0 - Non-Native Grassland (Cropping and earthworks)
- 0 - Planted Native Vegetation
- 0 - Planted Non Native Vegetation
- 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
- 0 - Dam
- 0 - infrastructure

SUGARLOAF CREEK

BULLS ROAD

GAROO ROAD

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 400m

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F2-4 Survey effort

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2.2.3 THREATENED FLORA SURVEY

2.2.3.1 REVIEW OF EXISTING INFORMATION

The BAM-C, BioNet Atlas Database and Atlas of Living Australia (ALA) were reviewed prior to the flora surveys conducted for this BDAR. Threatened flora sightings recorded within the Subject Land were further investigated and considered throughout this BDAR. Desktop review and field surveys within the Subject Land included the assessment of habitat constraints and microhabitats and their suitability for predicted species credit flora species.

'Species credit species', also referred to as 'Candidate species', are threatened species for which vegetation surrogates and / or landscape features cannot reliably predict the likelihood of their occurrence. These species are identified in the TBDC and require targeted surveys, or an expert report is required to confirm the presence or absence of these species on the Subject Land. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the Applicant may elect to assume the species is present.

A review of the TBDC was conducted to confirm species survey requirements for threatened flora associated with PCT 599 and / or considered to have potential habitat available on the subject land.

2.2.3.2 HABITAT CONSTRAINTS ASSESSMENT

Desktop review and field surveys within the Subject Land included the assessment of habitat constraints and microhabitats and their suitability for predicted species credit flora species.

2.2.3.3 SURVEY EFFORT AND METHODOLOGY

The BAM-C identifies candidate species that require seasonal targeted searches to be undertaken across the Subject Land in accordance with the BAM and relevant guidelines.

A total of 11 threatened candidate flora species were identified in the BAM-C associated with the chosen PCT on the subject land. A review of the Threatened Species Database was undertaken to review the survey requirements and undertake appropriate field surveys. Targeted field surveys were undertaken in habitat throughout the broader Subject Land prior to the refinement of the current development footprint.

The following targeted flora survey events were completed across the Subject Land:

- Spring 2024: 28th October and 1st November 2024
- Summer 2025: 13th January and 20th January 2025

Survey effort performed to assess threatened flora species presence in the Project Area is summarised in Table 2-4 Threatened flora survey effort is shown in Figure 2-5.

Additionally, a general habitat assessment, noting the abundance of various habitat features as well as an assessment of the likelihood of occurrence of potentially occurring threatened flora species was also undertaken at all times during the survey.

Legend

- Project Area
- Development Footprint
- Threatened Flora Transects
- Major Watercourse
- Local Road
- Local Track-Vehicular

PCT

- 0 - Non-Native Grassland
- 0 - Non-Native Grassland (Cropping and earthworks)
- 0 - Planted Native Vegetation
- 0 - Planted Non Native Vegetation
- 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
- 0 - Dam
- 0 - infrastructure

SUGARLOAF CREEK

GAROO ROAD

BULLS ROAD

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB/VN

Drawing Size: A3

0 400m

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F2-5 Threatened flora survey effort

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TABLE 2-4 FLORA FIELD SURVEY EFFORT AND TARGET SPECIES SUMMARY

Method	Target species	Applicable Guidelines	Effort
BAM plots	All flora species	The BAM (NSW Government, 2020)	25 BAM plots conducted
RVAs	All flora species- conducted in order to verify PCTS	The BAM 2020 (DPE, 2020)	36 RVAs were conducted throughout the site to gather high level information on vegetation composition, dominant flora species and note features of interest, to support vegetation mapping.
Scattered tree assessments	All trees that meet the Scattered Tree definition in the BAM	DPIE (2020) BAM 2020 Operational Manual- Stage 1	All scattered trees recorded. A total of 60 scattered trees were recorded during the survey.
LCA transects	Category 1 – Exempt Land	Conducted in accordance with the OEH Interim Grasslands and other Groundcover Assessment Method.	23 transects completed.
Targeted threatened flora surveys	Candidate species associated with PCT599.	NSW DPIE (2020) Surveying threatened plants and their habitats NSW survey guide for the BAM.	Surveys were carried out in areas of suitable habitat for each threatened flora species. Further details on survey effort is provided in Section 5.2.1of this report.

It is considered that targeted flora surveys range from being adequate to requiring additional surveys to meet the minimum requirements in accordance with the BAM. Where partial survey has been completed, or survey efforts have not met the minimum requirements for the species presence has been assumed.

Further details on targeted flora species surveyed are provided in Section 5.2.1 of this report.

2.2.4 THREATENED FAUNA SURVEY

2.2.4.1 REVIEW OF EXISTING INFORMATION

The BAM-C, BioNet Atlas Database and ALA were reviewed prior to the fauna surveys conducted for this BDAR. All threatened fauna sightings recorded over the Subject Land were further investigated and considered throughout this BDAR.

2.2.4.2 HABITAT CONSTRAINTS ASSESSMENT

Desktop assessments and field surveys within the Subject Land included assessment of habitat constraints and microhabitats and their suitability for predicted species credit fauna species. This included desktop assessment of the Assessment Area for features such as waterways and field inspection of microhabitats including leaf litter, stick nests and Hollow-Bearing Trees (HBTs) within the Subject Land. Threatened fauna species excluded from assessment because of habitat constraints are identified and justified.

2.2.4.3 FAUNA FIELD SURVEYS

Targeted field surveys were undertaken in habitat throughout the broader Project Area prior to refinement of the current Subject Land. The Project Area includes the Subject Land.

The following targeted fauna survey events were completed across the broader Project Area and Subject Land:

- Spring 2024: 28th October and 1st November 2024
- Summer 2025: 13th January and 20th January 2025

Requirements for targeted surveys include the survey months specified in the BAM-C, as well as the survey effort and methods described in the TBDC and other relevant survey guidelines. Relevant survey guidelines considered include the following:

- BAM 2020 (NSW DPIE, 2020a);
- Streamlined Assessment Module PNV (NSW DCCEEW, 2024b);
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (NSW DEC, 2004);
- Survey Guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (Cwth DEWHA, 2010b);
- Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (NSW DPE, 2022b);
- Survey Guidelines for Australia's Threatened Bats (Cwth DEWHA, 2010a);
- Survey guidelines for Australia's threatened mammals (Cwth DEWHA, 2011);
- Survey Guidelines for Australia's Threatened Reptiles (Cwth DSEWPC, 2011); and
- Threatened Reptiles: BAM Survey Guide (NSW DPE, 2022c).

Survey effort across the Subject Land and areas of the Project Area are detailed in Table 2-5 and shown in Figure 2-6 (amphibians, reptiles and diurnal birds), Figure 2-7 (nocturnal birds and bats) and Figure 2-8 (arboreal and terrestrial mammals).

TABLE 2-5 FAUNA SURVEY EFFORT SUMMARY

Target Species	Method	Effort	Survey Dates
Amphibians Booroolong Frog (*Litoria booroolongensis*) Tusked Frog (*Adelotis brevis*)	Nocturnal aural-visual surveys along a 500 m transect of suitable habitat (or pro-rata when less than 500 m of suitable habitat is present) commencing with a five minute listening period, two minute broadcast of target species calls, two minutes of listening for response, followed by a slow-paced walk visually scanning the area with a minimum 200-lumen torch to detect eyeshine walking 50 m over five minutes. Process repeated for the length of the transect.	Surveys were conducted from Sunday 27th October to Saturday 2nd November 2024 for the Booroolong Frog and Tusked Frog: seven locations were surveyed over four nights.	Sunday 27th October to Saturday 2nd November 2024.
Reptiles Pink-tailed Legless Lizard (*Aprasia parapulchella*) Hunter Valley Delma (*Delma vescolineata*) Pale-headed Snake (*Hoplocephalus bungaroides*) Border Thick-tailed Gecko (*Uvidicolus sphyrurus*)	Diurnal surveys were undertaken for the Pink-tailed Legless Lizard involving habitat surveys consisting of diurnal rock searches undertaken by turning over suitably sized rocks in areas of suitable habitat. Timed nocturnal transect searches were conducted in areas of suitable habitat for one person-hour using standard spotlighting techniques with a focus placed on the tree trunks and other habitat likely to be used by the Pale-headed snake. Diurnal surveys were undertaken for the Border Thick-tailed Gecko, involving turning over partially embedded or surface rock to detect reptiles sheltering during the day.	Pale-headed Snake and Border Thick-tailed Gecko: four nights Pink-tailed legless lizard: three areas containing suitable rocky habitat were surveyed over four afternoons. Hunter Valley Delma: surveyed over four nights and searches of rocky habitats.	Sunday 27th October to Saturday 2nd November 2024.

Target Species	Method	Effort	Survey Dates
<u>Diurnal Birds</u> South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) White-bellied Sea-Eagle (*Haliaeetus leucogaster*) Little Eagle (Hieraaetus morphnoides) Square-tailed Kite (*Lophoictinia isura*)	Diurnal bird surveys were performed at HBTs greater than 15 cm diameter and higher than 8 m above ground.	Surveys performed at three sites, for 20 minutes at each site. Surveys were repeated for three consecutive days.	Sunday 12th January and Monday 20th January 2025.
<u>Nocturnal Birds</u> Barking Owl (*Ninox connivens*) Masked Owl (*Tyto novaehollandiae*) Bush Stone-curlew (*Burhinus grallarius*)	Call playback was performed for the bush stone-curlew, barking and masked owl at three locations within suitable habitat for 15 seconds followed by 30 seconds of listening time. This was repeated for 15 minutes followed by a 1 ha circular plot around each broadcast station.	Barking Owl and Masked Owl: three survey locations, six nights	Sunday 12th January and Monday 20th January 2025.
<u>Bats</u> Corben's Long-eared Bat (*Nyctophilus corbeni*) Large-eared Pied Bat (*Chalinolobus dwyeri*) Large Bent-winged Bat (*Miniopterus orianae oceanensis)* Eastern Cave Bat (*Vespadelus troughtoni*) Grey-headed Flying-fox (*Pteropus poliocephalus*)	Echolocation detection equipment was deployed in areas of suitable habitat for the target species. Bat calls recorded by the devices were analysed for species identification by suitably qualified and experienced personnel. Detectors were secured to trees or fence posts approximately 1.5 – 2 m above ground level and recorded from 30-minutes before dusk to 30-minutes after dawn.	Four devices for four nights.	Sunday 12th January and Monday 20th January 2025.

Target Species	Method	Effort	Survey Dates
<u>Arboreal Mammals</u> Greater Glider (*Petauroides volans*) Squirrel Glider (*Petaurus norfolcensis*) Koala (*Phascolarctos cinereus*) Eastern Pygmy-possum (*Cercartetus nanus)*	Squirrel Glider: Camera traps were deployed in suitable habitat across the site for a total of five nights, strapped to suitable trees facing a lure containing peanut butter, oats, sardines and honey. Honey water was sprayed on and around the lure and tree trunk / branch to which it was fastened. Spot Assessment Technique (SAT): Moving outwards from a 'centre tree', the 29 nearest trees of any species will be identified and searched for evidence of koala scat in a 1 m radius from the tree base for a minimum of one minute per person, per tree. Where 30 trees are not available in a patch or where there are isolated trees, a modified Koala SAT will be completed searching for evidence of the species. Ecologists surveyed for evidence such as koala scats and scratches on trees, with each tree being photographed.	Squirrel Glider: six devices for five nights. Greater Glider, Yellow-bellied Glider, Squirrel Glider and Koala: four nights Koala: SAT performed on 166 trees within the Project Area across seven days.	Sunday 12th January and Monday 20th January 2025.
<u>Terrestrial Mammals</u> Spotted-tailed Quoll (*Dasyurus maculatus*)	Camera traps were deployed in suitable habitat across site for a total of five nights, strapped to suitable trees facing a lure containing peanut butter, oats, sardines and honey. Honey water was sprayed on and around the lure and tree trunk / branch to which it was fastened.	Six devices for five nights.	Sunday 12th January and Monday 20th January 2025.

Legend

- Project Area
- Development Footprint
- Reptile Survey Point
- Amphibian Surveys
- Reptile Survey Tracks
- Major Watercourse
- Local Road
- Local Track-Vehicular

PCT

- 0 - Non-Native Grassland
- 0 - Non-Native Grassland (Cropping and earthworks)
- 0 - Planted Native Vegetation
- 0 - Planted Non Native Vegetation
- 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
- 0 - Dam
- 0 - infrastructure

SUGARLOAF CREEK

BULLS ROAD

GAROO ROAD

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 400m

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F2-6 Threatened fauna survey effort - Amphibians, reptiles, diurnal birds

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Legend

- Project Area
- Development Footprint
- Spotlighting
- Hollow Bearing Tree
- Anabat Songmeter
- Major Watercourse
- Local Road
- Local Track-Vehicular

PCT

- 0 - Non-Native Grassland
- 0 - Non-Native Grassland (Cropping and earthworks)
- 0 - Planted Native Vegetation
- 0 - Planted Non Native Vegetation
- 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
- 0 - Dam
- 0 - infrastructure

SUGARLOAF CREEK

BULLS ROAD

GAROO ROAD

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 400m

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F2-7 Threatened fauna survey effort - nocturnal birds and bats

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

Legend

- Project Area
- Development Footprint
- Camera Trap
- Hollow Bearing Tree
- Major Watercourse
- Local Road
- Local Track-Vehicular

PCT

- 0 - Non-Native Grassland
- 0 - Non-Native Grassland (Cropping and earthworks)
- 0 - Planted Native Vegetation
- 0 - Planted Non Native Vegetation
- 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
- 0 - Dam
- 0 - infrastructure

SUGARLOAF CREEK

BULLS ROAD

GAROO ROAD

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 400m

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F2-8 Threatened fauna survey effort - arboreal and terrestrial mammals

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

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2.2.5 WEATHER CONDITIONS

The weather conditions during the survey events were appropriate for the survey of a variety of flora and fauna species. Daily weather observations from Quirindi Post Office and Tamworth Airport weather station (Station No. 055049 and Station No. 055325) (BoM Climate Data, 2025) are presented in Table 2-6.

TABLE 2-6 WEATHER CONDITIONS DURING THE PROJECT SURVEY PERIODS

Date	Min Temperature (°C)	Max Temperature (°C)	Rain	Relative Humidity (%)	Wind (9am)
Spring 2024					
24/09/2024	5.7°C	26.5°C	0 mm	71	Calm
25/09/2024	10.7°C	26.4°C	0 mm	69	Calm
26/09/2024	14.5°C	16.8°C	1.0 mm	83	Calm
27/09/2024	9.6°C	16.8°C	26.6 mm	82	SE 15km/h
28/09/2024	9.0°C	21.1°C	0 mm	69	SW 15km/h
28/10/2024	8.5°C	29.6°C	0 mm	63	Calm
29/10/2024	12.3°C	28.8°C	0 mm	73	Calm
30/10/2024	9.9°C	30.5°C	0 mm	62	Calm
31/10/2024	10.2°C	31.3°C	0 mm	63	Calm
1/11/2024	14.0°C	No data	0 mm	64	Calm
Summer 2025					
12/01/2025	16.4°C	31.8°C	2.8 mm	No data	No data
13/01/2025	18.1°C	34.0°C	27.0 mm	83	N 4km/h
14/01/2025	17.0°C	36.1°C	1.0 mm	65	NW 4km/h
15/01/2025	20.1°C	38.0°C	0 mm	64	NE 11km/h
16/01/2025	15.0°C	27.5°C	18.2 mm	87	WNW 6km/h
17/01/2025	15.3°C	22.8°C	11.8 mm	80	SE 26km/h
18/01/2025	16.9°C	28.5°C	0.2 mm	No data	No data
19/01/2025	16.9°C	28.9°C	0 mm	No data	No data
20/01/2025	10.4°C	30.9°C	0 mm	75	SW 6km/h
Winter 2025					
26/05/2025	0.9	13.5	8.0	83	Calm

*N/A = Data was unavailable from weather station
Dir = wind direction
Spd = wind speed
RH = relative humidity
Source: *Australian Government Bureau of Meteorology, www.bom.gov.au*

2.2.6 LIMITATIONS

The landscape and its features appear generally consistent throughout (based on review of other data such as aerial photography). Accordingly, target species were sampled using stratified surveys across the Project Area, generally by vegetation type and condition. The use of a combination of field survey data and desktop information is considered appropriate to identify potential key impacts for the current phase of the proposed development.

The absence of a species from a database list or observational studies does not confirm absence from the Project Area. The lack of existing records from databases is more likely to indicate a low historic sampling effort in the region, as opposed to an absence of threatening processes and species. To overcome these limitations, the likelihood of occurrence approach takes a precautionary approach and identifies species that have potential to occur (considering habitat features), to assess potential impacts accordingly.

2.2.6.1 VEGETATION CLASSIFICATION

The classification of native vegetation within the Subject Land has been assigned the best fit PCT by using a quantitative analysis of BAM plot data and corresponding comparative analysis with the BioNet Vegetation Classification database by an experienced practitioner. This process involved the consideration of BAM plot data obtained from several seasons, years and by several observers. The influence of broad ecotones generated from several environmental and anthropogenic influences has also been considered in this analysis. The corresponding PCT mapping has been guided by the quantitative analysis of floristic survey data, field observations and analysis of aerial imagery.

2.2.6.2 TARGETED SURVEYS

Targeted field surveys for threatened flora and fauna have been conducted in habitat throughout the Project Area. The Project Area includes the Subject Land. A period of several seasons or years is often needed to identify all the species present in an area, especially as some species are only apparent at certain times of the year (orchids or migratory birds) and require specific weather conditions for optimal detection.

These potential limitations have been addressed by adopting a cautionary approach (assumed presence), applied where habitat was identified, or species were predicted to utilise habitat components at some stage during their life cycle.

2.2.6.3 DEGRADED LANDS

The Subject Land comprises large areas of low condition grassland and roadside vegetation that is in a heavily degraded state. Reasonable assumption has been made with respect to the suitability of these lands for Candidate species occurrence. Efforts have been made to verify these assumptions, noting limitations in season and knowledge of impacts arising from the iterative design process.

2.2.7 LICENCING

Regarding the flora and fauna surveys conducted in this BDAR, ERM operated under the Scientific Licence of SL100196 and Animal Ethics Accreditation number 53055.

2.2.8 DESKTOP ANALYSIS

Desktop analyses inherently have limitations associated with data availability and potential mapping errors associated with species records and extents available through online databases. Generation of project layers through Geographic Information Systems (GIS) may also cause minor variations in the overall areas of project layers such as areas associated with broad layers (e.g. Subject Land and Assessment Areas) defined with less detailed ground-truthing. In this instance areas associated with vegetation classification that have undergone extensive ground-truthing are to be relied upon when assessing impacts and have been utilised to assess impacts of the proposed development in accordance with the BAM within this BDAR.

3. SITE CONTEXT

3.1 IDENTIFY LANDSCAPE FEATURES

The context features shown in Table 3-1, have been identified from an inspection of the Subject Land along with a Geographical Information Systems (GIS) assessment of available relevant digital mapping layers and aerial imagery.

TABLE 3-1 LANDSCAPE FEATURES OF THE SUBJECT LAND

Landscape feature	Description
IBRA Bioregions and Subregions	The Subject Land is located entirely within the Nandewar IBRA Bioregion and the Peel IBRA Subregion.
NSW Landscape Regions (Mitchell)	The Subject Land is located in the Nundle Hills Mitchell Landscape.
Rivers, streams, estuaries and wetlands	Tamarang Creek runs through the centre of the Subject Land, running south to north, with Sugarloaf Creek bounding the western edge of the Project Area. The Fisheries NSW Spatial Data Portal (DPI) maps both Tamarang Creek and Sugarloaf Creek as KFH, with Sugarloaf Creek also mapped as suitable habitat for the threatened Southern Purple Spotted Gudgeon (Mogurnda adspersa), listed under the Fisheries Management Act 1994 (FM Act).
Habitat connectivity	Native vegetation is present within the Subject Land; however, this is highly fragmented due to historical clearing and current agricultural land uses. Vegetation along Tamarang Creek is largely fragmented, however vegetation along Sugarloaf Creek on the western boundary of the Subject Land provides greater habitat connectivity. Both creeklines have been avoided by the Subject Land.
Geological features of significance	No discernible karsts, caves, cliffs or other geological features of significance occur in the Subject Land.
Soil hazard features	Review of the eSPADE portal determined the following: • Mass movement hazard: one very slight to negligible limitation and five severe limitations • Structural decline hazard: three moderate limitations and one very slight to negligible limitations. • Water erosion hazard: three moderate limitations, four moderate to severe limitations, five severe limitations, six very severe limitations • Water logging hazard: one very slight to negligible limitation and two slight but significant limitations. • Wind erosion hazard: one very slight to negligible limitation.
Areas of outstanding biodiversity value	The Subject Land is not identified as an area of outstanding biodiversity value, as defined under the BC Act.
Additional landscape features identified in SEARs	SEARs provided by DPI Fisheries identified that Sugarloaf Creek is mapped as suitable habitat for the threatened Southern Purple Spotted Gudgeon (*Mogurnda adspersa*), listed under the FM Act.

3.1.1 AQUATIC HABITAT

The Subject Land is dissected by Tamarang Creek, which runs south to north through the centre of the Subject Land, with sugarloaf Creek traversing the western boundary. NSW hydrography mapping (**Figure 3-1**) shows the two named creeks intersecting the Subject Land as well as several unnamed ephemeral tributaries.

The NSW DPI Fisheries Spatial Data Portal was reviewed to determine aquatic values and potential presence of threatened species in the Subject Land listed under the EPBC Act, BC Act as well as the NSW FM Act. A Spatial desktop analysis identified both named creeks on site as mapped KFH, as shown in Figure 3-2**.**

The SEARs issued by the NSW Department of Primary Industries and Regional Development (DPIRD Fisheries) (SSD-79747209, dated 11 February 2025) identified that the Endangered Sothern Purple Spotted Gudgeon (*Mogurnda adspersa*) has an indicative distribution within the Development Footprint. As a result, an aquatic assessment has been arranged to assess requirements under FM Act. The Aquatic provides further clarification on the impacts and mitigation measures for this threatened aquatic species, as well as provide mitigation measures associated with KFH. The Aquatic Assessment is provided in Appendix L.

3.2 NATIVE VEGETATION COVER AND PATCH SIZE

The assessment of site context involved the application of the site-based method. The following landscape attributes were assessed in the following sections:

- Percent native vegetation cover in the landscape; and
- Patch size.

3.2.1 PERCENT NATIVE VEGETATION COVER IN THE LANDSCAPE

The extent of native vegetation across the Assessment Area is shown in Figure 3-3 and summarised in Table 3-2, which includes the parameters used in the BAM-C for percentage of native vegetation cover. Assessment of native vegetation cover in the Assessment Area relies upon the SVTM and does not consider any amendments made to the vegetation mapping within the Subject Land as a result of ground truthing as discussed in Section 4**.**

The native vegetation cover class within the assessment area was determined to be 17% of the assessment area, classifying the native vegetation cover to be >10-30%.

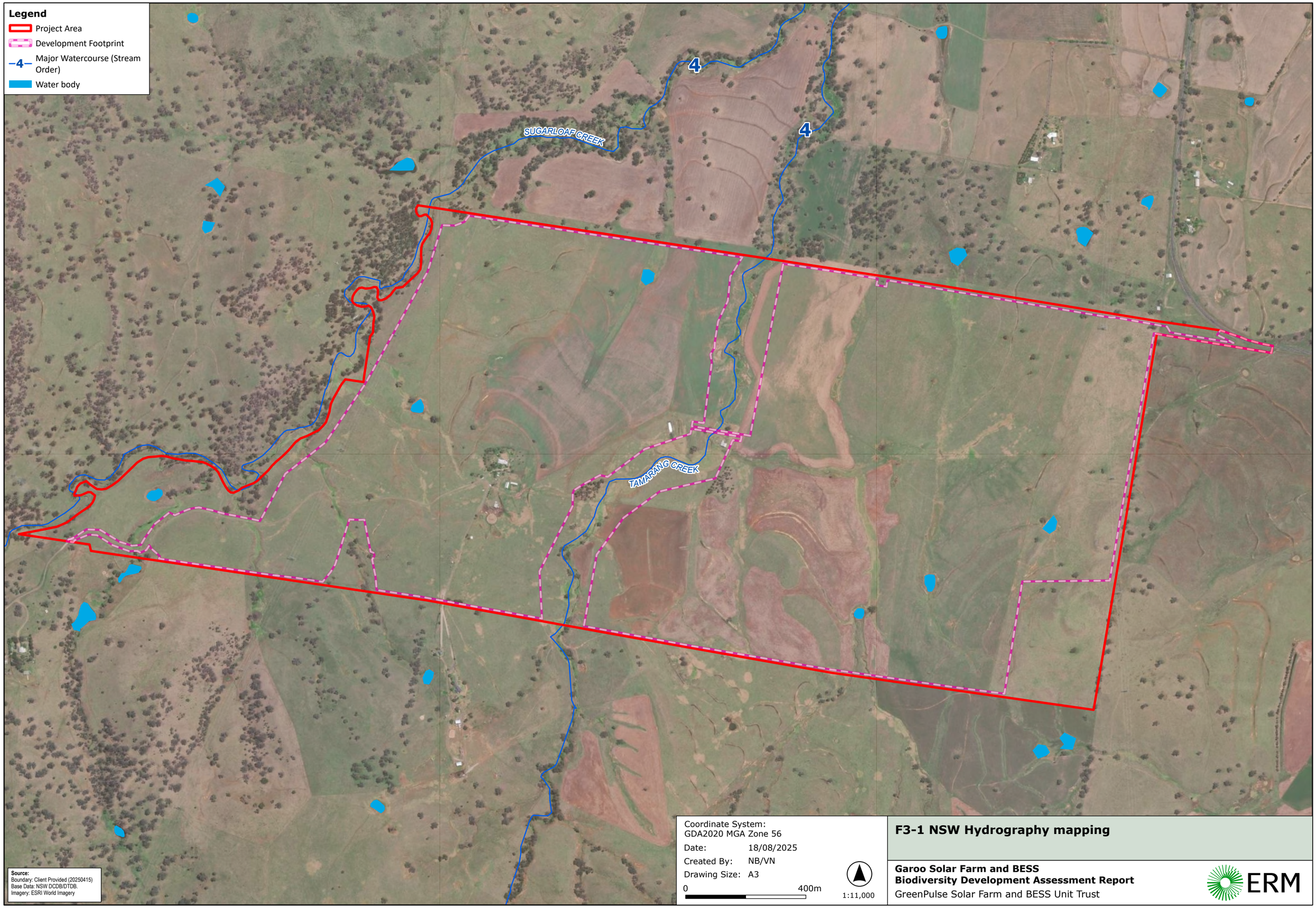
TABLE 3-2 NATIVE VEGETATION COVER OF THE ASSESSMENT AREA

Description	Value
Assessment Area	2,533.66 ha
Total area of native vegetation cover • Woody • Non-woody	429.22 ha
Percentage of native vegetation cover	17 %
Class (0-10, >10-30, >30-70 or 70%)	>10-30 %

3.2.2 PATCH SIZE

Patch size is defined in the BAM as an area of intact native vegetation that occurs on the development site and includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤ 30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site.

The patch size for each VZ within the Subject Land was calculated to be less than 5 ha and has been assigned to the < 5 ha class.



F3-1 NSW Hydrography mapping

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Legend

- Project Area
- Development Footprint
- Major Watercourse (Stream Order)
- Water body
- Key Fish Habitat Areas
- Modelled Threatened Species Distribution
- Strahler >3
- Connecting KFH

SUGARLOAF CREEK

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB/VN

Drawing Size: A3

0 400m

1:11,000

F3-2 Key Fish Habitat Mapping

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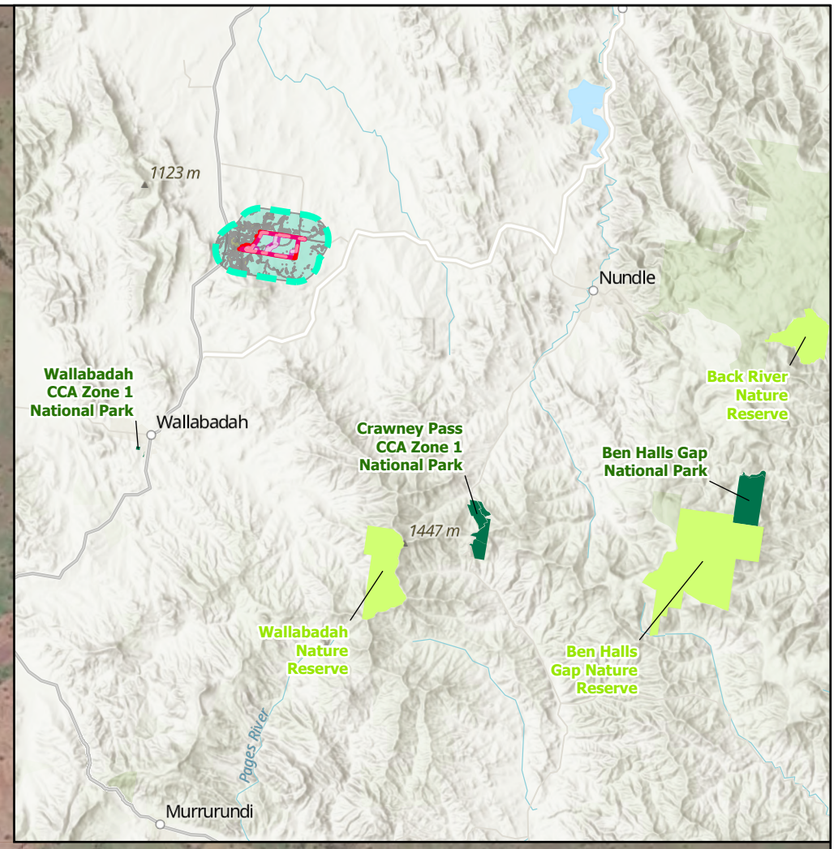
ERM

Legend

- Project Area
- Development Footprint
- Assessment Area
- National Park
- Nature Reserve

State Vegetation Type Mapping

- Dry Sclerophyll Forests (Shrub/grass sub-formation)
- Forested Wetlands
- Grassy Woodlands
- Not classified



Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB/VN

Drawing Size: A3

0 400 800m

1:30,000

F3-3 Extent native vegetation within assessment area

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4. NATIVE VEGETATION, THREATENED ECOLOGICAL COMMUNITIES AND VEGETATION INTEGRITY

This section describes the PCTs present within the Project Area in accordance with the requirements of Section 4 of the BAM as listed below:

- Vegetation formation and class;
- Species relied upon for identification of vegetation type and relative abundance;
- Justification of evidence used to identify a PCT (as outlined in paragraph 5.2.1.12 of the BAM);
- TEC status (as outlined in paragraph 5.2.1.16 of the BAM); and
- Estimate percentage cleared value of PCT (as outlined in paragraph 5.2.1.16 of the BAM).

In this assessment, approximation of lands classified as Category 1-exempt vegetation have been made based on desktop resources, including the Draft NVR Map, and field-based surveys. A LCA has previously been prepared and is provided in Appendix A.

4.1 NATIVE VEGETATION EXTENT

This section of the BDAR identifies native vegetation occurring on the Subject Land in accordance with the requirements of Section 5 of the BAM. This section describes PCTs on the Subject Land, including:

- Vegetation formation and class;
- Area (ha) for each vegetation type (PCT);
- Species relied upon for identification of vegetation type;
- Justification of evidence used to identify a PCT (as outlined in Paragraph 5.2.1.12 of the BAM);
- TEC status (as outlined in Paragraphs 5.2.1.14 – 5.2.1.15 of the BAM); and
- Estimate of percent cleared value of PCT (as outlined in Paragraph 5.2.1.16 of the BAM).

This section also includes the results of vegetation integrity assessments completed on the Subject Land, including:

- Mapping VZs (in accordance with Subsection 5.3.1 of the BAM);
- Patch size;
- Assessing vegetation integrity using benchmark data (in accordance with Subsection 5.3.3 of the BAM);
- Survey effort (as described in Subsection 5.3.4 of the BAM);
- Determining the current VIS (in accordance with Appendix 6 of the BAM) including:
    - Composition condition score;
    - Structure condition score;
    - Function condition score; and
    - VIS.

4.1.1 MAPPED NATIVE VEGETATION

Ground-verified vegetation mapping was conducted over the Subject Land and for most of the Assessment Area. Minor changes were made to the extent of areas mapped as containing native vegetation under the SVTM (DPE, 2022a) that resulted from ground-truthing the Subject Land. The overall landcover as ground-truthed across the Subject Land has been detailed in Table 4-1 below whilst the extent of ground-truthed native vegetation across the Subject Land is shown in Figure 4-1 below. Flora species recorded during surveys are provided in **Table 4-2**.

TABLE 4-1 OVERALL EXTENT OF LANDS WITHIN THE SUBJECT LAND

Disturbance	Landcover Class	Landcover Character	Draft NVM Land Category	Area (ha)	Area of impact (ha)
Surface	Vegetated	Native[1]	Category 2 – Regulated Lands	5.11	0.07
		Derived Grasslands[1]	Category 2 – Regulated Lands	8.21	0.04
		Mixed Planted[1]	Category 2 – Regulated Lands	0.47	0.0
		PNV[2]	Category 2 – Regulated Lands	0.68	0.68
		Non-native – Grassland	Category 1 – Exempt Lands	144.71	107.90
		Non-native – Cropping (other)	Category 1 – Exempt Lands	5.57	5.57
		Non-native – Cropping (Oats)	Category 1 – Exempt Lands	80.43	74.41
		Non-native – Cropping (Wheat)	Category 1 – Exempt Lands	33.60	33.33
		Non-native – Disturbed (Earthworks)	Category 1 – Exempt Lands	83.98	78.50
		Non-native – Planted	Category 1 – Exempt Lands	0.58	0.57
Canopy	Vegetated	Scattered Trees[1]	Category 2 – Regulated Lands	1.93	1.57
Surface	Unvegetated	Existing Infrastructure	-	2.77	2.70
		Existing Dams	-	1.03	0.87
			Total – Category 1 Lands and unvegetated lands	352.66	303.85
			Total – Category 2 Lands	16.41	2.65
			OVERALL TOTAL	**369.07**	**306.21**

[1] Area assessed in accordance with Appendix K of the BAM
[2] Area assessed in accordance with Appendix D of the BAM

4.1.1.1 SCATTERED TREES

Under Appendix B of the BAM, scattered trees are defined as species listed in a tree growth form that:

- have a percent foliage cover that is less than 25% of the benchmark for tree cover for the most likely PCT and are on Category 2-regulated land and surrounded by Category 1-exempt land on the NVR Map under the LLS Act, or
- have a DBH of greater than or equal to 5 cm and are located more than 50 m away from any living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground, or
- are three or fewer trees that have a DBH of greater than or equal to 5 cm and are within a distance of 50 m of each other, that in turn, are greater than 50 m away from the nearest living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground.

Scattered trees were observed in the field to determine the presence of hollows and to categorise each tree, or group of trees to be cleared as per Appendix B of the BAM and to determine their habitat values. Scattered trees with negligible biodiversity value are those trees identified as class 1, that is trees that are less than 20 cm DBH and without tree hollows. No further assessment or offset is required for Class 1 trees.

All trees recorded across the Subject Land considered to conform to the definition of a scattered tree were considered scattered trees as they were:

> *Trees on 'Category 2' land surrounded by 'Category 1' land, where the percentage canopy foliage cover is less than the 25% of benchmark; or*

- Trees living in a group of three or fewer trees that have a DBH of greater than or equal to 5cm and are within a distance of 50 m of each other, located greater than 50 m away from any living tree with greater than or equal to 5 cm DBH and are completely separated by groundcover species that are 100% exotic vegetation, human-made surfaces or bare ground.

Scattered tree results identified the majority of trees are categorised as Class 3. The scattered tree assessment results are listed in Table 4-1with examples of some scattered trees shown in Photograph A. The locations of scattered trees are shown in Figure 4-1. The total extent of impacts to scattered trees is discussed in Section 8.1 of this report.

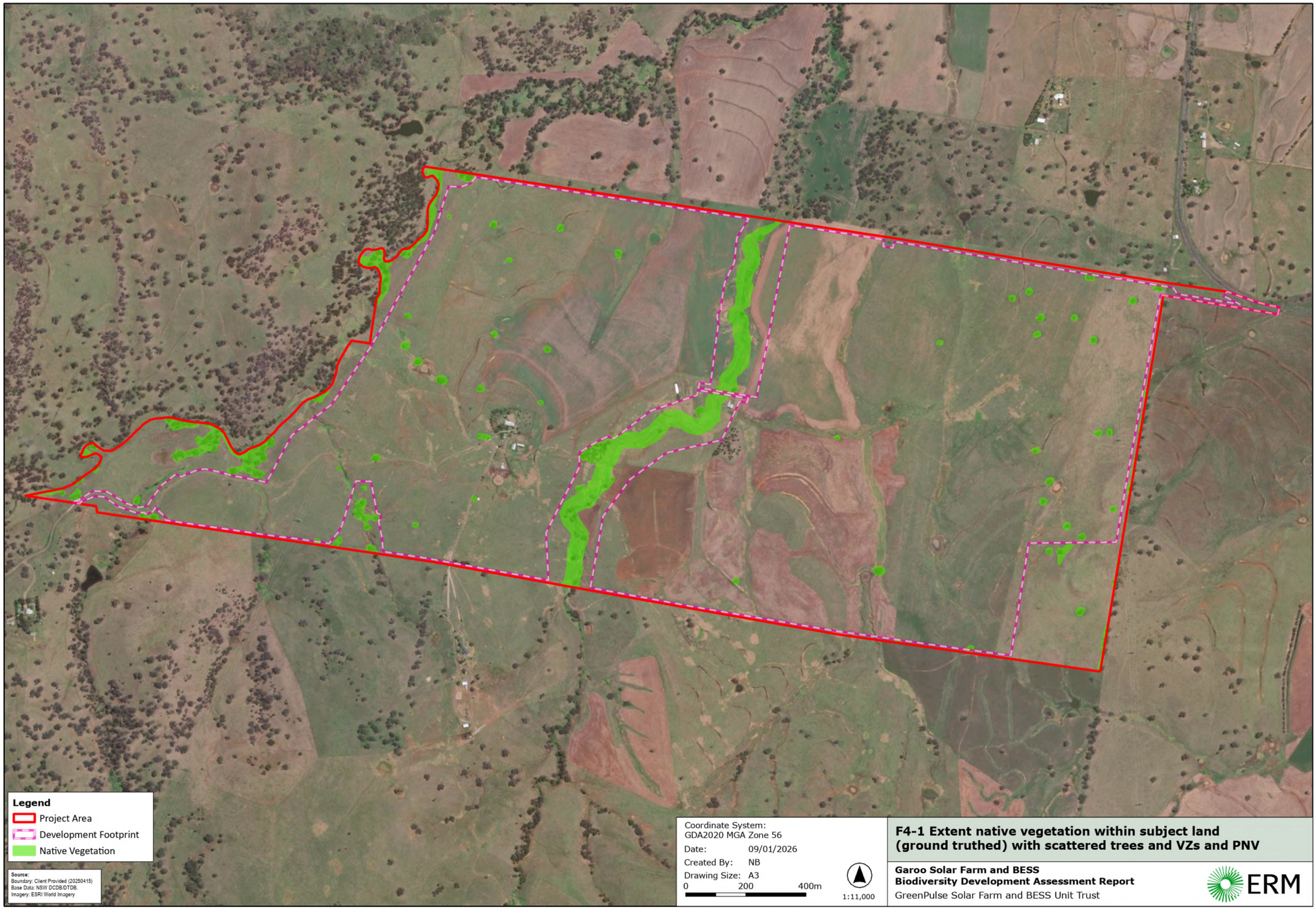
Scattered tree data is provided in Appendix D.

TABLE 4-1 SCATTERED TREE CLASS ASSESSMENT

Class of Scattered Tree to be cleared	Description	Number of Scattered Trees that contain hollows	Number of Scattered Trees that do not contain hollows	Associated species
Class 1	Trees that are <20cm DBH and without hollows	NA	1	Planted *Eucalypt* sp.
Class 2	Trees that are <20cm DBH and contain at least one hollow	0	NA	-
	Trees that are ≥20cm DBH and <50 large tree benchmark	0	3	*Brachychiton populneus* subsp. *populneus*
		0	1	*Angophora floribunda*
Class 3 (55)	Trees that are ≥50 large tree benchmark	4	1	*Angophora floribunda*
		0	1	*Callitris glaucophylla*
		39	4	*Eucalyptus albens*
		5	1	*Eucalyptus blakelyi*

PHOTOGRAPH A SCATTERED TREES: (LEFT) TREE 1; (RIGHT) TREE 2.





F4-1 Extent native vegetation within subject land (ground truthed) with scattered trees and VZs and PNV

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4.1.1.2 PLANTED NATIVE VEGETATION

The Project Area was observed to contain patches of PNV. Within these patches, each area was assessed initially through rapid vegetation assessment to evaluate the vegetation during preliminary site investigations. Table 4-2 summarises the areas of PNV recognised on the Subject Land with areas illustrated in Figure 4-1**.**

TABLE 4-2 PLANTED NATIVE VEGETATION AREAS

Landcover Character	Draft NVM Land Category	Area on Subject Land (ha)	Area of impact (ha)	Assessment Method
Mixed Planted	Category 2	0.47	0.0	Best-fit to PCT as per Q1 of the decision-key outcome provided in Appendix B.
PNV	Category 2	0.68	0.68	Assessed in accordance with D.2 of Appendix D of the BAM.
Non-native – Planted	Category 1	0.58	0.57	Direct impacts not assessed for Category 1 exempt lands.

Assessment of areas of PNV have occurred in accordance with Appendix D of the BAM. An assessment for each area of PNV is provided in Appendix B of this report.

The area of mixed planted vegetation is considered to form part of the mapped PCT 599 *Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion*. This patch has been recognised as VZ_4_Mixed-Planting and is present as a mix of planted and remnant native vegetation within Category 2 regulated lands.

The use of the PNV Streamlined Assessment module of the BAM has not been applied for the area of PNV that forms part of PCT 599.

Remnant canopy species present include *Eucalyptus albens* and *Angophora floribunda*. The middle stratum also includes *Notelaea microcarpa*. This vegetation exists within a disturbed mosaic of PCT 599, to which the afore-mentioned species form. The patch is dominated by plantings, however, has been assigned to PCT 599 based on the precautionary principle. Nonetheless, this patch has been avoided by the Development Footprint and no impacts are proposed.

Direct impacts to areas of PNV within Category 1 Exempt Lands have not been assessed as they are identified as Category 1 lands on the Draft NVR Map and consist of land containing low conservation value vegetation and the area does not offer suitable habitat for threatened species to inhabit or reliably forage.

The remaining area of PNV within Category 2 lands (0.68 ha) has been assessed using Appendix D of the BAM to determine the appropriate assessment of PNV. The assessment provided in Appendix B of this report determined that the area of PNV is reflective of a mix of native vegetation and plantings that have been established for aesthetic and functional horticultural purposes, including windbreaks in the agricultural landscape and landscaping to gardens surrounding existing infrastructure on the Subject Land.

Historical aerial imagery of the Subject Land, identifying the extent of PNV is shown in Figure 4-2.

An example of some PNV observed within the Subject Land is shown in Photograph B, illustrating rows of tree plantings and remnant planting socks.

It was determined through the assessment process that the 0.68 ha of identified PNV on Category 2 lands does not require assessment under Chapter 4 and Chapter 5 of the BAM. The assessment of PNV concluded that the small extent of PNV is considered unlikely to form an important and reliable source of habitat for foraging and roosting purposes on the Subject Land.

4.1.1.3 DERIVED NATIVE GRASSLAND

The BAM states that in the case of derived grasslands, the assessor must use the PCT that is most likely to have occurred prior to human intervention as described in the *Interim Grasslands and other Groundcover Assessment Method 2017* (IGGAM). A VZ that is mapped as derived vegetation must be assessed against the benchmark data, which in the opinion of the assessor, is the most likely original PCT, or against the benchmark data for the vegetation class of the most likely original PCT. Additionally, derived groundcover should be assessed only against benchmarks for groundcover vegetation using the *Grasslands and other Groundcover Assessment Method* (i.e. benchmarks value for trees and shrubs are not included in the calculation of VI under this method). Under this methodology, ground cover vegetation can occur in combination with taller canopy vegetation. However, this method cannot be used to assess any groundcover or grasslands vegetation that is:

- within a vegetation community that is dominated by low woody vegetation (e.g. shrublands), or
- within an area where woody vegetation occupies more than 2% of the VZ when measured as crown cover.

If vegetation is as described as above, then the area does not meet the requirements to use the IGGAM. The Derived Native Grasland (DNG) consists of vegetation dominated by grasses and grass-like flora as identified during surveys with no low woody vegetation present. As such, it meets the requirements to be assessed using the Interim Grasslands and Groundcover Assessment Method (IGGAM).

Approximately 8.21 ha of the Subject Land was identified through survey to be representative of PCT 599 but reflective of DNG. The extent of this area has been represented as VZ_3_Derived_Grasslands in this report. DNG on the Subject Land is considered representative of the TEC associated with PCT 599, being White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC).

The area of DNG was calculated to have a moderate conservation value (VI score between 15-60) with the VI score calculated at 46.8. The Development Footprint has attempted to avoid impacts to areas of DNG with impacts avoiding riparian lands and creek crossings where possible. Impacts to areas of DNG have been assessed in this report in accordance with Appendix K of the BAM.

Legend

Project Area

Development Footprint

1998

2011

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 275 550m

1:15,253

F4-2 Historical aerial imagery before and after 2001 for the Subject Land for PNV

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4.1.2 AREAS THAT ARE NOT NATIVE VEGETATION

A LCA Report has been completed for this Project. The assessment interrogated the published Draft NVR Map and analysed data collected from 23 LCA transects to determine between 'low' and 'moderate' condition grasslands where the vegetation structure did not comprise woody species.

The LCA transects were completed in conjunction with site assessment through BAM plots and the use of the IGGAM calculator. The exotic species observed were predominantly annual or short-lived perennial species, such as wheat (*Triticum spp*.), oats (*Avena spp*.), ryegrass (*Lolium* spp.), and medics (*Medicago* spp.). Examples of areas of the Subject Land that are not native vegetation are shown in Photograph C. The composition and structure of vegetation proposed as Category 1 – exempt land is consistent with a history of significant disturbance. The disturbance is associated with intensive agricultural land uses, such as cropping and modified pasture management.

Imagery from 1989 shows evidence of heavy disturbance in all areas identified as not native vegetation. Areas that were cleared of woody vegetation in 1989, remained cleared between 1993, 1998 and 2024, and showed evidence of significant disturbance in the historical aerial imagery, have been mapped as Category 1 – exempt land.

Areas of the Subject Land that are non-native vegetation and consist of non-native vegetation and unvegetated areas are summarised in Table 4-3 below. Further detail in relation to the assessment of non-native vegetation is provided in the LCA Assessment in Appendix A.

TABLE 4-3 AREAS THAT ARE NOT NATIVE VEGETATION

Landcover Character	Draft NVM Land Category	Area (ha)	Area of impact (ha)
Non-native – Grassland	Category 1	144.71	107.90
Non-native – Cropping (other)	Category 1	5.57	5.57
Non-native – Cropping (Oats)	Category 1	80.43	74.41
Non-native – Cropping (Wheat)	Category 1	33.60	33.33
Non-native – Disturbed (Earthworks)	Category 1	83.98	78.50
Non-native – Planted	Category 1	0.58	0.57
Existing Infrastructure	-	2.76	2.70
Existing Dams	-	1.03	0.87
Total – Category 1 Lands and unvegetated lands		**352.66**	**303.85**

PHOTOGRAPH B PLANTED NATIVE VEGETATION WITHIN THE SUBJECT LAND



PHOTOGRAPH C AREAS NOT NATIVE VEGETATION: (LEFT) CATEGORY 1 LANDS IDENTIFIED AS NON-NATIVE CROPPING (OATS); (RIGHT) CATEGORY 1 LANDS IDENTIFIED AS NON-NATIVE GRASSLANDS



4.1.3 IDENTIFY AND MAP PCTS

4.1.3.1 CLASSIFICATION

A total of 25 BAM Plots were used in this assessment to classify vegetation to PCTs. BAM plots located in non-woody vegetation were excluded as these are heavily modified areas and would alter the accuracy of the analysis. Analysis of BAM plot data revealed four BAM Plots were located within areas of woody vegetation that were relied upon to investigate and deliberate on the most appropriate PCTs.

4.1.4 PCT

Data from the relevant BAM plots were input into the BioNet Vegetation Classification system along with other known vegetation attributes to identify the most appropriate PCTs present within the Subject Land, in accordance with Chapter 4 of the BAM.

Attributes relied upon to assist with determining the most appropriate, or 'best-fit' PCT were:

- IBRA Subregion
- Vegetation Class
- Vegetation Structure
- Lithology
- Landform Elements
- Average Rainfall
- Diagnostic species

Diagnostic species used to assist in determining the best-fit PCT were commonly recorded within the four BAM plots within native vegetation on the Subject Land and included:

- White Box (*Eucalyptus albens*)
- Blakely's Red Gum (*Eucalyptus blakelyi*)
- Rough-barked Apple (*Angophora floribunda*)
- Yellow Box (*Eucalyptus melliodora*)
- White Cypress Pine (*Callitris glaucophylla*)
- Kurrajong (*Brachychiton populneaus subsp. populneaus*);
- Native Olive (*Notelaea macrocarpa*); and
- Sticky Daisy-bush (*Olearia elliptica*).

Using the above attributes and diagnostic species, a shortlist of five PCT candidates were identified:

- PCT 281 - Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW Southwestern Slopes Bioregion and Brigalow Belt South Bioregion
- PCT 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
- PCT 3395 - Northwest Elevated White Box Woodland
- PCT 3398 Northwest Slopes Box-Apple Woodland
- PCT 4147 - Northwest White Box Sparse Grassy Woodland

Assessment against attributes and diagnostic species is provided in Table 4-4 below.

TABLE 4-4 PCT CLASSIFICATION ASSESSMENT

Attribute	PCT281	PCT599	3395	3398	4147
IBRA Subregion	Peel				
Vegetation Class	Western Slopes Grassy Woodland				
Structure	Tall Open Forest or Woodland	Tall Woodland	Tall Woodland and Open Forest	Tall Sclerophyll Woodland	Tall Grassland
Lithology	Colluvial sediments Basalt Alluvial loams and clays	Siltstone Igneous rock Granite Colluvial sediments Shale Basalt Clay Alluvial loams and clays Sedimentary rock mudstone	No information	No information	No information
Landform elements	Bank Footslope Valley flat Gully	Valley flat Hillslope Drainage depression Plain	No information	No information	No information
Average rainfall	543-831	543-831	672-857	645-822	577-776
Diagnostic Species					
Eucalyptus albens	x	x	x	x	x
Eucalyptus blakelyi	x	x	x	x	x
Angophora floribunda	x	x			
Eucalyptus melliodora	x	x	x	x	x
Callitris glaucophylla	x	x	x	x	
Brachychiton populneaus subsp. populneaus	x	x			
Notelaea macrocarpa	x	x			
Olearia elliptica	x	x			

PCTs 3398 and 4147 were excluded due to the annual rainfall being lower than that of the Garoo Region (BOM Station 055245 Nundle) where a mean annual rainfall of 851 mm is recorded (BOM Climate Data, 2025). PCT 3395 was excluded due to the lack of landform information to support the PCT as well as the reduced diagnostic species present. PCT 281 was considered, however, was excluded from the final selection due to the site landform characteristics better representing that of PCT 599, with much of the Subject Land containing low hills on sedimentary rock associated with the Duri soil landscape and the Fullwoods Hill soil landscape.

Therefore, it was determined that the best-fit PCT was PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion due to the high number of attributes and diagnostic species associated with the PCT, as well as the lithology and landform of the Subject Land representative of PCT 599 attributes.

Table 4-5 provides a description of the chosen PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion with the extent of the PCT across the Subject Land identified within Figure 4-3**.**

TABLE 4-5 DESCRIPTION OF PCT 599

PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	
PCT ID	599
PCT name	Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
TEC Status	PCT 599 is associated with: • White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
Percent cleared value	0.8%
BioNet VIS PCT Description	Tall woodland dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Yellow Box (*Eucalyptus melliodora*) often with *Angophora floribunda* on flats or White Box (E*ucalyptus albens*) on hills. The shrub layer is absent to sparse and includes species such as *Acacia implexa*, *Olearia elliptica* subsp. *elliptica, Geijera parviflora, Myoporum montanum*, or *Pimelea neo-anglica*. The ground cover is usually mid-dense to dense dominated by grasses and forbs. Grass species include *Aristida personata, Austrostipa verticillata, Themeda australis, Bothriochloa macra* or *Dichanthium sericeum*. Forb species include *Dichondra repens, Geranium solanderi, Hydrocotyle laxiflora, Rumex brownii, Scutellaria humilis, Hypericum gramineum, Senecio quadridentatus, Haloragis heterophylla, Dianella longifolia var. longifolia* and *Chrysocephalum apiculatum*. The sedges *Cyperus gracilis* or *Carex inversa* may be present along with the climbers *Glycine tabacina* or *Glycine clandestina*. *Juncus* and other wetland species occur in drainage depressions. Occurs on brown, red to black sandy loam to clay loam soils that may be either alluvial / colluvial or

PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	
	derived from fine-grained sedimentary or metamorphic substrates and sometimes volcanic rocks on valley flats, hillslopes in hills and low hills landform patterns. Widespread in the Nandewar Bioregion and on the eastern edge of the Brigalow Belt South Bioregion. Mostly cleared. Part of the grassy box-gum woodland TSC and EPBC Act listed EECs.
Description within the Subject Land	The PCT presents in four identified vegetation conditions within the Subject Land, including open woodland, scattered trees, mixed vegetation, and derived grassland. The dominant canopy species observed across the site were *Eucalyptus albens* and *Angophora floribunda*, often presenting as scattered paddock trees and small remnant patches, with *E.blakelyi, E. melliodora, Callitris glaucophylla,* and *Brachychiton populneaus subsp. populneus* also present. Shrub species were largely absent, where present these included *Notelaea macrocarpa* and *Olearia elliptica*. PCT 599 has been selected based on the assemblage of diagnostic species present despite the low prominence of *E.blakelyi* and *E. melliodora* in the landscape. The area has experienced historic grazing and intense agricultural activity and generally presents as disturbed.
Associated species present	*Eucalyptus albens, Angophora floribunda*, *E.blakelyi, E. melliodora, Callitris glaucophylla, Brachychiton populneaus subsp. Populneus, Notelaea microcarpa* and *Olearia elliptica*.
Vegetation Zones	VZ1_Open_Woodland VZ2_Scattered_trees VZ3_Derived_Grassland VZ4_Planted_Native_Vegetation



4.1.5 LZS

The mapping of VZs was initially delineated by land categorisation as published on the Draft NVR Map (see Figure 1-1). Non-woody vegetation cover aligning with Category 1 exempt lands were generally assigned 'non-native vegetation'. The approach to mapping non-native vegetation was verified from BAM plot data (n=21 plots) and LCA transects (n=23).

A LCA was later prepared and identified an estimated 348.87 ha of the Subject Land as non-native vegetation and 15.73 ha identified as native vegetation, associated with PCT 599.

A total of four VZs were delineated to describe PCT 599 in various condition states (e.g., structural form such as open forest, woodland, open woodland, grassland), impact type (i.e., surface clearing and tree canopy only) and tenure (i.e., private lands and local road corridor).

Details on VZs and BAM plot requirements is provided in Table 4-6 below. The mapped extent of VZs within the Subject Land and Development Footprint is shown in Figure 4-1.

TABLE 4-6 VEGETATION ZONES AND SURVEY REQUIREMENTS

PCT	VZ	Patch Size	Area on Subject Land (ha)	Area of impact (ha)	No. Plots required	No. Plots completed	Plot Details
599	VZ1_Open_Woodland	<5ha	5.11	0.07	1	3	BAM_A_LM BAM_B_LM BAM_D_LM
599	VZ2_Scattered_Trees	<5ha	1.94	1.57	NA	NA	Scattered Tree Assessment
599	VZ3_Derived_Grassland	<5ha	8.21	0.04	1	1	BAM_C_LM
599	VZ4_Mixed_Plantings	<5ha	0.47	0.00	0	0	No impacts proposed

4.1.5.1 PATCH SIZE

Patch size of each vegetation zone was determined based on BAM Subsection 4.3.1. Patch sizes were assigned to VZs within the Subject Land using ArcGIS to select boundaries depicted in the vegetation mapping for the Subject Land and aerial imagery. In accordance with the BAM, patch size area was assigned to each VZ as a class, being < 5 ha, 5–24 ha, 25–100 ha or ≥ 100 ha.

The patch size for each VZ within the Subject Land was calculated to be <5 ha and is due to the distance between woody and non-woody ecosystems.

4.1.5.2 SCATTERED TREES

The scattered tree assessment identified 60 individual trees across the Subject Land, categorised into three classes in accordance with the BAM. Table 4-1 provides detail on each scattered tree and their attributes whilst Table 4-7 below identifies the impacts to scattered trees as a result of the Development Footprint in accordance with the BAM.

Scattered trees with negligible biodiversity value are those trees identified as Class 1, that is trees that are less than 20cm DBH and without tree hollows. No further assessment or offset is required for Class 1 trees.

TABLE 4-7 SCATTERED TREE CLASSIFICATION

Class of Scattered Tree to be cleared	Description	Number of Scattered Trees that contain hollows	Trees to be cleared	Number of Scattered Trees that do not contain hollows	Trees to be cleared	Associated species	Associated Tree numbers
Class 1	Trees that are <20cm DBH and without hollows	NA	NA	1	1	Planted *Eucalypt* sp.	30
Class 2	Trees that are <20cm DBH and contain at least one hollow	0	0	NA	NA	-	
	Trees that are ≥20cm DBH and <50 large tree benchmark	0	0	3	*3*	*Brachychiton populneus* subsp. *populneas*	49, 50, 51
		0	0	1	*0*	*Angophora floribunda*	
Class 3	Trees that are ≥50 large tree benchmark	4	3	1	*0*	*Angophora floribunda*	1, 2, 57
		0	0	1	*1*	*Callitris glaucophylla*	45
		39	26	4	*4*	*Eucalyptus albens*	*Hollows:* *3 – 10, 13, 15, 16, 19 – 21, 25, 26, 28, 31, 35, 36, 47, 48, 52 - 55* *No hollows:* *14, 18, 38, 39*
		5	2	1	*0*	*Eucalyptus blakelyi*	*12, 17*

4.1.6 TECS

4.1.6.1 BIODIVERSITY CONSERVATION ACT 2016

Under Section 4.2.2 of the BAM, TECs are to be identified where present within the Subject Land. Where the BioNet Vegetation Classification system indicates a PCT may be associated with a TEC, the assessor must also consider information in the NSW Scientific Committee Final Determination for the TEC and assess the potential of the TEC in conjunction with field surveys.

PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion was determined to occur across the Subject Land in four various forms, being:

- VZ1_Open_woodland
- VZ2_Scattered_trees
- VZ3_Derived_grasslands
- VZ4_Mixed_planted

PCT 599 is associated with the TEC listing of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.

White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland is listed as a CEEC under the BC Act 2016 and also under the EPBC Act 1999. It corresponds broadly with Keith's (2004) Western Slopes Grassy Woodlands, Southern Tableland Grassy Woodlands and New England Grassy Woodlands classes in NSW and is characterised by widely spaced trees with canopies not touching with a projected foliage cover of less than 30% (Prober *et* al. 2017). Understorey shrubs are typically sparse or absent and the groundcover is dominated by perennial tussock grasses interspersed with a diverse range of forb species with the families Asteraceae and Fabaceae, and the orders Liliales and Asparagales well represented.

Currently, the NSW Government does not have interpretive guidelines associated with the current listing under the BC Act. Therefore, determining the presence or otherwise of this CEEC relies on the current NSW Final Determination. As part of information available, key characteristic questions have been published in the Field Identification Guidelines (DECC NSW, 2007). These questions were used to support the review and analysis of the presence of this TEC on the Subject Land and the decision analysis has been provided in Table 4-8.

TABLE 4-8 WHITE BOX – YELLOW BOX – BLAKELY'S RED GUM GRASSY WOODLAND BC ACT TEC ASSESSMENT

Question	Response
Is the site on the tablelands or western slopes of NSW?	Yes – the site is on the tablelands of NSW.
Does the site contain, or would the site have recently been likely to contain, White Box, Yellow Box or Blakely's Red Gum?	Yes – patches of PCT 599 within the Subject Land are dominated or co-dominated by White Box, (Eucalyptus albens), Yellow Box (*Eucalyptus melliodora*) and/or Blakely's Red Gum (*Eucalyptus blakelyi*).
Is the ground layer mainly grassy?	Yes – the ground layer of PCT 599 is mainly grassy.
If the site has been degraded, is there potential for assisted natural regeneration of the tree layer or the understorey (e.g. by removing grazing, weeds, etc)?	Yes – the site is subject to grazing and areas mapped associated with the TEC would have potential for regeneration if land use practices changed.
Determination of Presence	**Present**

As such, a review of the species assemblage within each VZ associated with PCT 599 confirmed that the following VZs are appropriate to be considered representative of White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland:

- VZ1_Open_woodland
- VZ2_Scattered_trees
- VZ3_Derived_grasslands

VZ4_Mixed Plantings was not considered to be reflective of the CEEC listing due to the lack of native understorey and groundcovers present associated with this CEEC. Therefore, VZ4_Mixed Plantings have been excluded from the TEC listing within the Subject Land. Regardless, no impacts to VZ4_Mixed Plantings will occur as a result of the development footprint.

The total extent of this CEEC identified within the Subject Land is 15.26 ha albeit in various conditions, but in relatively moderate condition. The total area proposed to be impacted by the development is 1.68 ha, of which 1.57 ha consists of scattered trees.

4.1.6.2 EPBC ACT 1999

A review of the PMST identified a total of four TECs listed as MNES as having the potential of occurring within the Subject Land.

An analysis of each of the TECs listed under the EPBC Act was conducted through desktop analysis and PCT identification to determine whether TECs were present. The analysis has been provided in Table 4-9 below.

It was determined that the EPBC listing of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland was likely to occur within the Subject Land as it is associated with the TEC listing under the BC Act and is also associated with the chosen PCT present on site, being PCT 599.

TABLE 4-9 EPBC LISTED TEC DETERMINATION

EPBC Listed TEC	BC Act Listing	EPBC Act Listing	Likely Presence	Likely to occur on the Subject Land
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland/White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions	CE	CE	TEC likely to occur within the feature buffer area	Yes – mapped in associated with patched of PCT 599.
Weeping Myall Woodlands Endangered	-	E	TEC may to occur within the feature buffer area	No – the Subject Land is within the species distribution, however dominant key flora species in this community such as Acacia pendula are not present in the Subject Land.
New England Peppermint (Eucalyptus nova-angelica) Grassy Woodlands, Critically Endangered	-	CE	TEC may to occur within the feature buffer area	No - the Subject Land is within the distribution however suitable habitat was not present, as the Subject Land was not dominated or co dominated by Eucalyptus nova-anglica or a Poa sieberiana dominated ground layer.
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland, Critically Endangered	-	CE	TEC likely to occur within the feature buffer area	No - the Subject Land is within the species distribution. However, suitable landform and soils for this community are absent.

The White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland TEC is listed as Critically Endangered under the EPBC Act and part of the national community is listed in NSW as the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions which is listed as Critically Endangered under the BC Act.

The EPBC listed community generally presents as an open woodland with a canopy foliage cover of less than 30% consisting of *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box) and / or *Eucalyptus blakelyi* (Blakely's Red Gum) and in some cases the grey boxes *Eucalyptus microcarpa* and *E. moluccana* can occur as co-dominants. A shrub layer is generally absent but can include *Acacia, Bursaria, Cassinia, Hibbertia, Lissanthe* and *Templetonia* species (DCCEEW 2023; NSW TSSC, 2020).

The ground cover is dominated by tussock grasses, especially *Themeda triandra* (Kangaroo Grass) and *Poa sieberiana* (Snow Grass), along with species of *Austrostipa, Aristida, Chloris, Cymbopogon, Dichanthium, Microlaena* and *Rytidosperma*. Between the tussocks there may be bare ground or a range of forbs from genera such as *Bulbine, Chrysocephalum, Dianella, Geranium, Goodenia, Lomandra, Pimelea* and *Stackhousia* (DCCEEW 2023; NSW TSSC, 2020).

The extent of occurrence of the EPBC Act listed TEC within the Subject Land was determined using the key diagnostic characteristics of the National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Key characteristics of this TEC were assessed against the three VZs on PCT 599 considered representative of the NSW CEEC listing, being:

- VZ1_Open_woodland
- VZ2_Scattered_trees
- VZ3_Derived_grasslands

To be considered part of the EPBC Act listed TEC patches must meet the key diagnostic characteristics as set out in Table 4-10.

TABLE 4-10 KEY DIAGNOSTIC CHARACTERISTICS FOR THE WHITE BOX-YELLOW BOX-BLAKELY'S RED GUM GRASSY WOODLAND TEC

Key Diagnostic Characteristic	Response
The ecological community occurs in the following bioregions (IBRA, DoE 2012): Brigalow Belt South, Murray Darling Depression, Nandewar, New England Tableland, NSW North Coast, NSW South Western Slopes, Riverina, South Eastern Queensland, South East Corner, South East Coastal Plain, South Eastern Highlands, Southern Volcanic Plain, Sydney Basin and Victorian Midlands (TSSC 2006; DECCW 2011; DCCEEW 2022).	Characteristic present. The Subject land is entirely within the Nandewar IBRA Bioregion.
It has, or previously had, an overstorey dominated or co-dominated, by: • *Eucalyptus albens* (white box) and/or *E. melliodora* (yellow box) and/or *E. blakelyi* (Blakely's red gum) (applicable across the entire range of the ecological community); or, • in the Nandewar bioregion (IBRA, DoE 2012), any of the above three species and/or *E. microcarpa* (western grey box) and/or *E. moluccana* (grey box, coastal grey box);	Characteristic present. Areas of PCT 599 within the Subject Land identified as open woodland and derived grasslands contain overstorey species including White Box (E.albens), Yellow Box (E.melliodora) and Blakely's Red Gum (E.blakelyi).
It has a predominantly native ground layer	Characteristic present Areas of the Subject land classed as open woodland and derived grasslands are considered to meet this characteristic with a perennial native ground layer greater than 50%. Areas of scattered trees do not meet this characteristic due to the lack of native ground layers present and the highly degraded nature of the ground covers within the vicinity of scattered trees being reflective of cropping and pasture.
Tussock grasses are conspicuous in the ground layer (except in some situations, such as under dense groves of shrubs or regenerating trees), usually with several native species from some the following genera: *Austrostipa*, *Bothriochloa*, *Chloris*, *Cymbopogon*, *Dichanthium*, *Microlaena*, *Poa*, *Themeda*, *Rytidosperma* or *Sorghum*.	Characteristic present Areas of the Subject Land mapped as PCT 599 and identified as open woodland and derived grasslands contained the following native species associated with Tussock grasses: *Austrostipa verticillate*, *Bothriochloa decipiens, Chloris truncata, Chloris ventricose, Poa annua, rytidosperma fulvum,* Areas of scattered trees do not meet this characteristic due to the lack of native ground layers present and the highly degraded nature of the ground covers within the vicinity of scattered trees being reflective of cropping (Oats and Wheat) and pasture grasses.

Key Diagnostic Characteristic	Response
Amongst the grass tussocks and sometimes in swathes, a range of broad-leaved forbs and petaloid monocots (e.g. lilies *sens. lat*.) may be a major component of the plant diversity	Characteristic present A range of broad-leaved forbs were present within areas of the Subject Land identified as PCT 599 open woodlands and derived grasslands, including: • Senecio spp. • Sida corrugata • Rumex brownii • Ranunculus sessiliflorus Areas of scattered trees do not meet this characteristic due to the lack of broad-leaved forbs and monocots within the ground cover.
While shrubs may be dominant locally within areas of the ecological community, areas of native vegetation with a more continuous shrub layer, in which the average shrub cover of the whole patch is greater than 30%, is considered to be a shrubby woodland and so is not part of the listed ecological community. In assessing this, the effects of disturbance need to be considered, for example where heavy grazing may result in high densities of shrubs during a recovery phase	Characteristic present Shrub cover for the patches of PCT 599 identified as open woodland and derived grasslands was typically low or absent. When shrub cover was observed it did not exceed 10% for the vegetation zone. No shrub layer was present within areas of scattered trees.
Condition Thresholds	
Condition Class A Good quality understorey and mature overstorey both present. Patch Size 0.1 ha (1,000 m2) or larger Features present: • The ground layer is predominantly native; and • The understorey contains at east 12 native, non-grass species (such as forbs, shrubs, ferns and sedges); and • At least one of the understorey species should be species recognised as 'important' (e.g. grazing-sensitive, regionally significant, listed threatened or uncommon species); and • The patch contains 10 or more mature trees per hectare consistent with the key diagnostics for the ecological community. Condition Class B	Characteristic present The following patches of PCT 599 recorded on the Subject Land are considered to meet the condition class requirements under Condition Class A: • VZ1_Open_Woodland • VZ3_Derived_Grasslands • The patch of open woodland is calculated to be 5.11 ha across the Subject Land and exceeds the 0.1 ha threshold. • The patch of VZ3 derived grasslands is calculated to be 8.21 ha within the Subject Land, exceeding the 0.1 ha threshold. • The ground layers of VZ1 and VZ3 are predominantly native; • The understorey contains over 12 native non-grass species, including *Carex inversa, Dichondra repens, Einadia nutans, Rumex brownii, Geranium solanderi, Urtica incisa, Lomandra multiflora, Cotula Australis, Crassula sieberiana, Erodium crinitum, Acaena novae-zelandiae, Olearia elliptica, Lobelia purpurascens, Lomandra filiformis, Oxalis perennans, Plantago debilis* and *Wahlembergia sp.*

Key Diagnostic Characteristic	Response
Good quality understorey present. Characteristic trees may be absent. <u>Patch Size</u> 0.1 ha (1,000 m2) or larger <u>Features present</u>: • The ground layer is predominantly native; and • The understorey contains at least 12 native, non-grass species (such as forbs, shrubs, ferns and sedges); and • At least one of the understorey species should be a species recognised as 'important' (e.g. grazing-sensitive, regionally significant, listed threatened or uncommon species); and • The patch contains 10 or more mature trees per hectare consistent with the key diagnostics for the ecological community.	• Of these, seven species are considered to be recognised as 'important', including *Desmodium varians, Asperula conferta, Zornia dyctiocarpa, Glycine tabacina, Hardenbergia violacea, Goodinea pinnatifolia and Chrysocephalum apiculatum.* • Areas of open woodland are considered to contain greater than 10 mature trees per hectare. • Characteristic trees are present within each patch but are considered to be fewer within areas of derived grasslands. However, it is considered that derived grasslands still meet the 10 or more mature tree requirements under Class A.
Outcome	**Present** Patches of PCT 599 identified as VZ1_Open_Woodland and VZ3_Derived_Grasslands are considered to meet the requirements to be considered part of the TEC listing under the EPBC Act 1999. Areas of Scattered Trees do not conform to the TEC listing under the EPBC Act due to the patch being degraded to not meet the listing requirements due to areas of scattered trees: • Having a lack of native ground covers present; and • Having a lack of broad-leaved forbs and monocots; and • Containing no shrub layer. However, scattered trees are still considered valuable and may still retain important components of the ecological community.

It was determined through analysis of Table 4-10 that the Commonwealth listing of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland occurs across the Subject Land within areas identified as VZ1_Open_Woodland and VZ3_Derived_Grasslands.

Table 4-11 below provides a summary of the overall extent of TECs on the Subject Land and their association under the BC Act and EPBC Acts respectively.

TABLE 4-11 EXTENT OF TECS ON THE SUBJECT LAND

PCT	Vegetation Zone	Area on Subject Land (ha)	Area of impact (ha)	Associated TEC BC Act 2016	Associated TEC EPBC Act 1999
599	VZ1_Open_Woodland	5.11	0.07	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
599	VZ2_Scattered_Trees	1.94	1.57	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland	Does not meet criteria
599	VZ3_Derived_Grassland	8.21	0.04	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The total extent of the EPBC listed TEC on the Subject Land is approximately 13.32 ha and is largely confined to areas of vegetated lands along riparian lands of Tamarang Creek and Sugarloaf Creek, as shown in Figure 4-3.

The total extent of proposed impacts to the EPBC listed TEC is 0.11 ha, or 3% of the total extent available on the Subject Land.

Legend

- Project Area
- Development Footprint

Vegetation Zone

- VZ 1 Open Woodland - TEC under the BC Act and EPBC Act
- VZ 2 Scattered Trees - TEC under the BC Act
- VZ 3 - Derived Grasslands - TEC under the BC Act and EPBC Act
- VZ 4 - Mixed plantings

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 200 400m

1:11,000

F4-3 Extent of PCT 599 and areas of TECs within the Subject Land

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

4.1.7 VIS

Vegetation integrity (VI) measures the overall condition of each vegetation zone based on the collection of data of floristic composition, structure and function. It is calculated by inputting the data collected through BAM Plots into the BAM-C against reflective VZs.

BAM Plot data is provided in Appendix E of this report and reflects the data collection for areas of the Subject land identified as PCT 599. VI scores were calculated for areas of PCT 599 identified as VZ1_Open_Woodland and VZ3_Derived_Grasslands. Table 4-12 provides an overview of the current VI scores for each VZ on the Subject Land and within the development footprint.

TABLE 4-12 VIS

Vegetation zone ID	TEC	Composition condition score	Structure condition score	Function condition score	Vegetation integrity score	Hollow bearing trees present?
VZ1_Open woodlands	Yes	73.3	81.4	67.3	73.8	Yes
VZ3_Derived Grassland	Yes	50.9	43.6	46.1	46.8	No

It is considered that both VZs are of moderate condition with VI scores ranging between 46 to 74 and will require formal offsets for residual impacts associated with the development footprint.

No VI score can be calculated using BAM plot data for areas of scattered trees (VZ2). However, where scattered trees were recorded, a scattered tree assessment was undertaken in accordance with Appendix B of the BAM. Impacts to scattered trees have been discussed in Section 4.1.5.2 of this report.

The development footprint will retain 20 scattered trees across the Subject Land, totalling a 33% retention of scattered trees. There is a likelihood that additional scattered trees can be retained through project design. However, impacts to habitat values have been considered using the precautionary principle and the worst-case scenario has been assumed for the purposes of the BAM-C.

Scattered trees to be retained largely consist of Class 3 trees (Trees that are ≥50 large tree benchmark) containing hollows and largely represent White Box (*Eucalyptus albens*).

It is noted that areas of scattered trees identified on the Subject Land are considered to reflect the TEC listing of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland under the BC Act, as identified in Section 4.1.6 of this report.

5. HABITAT SUITABILITY FOR THREATENED SPECIES

5.1 HABITAT SUITABILITY

Ecosystem credit species are threatened species whose occurrence can generally be predicted by vegetation surrogates and / or landscape features, or that have a low probability of detection using targeted surveys. The TBDC identifies the threatened species assessed for ecosystem credits. A targeted survey is not required to identify or confirm the presence of ecosystem credit species.

'Species credit species', also referred to as 'Candidate species', are threatened species for which vegetation surrogates and / or landscape features cannot reliably predict the likelihood of their occurrence. These species are identified in the TBDC. A targeted survey or an expert report is required to confirm the presence or absence of these species on the Subject Land. Alternatively, for a development, activity, clearing or biodiversity certification proposal only, the Applicant may elect to assume the species is present.

In some circumstances the TBDC may identify a threatened species that requires assessment for ecosystem credits and species credits (referred to as dual credit species). For dual credit species, part of the habitat is assessed as a species credit (e.g., breeding habitat or land mapped on an important habitat map for a species). The remaining habitat components for the species are assessed as an ecosystem credit (e.g., foraging habitat).

For a small number of threatened species, a habitat constraint may refer to a mapped location (Important Mapped Area) that identifies areas that are considered important for those species. Maps currently available that are relevant to the Subject Land include important areas for breeding of the Regent Honeyeater (*Anthochaera phrygia*) and Swift Parrot (*Lathamus discolor*). A review of these important habitat maps revealed that the Subject Land does not form part of the important habitat map for either species.

The following sections identify the ecosystem credit species, species credit species and dual credit species relevant to this BDAR.

5.1.1 ECOSYSTEM CREDIT SPECIES

A total of 28 ecosystem credit species (predicted species) were recognised as associated with PCT 599 in the BAM-C, including:

- VZ1_Open_Woodland
- VZ2_Scattered_Trees
- VZ3_Derived_Grasslands

The ecosystem credit species predicted to occur on, or use the Subject Land as advised by the BAM-C are listed in Table 5-1. Species in bold were recorded during surveys.

The Predicted Species Report generated in the BAM-C is provided in Appendix F.

TABLE 5-1 PREDICTED ECOSYSTEM CREDIT SPECIES

Common name	Scientific name	BC Act	EPBC Act	Species retained for further assessment	Associated PCT	Sensitivity to gain class
Black Falcon	*Falco subniger*	V	-	Yes	599	Moderate
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V	-	Yes	599	Moderate
Black-striped Wallaby	*Macropus dorsalis*	E	-	Yes	599	High
Brown Treecreeper	*Climacteris picumnus victoriae*	V	-	Yes	599	High
Corben's Long-eared Bat	***Nyctophilus corbeni***	**V**	**V**	**Yes**	**599**	**High**
Diamond Firetail	*Stagonopleura guttata*	V	V	Yes	599	Moderate
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V	-	Yes	599	Moderate
Flame Robin	*Petroica phoenicea*	V	-	Yes	599	Moderate
Glossy Black-Cockatoo	*Calyptorhynchus lathami lathami*	V	V	No	599	High
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V	-	Yes	599	Moderate
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	Yes	599	High
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	Yes	599	High
Little Eagle	*Hieraaetus morphnoides*	V	-	Yes	599	Moderate
Little Lorikeet	*Glossopsitta pusilla*	V	-	Yes	599	High
Little Pied Bat	*Chalinolobus picatus*	V	-	Yes	599	High

Common name	Scientific name	BC Act	EPBC Act	Species retained for further assessment	Associated PCT	Sensitivity to gain class
Painted Honeyeater	*Grantiella picta*	V	V	No	599	Moderate
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes	599	High
South-eastern Hooded Robin	*Melanodryas cucullata cucullata*	E	E	Yes	599	Moderate
Speckled Warbler	*Chthonicola sagittata*	V	-	Yes	599	High
Spotted Harrier	*Circus assimilis*	V	V	Yes	599	Moderate
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Yes	599	High
Square-tailed Kite	*Lophoictinia isura*	V	-	Yes	599	Moderate
Swift Parrot	*Lathamus discolor*	E	CE	Yes	599	Moderate
Turquoise Parrot	*Neophema pulchella*	V	-	Yes	599	High
Varied Sitella	*Daphoenositta chrysoptera*	V	-	Yes	599	Moderate
White-bellied Sea-eagle	*Haliaeetus leucogaster*	V	-	Yes	599	High
White-throated Needletail	*Hirundapus caudacutus*	V	V	Yes	599	High
Yellow-bellied Sheathtail-bat	***Saccolaimus flaviventris***	**V**	**-**	**Yes**	**599**	**High**

Two predicted microbat species were recorded on the Subject Land and adjoining vegetation during surveys, being:

Corben's Long-eared Bat (*Nyctophilus corbeni*) and Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*). Both species are associated with PCT 599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion. No further assessment is required.

Additionally, two predicted species have been excluded from further assessment due to habitat constraints on the Subject Land, including:

- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*) was excluded due to the lack of presence of *Allocasuarina* and *Casuarina* species being present on the Subject Land; and
- Painted Honeyeater (*Grantiella picta*) was excluded due to the presence of Mistletoes not meeting the requirements of a density of greater than five mistletoes per ha.

5.1.2 SPECIES CREDIT SPECIES

A total of 32 species credit species (candidate species) were associated with the occurrence of PCT 599 in the BAM-C, as shown in the Candidate Species Report provided in Appendix G The candidate species identified by the BAM-C for vegetation zones VZ1_Open_Woodland and VZ3_Dervied_Grasslands are listed in Table 5-2 Species recorded during surveys are in bold.

TABLE 5-2 CANDIDATE SPECIES CREDIT SPECIES

Common Name	Scientific Name	Listing status		SAII Entity	Retained for further assessment
		BC Act	EPBC Act		
Austral Toadflax	*Thesium australe*	V	V	-	Yes
Barking Owl	*Ninox connivens*	V	-	-	Yes
Belson's Panic	*Homopholis belsonii*	E	V	-	Yes
Bluegrass	*Dichanthium setosum*	V	V	-	Yes
Booroolong Frog	*Litoria booroolongensis*	E	E	-	Yes
Border Thick-tailed Gecko	*Uvidicolus sphyrurus*	V	V	-	Yes
Bush Stone-curlew	*Burhinus grallarius*	E	-	-	Yes
Callistemon pungens	*Callistemon pungens*	-	V	-	Yes
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	-	Yes
Eastern Pygmy Possum	*Cercartetus nanus*	V	-	-	Yes
Euphrasia arguta	*Euphrasia arguta*	CE	CE	Yes	Yes
Finger Panic Grass	*Digitaria porrecta*	E	-	-	Yes
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	-	No
Hawkweed	*Picris evae*	V	V	-	Yes

Common Name	Scientific Name	Listing status		SAII Entity	Retained for further assessment
		BC Act	EPBC Act		
Hunter Valley Delma	*Delma vescolineata*	E	E	No	Yes
Koala	*Phascolarctos cinereus*	E	E	-	Yes
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	-	No
Large-eared Pied Bat	*Chalinolobus dwyeri*	E	E	-	No
Little Eagle	*Hieraaetus morphnoides*	V	-	-	Yes
Masked Owl	*Tyto novaehollandiae*	V	-	-	Yes
Myall Creek Wattle	*Acacia atrox*	CE	-	Yes	Yes
Pale-headed Snake	*Hoplocephalus bitorquatus*	V	-	-	Yes
Pink-tailed Legless Lizard	*Aprasia parapulchella*	V	V	-	Yes
Prasophyllum sp. Wybong	*Prasophyllum sp. Wybong*	-	CE	Yes	Yes
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes	No
Silky Swainson-pea	*Swainsona sericea*	V	-	-	Yes
South-eastern Glossy Black-cockatoo	*Calyptorhynchus lathami lathami*	V	V	-	No
Square-tailed Kite	*Lophoictinia isura*	V	-	-	Yes
Squirrel Glider	*Petaurus norfolcensis*	V	-	-	Yes
Swift Parrot	*Lathamus discolor*	CE	CE	Yes	No
Tusked Frog Population in the Nandewar and New England Tableland Bioregions	*Adelotus brevis*	Epop	-	-	Yes
Tylophora linearis	*Tylophora linearis*	V	E	-	Yes
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	V	-	-	Yes

A possible recording of Eastern Cave Bat (*Vespadelus troughtoni)* was recorded during Anabat surveys in January 2025. Further discussion on presence of species is provided in Section 5.2.1 of this report.

Modification to the BAM-C generated list is appropriate where one or more of the following factors is relevant to the species:

- Disturbance;
- Vagrancy;
- Geographical limitations; and
- Absence of habitat constraints.

Of the candidate species listed, a total of six were excluded due to habitat constraints and / or geographic limitations, or the species has been considered a vagrant.

Candidate species excluded from further assessment include:

- Grey-headed Flying-fox (*Pteropus poliocephalus*): Excluded due to the lack of breeding camps and breeding camp habitat on the Subject Land.
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*): Excluded due to no suitable breeding habitat being present on the Subject Land or within proximity of the Subject Land, such as caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding.
- Large-eared Pied Bat (*Chalinolobus dwyeri*): No suitable habitat including cliffs occur on the Subject Land and no suitable habitats occur within 2 km of the development footprint, including rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or old mines or tunnels. Therefore, it has been excluded from further assessment.
- Regent Honeyeater (*Anthochaera phrygia*): The Subject Land has not been mapped as containing important habitat for this species, as shown in Figure 5-1. As such, it has been excluded from further assessment.
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami*): The Subject Land contains several HBTs considered suitable for use by this species of breeding habitat, being HBTs living or dead with hollows greater than 15 cm in diameter and higher than 8 km above ground. However, the site contains no suitable foraging resources, such as *Allocasuarina* or *Casuarina* species making the available breeding habitats unfavourable to this species. Additionally, the subject land has been the subject of disturbance through historical land use for agriculture and pasture production and does not contain larger patches of suitable habitat and / or areas of intact landscape that is relied upon for breeding by this species, as identified in the TBDC. Due to the lack of suitable foraging habitat available that would be required to support a successful breeding pair, it is considered that habitats available for this species are degraded. Therefore, this species has been excluded from further assessment.
- Swift Parrot (*Lathamus discolor*): The Subject Land has not been mapped as containing important habitat for this species, as shown in Figure 5-1. As such, it has been excluded from further assessment.

5.1.3 SCATTERED TREE SPECIES

All SAII candidate species generated by the BAM-C for scattered trees must be assessed in accordance with Steps 3-5 in Section 5.2 of the BAM, as identified in Appendix B of the BAM.

If a threatened species at risk of SAII is recorded on the Subject Land, the scattered tree module cannot be applied. However, if no threatened species at risk of SAII are present or are likely to be present then the scattered tree module can be applied.

A total of four candidate species at risk of SAII were identified in association with PCT 599 where scattered trees were identified under VZ2_Scattered_Trees; Table 5-3details candidate species at risk of SAII and associated with scattered trees of PCT 599.

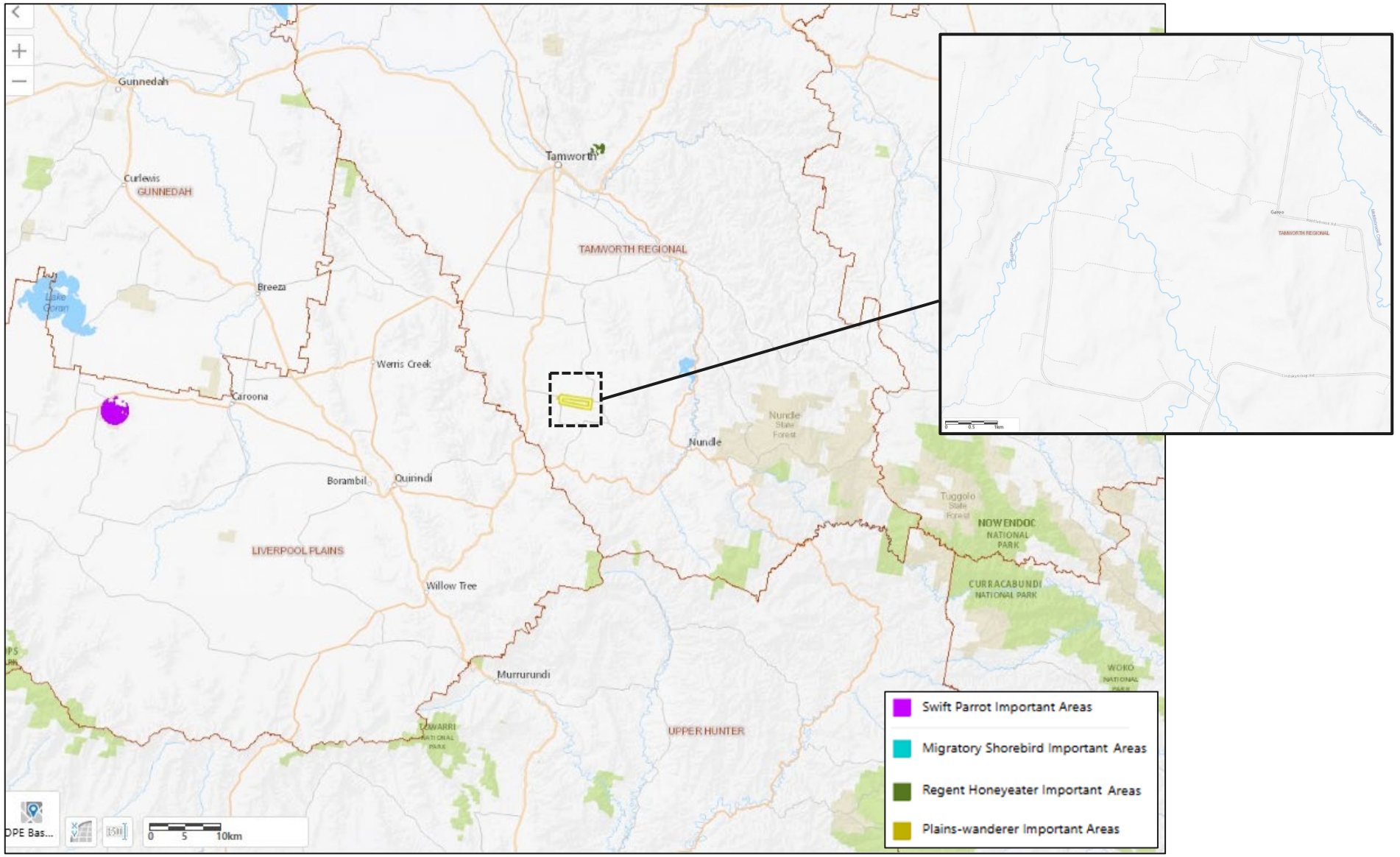
In accordance with Steps 3-5 of Section 5.2 of the BAM, a candidate species that does not have suitable habitat does not require further assessment. A review of candidate species at risk of SAII associated with scattered trees determined that all four candidate species at risk of SAII were considered appropriate for exclusion due to a lack of suitable habitat being present within areas of scattered trees, as detailed in Table 5-3.

TABLE 5-3 CANDIDATE SAII SPECIES ASSOCIATED WITH SCATTERED TREES ON THE SUBJECT LAND

Common Name	Listing status		SAII Entity	Retained for further assessment	Justification
	BC Act	EPBC Act			
Myall Creek Wattle *(Acacia atrox)*	CE	-	Yes	No	This species has been excluded due to the limited distribution and population known to remain. A review of the TBDC identified that only two individual populations are remaining near Delungra and Gurley NSW, each occupying less than 5 ha. Additionally, this threatened species is considered strongly clonal. The Subject Land does not occur within areas occupied by known populations and habitats are considered to be highly degraded due to historical land use for agriculture and pasture. Additionally, floristic surveys did not identify any *Acacia* species on the subject land. As such, it has been excluded from further assessment.
Prasophyllum sp. Wybong	-	CE	Yes	No	This species has been listed as a candidate species at risk of SAII within the BAM-C due to the listing as critically endangered under the EPBC Act. However, under the TBDC for this species, it states: *'While the TBDC and BAM-C indicate that this species requires SAII assessment, requirements relating to serious and irreversible impacts (clause 6.7 of the Biodiversity Conservation Regulation 2017 (BC Regulation)) do not apply to EPBC Act only listed entities. This is an EPBCA-only listed species and is regarded as Prasophyllum petilum under the BC Act.'* This species has been surveyed in association with areas of the Subject Land identified as White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands that meet the EPBC listing (i.e. VZ1_Open_Woodland and VZ3_Derived_Grasslands). Surveys for this species have not occurred within areas of Scattered trees as areas of VZ2_Scattered_Trees do not meet the requirements to be considered part of the EPBC Act listing of this TEC.

Common Name	Listing status		SAII Entity	Retained for further assessment	Justification
	BC Act	EPBC Act			
					However, in response to the TBDC, *Prasophyllum petilum* has been considered as part of this BDAR for areas identified as VZ2_Scattered_Trees. *Prasophyllum petilum* is listed as Endangered under the BC Act and Endangered under the EPBC Act. However, it is not listed as an SAII entity under the BC Act. Therefore, assessment of this candidate species is not required within areas of scattered trees as per Appendix B of the BAM. Regardless, floristic surveys undertaken within areas of scattered trees surveyed using a precautionary approach and opportunistic surveys were conducted during suitable survey times for this species, being October to December 2024. No individuals of this species were recorded during surveys. Therefore, no further consideration for *Prasophyllum petilum* is required.
Regent Honeyeater (*Anthochaera phrygia)*	CE	CE	Yes	No	The Subject Land has not been mapped as containing important habitat for this species, as shown in Figure 5-1. As such, it has been excluded from further assessment. Suitable foraging habitat has been appropriately assessed under predicted species listing in accordance with Chapter 5 of the BAM.
Swift Parrot (*Lathamus discolor)*	CE	CE	Yes	No	The Subject Land has not been mapped as containing important habitat for this species, as shown in Figure 5-1. As such, it has been excluded from further assessment. Suitable foraging habitat has been appropriately assessed under predicted species listing in accordance with Chapter 5 of the BAM.

FIGURE 5-1 IMPORTANT HABITAT MAPPING IN PROXIMITY TO THE SUBJECT LAND



5.2 HABITAT SURVEYS: CANDIDATE SPECIES CREDIT SPECIES

A targeted survey or an expert report is required to confirm the presence of these species on the Subject Land. Alternatively, for a development activity, the Applicant may elect to assume the species is present. Fauna species recorded during surveys are provided in Appendix C.

5.2.1 CANDIDATE SPECIES OCCURRENCE

A total of 24 candidate species have been included in further assessment in accordance with the BAM as identified in Table 5-2**.**

Presence of a species can be determined based on the following:

- Assumed presence within the Subject Land; or
- An Important Mapped Area; or
- Targeted threatened species surveys; or
- An expert report.

5.2.1.1 ASSUMED PRESENCE

Targeted threatened species surveys were completed across the Subject Land. Targeted surveys of candidate species are detailed in Table 5-4 (flora) and Table 5-5 (fauna) below. Presence for threatened flora and fauna has been assumed in areas where surveys were not completed to the level of requirement as detailed in the BAM and where the species is not listed as a SAII entity.

Of the 24 candidate species, three species have been assumed present being:

- Bluegrass (*Dichanthium setosum*);
- Euphrasia arguta; and
- Finger Panic Grass (*Digitaria porrecta*).

This is due to inadequate surveys being undertaken and survey timing constraints in relation to the delivery of the project.

Candidate species recorded during survey, or assumed present within the Subject Land are listed in Table 5-6. A species polygon has been established for this species assumed present.

Candidate species at risk of SAII, including those included in the assessment for scattered trees were subject to targeted survey in accordance with the BAM.

Prasophyllum sp. Wybong is identified as a candidate species at risk of SAII in the BAM-C for PCT 599. The distribution of *Prasophyllum* sp. Wybong overlaps with White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands that meet the EPBC listing. VZ2_Scattered_Trees does not meet the requirements to be considered part of the EPBC listed TEC. The TBDC identifies that:

> *While the TBDC and BAM-C indicate that this species requires SAII assessment, requirements relating to serious and irreversible impacts (clause 6.7 of the Biodiversity Conservation Regulation 2017 (BC Regulation)) do not apply to EPBC Act only listed entities.*

As such, it is considered that surveys for this species within the areas of native vegetation that meet the EPBC listing (i.e. VZ1_Open_Woodland and VZ3_Derived_Grasslands) are adequate and this species has been appropriately and adequately surveyed.

5.2.1.2 IMPORTANT AREAS

The Subject Land contains no important mapped areas. Species excluded on this basis include:

- Regent Honeyeater;
- Swift Parrot;
- Migratory Shorebirds; and
- Plains Wanderer.

Targeted survey and species polygons are not required for these species.

5.2.1.3 TARGETED THREATENED SPECIES SURVEYS

Candidate species identified as likely to occur within the development footprint are required to have targeted surveys undertaken. Targeted survey is the preferred survey method rather than assume presence, to confirm whether a species may be present or has habitat available.

Targeted surveys of candidate species are detailed in Table 5-4 and Table 5-5 below. Data collected for targeted surveys on microchiropteran bats (microbats) has been analysed by GreenTape Solutions and an assessment report was prepared. The Anabat Analysis Report is provided in Appendix H.

Candidate species recorded as present within the Subject Land after the completion of targeted surveys are listed in Table 5-6. Species polygons are required for these species and have been established.

5.2.1.4 EXPERT REPORTS

No expert reports were relied upon for this BDAR. Species are considered to have been appropriately surveyed in accordance with the BAM or assumed present where habitat conditions were considered suitable for the species.

TABLE 5-4 THREATENED FLORA CANDIDATE SPECIES FIELD SURVEY EFFORT

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Spring 2024				
Prasophyllum sp. Wybong	599	September – November	<u>Targeted flora surveys</u> 28th, 29th, 30th, 31st October and 1st November 2024. Five recorded parallel walking transects across five days conducted by two ecologists, walking 10 m apart, in PCTs associated with each species. Survey effort focused on areas within the Subject Land to ensure coverage for potential direct impacts to biodiversity. Opportunistic surveys occurred at all other times during survey.	No individuals or extent of a population detected.
Silky Swainson-pea (*Swainsona sericea*)	599	October – May		
Summer 2025				
Austral Toadflax (*Thesium australe*)	599	November - February	<u>Targeted flora surveys</u> 1st November 2024 and the 13th, 14th, 16th, 17th, 18th, 19th of January 2025, included parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland and in PCT 599. Opportunistic surveys occurred at all other times during survey.	No individuals or extent of a population detected. Target species surveyed for in non-native grassland. Habitat was considered to be degraded within areas of open woodland and derived grasslands for this species.
Belson's Panic (*Homopholis belsonii)*	599	December - April	<u>Targeted flora surveys</u> 13th, 14th, 16th, 17th, 18th,19th of January 2025. Parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland. Opportunistic surveys occurred at all other times during survey.	No individuals or extent of a population detected. Target species surveyed for in non-native grassland. Habitat was considered to be degraded within areas of open woodland and derived grasslands for this species.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Bluegrass (*Dichanthium setosum*)	599	November – May	Targeted flora surveys 1st November 2024 and the 13th, 14th, 16th, 17th, 18th, 19th of January 2025, included parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland. Opportunistic surveys occurred at all other times during survey.	Partial survey within grasslands during seasonal survey period. Although no individuals or extent of a population were detected, surveys did not occur within areas of PCT 599. Therefore, this species has been assumed present due to insufficient survey and the degraded habitat of PCT 599 and association with *E. albens.*
Callistemon pungens	599	September - February	Targeted flora surveys 13th, 14th, 16th, 17th, 18th, 19th of January 2025. Parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland. Opportunistic surveys occurred at all other times during survey.	No individuals or extent of a population detected. Target species surveyed for in non-native grassland. Habitat was considered to be degraded within areas of open woodland and derived grasslands due to the lack of *Casuarin*a sp. Dominant riparian lands.
Euphrasia arguta	599	November - March	Targeted flora surveys 13th, 14th, 16th, 17th, 18th, 19th of January 2025. Parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland. Opportunistic surveys occurred at all other times during survey.	Partial survey within grasslands during seasonal survey period. Although no individuals or extent of a population were detected, surveys did not occur within areas of open woodlands. Therefore, this species has been assumed present due to insufficient survey at this time.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Finger Panic Grass (*Digitaria porrecta*)	599	January - February	Targeted flora surveys 13th, 14th, 16th, 17th, 18th, 19th of January 2025. Parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland. Opportunistic surveys occurred at all other times during survey.	Partial survey within grasslands during seasonal survey period. Although no individuals or extent of a population were detected, surveys did not occur within areas of open woodlands. Therefore, this species has been assumed present due to insufficient survey at this time.
Hawkweed (*Picris evae*)	599	November – February	Targeted flora surveys 1st November 2024 and the 13th, 14th, 16th, 17th, 18th, 19th of January 2025, included parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland and in PCT 599. Opportunistic surveys occurred at all other times during survey.	No individuals or extent of a population detected. Target species surveyed for in non-native grassland. Habitat was considered to be degraded within areas of PCT 599 due to historical grazing and cropping activities.
Myall Creek Wattle (*Acacia atrox*)	599	All year	Targeted flora surveys 13th, 14th, 16th, 17th, 18th, 19th of January 2025 and 26th June 2025. Parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland and areas of PCT 599. Opportunistic surveys occurred at all other times during survey.	Survey effort met No individuals or extent of a population detected.
Tylophora linearis	599	September - October	Targeted flora surveys 28th, 29th, 30th, 31st October and 1st November 2024 and 13th, 14th, 16th, 17th, 18th, 19thF of January 2025. Parallel walking transects across five days conducted by two ecologists, walking 10 m apart was conducted in areas mapped as non-native grassland and PCT599 associated with the species. Survey effort focused on areas within the Subject Land to ensure coverage for potential direct impacts to biodiversity. Opportunistic surveys occurred at all other times during survey.	No individuals or extent of a population detected.

TABLE 5-5 THREATENED FAUNA CANDIDATE SPECIES FIELD SURVEY EFFORT

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Amphibians				
Booroolong Frog *(Litoria booroolongensis)*	599	October – December	Aural-visual surveys 29th, 30th, 31st October and 1st November 2024 between the hours of 8:00pm – 11:00pm. Aural-visual surveys were undertaken at four farm dams and three points along Tamarang Creek (seven locations visited four times). Call playback of target frog calls combined with spotlighting transects along creek and dam banks were undertaken. In total, 1150m of suitable habitat across seven locations were surveyed by two ecologists for 720 minutes (six hours), each totalling 24 hours of survey effort.	Survey effort met. Four repeat surveys were undertaken for approx. 1440 minutes across 1150m of suitable habitat. Species not detected.
Tusked Frog Population in the Nandewar and New England Tableland Bioregions (*Adelotus brevis*)	599	October – February	Aural-visual surveys 29th, 30th, 31st October and 1st November 2024 between the hours of 8:00pm – 11:00pm. Aural-visual surveys were undertaken at four farm dams and three points along Tamarang Creek (seven locations visited four times). Call playback of target frog calls combined with spotlighting transects along creek and dam banks were undertaken. In total, 1150 meters of suitable habitat across seven locations were surveyed by two ecologists for 720 minutes each totalling 1140 minutes of survey effort.	Survey effort met. Four repeat surveys were undertaken for approx. 1440 minutes across 1150 meters of suitable habitat. Species / population not detected.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Arboreal Mammals				
Eastern Pygmy Possum (*Cercartetus nanus*)	599	October – March	<u>Baited camera monitoring</u> 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th of January. Six baited camera devices we're deployed in total, with one device deployed for six nights and five devices deployed for five nights in suitable habitat. There were six cameras targeting arboreal species throughout the Subject Land for a combined total of 890 hours of recorded footage. <u>Spotlight</u> 13th, 14th,16th, 18th of January 2025 between the hours of 8pm – 11pm. Four spotlight surveys were undertaken by two ecologists for four nights. A distance of 21.4 km was covered totalling approx. 256 minutes (4.25 hours) of survey effort. No target species detected.	Survey effort met. Review of 890 hours of baited camera monitoring data showed no target species. Spotlight surveys amounting to 256 minutes of survey effort across 21.4 km was undertaken with no target species detected. Species not detected.
Squirrel Glider (*Petaurus norfolcensis*)	599	All year	<u>Spotlight</u> 13th, 14th,16th, 18th of January 2025 between the hours of 8pm – 11pm. Four spotlight surveys were undertaken by two ecologists for four nights. A distance of 21.4 km was covered totalling approx. 4.25 hours (256 minutes) of survey effort. <u>Baited camera monitoring</u> 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th of January. Six baited camera devices we're deployed in total, with one device deployed for six nights and five devices deployed for five nights in suitable habitat. There were six cameras targeting arboreal species throughout the Subject Land for a combined total of 890 hours of recorded footage.	There are no species-specific survey guidelines available for this species, however, implementing two forms of appropriate survey method is sufficient. The number of cameras and length of survey in addition to spotlighting surveys is considered adequate for detection of the species and therefore the species is determined not to occur.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
				Six baited cameras deployed for a total of six nights (890 hours of footage) and four nights of spotlighting covering 21.4 km with 4.25 hours of survey effort. In total, 894.25 hours of survey effort was undertaken with no target species detected. Species not detected.
Koala *(Phascolarctos cinereus)*	599	All year	<u>Spot Assessment Technique (SAT)</u> 13th, 14th, 16th, 17th, 18th, 19th, 26th of January 2025. Two ecologists inspected 166 trees- SAT searches performed on all identified scattered trees and areas of planted vegetation within the Subject Land for one minute each, surveying for faunal use (scratches on trees, scats within 1 m radius around trees) with each tree species being identified and photo documented. A total of 332 minutes of survey effort was undertaken for SAT. <u>Spotlight</u> 13th, 14th,16th, 18th of January 2025 between the hours of 8pm – 11pm. Four spotlight surveys were undertaken by two ecologists for four nights. A distance of 21.4 km was covered totalling approx. 256 minutes (4.25 hours) of survey effort. In total, 588 minutes of targeted survey effort was undertaken for target species and target species habitat.	Survey effort met. Two standard survey methods for Koala's were undertaken. SAT was performed on 166 trees. Spotlighting was performed across 21.4 kilometre distance over four nights. Both surveys totalled a combined 588 minutes of survey effort. Species not detected. Evidence of fauna use on surveyed trees not detected.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Micro Bats				
Eastern Cave Bat (*Vespadelus troughtoni*)	599	November – January	Passive acoustic detection 15th, 16th, 17th, 18th and 19th of January 2025. Four passive ultrasonic acoustic detection devices (Anabat Chorus) were deployed across four nights at four potential foraging habitat areas within the Project Area, amounting to 16 survey events. A total of 184 hours of ultrasonic acoustic recording was recorded across four nights. Recorded data was interpreted within nationally accepted standards for the interpretation and reporting of Anabat and Songmeter data and outlined in Appendix H	Survey effort met. Ultrasonic acoustic data interpretation suggested 'possible' detection of target species at three out of four recorded potential foraging habitat sites. As outlined in Appendix H, the reliability of identification associated with 'possible' is stated as '*Call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls*.'
Owls				
Barking Owl (*Ninox connivens*)	599	All year	Habitat assessment 23rd-28th September 2024. A Scattered Tree Assessment was undertaken on site. Call playback and spotlighting 13th, 14th, 15th, 16th, 17th, 18th, 19th January 2025 between the hours of approx. 8pm – 12:30am. Call playback surveys consisted of 15 seconds of target species call playback followed by 30 seconds of listening time repeated for 15 minutes, followed by spotlighting. The surveys were undertaken in suitable habitat by two ecologists across three sites over six days, each site being visited six times. In total, 18 survey events conducted in suitable habitat across three sites amounted to 270 minutes of call playback and listening for faunal response, with an additional 325 minutes spent spotlighting a 1 ha circular plot around each broadcast station.	Survey effort met. Three call playback stations were deployed within the Project Area, achieving a spatial distribution of approximately one station per 123 ha. A combined total of 595 minutes of survey effort. Species not detected. No evidence of nesting / roosting habitat.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Masked Owl *(Tyto novaehollandiae)*	599	All year	Habitat assessment 23rd-28th September 2024. A Scattered Tree Assessment was undertaken on site. Call playback and spotlighting 13th, 14th, 15th, 16th, 17th, 18th, 19th January 2025 between the hours of approx. 8pm – 12:30am. Call playback surveys consisted of 15 seconds of target species call playback followed by 30 seconds of listening time repeated for 15 minutes, followed by spotlighting. The surveys were undertaken in suitable habitat by two ecologists across three sites over six days, each site being visited six times. In total, 18 survey events conducted in suitable habitat across three sites amounted to 325 minutes of call playback and listening for target species response, with an additional 260 minutes spent spotlighting a 1 ha circular plot around each broadcast station.	Survey effort met. Three call playback stations were deployed within the Project Area, achieving a spatial distribution of approximately one station per 123 ha. A combined total of 595 minutes of survey effort. Species not detected. No evidence of nesting / roosting habitat.
Birds				
Bush Stone-curlew (*Burhinus grallarius*)	599	All year	Call playback 13th, 14th, 15th, 16th, 17th, 18th, 19th January 2025 between the hours of approx. 8pm – 12:30am. Call playbacks consisting of 30 second calls with 4.5 minutes of listening and spotlighting undertaken in suitable habitat by two ecologists across three sites over six days, each site being visited six times. In total, 18 survey events across six nights were conducted in suitable habitat across three sites amounted to 90 minutes of call playback and listening for target species response with additional 325 minutes spent spotlighting a 1 ha circular plot around each broadcast station.	Survey effort met. 415 minutes of survey effort was performed across most suitable habitat / foraging sites within Project Area. Species not detected.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Little Eagle (*Hieraaetus morphnoides*)	599	August – October	Habitat assessment 23rd-28th September 2024. Trees and stags within the Project Area were surveyed for stick nests with no large stick nests (>49 centimetres in diameter) present within the Project Area. Bird survey 16th, 17th, 18th and 19th January. Bird surveys were undertaken at three sites across four days for 20 minutes per survey conducted by two ecologists. A total of 12 survey events and 480 minutes of survey effort was undertaken. No target species observed.	Survey effort met. Stick nest surveys found no suitably sized stick nests within the Project Area. Bird surveys were undertaken for a total of 480 minutes across three sites within the Project Area. No target species was observed. Species not detected. No breeding habitat detected.
South-eastern Glossy Black-cockatoo *(Calyptorhynchus lathami lathami)*	599	April - August	Habitat assessment 23rd-28th September 2024. Project Area is absent of foraging habitat however there were 45 Living trees with hollows greater than 15 cm diameter and nine stags with hollows greater than 15 cm diameter within the Project Area suggesting potential breeding habitat. No target species recorded using hollows. Bird survey 16th, 17th, 18th and 19th January. Bird surveys were undertaken at three sites across four days for 20 minutes per survey conducted by two ecologists. A total of 12 survey events and 480 minutes of survey effort was undertaken. No target species observed.	Species excluded from BAM-C but surveys completed. Survey effort met (Note: Survey requirements have changed over the course of this BDAR. Initial survey conducted met survey requirements.) No foraging habitat present on site. All hollows surveyed did not meet target species habitat requirements and / or were occupied by other species. No target species detected on site during habitat assessment. No target species detected during 480 minutes of bird surveys. Species not detected.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Square-tailed Kite *(Lophoictinia isura)*	599	September - January	Habitat assessment 23rd-28th September 2024. Trees and stags within the Project Area were surveyed for stick nests with two small stick nests (1-19 cm in diameter) and seven medium stick nests (between 20-40 cm in diameter) present within the Project Area. Two of these suitably sized nests were observed with other species present, and two were recorded as abandoned. Five potentially suitable stick nests were recorded within the Project Area. Bird Survey 16th, 17th, 18th and 19th January. Bird surveys were undertaken at three sites across four days for 20 minutes per survey conducted by two ecologists. A total of 12 survey events and 480 minutes of survey effort was undertaken. No target species observed, and no target species observed using potential stick nests.	Survey effort met. Target species was not observed during bird surveys and potential stick nest habitat (five suitably sized stick nests) were not observed to be utilised by target species during breeding season (July-February). Bird surveys were undertaken for a total of 480 minutes across three sites within the Project Area. No target species was observed. Species not detected. No breeding habitat detected.
White-bellied Sea-Eagle *(Haliaeetus leucogaster)*	599	July – December	Habitat assessment 23rd-28th September 2024. Trees and stags within the Project Area were surveyed for stick nests with no large stick nests (>49 cm in diameter) present within the Project Area. Bird survey 16th, 17th, 18th and 19th January. Bird surveys were undertaken at three sites across four days for 20 minutes per survey conducted by two ecologists. A total of 12 survey events and 480 minutes of survey effort was undertaken. No target species observed.	Survey effort met. Stick nest surveys found no suitably sized stick nests within the Project Area. Bird surveys were undertaken for a total of 480 minutes across three sites within the Project Area. No target species was observed. Species not detected. No breeding habitat detected.

Target Species	PCT	Recommended Survey Period	Effort	Outcome
Reptiles				
Border Thick-tailed Gecko (*Uvidicolus sphyrurus*)	599	November – March	Spotlight survey 13th, 14th, 16th, 17th of January 2025 between the hours of 8pm - 10pm. Spotlight surveys were undertaken by two ecologists at three sites with four visits across three sites in total (one site visited twice). In total, 350 minutes survey effort within suitable rocky habitat across three locations were surveyed by two ecologists. Of the rocky habitat surveyed, three sites were visited once and one site visited twice.	Survey effort met 350 minutes of survey effort was undertaken across two sites over four survey events. Survey occurred across most suitable habitat within Project Area (rocky outcrop). Species not detected.
Pale-headed Snake (*Hoplocephalus bitorquatus*)	599	November – March	Spotlight survey 13th, 14th, 16th, 17th January 2025 between the hours of 8pm – 10pm. Spotlight surveys were undertaken by two ecologists at two sites. Survey efforts were conducted over four nights, with each site being surveyed three times across the four nights. A total of 598 minutes of survey effort across 7.4 km was undertaken.	Survey effort not met. A total of 598 minutes of survey effort across 7.4 kilometres was undertaken across two sites of suitable habitat. No funnel traps were undertaken for target species. Species not detected.
Pink-tailed Legless Lizard (*Aprasia parapulchella*) Hunter Valley Delma (*Delma vescolineata*)	599	September – November	Rock search 29th, 30th, 31st October and 1st November between 5pm – 7pm. Two ecologists undertook rock searches in two sites of most suitable habitat for target species. Survey efforts were conducted over four nights, with each site surveyed for one hour per night. In total, 913 suitably sized rocks were turned. Each of the two sites received four one-hour surveys, resulting in a combined total of 16 hours of survey effort.	Survey effort met (Note: Survey requirements have changed over the course of this BDAR. Initial survey conducted met survey requirements). A total of four nights of survey effort on two sites of suitable habitat was undertaken with 913 rock searches across approx. 11.25 ha averaging 450 rock searches per 5 ha. A total of 16 hours of survey effort was completed. Species not detected.

5.2.1.5 PRESENT THREATENED SPECIES

Targeted surveys identified one candidate species occurring within the Subject Land, being Eastern Cave Bat (*Vespadelus troughtoni)*. Detail on this species is provided in Table 5-6.

A possible recording of this candidate species was recorded during Anabat surveys in January 2025. The Anabat Analysis Report prepared by GreenTape Solutions is provided Appendix H.

No further candidate species were recorded during surveys. Flora transects across the Subject Land did not result in the identification of any targeted threatened flora species. Camera traps deployed did not record any threatened species. Species polygons are not required for candidate species identified as not present within the Subject Land. However, species polygons are required to be prepared in accordance with the BAM for each species credit species present, or assumed to be present, within the Subject Land. Therefore, species polygons have been prepared for the following species considered present in accordance with the BAM:

- Bluegrass (*Dichanthium setosum*) (assumed present);
- *Euphrasia arguta* (assumed present);
- Finger Panic Grass (*Digitaria porrecta*) (assumed present); and
- Eastern Cave Bat (*Vespadelus troughton*i) (possible recording)

Species polygons have been developed for the above species and are based on the species polygon specifications outlined in the TBDC and relevant guidelines for the species.

Species habitats as identified by species polygons are shown in Figure 5-2, Figure 5-3, Figure 5-4 and Figure 5-5.

TABLE 5-6 CANDIDATE SPECIES IDENTIFIED BY TARGETED SURVEY

Common Name	Scientific Name	BC Act	EPBC Act	Biodiversity risk weighting	SAII entity	Record Notes	Species Polygon
Bluegrass	*Dichanthium setosum*	V	V	High	No	Assumed present	VZ1_Open_Woodland VZ3_Derived_Grasslands This species has been assumed present within areas of moderate to good native vegetation due to insufficient survey.
Euphrasia arguta	*Euphrasia arguta*	CE	CE	Very High	Yes	Assumed present	VZ1_Open_Woodland VZ3_Derived_Grasslands This species has been assumed present within areas of moderate to good native vegetation due to insufficient survey.
Finger Panic Grass	*Digitaria porrecta*	E	-	High	No	Assumed present	VZ1_Open_Woodland VZ3_Derived_Grasslands This species has been assumed present within areas of moderate to good native vegetation due to insufficient survey.
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	Very high	Yes - When the species is present on the subject land and the proposed impact is not a potential SAII (i.e. no impacts to potential breeding habitat), standard species credits will be generated	Possible recording	Potential breeding habitat is PCTs associated with the species within 100 m of rocky areas, caves, overhangs crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds within the potential habitat. When the species is present on the subject land and the proposed impact is not a potential SAII, standard species credits will be generated. All habitat on the subject land where the subject land is within 2 km of caves, scarps, cliffs, rock overhangs and disused mines must be mapped.

Legend

- Bluegrass (Dichanthium setosum)
- Project Area
- Development Footprint

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 200 400m

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F5-2 Species Polygon Map Bluegrass (Dichanthium setosum)

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Legend

- Project Area
- Development Footprint
- Euphrasia arguta

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

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F5-3 Species Polygon Map Euphrasia arguta

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ERM

Legend

- Project Area
- Development Footprint
- Finger Panic Grass (Digitaria porrecta)

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 200 400m

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F5-4 Species Polygon Map Finger Panic Grass (Digitaria porrecta)

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Biodiversity Development Assessment Report
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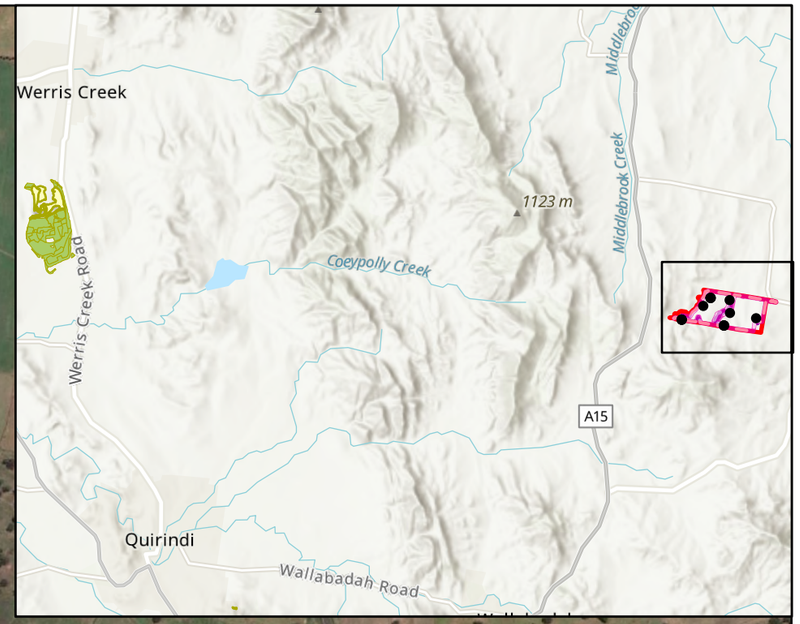
ERM

Legend

- Project Area
- Development Footprint
- Eastern Cave Bat (Vespadelus troutoni)
- Anabat Songmeter

Mine Rehabilitation

- Decommissioning
- Landform Establishment
- Growth Media Development
- Ecosystem and Land Use Establishment
- Ecosystem and Land Use Development
- Relinquishment (Rehabilitated)
- Rehabilitation Completion



Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

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F5-5 Species Polgon Map Eastern Cave Bat (Vespadelus throughtoni)

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5.3 SUPPLEMENTARY SEARS REQUIREMENTS

It is anticipated that several SEARs will be issued by several governing agencies as part of the SSD process (SD-79747209).

5.3.1 COMMONWEALTH OF AUSTRALIA

An EPBC Act Referral was submitted by ERM to address potential impacts to MNES under the EPBC Act. The referral identified no MNES have been recorded within the development footprint and that the proposed action is not expected to have any considerable impact on any MNES.

The EPBC Assessment has been provided in Appendix I.

5.3.2 NSW DEPARTMENT OF PLANNING, HOUSING AND INFRASTRUCTURE

SEARs were issued by the NSW DPHI on the 4th March 2025 in relation to the Garoo Solar Farm SSD (SD-79747209).

One of the key issues identified in the SEARs relates to Biodiversity. Specifically, the SEARs identify:

Biodiversity

- *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) (BC Act), having regard to the Biodiversity Assessment Method (BAM) 2020 and documented in a Biodiversity Development Assessment Report (BDAR).*

  The BDAR must:

  - *be prepared using the approved BDAR template;*
  - *document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM;*
  - *assess the impacts associated with all ancillary infrastructure, including the transport route road upgrades;*
  - *include an assessment for serious and irreversible impacts (SAII) in accordance with Section 9.1 of the BAM;*
  - *include a strategy to offset any residual impacts of the development in accordance with the BC Act; and*
  - *be finalised by an accredited assessor as BAM-compliant within 14 days of submission; unless Conservation Programs, Heritage and Regulation Group (CPHR) and DPHI determine the proposed development is not likely to have any significant impacts on biodiversity values;*
- *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;*
- *a cumulative impact assessment of biodiversity values in the region from nearby developments; and*
- *if an offset is required, details of the measures proposed to address the offset obligations.*

This BDAR is considered to appropriately address the initial SEARs provided by DPHI.

A site meeting was held between CPHR and H2O Ecology has been engaged to prepare and undertake the Aquatic Ecology Assessment separately to assess impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the FM Act.

5.3.3 NSW DPI FISHERIES

SEARs have been issued by the NSW DPI Fisheries regarding aquatic ecological impacts. In accordance with the FM Act and the *Policy and Guidelines for Fish Habitat Conservation and Management (2013)* (NSW DPI, 2013), an aquatic ecological assessment is required to evaluate all direct and indirect impacts of the Garoo Solar Farm Project on KFH and associated aquatic and riparian flora and fauna, including threatened species, populations and ecological communities, for the life of the Project.

The assessment should cover the assessment requirements outlined in Chapter 3 of the *Policy and Guidelines for Fish Habitat Conservation and Management (2013)* (NSW DPI, 2013). Particular focus will be given to Tamarang Creek, Sugarloaf Creek and their tributaries, which have been mapped for the indicative distribution of threatened fish species, including the endangered Southern Purple Spotted Gudgeon (*Mogurnda adspersa*).

H2O Ecology has been engaged to prepare and undertake the aquatic ecological assessment to ensure compliance with DPI fisheries policy objectives to prevent the net loss of fish habitat and minimise disturbance to riparian vegetation The Aquatic Assessment has been provided in Appendix L.

6. IDENTIFYING PRESCRIBED IMPACTS

Prescribed impacts are identified in Clause 6.1 of the BC Regulation. Prescribed impacts are those that are additional to the clearing of native vegetation and associated habitat. These include:

- Development on the habitat of threatened species or ecological communities associated with:
  - Karst, caves, crevices, cliffs, rock outcrops and other geological features of significance;
  - Human-made structures; and
  - Non-native vegetation.
- Development on areas connecting threatened species habitat, such as biodiversity corridors;
- Impacts on water quality, waterbodies and hydrological processes that sustain threatened species and TECs;
- Wind turbine strikes on protected animals; and
- Vehicle strikes on threatened species or on animals that are part of a TEC.

The BAM does not provide an approach to determine the number and class of biodiversity credits that are required for a prescribed impact. However, the additional prescribed impacts on biodiversity may be considered by a consent authority when they determine the biodiversity credits required to be retired (or other conservation measures required to be taken) under a planning approval.

An assessment of the relevance of these prescribed impacts to the Project is provided in Table 6-1 and Figure 6-1.

TABLE 6-1 ASSESSMENT OF PRESCRIBED IMPACTS

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes ☒No	No discernible karsts, caves, cliffs or other geological features of significance occur in the Subject Land.	No further assessment is required.
Human-made structures	☒Yes ☐No	Human-made structures subject to impacts because of the Project include fences, gates and other agricultural infrastructure.	Raptors and other avian species are known to frequently use human-made structures for foraging, perching and nesting.
Non-native vegetation	☒Yes ☐No	Areas comprised of non-native vegetation or lacking vegetation entirely occur throughout the Subject Land. These areas are subject to high levels of disturbance including grazing, cropping and vehicle movements.	It is considered unlikely that the impacts to this feature will have a significant impact on threatened species due to their history of high levels of disturbance and therefore no further assessment is required.
Habitat connectivity	☒Yes ☐No	The Subject Land is highly fragmented due to historical clearing and current agricultural land uses, however native vegetation is present. Vegetation along Tamarang Creek is largely fragmented, however vegetation along Sugarloaf Creek on the western boundary of the Subject Land provides greater habitat connectivity. Both creeklines have been avoided by the Subject Land.	All threatened fauna species assessed. Level of habitat connectivity use differs based on species behaviour and habitats available within the Subject Land
Waterbodies, water quality and hydrological processes	☒Yes ☐No	Tamarang Creek runs through the centre of the Subject Land, running south to north, with Sugarloaf Creek bounding the western edge of the Project Area.	The Fisheries NSW Spatial Data Portal (DPI) maps both Tamarang Creek and Sugarloaf Creek as KFH, with Sugarloaf Creek also mapped as suitable habitat for the threatened Southern Purple Spotted Gudgeon (*Mogurnda adspersa*), listed under the FM Act. Assessment of waterways and aquatic habitat has been undertaken within the assessment prepared by H20 Ecology.

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature
Wind turbine strikes	☐Yes ☒No	No wind turbines are proposed for the Project	No further assessment is required.
Vehicle strikes	☒Yes ☐No	The project will include the construction of internal access tracks and use of existing roads and tracks within the Subject Land, as shown in Figure 6-1. An increase in vehicular traffic will occur during construction and operation of the Project.	Ground-dwelling species are most at risk of vehicle strike resulting from the Project. Mitigation measures will be implemented to reduce the risk of vehicle strike.

Legend

- Project Area
- Development Footprint
- Major Watercourse (Stream Order)
- Water body
- Non Native Vegetation
- Access Tracks

Project Layout - Manmade Structures

- BESS Container
- OHL Interconnection
- PCS Station
- Substation Interior
- Fence
- Inverters
- Transgrid Substation Area
- Customer Substation Area
- Parking and Laydown Area
- Internal Road
- PV (Mounting Structure - Full Table)
- PV (Mounting Structure - Half Table)
- Culvert
- Bridge

SUGARLOAF CREEK

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

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F6-1 Prescribed Impacts

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STAGE 2: IMPACT ASSESSMENT (BIODIVERSITY VALUES AND PRESCRIBED IMPACTS)

7. AVOID AND MINIMISE IMPACTS

7.1 AVOID AND MINIMISE DIRECT AND INDIRECT IMPACTS

In accordance with Section 7.1 of the BAM, impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas:

a. Lacking biodiversity values;
b. Where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low VI score);
c. That avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or highly cleared PCT;
d. Outside of the buffer area around breeding habitat features such as nest trees or caves.

For the reasons outlined in the following sections, the Project will utilise lands that will result in unavoidable impacts. This is because the landscape, since European settlement, has only ever been used for agricultural purposes and has retained biodiversity values. However, to ensure impacts have been avoided, the Applicant has completed environmental assessment of the Project Area and has modified the project layout based on the outcomes of these assessments, consideration of technical, environmental, and constructability issues, and community feedback.

Throughout the Project design process, the Applicant has undertaken additional design work to avoid and minimise potential environmental impacts and optimise the Project layout and constructability. Where the potential for impacts could not be avoided, design principles were sought to minimise environmental impacts, and mitigation measures have been proposed to manage the extent and severity of any residual impacts.

7.1.1 STRATEGIC DEVELOPMENT CONTEXT

The Project will contribute to the overall development of renewable energy infrastructure within the Tamworth Regional Council LGA. The Subject Land does not form part of an existing REZ. Regardless, the project location has been strategically selected based on detailed geospatial mapping which identified areas of high renewable energy resource potential (e.g. solar irradiance), proximity to existing transmission infrastructure, and interactions with existing land uses. Table 7-1 provides an overview of the strategic development context of the Subject Land.

The Project will deliver affordable clean energy, contribute to the diversification of the NSW energy sector, and facilitate the expansion of electrical transmissions capabilities for energy generation. Relevant clean energy proposed, approved, under construction and operational SSDs known at the time of finalisation of this BDAR and within and in the vicinity of the Subject Land and LGA have been considered.

Potential direct, indirect and prescribed biodiversity impacts because of the Project have been assessed, additionally it is acknowledged the Project will contribute to cumulative impacts during construction and operation within the existing environment. Cumulative impacts occur when impacts from a project interact or overlap with impacts from other projects and can potentially result in a larger overall effect on the environment.

TABLE 7-1 STATEGIC DEVELOPMENT CONTEXT

Preferable Site Condition	Applicability to the Project
Optimal renewable energy resources	The project is located within in an area that climatically offers clear weather and less rainfall to coastal regions. There are several other existing and proposed energy projects located within the region and near the project area.
Suitable Land	The project is located on a relatively flat topography and low relief on RU1 Primary Production zoned land, which allows for development of complementary non-agricultural use that is compatible with existing land uses.
Local impacts minimised	The Project is located within a remote and sparsely populated area with limited receptors near the Project Area.
Proximity to electrical network	The project is well located to connect to existing networks with connections to services to Tamworth via the Muswellbrook-Tamworth 330Kv overhead transmission line available.
Accessibility	The Project Area is easily accessible via several local roads in the area and accessibility has been optimised through identifying topographic constraints and strategic positioning of the Project to minimise earthworks required during construction.

7.1.2 PROJECT DESIGN AND ITERATION

The Applicant has focused on attaining impact avoidance outcomes through site selection and avoidance of higher quality native vegetation and habitat. This approach is consistent with the BAM, focusing on avoiding or minimising impacts during site selection and design.

Since the conception of this Project, the design has evolved through consideration of technical, environmental, social, and commercial constraints. Although no substantial alternative locations have been identified for the project, a significant aspect of this design refinement was engagement with landowners, neighbours to the Project, the broader community, local government, State and Federal Agencies, and business and stakeholder groups. This engagement, along with technical studies undertaken, has helped to shape the current layout of the Development Footprint.

The initial footprint which was presented was for a Development Footprint of 319.5 ha, including areas of native vegetation. This total impact area has since reduced through design appropriation to 305.43 ha with changes to the following:

- Use of the existing road network across the Subject Land;
- Use of the existing waterway crossing of Tamarang Creek, rather than a newly located crossing;
- Revision of design to avoid impacts on high biodiversity values where possible, resulting in a more sinuous design.

The initial footprint in comparison to the final development footprint is shown in Figure 7-1.

These design changes support the principles of avoid in the first instance and minimise impacts to biodiversity values with the final footprint offering considerably fewer impacts to native vegetation and habitats on the Subject Land. The mapping of native vegetation at a high resolution (i.e., capture scale of 1:1,000 or better (Section 4.1 of the BAM)) has substantially assisted the identification of impact avoidance outcomes during the design process.

The mapping of woody vegetation and its separation from areas of treeless grasslands used for agricultural purposes has resulted largely in the avoidance of high VI vegetation cover and has ensured impacts to areas of high VI have been minimised through design appropriation. By directing impacts away from woody vegetation, the high-resolution vegetation mapping used in this assessment has encouraged the Applicants design team to preferentially utilise low condition grasslands and, where unavoidable, use moderate condition grasslands. Therefore, it is considered that the final development footprint has been appropriately designed and located to achieve the core BAM principles for demonstrating impact avoidance (Section 7.1 of the BAM). The Project design has incorporated considerable impact avoidance measures, which reflects in the residual impact calculated for the Project. Therefore, impacts to biodiversity will be avoided, mitigated and offset where necessary, in order to ensure that there is no net loss in biological diversity and that ecological integrity is maintained. The environmental impacts of the amendments to the Project have been carefully evaluated and where practicable have been (or will be) avoided, mitigated, managed or offset.

The Applicant has designed the project to avoid and minimise impacts on high quality vegetation and habitats, including:

- Areas of moderate to high value White Box – Yellow Box – Blakely’s Grassy Woodland and Derived Native Grasslands CEEC;
- Scattered trees identified within the Class 2 and Class 3 tree categories with consideration of trees with hollows;
- Ensuring landscape scale connectivity between the Subject Land and surrounds is maintained; and
- Avoiding and minimising impacts on riparian corridors by limiting crossing points and development within the Vegetated Riparian Zones (VRZs).

Despite the Development Footprint covering 305.43 ha of the Subject Land, impact avoidance on areas of higher biodiversity value has been achieved. The footprint design has focused on largely avoiding impacts on native vegetation described as open woodland or derived grasslands representative of White Box-Yellow Box-Blakely’s Grassy Woodland CEEC. Unavoidable impacts exist within areas of waterway crossings where bridge infrastructure upgrades are required to support safe access across the Subject Land. Where possible, impacts have been minimised.

Various design options have been considered for the mounting structures, BESS and associated infrastructure having regard to environmental risks. Ultimately, options with lower environmental impacts and risks have been selected to avoid and minimise potential biodiversity impacts.

Management measures have been proposed for all significant environmental impacts, and where uncertainty exists, measures have been suggested to address the uncertainty. As such, there is no threat of serious or irreversible damage to the environment and no alternative locations that would avoid or minimise impacts on biodiversity values are considered practical.

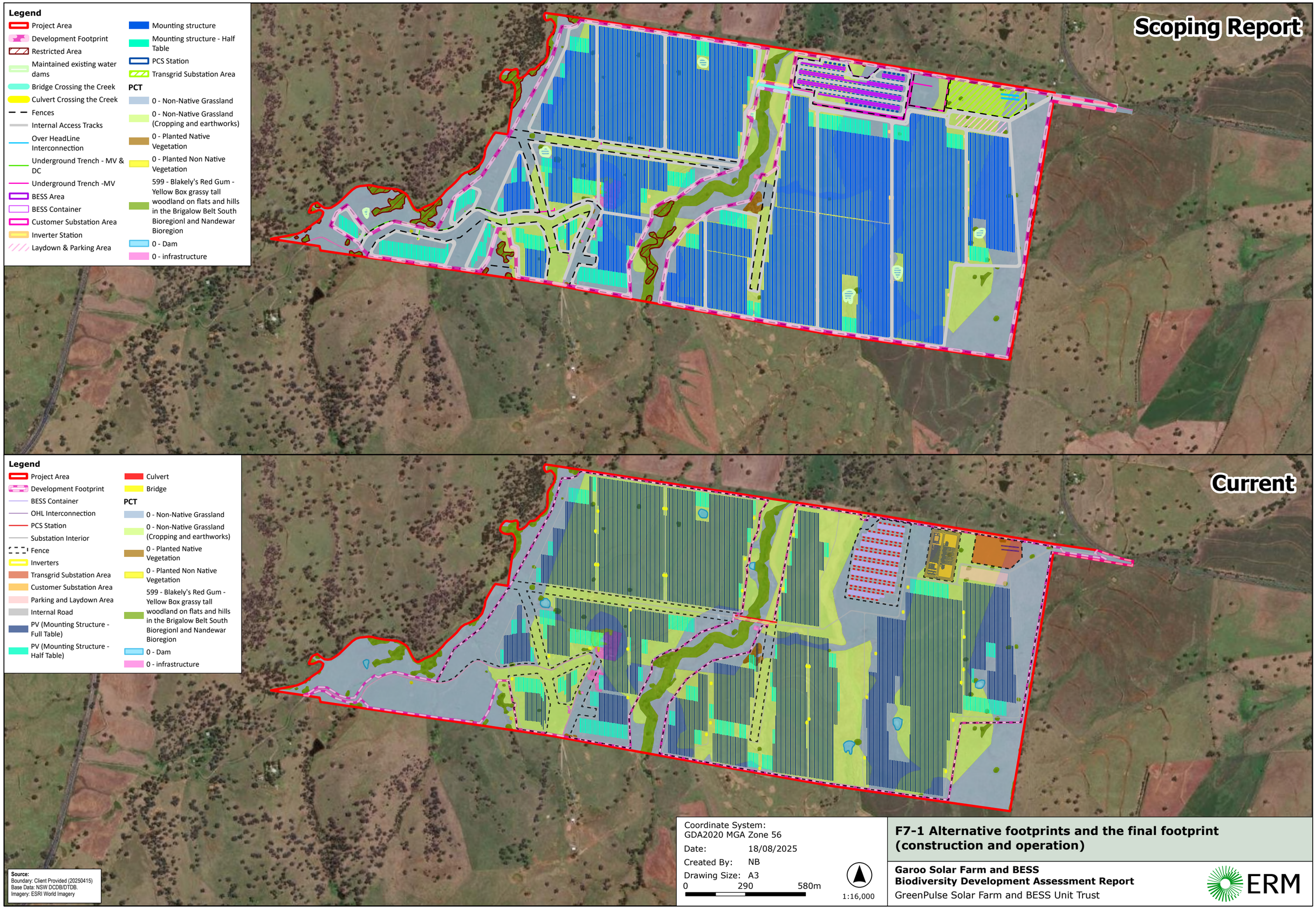
7.1.3 ALTERNATIVE LOCATIONS

A project of this scale, alike many similar SSD projects require a significant area of land that meets specific requirements to support design and operation of the facility, such as the proximity to existing or proposed transmission or distribution networks and available network capacity. Many alternative sites may be limited in providing such critical design elements.

The final location for the project was selected by the Applicant due to a number of site features, including:

- Proximity to grid
- Grid capacity
- Available land
- Minimum clearing of woody vegetation required
- Landowner sentiment
- Topography
- Constructability and operation

The project location was ultimately selected as a result of the multiple site factors in favour of supporting a functional and operational design.


Scoping Report
Legend
Project Area
Development Footprint
Restricted Area
Maintained existing water dams
Bridge Crossing the Creek
Culvert Crossing the Creek
Fences
Internal Access Tracks
Over HeadLine Interconnection
Underground Trench - MV & DC
Underground Trench -MV
BESS Area
BESS Container
Customer Substation Area
Inverter Station
Laydown & Parking Area
Mounting structure
Mounting structure - Half Table
PCS Station
Transgrid Substation Area
PCT
0 - Non-Native Grassland
0 - Non-Native Grassland (Cropping and earthworks)
0 - Planted Native Vegetation
0 - Planted Non Native Vegetation
599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
0 - Dam
0 - infrastructure
Current
Legend
Project Area
Development Footprint
BESS Container
OHL Interconnection
PCS Station
Substation Interior
Fence
Inverters
Transgrid Substation Area
Customer Substation Area
Parking and Laydown Area
Internal Road
PV (Mounting Structure - Full Table)
PV (Mounting Structure - Half Table)
Culvert
Bridge
PCT
0 - Non-Native Grassland
0 - Non-Native Grassland (Cropping and earthworks)
0 - Planted Native Vegetation
0 - Planted Non Native Vegetation
599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
0 - Dam
0 - infrastructure
Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery
Coordinate System:
GDA2020 MGA Zone 56
Date: 18/08/2025
Created By: NB
Drawing Size: A3
0 290 580m
1:16,000
F7-1 Alternative footprints and the final footprint (construction and operation)
Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust
ERM

7.2 AVOID AND MINIMISE PRESCRIBED IMPACTS

Prescribed impacts relevant to the Project were defined in Section 6 of this report. Below provides further information on how relevant prescribed impacts have been avoided and minimised by the proposed development.

7.2.1 HUMAN-MADE STRUCTURES

The Subject Land contains approximately 2.67 ha of human-made structures in the form of farm fences, gates, agricultural infrastructure, dwellings and farm sheds. The extent of human-made structures are generally in good condition and not in any dilapidated state that may offer habitat opportunities to a range of fauna species, such as microbats. At best, the human-made structures present provide opportunities for raptors and other avian species known to frequently utilise human-made structures for perching and foraging activities. It is anticipated that similar infrastructure will occur across the Development Footprint for the operational period and that no significant change to available structures will occur.

Impacts to human-made structure are unavoidable but will be managed under a Biodiversity Management Plan (BMP).

7.2.2 NON-NATIVE VEGETATION

A large proportion of the Subject Land has been subject to extensive cropping and modification of the upper soil horizons through earthworks associated with contour banks for pasture improvement. A LCA Report was prepared by ERM to determine the extent of native vegetation present and is provided in Appendix A.

Approximately 349.35 ha of the Subject Land consists of non-native vegetation in the form of cropping and pasture for intensive agriculture purpose, non-native grassland and planted vegetation. Areas comprised of non-native vegetation or lacking vegetation entirely occur throughout the Subject Land. These areas are subject to high levels of disturbance including grazing, cropping and vehicle movements.

It is considered unlikely that the impacts to this feature will have a significant impact on threatened species due to their history of high levels of disturbance.

7.2.3 HABITAT CONNECTIVITY

The Subject Land is highly fragmented due to historical clearing and current agricultural land uses, however native vegetation is present. Vegetation along Tamarang Creek is largely fragmented, however vegetation along Sugarloaf Creek on the western boundary of the Subject Land provides greater habitat connectivity. Both creek lines have been avoided by the Development Footprint where possible. The Project has been designed to maximise use of existing public and internal access tracks and access points across the Project Area, minimising vegetation clearance required and avoiding development where the highest concentration of habitat connectivity is present.

Connectivity suitable for a range of fauna species will remain across the Subject Land and will be managed under a BMP.

7.2.4 WATERBODIES, WATER QUALITY AND HYDROLOGICAL PROCESSES

Tamarang Creek runs through the centre of the Subject Land, running south to north, with Sugarloaf Creek bounding the western edge of the Project Area. The Fisheries NSW Spatial Data Portal (DPI) maps both Tamarang Creek and Sugarloaf Creek as KFH, with Sugarloaf Creek also mapped as suitable habitat for the threatened Southern Purple Spotted Gudgeon (*Mogurnda adspersa*), listed under the *Fisheries Management Act 1994*.

H20 Ecology have been engaged to prepare an aquatic assessment for areas of the development footprint mapped as KFH, including key waterbodies of Tamarang Creek and Sugarloaf Creek. Prescribed impacts to these waterways and their hydrological processes has been assessed within the aquatic assessment. The Aquatic Assessment has been provided in Appendix L.

7.2.5 VEHICLE STRIKES

Vehicle strikes can pose a substantial threat to wildlife, including ground-dwelling species such as the Spotted-tailed Quoll and Koalas during dispersal. The project will include the construction of internal access tracks and use of existing roads and tracks within the Subject Land and will result in an increased vehicular presence across the Subject Land.

The highest risk period for vehicle collision is anticipated during the construction and decommissioning stages, which generate trips associated with the workforce accessing and traversing the site and the delivery / removal of raw materials and plant. During operation, vehicle movement will be considerably reduced; however, also presents potential collision hazard with a limited number of vehicles entering for routine maintenance and monitoring purposes.

Native wildlife mortality due to vehicle strike is possible; however, is expected to be relatively low following implementation of mitigation measures. These measures will be addressed in the Construction Traffic Management Plan (CTMP) and Construction Environmental Management Plan (CEMP), and include examples such as on-site education, identifying and reporting hazards as they occur during construction, use of appropriate signage and creating driving policies such as appropriate working hours and vehicle speed limits.

7.3 FURTHER MEASURES TO AVOID AND MINIMISE IMPACTS

Impacts will be further avoided and minimised where possible through additional detailed design to protect retained and adjacent vegetation and habitat during the construction and operation and decommissioning phases of the project. Notably, it is anticipated that additional impact avoidance outcomes will be achieved in the local road reserve network as the Project currently assumes a conservative design in these areas.

Further measures are detailed in Section 8.5 of this BDAR.

8. IMPACT ASSESSMENT

8.1 DIRECT IMPACTS

The construction and operational phase of the development will result in direct impacts to biodiversity values within the Subject Land which cannot be avoided. Direct impacts include the clearing and modification of native vegetation and threatened species habitat but in a marginal way.

Direct impacts as a result of the Project will occur to:

- Native vegetation and habitat of associated predicted species (outlined in Table 8-1); and;
- Native scattered trees and habitats associated with scattered trees (outlined in Table 8-2); and
- Threatened candidate species and species' habitat (outlined in Table 8-3).

TABLE 8-1 DIRECT IMPACTS TO NATIVE VEGETATION

Directly Impacted Entity	Total area on Subject Land (ha)	VI score	BC Act TEC (ha)	EPBC Act TEC (ha)	Project timing of impact
PCT599_VZ1_Open_Woodlands	5.13	73.8	0.07	0.07	Construction
PCT599_VZ3_Derived_Grasslands	8.21	46.8	0.04	0.04	Construction

TABLE 8-2 DIRECT IMPACTS TO SCATTERED TREES

Class Description	Number of Scattered Trees to be cleared		Associated species	Associated Tree numbers
	Contain hollows	Do not contain hollows		
Class 1 Trees that are <20cm DBH and without hollows	NA	1	*Eucalypt* sp. (planted)	30
Class 2 Trees that are ≥20cm DBH and <50 large tree benchmark	0	*3*	*Brachychiton populneus* subsp. *populneus*	49, 50, 51
Class 3 Trees that are ≥50 large tree benchmark	3	*0*	*Angophora floribunda*	1, 2, 57
	0	*1*	*Callitris glaucophylla*	45
	26	*4*	*Eucalyptus albens*	*Hollows: 3 – 10, 13, 15, 16, 19 – 21, 25, 26, 28, 31, 35, 36, 47, 48, 52 - 55* *No hollows: 14, 18, 38, 39*
	2	*0*	*Eucalyptus blakelyi*	*12, 17*

TABLE 8-3 SUMMARY OF DIRECT IMPACTS TO THREATENED SPECIES AND THREATENED SPECIES HABITAT

Candidate Species	Listing status		SAII entity	Species record	Loss of habitat (ha)	Project timing of impact
	BC Act	EPBC Act				
Bluegrass *(Dichanthium setosum)*	V	V	No	Assumed present	0.11	Construction
Euphrasia arguta	CE	CE	Yes	Assumed present	0.11	Construction
Finger Panic Grass *(Digitaria porrecta)*	E	-	No	Assumed present	0.11	Construction
Eastern Cave Bat *(Vespadelus troughtoni)*	V	-	Yes[1]	Possible recording	0.11	Construction

[1]When the species is present on the subject land and the proposed impact is not a potential SAII (i.e. no impacts to potential breeding habitats) then standard species credits will be generated.

8.1.1 CHANGE IN VEGETATION INTEGRITY SCORE

Table 8-4 details the change in VI score for each VZ impacted by the proposed development. It is assumed that the direct impacts of the project will result in the total clearing of native vegetation identified within the Development Footprint.

TABLE 8-4 CHANGE IN VEGETATION INTEGRITY SCORES

VZ	Area of impact (ha)	Before Development VI			Overall VI	Change in VI
		Composition	Structure	Function		
VZ1_Open_Woodland	0.07	73.3	81.4	67.3	73.8	-73.8
VZ3_Derived_Grasslands	0.04	50.9	43.6	46.1	46.8	-46.8

No VI score can be calculated for areas assessed under the Scattered Tree Assessment Module therefore the overall change in VI score for areas of scattered trees cannot be provided. However, a change in the composition of scattered trees is expected to occur with the removal of 40 scattered trees across the Development Footprint. This equates to a loss of 1.57 ha of scattered trees and an overall change to the landscape and scattered tree abundance. Nonetheless, scattered trees will be retained over the Subject Land and continue to support a range of functions for fauna.

8.2 INDIRECT IMPACTS

The BAM (Section 8.2.2) identifies 16 potential indirect impacts that, as a minimum, must be considered as a part of a BDAR. Indirect impacts of the project on native vegetation, threatened species and their habitat beyond the Subject Land have been considered in accordance with the BAM in Table 8-5. Impacts to MNES have also been considered throughout the assessment of indirect impacts.

Note that assessment of indirect impacts as a result of the Project on PCTs and / or threatened species and their habitat have been fully considered, however, there may be some unforeseen indirect impacts that have not been predicted.

Mitigation measures to address indirect impacts as described in Table 8-5 are provided in Section 8.5of this report. Despite the likelihood of indirect impacts, it is considered that mitigation measures proposed are reliable and capable of limiting the effects of these impacts without causing harm to the adjoining environment.

TABLE 8-5 SUMMARY OF INDIRECT IMPACTS AND MITIGATION MEASURES

Indirect impact	Nature	Extent	Impact entities	Project phase	Consequences	Mitigation
(a) Inadvertent impacts on adjacent habitat or vegetation	Construction activities may result in inadvertent impacts on retained vegetation, such as increased sedimentation, disturbance and compaction by construction vehicles, or accidental removal of vegetation external to the approved development area.	Uncertain, but generally in retained native vegetation adjacent to the approved Development Footprint.	PCTs and threatened species habitat	Construction	Reduced condition of retained native vegetation and threatened species habitat adjacent to the approved Development Footprint, resulting in loss and dispersal of species.	Risks will be mitigated through environmental management measures and controls via the preparation of a CEMP. Clear boundaries are to be created using fencing, tape, etc. to ensure that no retained vegetation is incidentally impacted.
(b) Reduced viability of adjacent habitat due to edge effects	Increase in edge: core habitat ratio, resulting in edge effects such as light and noise pollution, weed invasion and altered moisture, wind and temperature	Uncertain, but generally in retained native vegetation adjacent to the approved Development Footprint.	PCTs and threatened species habitat	Construction	Reduced condition of retained native vegetation adjacent to the approved Development Area. May reduce habitat quality or affect habitat use or movements of some species.	Impacts to viability of adjacent habitat due to edge effects is considered low due to current land use and condition (livestock grazing and weed incursions) of the Subject Land. However, to minimise edge effects as a result of the Project, mitigation measures will be incorporated into the CEMP to manage impacts to soil quality, hydrology regimes and habitat degradation. Clear boundaries are to be created using fencing, tape, etc. to ensure that no retained vegetation adjacent to the Subject Land is impacted by edge effects.

Indirect impact	Nature	Extent	Impact entities	Project phase	Consequences	Mitigation
(c) Reduced viability of adjacent habitat due to noise, dust or light spill	Construction and operational activities are likely to increase the noise, dust and light above current levels within and beyond the Subject Land.	Uncertain, but generally in retained native vegetation adjacent to the approved Development Footprint.	PCTs and threatened species habitat	Construction and operation	Disruption of fauna habitat usage during construction and operation.	The CEMP will work to mitigate potential impacts to the viability of adjacent habitat as a result of artificial light, runoff, noise and dust incursions during construction of the Project. The CEMP will specify how artificial lighting is to be directed away from the neighbouring lands and potentially use barriers to further minimise noise and disturbance. By limiting construction hours, noise and light and can be managed to provide the least amount of disruption to species vulnerable to these disturbances.
(d) Transportation of weeds and pathogens from the subject site to adjacent vegetation	High threat weeds and other exotic species may be inadvertently spread to other areas within and beyond the Subject Land.	Uncertain, but generally in retained native vegetation adjacent to the approved Development Footprint.	PCTs and threatened species habitat	Construction, operation and rehabilitation	Reduced condition of retained native vegetation adjacent to the approved Development Footprint and a change in the composition of foraging resources, which may be detrimental to certain fauna species.	There is a potential risk of transportation of introduced weeds and pathogens during construction and operation to adjacent vegetation. This risk is already present as a result of the current land use however, risk is increased with increased vehicular movements. This risk will be mitigated within the CEMP and Pest Management Control Programs to be implemented.
(e) Increased risk of starvation, exposure and loss of shade or shelter	Construction and operational impacts may cause a decline in habitat suitability, particularly for species with specific habitat requirements.	Uncertain, but generally in retained native vegetation adjacent to the approved Development Footprint.	Threatened fauna species	Construction and operation	Clearing of native vegetation for the construction of the Project will result in reduction of resources available for threatened fauna species that may result in starvation, exposure and loss of shade or shelter.	The extent of clearing of native vegetation has been minimised where possible and the extent of clearing is not considered critical to the survival of any threatened species. Ongoing monitoring through the BMP and CEMP will identify any increase in risk to threatened species and will manage this accordingly.

Indirect impact	Nature	Extent	Impact entities	Project phase	Consequences	Mitigation
(f) Loss of breeding habitat due to vegetation clearance	Construction and operational impacts may cause a decline in habitat suitability, particularly for species with specific breeding requirements.	Uncertain, but generally in retained native vegetation adjacent within the Subject Land.	Threatened fauna species	Construction and operation	Reduced function of retained native vegetation and other breeding habitats adjacent to the approved Development Area which may force species to disperse or be detrimental to their survival.	The Project will result in reduction of breeding habitat available for a range of threatened fauna species. Habitat features known to be of importance for breeding, such as hollow bearing trees, have been avoided where possible. Ongoing monitoring through the BMP and CEMP will identify any increase in risk to threatened species and will manage this accordingly.
(g) Trampling of threatened flora species	Construction and operational activities may result in inadvertent trampling of threatened flora by humans and construction and / or operational vehicles.	Uncertain, but generally in retained native vegetation adjacent within the Subject Land.	Threatened flora species habitat	Construction, operation and rehabilitation	Reduction in the number and extent of threatened flora species.	No threatened flora species were recorded during surveys therefore, indirect impacts of trampling can only be considered for potential habitat. As no threatened flora species were recorded, there is unlikely to be residual inadvertent impacts to threatened flora.
(h) Inhibition of nitrogen fixation and increased soil salinity	Construction and operational activities may result in disruption to soil microbial activity and processes which occur in the soil due to compaction by heavy vehicles, introduction of chemicals and altered vegetation.	Uncertain, but generally in the approved Development Footprint and retained native vegetation, and other habitats adjacent to the approved Development Area.	PCTs, threatened species and their habitat	Construction phase and operation	Reduced vegetation function and subsequent impacts on foraging resources and habitat.	The Project is not expected to result in the inhibition of nitrogen or increased soil salinity.

Indirect impact	Nature	Extent	Impact entities	Project phase	Consequences	Mitigation
(i) Fertiliser drift	Construction and operational activities may result in a reduction in vegetation extent which means that fertiliser drift from existing agricultural activities will be able to spread further into the landscape affecting other areas of vegetation and habitat.	Uncertain, but generally in retained native vegetation adjacent to the approved Development Footprint.	PCTs and threatened species habitat	Construction, operation and rehabilitation	Reduced native vegetation function and the subsequent impacts on foraging resources and habitat. Potential reduction in water quality in waterbodies, including farm dams.	The Project is not expected to result in any fertiliser drift.
(j) Rubbish dumping due to improper management of waste	Construction and operational activities may result in inadvertent rubbish dumping which can negatively affect vegetation communities and habitat resources.	Uncertain, but generally in the approved Development Footprint.	Threatened species and their habitat	Construction and operation	Reduce native vegetation function and impacts on suitable habitat. Improper waste disposal, particularly food waste can contribute to an increase in feral animal populations, posing a significant threat to threatened fauna.	The Project is not expected to result in rubbish dumping. However, this risk will be mitigated within the CEMP

Indirect impact	Nature	Extent	Impact entities	Project phase	Consequences	Mitigation
(k) Wood collection	Construction and operational activities will result in a reduction in vegetation extent which means that existing wood collection will need to be undertaken in other areas of vegetation and habitat.	Uncertain, but generally in retained native vegetation and other habitats adjacent to the approved Development Footprint.	Threatened fauna species, including threatened birds that build stick nests.	Construction	Reduced native vegetation function and impacts on suitable habitat, particularly for species which use fallen logs for foraging or shelter. Removal of dead wood and dead trees is a Key Threatening Process in schedule 4 of the BC Act and can result in the loss of important habitat, such as hollow logs and decaying wood, for a wide variety of species.	The Project is not expected to result in increased wood collection. In the instance that coarse woody debris requires removal for the development, it is to be relocated within retained native vegetation to continue to support habitat.
(l) Removal and disturbance of rocks, including bush rocks	Construction and operational activities may result in disturbance and removal of habitat containing surface rocks.	Uncertain, but generally in retained native vegetation and other areas of rock adjacent to and within the approved Development Footprint.	Threatened species and habitats	Construction	Loss of potential shelter, basking and habitat resources.	The Project is not expected to result in any indirect impacts resulting in the removal and disturbance of rocks, including bush rocks.

Indirect impact	Nature	Extent	Impact entities	Project phase	Consequences	Mitigation
(m) Increase in predators	Construction and operational activities may result in a disturbance to the natural ecological balance of fauna and vegetation communities which may lead to an increase in predators. For example, disruption to existing fauna corridors may mean prey become exposed to predation and thus predator numbers increase as food becomes more readily available.	Uncertain, but generally in approved development footprint and retained native vegetation and other habitats adjacent to the approved Development Footprint.	Threatened flora and fauna species	Construction and operation	Reduction in fauna numbers and genetic material within populations. Reduction in the number of herbivores in vegetation communities, potentially disrupting the ecological balance.	The Project will involve the construction and upgrading of access tracks throughout the Subject Land, resulting in the potential to increase predator activity. The Project will involve the implementation of a Pest Control Management Program that will aim to eliminate or reduce the risk of increase in predator activity.
(n) Increase in pest animal populations	Construction and operational activities may result in a disturbance to the natural ecological balance of fauna and vegetation communities which may lead to an increase in pest animal populations.	Uncertain, but generally in approved Development Footprint and retained native vegetation and other habitats adjacent to the approved Development Footprint.	PCTs, threatened species and their habitat	Construction and operation	Increase in the number of herbivores in vegetation communities, potentially disrupting the ecological balance. Negative impacts to vegetation communities and habitats by pest animals. Competition with and predation of native fauna	The Project will involve the construction and upgrading of access tracks throughout the Subject Land, resulting in the potential to increase pest animal activity. The Project will involve the implementation of a Pest Control Management Program that will aim to eliminate or reduce the risk of increase in pest animal populations. There is unlikely to be residual inadvertent impacts to threatened fauna species.

Indirect impact	Nature	Extent	Impact entities	Project phase	Consequences	Mitigation
(o) Change in fire regimes	Construction and operational activities may result in vegetation community changes which lead to different fuel consumption patterns, increased intensity and severity of fires, increased or altered fire frequency, larger patch size, and changes to the timing of fires.	Uncertain, but generally in approved development footprint and retained native vegetation and other habitats adjacent to the approved Development Footprint.	PCTs, threatened species and their habitat	Construction and operation	This risk is considered low due to the general lack of large patches of woody vegetation within the Subject Land. However, altered vegetation community composition, structure and function as a result of the Project may lead to fires in shrub and grass communities in very dry conditions, following good growth of vegetation in wet conditions (and hence a fuel source). The risk of changing fire regimes may also cause loss or changes to habitats and resources.	The Project is not expected to result in any change in fire regimes.
(p) Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds	Construction and operational activities may result in loss or alteration to specialist breeding and foraging habitat.	Uncertain, but generally in retained native vegetation and other habitats adjacent to the approved Development Footprint.	Threatened fauna species	Construction and operation	Reduction in fauna numbers, fitness and the gene pool of populations.	The Project is not expected to result in any disturbance to specialist breeding habitat

8.3 PRESCRIBED IMPACTS

Prescribed impacts on the Subject Land were identified under Section 7.2 of this report. The following prescribed impacts are relevant to the Subject Land:

- Impacts on the following habitat of threatened entities:
  - Human-made structures;
  - Non-native vegetation;
- Impacts on areas connecting threatened species habitat and which maintain their lifecycle, such as movement corridors;
- Impacts that affect waterways, water quality and hydrological processes that sustain threatened entities;
- Impacts on threatened species or fauna that are part of a TEC from vehicle strike.

Table 8-6 below details the nature, extent, frequency, duration, timing, consequence and any limitations of each prescribed impact and for the identification of potentially affected threatened entities. It is considered that the most serious of these impacts involve mortality and injury of ground-dwelling fauna potentially resulting from vehicle strike.

TABLE 8-6 SUMMARY OF PRESCRIBED IMPACTS

Impact	Nature	Extent	Frequency, Timing & Duration	Associated Threatened Entities	Consequences & Limitations
Human-made structures	Human-made structures within the Subject Land, including farm fences, gates, agricultural infrastructure, dwelling and farm sheds. The extent of human-made structures are generally in good condition and not in any dilapidated state that may offer habitat opportunities to a range of fauna species, such as microbats. At best, the human-made structures present provide opportunities for raptors and other avian species known to frequently utilise human-made structures for perching and foraging activities.	The Subject Land contains approximately 2.67 ha of human-made structures.	Construction	Threatened fauna species, including raptors and microbats.	While current human-made structures may be removed during construction of the project, it is noted that additional fencing and infrastructure will be installed for and by the Project. The Project will continue to offer similar suitable habitat across the Subject Land. No expected limitation to the availability of these features is likely.
Non-native vegetation	A large proportion of the Subject Land has been subject to extensive cropping and modification of the upper soil horizons through earthworks associated with contour banks for pasture improvement.	Approximately 349.35 ha of the Subject Land consists of non-native vegetation in the form of cropping and pasture for intensive agriculture purpose, non-native grassland and planted vegetation.	Construction and operation	All threatened fauna species, including predicted species, detected candidate species and other threatened species.	Potential reduction in foraging and sheltering resources. Consequences expected to be minimal as non-native vegetation is not a limited resource within the broader landscape.

Impact	Nature	Extent	Frequency, Timing & Duration	Associated Threatened Entities	Consequences & Limitations
Increased habitat fragmentation / impacts on habitat connectivity	The Subject Land is highly fragmented due to historical clearing and current agricultural land uses; however native vegetation is present. Vegetation along Tamarang Creek is largely fragmented, however vegetation along Sugarloaf Creek on the western boundary of the Subject Land provides greater habitat connectivity.	0.07 ha of woodland vegetation adjoining riparian areas and 1.57 ha of scattered trees across the Subject Land	Construction and operation	All threatened fauna species, including predicted species, detected candidate species and other threatened species, and Threatened fauna species that may attempt to cross the Subject land.	Some species may avoid edge habitat, increasing competition for resources and disrupting home ranges. Gene flow may be restricted to subpopulations no longer connected by suitable habitat to facilitate dispersal. It is important to note however, that the vegetation removal would not result in complete isolation of any habitat patches due to the project design maintaining connectivity features. Impacts to habitat connectivity have been minimised throughout Project design reiterations and reduction of native vegetation clearing required.
Waterbodies, water quality and hydrological processes	Tamarang Creek runs through the centre of the Subject Land, running south to north, with Sugarloaf Creek bounding the western edge of the Project Area. The Fisheries NSW Spatial Data Portal (DPI) maps both Tamarang Creek and Sugarloaf Creek as KFH,	Uncertain, although likely to be minor. Standard erosion control methods will be used during construction and standard stormwater management measures will be implemented during the operation phase.	Construction and operation	Southern Purple Spotted Gudgeon (*Mogurnda adspersa*), listed under the FM Act. All threatened fauna species including ecosystem credit species, detected candidate species and other threatened species.	May decrease downstream water quality, which would affect pollution-sensitive species, and may impact the quality of drinking water for all fauna species. Structures associated with the project may modify hydrological processes reducing flow and inundation events on the Subject Land. However, impacts to waterways have been avoided and minimised through project design and minimal impacts will occur. Additionally, farm dams that occur across the Subject Land will be retained and will continue to support current the hydrological processes.

Impact	Nature	Extent	Frequency, Timing & Duration	Associated Threatened Entities	Consequences & Limitations
Vehicle Strikes	The project will include the construction of internal access tracks and use of existing roads and tracks within the Subject Land. An increase in vehicular traffic will occur during construction and operation of the Project.	Uncertain. Likely minor due to low-speed limits within the Subject Land.	Construction and operation	Ground-dwelling fauna species; and Low-flying or ground foraging avian species, such as raptors, parrots, robins; Low-flying foraging microbats during dusk.	Death or injury to fauna that may cross roads or low flying avian species.

8.4 CUMULATIVE IMPACTS

The Project will contribute to the overall development of renewable energy infrastructure within the Tamworth Regional LGA. Relevant clean energy proposed, approved, under construction and operational SSDs known at the time of finalisation of this BDAR and within and in the vicinity of the Subject Land and LGA have been considered.

Potential direct, indirect and prescribed biodiversity impacts because of the Project have been assessed. Additionally, it is acknowledged the Project will contribute to cumulative impacts during construction and operation within the existing environment. Cumulative impacts occur when impacts from a project interact or overlap with impacts from other projects and can potentially result in a larger overall effect on the environment.

A review of relevant clean energy proposals known at the time of finalisation of this BDAR and within and in the vicinity of the subject Land has been undertaken, with potential relevance to the Project provided in Table 8-7. A large portion of these projects are in the planning phase, and as such the level of direct impacts to native vegetation, TECs, and threatened and migratory listed species is unknown. It is considered likely that cumulative impacts will increase the loss of similar native vegetation and threatened species habitat in the region.

Of the seven projects detailed, two have received consent. The cumulative impacts from these two approved projects will impact approximately 421.70 ha of similar native vegetation and habitats and will impact foraging habitat of predicted species which are also predicted to occur on the Subject Land, such as the Regent Honeyeater and Swift Parrot.

Given this, the loss of 1.68 ha of native vegetation associated with this development is considered somewhat trivial in relation to the clearing extents of similar approved projects.

The complete cumulative impacts assessment is provided in Table 8-7. Proposed management of cumulative impacts to listed birds and bats that are likely to be impacted by the cumulative impacts of development within the Tamworth Regional LGA have been considered in Section 8.5 of this BDAR.

TABLE 8-7 POTENTIAL CUMULATIVE IMPACTS

Project / Status	LGA	Distance from Project (km) / LGA	Potential Cumulative Biodiversity Impacts	Mitigation Measures
Thunderbolt Wind Farm Approved May 2024	Tamworth Regional & Uralla Shire LGAs	87 km north Uralla Shire LGA	• Disturbance to approximately 215 ha of native vegetation; • Clearing of native vegetation and key habitat; • Impacts of development on hollow bearing trees; • Impacts of development on threatened bird and bat populations	• BMP to manage impacts to threatened flora and fauna species, including • Austral Toadflax • Bell's Turtle • Koala • Spotted-tailed Quoll • White-throated Needletail • Bird and Bat Adaptive Management Plan (BBAMP) • Implement a reserve program to provide further scientific understanding of indirect impacts of wind energy projects to avifauna species.
Hills of Gold Wind Farm Approved September 2024	Tamworth Regional, Liverpool Plains Shire, Upper Hunter Shire LGAs	44 km south west Liverpool Plains Shire	• Clearing of 206.70 ha of native vegetation including TECs; • Clearing of key habitat for threatened bat and arboreal species; • Collision risk for avifauna; • Loss of habitat connectivity; and • Impacts to aquatic habitats.	• BMP • Weed Management Plan • BBAMP • Continue to explore opportunities to minimise impacts through detailed design.
Bendemeer Solar Farm In Planning (Response to Submissions)	Tamworth Regional LGA	71 km north Tamworth LGA	• Habitat clearance; • Noise and disturbance; • Clearing of native vegetation; and • Impact to threatened species and threatened species habitat.	• Fencing of 'Environmentally Sensitive No-Go Zones' during construction • BMP • Habitat compensation • Implementation of the North West Regional Strategic Weed Management Plan 2017 – 2022 • VMP

Project / Status	LGA	Distance from Project (km) / LGA	Potential Cumulative Biodiversity Impacts	Mitigation Measures
Nottingham Park Solar Farm In Planning (Prepare EIS)	Tamworth Regional LGA	71 km north Tamworth LGA	• Habitat clearance; • Clearance of native vegetation; and • Clearance of Threatened Ecological Communities.	• Continue to explore opportunities to minimise impacts through detailed design. • Conduct more ecological surveys for data collection.
Middlebrook Solar Farm In Planning (Recommendation)	Tamworth Regional LGA	71 km north Tamworth LGA	• Habitat clearance; • Noise and disturbance; • Removal of hollow bearing trees; and • Disturbance of 2.23 ha of native vegetation.	• Implementation of a CEMP • Creation of BMP • Weed Management Procedure • Creation of Construction Flora and Fauna Management Plan
Tamworth BESS In Planning (Response to submissions)	Tamworth Regional LGA	71 km north Tamworth LGA	• Clearing of native vegetation including Threatened Ecological Community; and • Removal of habitat.	• CMP • Adaptive Management Strategy for fauna
Kingswood BESS In Planning (Response to submissions)	Tamworth Regional LGA	71 km north Tamworth LGA	• Clearing of native vegetation; • Clearing of habitat; • Reduce viability to adjacent habitat; • Transportation of weeds;	• Creation of Environmental Management System; • Offset for impacted PCT • Fencing for protected vegetation on site.

8.5 MITIGATING RESIDUAL IMPACTS – MANAGEMENT MEASURES AND IMPLEMENTATION

A range of mitigation measures have been developed for the Project to mitigate the impacts to native vegetation and habitat that are unable to be avoided. These include a range of measures to be undertaken before and during construction to limit the impact of the Project. Each mitigation measure is discussed in detail in Table 8-8.

In accordance with Section 8.4 of the BAM, adaptive management is to be used to address impacts that are infrequent or difficult to measure, such as indirect or prescribed impacts, or other remaining biodiversity impacts. There is scope to ensure that the principles of adaptive management are included in the construction and ongoing function of the Subject Land through monitoring of operational performance and by providing flexibility to adjust management measures where required. Several management plans that will be produced for the construction, operation and decommissioning of the Project, including:

- CEMP;
- CTMP;
- BMP;
- Erosion and Sediment Control Plan (ESCP); and
- Pest Animal Management Plan (PAMP).

The CEMP will make provisions for clearing protocols, construction timing and include measures to minimise soil disturbance, runoff and sediment transfer, artificial light, noise, dust, and vibrations as a result of the Project. The CTMP will detail mitigation and management measures which aim to minimise the impact of construction traffic by installing suitable signage and driving protocols to reduce the risk of vehicle strike. The BMP will make specific provisions to limit impacts on biodiversity values, such as the use of fauna handlers to rescue and relocate resident fauna during construction. The ESCP will detail mitigation measures to reduce run-off, soil erosion and to protect water resources. The PAMP will be developed and implemented to minimise the impacts of introduced predators on existing native fauna.

Table 8-8 outlines the key components of these management plans and their intended outcomes, along with other measures to mitigate and manage impacts.

TABLE 8-8 SUMMARY OF PROPOSED MITIGATION AND MANAGEMENT MEASURES FOR RESIDUAL IMPACTS (DIRECT, INDIRECT AND PRESCRIBED)

Mitigation measure	Action / Method	Outcome	Timing / Frequency	Responsibility	Adaptive Management Strategy
Offsets	Residual impacts on habitat will be offset through the Biodiversity Offset Scheme.	Retirement of credit liability	Detailed design at the planning phase	Applicant	Nil.
Vegetation Clearing	Where vegetation is to be removed it will be undertaken in accordance with specifications provided in a vegetation clearing protocol, detailed within the CEMP.	Reduction of negative impacts due to vegetation clearing, such as soil erosion and sedimentation and run off.	Pre-construction and throughout the construction phase	Construction contractor	Construction manager must ensure protocols are followed by construction team and activities are supervised. Any inadvertent vegetation removal or impacts must be repaired through restoration activities.
Fencing	Plain wire perimeter fencing (opposed to barbed-wire fencing) will be used to avoid potential entrapment of fauna on fences.	Reduction in harm of resident fauna and fauna using the Subject Land for dispersal.	Construction phase and ongoing	Construction contractor	Negotiations must be undertaken with landowners in the pre-construction phase in a timely manner to ensure all landholders agree to plain wire fencing.
Impacts on water quality, waterbodies and hydrological processes	'Environmental Sensitive No-Go Zones' will be established around areas of significance including threatened fauna habitat and threatened flora species locations outside the Development Footprint.	Prevention and minimisation of negative impacts to waterbodies and water quality, including those downstream of the Subject Land.	Pre-construction, Construction phase and ongoing	Construction contractor	Construction and operational staff and landholders implement best practice land management activities which cumulatively limit impacts to waterbodies.

Mitigation measure	Action / Method	Outcome	Timing / Frequency	Responsibility	Adaptive Management Strategy
Delineation of clearing areas	To avoid unnecessary removal or damage to retained vegetation, the limit of clearing will be clearly demarcated and signed as 'Environmental Sensitive No-Go Zones' prior to the commencement of clearing. This will be detailed within the BMP, including measures: • Vehicles or machinery will not be permitted to park within or drive through areas of retained vegetation. • Construction materials will not be stockpiled or stored within areas of retained vegetation. • Ancillary facilities, such as site compounds and construction zones, will not be located beyond the limits of clearing. • Temporary fencing and signage will be maintained throughout construction. • Site inductions will be given by the civil contractor to all personnel and visitors to ensure all site workers and visitors are aware of any No-Go Zones.	Reduction in negative impacts to adjacent vegetation and habitat.	Pre-construction and throughout the construction phase	Construction contractor	Construction and operational managers must ensure protocols are followed by staff and contractors and activities are supervised. Construction planning must be undertaken in a timely manner to ensure indirect impacts can be avoided.
Daily/seasonal timing of construction activities to reduce impact of noise and light spill	The BMP will include measures to avoid light encroachment on adjacent habitats by restricting construction works to daylight hours as much as possible and incorporating sensitive lighting arrays that shield the adjoining native vegetation and habitat from stray light, with low-level lighting installed for all required external lighting.		Pre-construction and throughout the construction phase	Construction contractor	

Mitigation measure	Action / Method	Outcome	Timing / Frequency	Responsibility	Adaptive Management Strategy
Adaptive dust monitoring programs to control air quality	The Applicant will implement programs to monitor the generation of dust during construction activities. All construction activities will be undertaken with the objective of preventing visible dust emissions from construction activities.		Construction phase and clearing phase	Construction contractor	
Pest Control Management Program - Weed Management	To minimise the spread of weeds throughout the Subject Land and surrounding patches, appropriate weed control activities will be undertaken in accordance with State and regional weed management plans. The Subject Land is subject to management of Weeds of National Significance and management of weeds under the NSW *Biosecurity Act 2015* and regulations that provide specific legal requirements for state level priority weeds and high-risk activities.	Reduction in weed abundance and new incursions	Construction and operation, then ongoing	Construction and operations contractors	Construction and operational managers must ensure protocols are followed by staff and contractors and activities are supervised. Construction planning must be undertaken in a timely manner to ensure weed management protocols can be implemented. Protocols must be followed despite any time and financial pressures associated with construction activities. Regular communication must be undertaken with landholders to ensure weed management activities align.
Pest Control Management Program - Pathogen Management	A pathogen management protocol will be implemented. Infection of native plants by *Phytophthora cinnamomic* is listed as a key threatening process under the BC Act and EPBC Act. The risk of spreading pathogens and the mitigation measures required on site will be regularly communicated to staff and contractors during inductions and toolbox talks.	Reduction in pathogen incursions within the Subject Land and adjacent areas.	Construction and operation, then ongoing	Construction and operations contractors	Construction and operational managers must ensure protocols are followed by staff and contractors and activities are supervised. Construction planning must be undertaken in a timely manner to ensure pathogen management protocols can be implemented. Protocols must be followed despite any time and financial pressures associated with construction activities. Regular communication must be undertaken with landholders to ensure pathogen management activities align.

Mitigation measure	Action / Method	Outcome	Timing / Frequency	Responsibility	Adaptive Management Strategy
Pest Control Management Program - Pest Species Management	Feral pest management programs will be developed and implemented for the Project, with focus European Foxes. All control methods will be completed in accordance with relevant legislation / standard operating procedures, including but not limited to the *NSW Threat Abatement Plan: Predation by the Red Fox (Vulpes vulpes)* (NSW OEH, 2010).	Reduction in feral pest animals.	Construction and operation, then ongoing	Construction and operations contractors	Construction and operational managers must ensure protocols are followed by staff and contractors and activities are supervised. Construction planning must be undertaken in a timely manner to ensure feral animal management protocols can be implemented. Regular communication must be undertaken with landholders to ensure feral pest management activities align.
Soil and Water Management Plan - Erosion and Sediment Control Plan	A site-specific Erosion and Sediment Control Plan will be developed and implemented to minimise erosion and sediment control risks. The Plan will include arrangements for managing wet weather events, and working with high surface water levels, including monitoring of potential high-risk events and specific controls and follow-up measures to be applied in the event of wet weather to avoid adverse impacts to hydrological processes, wetlands and ephemeral creek lines.	Reduction in erosion and sediment run-off	Construction phase then ongoing	Construction contractors	Construction and operational managers must ensure protocols are followed by staff and contractors and activities are supervised. Construction planning must be undertaken in a timely manner to ensure ESCP protocols can be implemented. Protocols must be followed despite any time and financial pressures associated with construction activities.

9. ASSESSING AND OFFSETTING IMPACTS

9.1 SERIOUS AND IRREVERSIBLE IMPACTS

A SAII entity is listed under the BC Act as an impact that is likely to contribute significantly to the risk of extinction of a threatened entity.

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct through one or more of the following principles:

1. It will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
2. It will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.
3. It is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution; or
4. The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

The assessment of entities identified at risk of a SAII, where impacted by an SSD project, the Minister for Planning is required to:

- Take those impacts into consideration, and
- Determine whether there are any additional and appropriate measures that will minimise those impacts if consent or approval is to be granted.

Potential SAII has been addressed in the following sections in accordance with Section 9.1 of the BAM (2020).

9.1.1 ASSESSMENT FOR SERIOUS AND IRREVERSIBLE IMPACTS ON BIODIVERSITY VALUES

Based on the results of field surveys and the listed candidate species associated with the PCT for the Subject Land, a total of three (3) threatened entities either recorded or assumed present were identified as being at risk of an SAII, being:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland;
- *Euphrasia arguta*; and
- Eastern Cave Bat (*Vespadelus troughtoni)*.

Regarding the SAII entity Eastern Cave Bat (*Vespadelus troughtoni*), any impacts on breeding habitat used by this species could be considered potentially serious and irreversible.

Potential breeding habitat is PCTs associated with the species (such as PCT 599) within 100m of rocky areas, caves, overhangs crevices, cliffs and escarpments, or old mines or tunnels, old buildings and sheds within the potential habitat.

No such potential breeding habitat occur on the Subject Land. Therefore, the occurrence of this species possibly recorded cannot be considered to be associated with breeding habitat on the Subject Land and the SAII trigger (being impacts to breeding habitat) is not activated in this instance. Therefore, it is considered that the presence of this species on site does not constitute the SAII entity and it has been excluded from further SAII Assessment.

When the species is present on the subject land and the proposed impact is not a potential SAII, standard species credits will be generated.

Given the exclusion of the Eastern Cave Bat (*Vespadelus troughtoni*) the remaining SAII entities have been further summarised in Table 9-1 below.

All SAII candidate species generated by the BAM-C for scattered trees must be assessed in accordance with Steps 3-5 in Section 5.2 of the BAM, as identified in Appendix B of the BAM. Where a candidate species does not have suitable habitat, it does not require further assessment. A review of candidate species at risk of SAII associated with scattered trees determined that all four candidate species at risk of SAII associated with the scattered tree assessment module were considered appropriate for exclusion due to a lack of suitable habitat being present within areas of scattered trees, as detailed in Table 5-3.

Therefore, SAII entities listed in Table 9-1 below are associated with the occurrence of PCT 599 where it represent open woodland (VZ1_Open_Woodland) and derived native grassland (VZ3_Derived_Grasslands). Species' polygons for threatened entities subject to SAII in the Subject Land are presented in Figure 9-1.

TABLE 9-1 SUBJECT LAND ENTITIES AT RISK OF SERIOUS AND IRREVERSIBLE IMPACTS

SAII Entity	SAII Principles	Reason for inclusion in assessment	Assessment Section
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (Box-Gum Grassy Woodlands)	Principle 1 and 2 EEC currently in a rapid rate of decline with a very small population size.	Community was determined to be present within the Subject Land within areas of PCT599.	Section 9.1.1.1
Euphrasia arguta	Principle 3 Species with very limited geographic distribution.	Species assumed present over 0.45ha of open woodland and derived grasslands within associated PCT 599 due to insufficient survey effort.	Section 9.1.1.2

Legend

- Project Area
- Development Footprint
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC
- Euphrasia arguta

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 200 400m

1:11,000

F9-1 Entities at risk of Serious and Irreversible Impact

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

9.1.1.1 SAII COMMUNITIES

An additional impact assessment for the TEC White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands (CEEC) at risk of SAII recorded on the Subject Land has been undertaken in accordance with Section 9.1.1 of the BAM and presented in Table 9-2.

TABLE 9-2 WHITE BOX – YELLOW BOX – BLAKELY'S RED GUM GRASSY WOODLAND AND DERIVED NATIVE GRASSLANDS

Response to BAM Section 9.1.1 Criteria
1. The action and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII (or reference to where these have been addressed in the relevant section of the BDAR).
Within the Subject Land (369.07 ha) there is 15.26 ha of the BC Act listed White Box – Yellow Box – Blakely's' Red Gum Grassy Woodland and Derived Native Grassland EEC predominantly located along riparian corridors associated with Tamarang Creek and Sugarloaf Creek, and occurring as scattered trees across the landscape. Through project design, impacts to this TEC have been avoided minimised. Further measures to avoid and minimise impacts to this TEC are discussed in Section 7 and Section 8 of this BDAR.
2. The assessor must consult the TBDC and/or other sources to report on the status of the TEC including: *a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)* *b. The extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:* *vi. Change in community structure* *vii. Change in species composition* *viii. Disruption of ecological processes* *ix. Invasion and establishment of exotic species* *x. Degradation of habitat* *xi. Fragmentation of habitat* *c. Evidence of restricted geographic distribution (Principle 3, clause 6.7(2)(c) BC Regulation), based on the TEC's geographic range in NSW according to the:* *i. extent of occurrence* *ii. area of occupancy* *iii. number of threat defined locations.* *d. Evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).*
The TBDC has been reviewed in relation to the information available for White Box – Yellow Box – Blakely's' Red Gum Grassy Woodland and Derived Native Grassland EEC. Interrogation of the TBDC identifies two (2) listings associated with this TEC, one being associated with the NSW BC Act listing (Profile ID: 10837) and one being associated with the EPBC Act listing (Profile ID: 20392). Both profiles were reviewed to gain a comprehensive understanding of this TEC. A response to these criteria is as follows:

Response to BAM Section 9.1.1 Criteria

a. The current extent of this TEC and the estimated reduction in the geographic extent since 1970 is not available in the TBDC. Therefore, a review of alternate but valid resources was undertaken.

BioNet Vegetation Classification System

A review of PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion, associated with this TEC identified that the current extent of PCT599 is 30,000ha (±30%), as estimated from the mapped extant of vegetation. It is estimated to have had a pre-European extent of 150,000ha (±30%) making the estimated reduction in the geographic extent approximately 80% (±50%) of its original distribution.

NSW Threatened Species Scientific Committee (Tozer and Simpson 2020)

The average areas cleared annually attributable to either agriculture or infrastructure in the New England Tablelands in which White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland occurs over the period 2009-2018 is 934 ha. Since European settlement, the estimated loss of this TEC is 93%.

Annual Loss and Reduction in Extent Since 1970

During the period 2009 – 2016 an average of 395 ha of Grassy Woodland (sensu Keith 2004, of which White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is a major component) was lost annually across NSW to agriculture-related activities (cropping, conversion to pasture and thinning) and a further 155 ha/annum due to infrastructure developments (NSW DPIE 2019 in Tozer and Simpson 2020).

Estimated Total Extent (current)

Data limitations prohibit the calculation of an accurate aerial extent of this TEC. Vardan et al (2023) estimates NSW comprised 1,963,578 ha (in the likely category) as of 2017. Tozer and Simpson (2020) estimated of 250,729 ha to occur NSW in 2006, which Vardan et al (2023) estimated 1,817,576 ha to occur at that time. The total extent of the TEC is therefore likely to be somewhere between these two estimates.

b. Tozer and Simpson (2020) report the following in relation to TEC change, disruption, degradation and fragmentation:

vi. Change in community structure

The community structure has been substantially modified across its extent of occurrence because of land clearing and modification.

vii. Change in species composition

Species composition has been substantially modified through disturbance history such as clearing of remnants and paddock trees, grazing, cropping, weed invasion and introduction of feral species.

viii. Disruption of ecological processes

The TEC largely occurs in the sheep wheat belt of NSW where widespread long-term agricultural production has resulted in the clearing and medication of this TEC. Several threats to ecological process remain active throughout the range of the TEC, which adversely affect ecological processes.

ix. Invasion and establishment of exotic species

Exotic plant and animal species are commonly encountered in this TEC, including the occurrence of the High Threat Weed Sweet Briar (*Rosa rubiginosa*). These species directly compete with native species that characterise this ecological community, resulting in reduced abundance and extent for these species.

Response to BAM Section 9.1.1 Criteria

x. Degradation of habitat

The ecological community generally occurs in a degraded condition across its entire extent. Reduced patch size and associated edge effects with cleared lands has resulted in lower species diversity in remaining patches.

xi. Fragmentation of habitat

Most patches of the ecological community are small and are separated by treeless (cleared) lands. The degree of separation varies across the TECs extent; however, occurrence is commonly hallmarked by paddock trees and small patches with large inter tree/patch distances that often result in fragmentation outcomes (i.e., gaps greater than 30-100m).

c. Principle 3 (geographic distribution) is not relevant to this TEC.

d. Principle 4 (unlikely to response to management) is not relevant to this TEC.

3. Where the TBDC indicates that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in Section 9.1.1(2), the assessor must record this in the BDAR

The NSW White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC is not identified as 'unknown' or 'data deficient' in the TBDC.

4. The following questions are addressed in relation to the impacts from the proposal of the TEC.
a. The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal:
i. in hectares
ii. as a percentage of the current geographical extent of the TEC in NSW
b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by:
i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals
ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:
- distance between isolated areas of the TEC, presented as the average
- distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and
- estimated maximum dispersal distance for native flora species characteristic of the TEC, and
- other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development
iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone (s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.

The Subject Land contains 15.26ha of the BC Act listed White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC made up of open woodland, derived native grassland and scattered trees. However, most of this area is located outside of the proposed development footprint and impacts to this EEC have largely been avoided and are able to be minimised through project design at the construction phase. The total area of impact to this TEC is 1.68 ha within the Subject Land. Specifically, the project will impact on the following extent of TEC:

Response to BAM Section 9.1.1 Criteria

Open Woodland (VZ1_Open_Woodland)

A total area of 0.07 ha of this TEC in the form of open woodland will be impacted by the proposed development. This equates to an impact of approximately:

- 1.3% of the extent of open woodland within the Subject Land
- 0.45% (<1%) of the total extent of this TEC within the Subject Land.

Scattered Trees (VZ2_Scattered_Trees)

Scattered trees across the Subject Land are considered representative of this TEC due to the presence of canopy species representative of this EEC, even though there is evident lack of structure and function. 1.57 ha of this TEC, consisting of 40 scattered trees across the development footprint will be impacted by the proposed development. This equates to approximately 10% of the total extent within the Subject Land.

Derived Grasslands (VZ3_Derived_Grasslands)

Approximately 0.04 ha of Derived Grassland representative of this TEC will be impacted by the development footprint. This equates to:

- 0.48% of the total extent of derived native grasslands (8.21 ha) on the Subject Land;
- 0.26% of the total extent of this TEC within the Subject Land.

Relative to the total extent of this TEC in NSW (as identified above), this impact of 1.68 ha, consisting of 0.07 ha of open woodland, 1.57 ha of scattered trees (or 40 scattered trees) and 0.04 ha of derived grasslands is estimated to be between 0.0006% and 0.00008%. (i.e. 1.68 ha of 250,729 ha and 168 ha of 1,963,579 ha).

The Project is not expected to isolate or fragment areas of this TEC within and adjacent to the Subject Land. Impacts to areas of this TEC with a moderate to good VI score have been avoided by the development and connectivity to surrounding patches has been maintained through project design and avoiding patches of open woodland and derived grassland connected through the landscape (i.e. within 30m – 100m of each patch).

By maintaining connectivity and areas of this TEC with higher calculated VI, dispersal opportunities and dispersal distances for flora species are unlikely to be changed or significantly altered by the proposed development. Additionally, functional habitat (i.e. hollows) will be retained within the Subject Land to support dispersal of fauna species associated with this TEC.

The VI scores for areas of this EEC to be impacted by the proposed development were calculated as:

- VZ1_Open_Woodland – 73.8
- VZ3_Derived_Grassland – 46.8

VZ2_Scattered_Trees does not have a calculatable VI score as it has been assessed under Appendix B of the BAM (Scattered Tree Assessment module).

Review to Section 8.1 for further details on Vegetation Integrity and direct impacts.

9.1.1.2 THREATENED SPECIES

An assessment for SAII as a result of the proposed development has been undertaken for the potential impacts to *Euphrasia arguta* in accordance with BAM Section 9.1.2 and presented in Table 9-3. The location of assumed habitats for this species are provided in Figure 9-1.

TABLE 9-3 *EUPHRASIA ARGUTA* SAII ASSESSMENT

Response to BAM Section 9.1.2 Criteria
1. What action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII?
Euphrasia arguta has been assumed to be present within the Subject Land in the associated PCT 599 where a moderate to good VI score occur (i.e. VZ1_Open_Woodland and VZ3_Derived_Grasslands), covering approximately 13.32 ha of the Subject Land (369.07 ha). Parallel transects for this species were undertaken across an estimated 144.7 ha of non-native grassland within the development footprint. However, these areas are not associated with the extent of this PCT, Therefore, the survey effort conducted was not considered adequate for the extent of potentially available habitat for this species. As such, it has been assumed present in unsurveyed areas. The assumed presence approach limits the ability to avoid direct impacts , however, as most of the flora transects were conducted within the indicative Development Footprint, and the species was not found, it is unlikely to be present. The Project will continue to avoid locations of threatened species habitat during the detailed design and construction phase through pre-clearance surveys.
2. The assessor must consult the TBDC and/or other sources to report on the current population of the species including: *a. evidence of rapid decline (Principle 1, clause 6.7(2)(a) BC Regulation) presented by an estimate of the:* *i. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer), or* *ii. decline in population of the species in NSW in the past 10 years or three generations (whichever is longer) as indicated by: an index of abundance appropriate to the species; decline in geographic distribution and/or habitat quality; exploitation; effe ct of introduced species, hybridisation, pathogens, pollutants, competitors or parasites* *b. evidence of small population size (Principle 2, clause 6.7(2)(b) BC Regulation) presented by:* *i. an estimate of the species' current population size in NSW, and* *ii. an estimate of the decline in the species' population size in NSW in three years or one generation (whichever is longer), and* *iii. where such data is available, an estimate of the number of mature individuals in each subpopulation, or the percentage of mature individuals in each subpopulation, or whether the species is likely to undergo extreme fluctuations* *c. evidence of limited geographic range for the threatened species (Principle 3, clause 6.7(2)(c) BC Regulation) presented by:* *i. extent of occurrence* *ii. area of occupancy* *iii. number of threat-defined locations (geographically or ecologically distinct areas in which a single threatening event may rapidly affect all species occurrences), and* *iv. whether the species' population is likely to undergo extreme fluctuations* *d. evidence that the species is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation) because:* *i. known reproductive characteristics severely limit the ability to increase the existing population on, or occupy new habitat (e.g. species is clonal) on, a biodiversity stewardship site* *ii. the species is reliant on abiotic habitats which cannot be restored or replaced (e.g. karst systems) on a biodiversity stewardship site, or*

Response to BAM Section 9.1.2 Criteria

i. iii. life history traits and/or ecology is known but the ability to control key threatening processes at a biodiversity stewardship site is currently negligible (e.g. frogs severely impacted by chytrid fungus).

The TBDC has been reviewed in relation to information available for this threatened species. The following response has been provided:

a. Principle 1 is not relevant to this species.

b. Principle 2 is not relevant to this species.

c. The TBDC identified that this species is listed as an SAII entity due to the association with Principle 3, that is, it is known from < 3 locations and / or has an Area of Occupancy (AOO) of <10km2, or an Extent of Occurrence (EOO) of <100km2. However, no further information regarding the species AOO, EOO, number of threat-defined locations or whether a species population is likely to undergo extreme fluctuations. Therefore, other resources have been interrogated to provide reasonable information for this species to assist the decision-maker in a final outcome for this SAII entity, including the NSW Scientific Committee's Final Determination (NSW TSSC, 2011b) and the Commonwealth's Approved Conservation Advice for *Euphrasia arguta* (Cwth DCCEEW, 2011).

i. The geographic distribution of Euphrasia arguta is estimated to be highly restricted. In the Nundle region, there are currently four populations of the species in three areas, approximately 23 km apart, with two further populations located about 14 km to the south east. The EoO is estimated to be approximately 40 km2 (Cwth DCCEEW, 2011; NSW TSSC, 2011b).

ii. The AoO is estimated to be 20 km2. As both EoO and AoO figures were estimated approximately 15 years ago, it is possible they may have since decreased due land clearing and frequent road maintenance activities, both threats to the species (NSW TSSC, 2011b).

iii. No threat defined locations have been identified, however, *Euphrasia arguta* is threatened by frequent road maintenance and regular clearing of roadside vegetation for firebreaks (Cwth DCCEEW, 2011; NSW TSSC, 2011b). The Nundle area, where most of the known population is located, might be defined as a 'threat defined location' if these activities are undertaken frequently. The Subject Land is over 280 km from Nundle.

d. Principle 4 is not relevant to this species.

3. Where the TBDC indicates data is 'unknown' or 'data deficient' for a species for a criterion listed in Subsection 9.1.2(2.), the assessor must record this in the BDAR or BCAR.

The TBDC does not indicate whether date are 'unknown' or 'data deficient' for this species.

4. In relation to the impacts from the proposal on the species at risk of an SAII, the assessor must include data and information on:
a) the impact on the species' population (Principles 1 and 2) presented by:
i. an estimate of the number of individuals (mature and immature) present in the subpopulation
on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and
ii. an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or
iii. if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal.

Response to BAM Section 9.1.2 Criteria

b) Impact on geographic range (Principles 1 and 3) present by:

i. The area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW

ii. the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted

iii. to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species

iv. to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of

disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR

a. Principles 1 and 2 are not relevant to this species.

b. Principles 1 is not relevant to this species. However, Principle 3 applies.

i. The Project will impact approximately 0.11 ha of the species' geographic range across PCT 599, in which it has been assumed present. The total AOO for this species has been recorded in the TBDC as <10km^2. However, according to the NSW Scientific Committee (2011b), the species possesses an AOO of about 20km^2 and an EOO of approximately 40km^2 (Cwth DCCEEW, 2011; NSW TSSC, 2011b). The area of assumed presence within the Subject Land (0.11 ha) is the maximum extent of suitable habitat which will be impacted as a result of the Project. This potential suitable habitat constitutes:

- 0.005% of the estimated AOO for the species (0.11 h / 2000 ha) and
- 0.002% of the estimated EOO (0.11 ha / 4000 ha)

ii. Due to insufficient survey effort and the resulting need to assume presence for this species, it is not possible to confidently determine whether the potential impact will be restricted to affect some individuals and habitat or impact some habitat but no individuals. Although survey efforts were restricted to non-native vegetation, no species were recorded. Given the proximity to Nundle (approximately 10km east), there is potential overlap of this species and the EOO. The Final Determination (NSW TSSC, 2011b) identified that this species has been recorded in open disturbed areas, indicating the species may be regenerative following disturbance. However, areas where follow up clearing and soil disturbance occurred, significant population decline was considered to occur. Given this, it is considered unlikely to be present within the Subject Land due to the ongoing disturbances to vegetation and soils through agricultural practices, such as grazing and cropping.

iii. The species is reported to tolerate some disturbance, such as logging and some clearing, but too frequent disturbance seems to negatively impact on germination (Cwth DCCEEW, 2011; NSW TSSC, 2011b). Much of the Subject Land is affected by disturbance through agricultural impacts; the increase in the intensity of disturbance as a result of the Project may negatively impact the species, if present. There is limited data available on the distance over which genetic exchange and pollination can occur for this species. Given the lack of presence of this species and suitable habitats

Response to BAM Section 9.1.2 Criteria
recorded on the Subject Land, it is unlikely that the Subject Land would support any population establishing or alter the current dispersal outcomes of this species within the AOO and EOO. iv. Direct, indirect and prescribed impacts to the species have been assessed in Sections 6 and 8 of this BDAR. Beyond the direct impacts to habitat from clearing, all other changes in environmental factors including fire regimes, pollutants, fragmentation, increased edge effects, pathogens, invasive plant species, increased competition between species and erosion will be mitigated through management plans outlined in Section 8.5 of the report.

9.2 IMPACT SUMMARY

9.2.1 IMPACTS THAT REQUIRE OFFSET

9.2.1.1 ECOSYSTEM CREDITS

Impacts requiring offset for the development footprint are shown in Figure 9-2. In accordance with Section 9.2.1 of the BAM, offsets are required for all impacts of proposals on PCTs that are associated with a VZ that have a calculated VI score of:

- ≥15, where the PCT is representative of an EEC or a CEEC;
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community; or
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

VZ 1 and VZ 3 within the Subject Land, associated with PCT 599 will experience a permanent direct impact that requires offsetting, as both of these VZs meets the VI score threshold above.

Where the scattered tree assessment module has been used for VZ 2 (in accordance with Appendix B of the BAM), impacts to scattered trees assigned to Class 2 (trees that are ≥20cm DBH and <50 large tree benchmark) or Class 3 (trees that are ≥50cm DBH large tree benchmark) also require offset.

Table 9-4 details the impacts to native vegetation that require offset (ecosystem credits).

TABLE 9-4 IMPACTS THAT REQUIRE AN OFFSET – ECOSYSTEM CREDITS

PCT ID/Condition	Impact area (ha)	VIS Loss	Offsetable Impact
599_VZ1_Open_woodland	0.07	-73.8	Yes
599_VZ2_Scattered_Trees	1.57	NA	Yes
599_VZ3_Derived_Grassland	0.04	-46.8	Yes

BAM-C credit reports confirming impacts requiring offset have been provided in Appendix J.

9.2.1.2 SPECIES CREDIT SPECIES

Section 9.2.2of the BAM stipulates that the accredited assessor must determine an offset for the impacts of the proposed development on threatened species that require species credits to be offset.

Four candidate species identified in Table 8-3of this report and that have had species polygons created will require an offset. These are:

- Bluegrass (*Dichanthium setosum*) (assumed present);
- *Euphrasia arguta* (assumed present);
- Finger Panic Grass *(Digitaria porrecta)* (assumed present); and
- Eastern Cave Bat (*Vespadelus troughtoni*) (possible recording).

Further detail on the required offset is provided in Section 10.1 below.

9.2.2 IMPACTS THAT DO NOT REQUIRE OFFSET

Under Section 9.2.1(3) of the BAM, an offset is not needed for impacts on native vegetation if the VI score is below:

- <15, where the PCT is representative of an EEC or a CEEC b.
- < 17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community c.
- < 20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

However, if the entity is at risk of an SAII the assessor must address the relevant criteria in Section 9.1 of the BAM (SAII entities) and include this in the BDAR.

No VZs identified within the development footprint have low VI scores that meet these threshold criteria and an SAII assessment has been provided of impacts to White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands CEEC.

The development footprint will require the removal of 0.68 ha of Planted Native Vegetation within category 2 regulated lands. These lands have been assessed in accordance with Appendix D of the BAM and detailed in Section 2.2.2and Section 4.1.1.2of this BDAR. Species credits are not required to offset proposed impacts to threatened species within PNV.

No evidence of use by threatened species occurred within areas of PNV. Additionally, a number of steps have been taken to mitigate impacts to potential habitats as identified in Section 8.5.

Impacts not requiring offset are shown in Figure 9-3.

9.2.2.1 PRESCRIBED IMPACTS

The development footprint will impact on 3.57 ha of existing infrastructure and farm dams, assessed in accordance with Section 8.6 of the BAM under Section 7.2 and Section 8.3 of this report. An offset requirement can be proposed for a prescribed impact in accordance with Section 8.6 of the BAM if mitigation and management measures described in adaptive management plans are considered at high risk of failure. Measures to secure offsets can be proposed and justified in the BDAR. These measures may include the retirement of credits and / or other conservation measures that benefit a threatened entity. The consent authority will assess the proposed mitigation measures and determine whether additional biodiversity credits will need to be retired, or alternative measures undertaken to offset high risk impacts.

Conservation measures to offset indirect and prescribed impacts have been discussed in Chapter 8 of this BDAR with mitigation measures recommended provided in Table 8-5.

It is considered that the mitigation measures recommended within this report will provide appropriate conservation management such that no additional offsets are likely to be required to further mitigate indirect and prescribed impacts associated with the proposed development.

9.2.3 AREAS NOT REQUIRING FURTHER ASSESSMENT

The BAM does not assess biodiversity values for:

- Marine mammals;
- Wandering seabirds;
- Biodiversity that is endemic to Lord Howe Island; and/or
- Native vegetation and loss of habitat on category 1-exempt land (within the meaning of Part 5A of the Local Land Services Act 2013 (LLS Act)), other than the additional biodiversity impacts under clause 6.1 of the BC Regulation (referred to as prescribed impacts in the BAM).

Of particular interest is the extent of native vegetation and loss of habitat on category 1 exempt lands.

The development footprint contains 300.28 ha of vegetation that does not require assessment for ecosystem credits as it occurs in the form of Category 1 exempt lands within the development footprint. Much of these lands consist of non-native grasslands containing cropping and pastures reflective of the agricultural land use of the Subject Land as identified in Table 9-5 and illustrated in Figure 9-4.

As such, these areas lack native vegetation due to historical clearing and agriculture activities, including works associated with clearing for access tracks, infrastructure, farm dams, and crops.

TABLE 9-5 VEGETATION NOT REQUIRING FURTHER ASSESSMENT

Landcover Character	Draft NVM Land Category	Area (ha)	Area of impact (ha)
Non-native – Grassland	Category 1	144.71	107.90
Non-native – Cropping (other)	Category 1	5.57	5.57
Non-native – Cropping (Oats)	Category 1	80.43	74.41
Non-native – Cropping (Wheat)	Category 1	33.60	33.33
Non-native – Disturbed (Earthworks)	Category 1	83.98	78.50
Non-native – Planted	Category 1	0.58	0.57
	TOTAL	**348.87**	**300.28**

These lands are not considered to constitute habitat for threatened species and no prescribed impacts within these areas are considered to require additional offsets. Additionally, areas of the Subject Land that are not proposed to be impacted by the development do not require further assessment. In this instance, the area of VZ4_Mixed_Plantings (0.47 ha) has not been further assessed due to no impact occurring to the extent on the Subject Land.

Legend

- Project Area
- Development Footprint
- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland EEC

Require Offset

- Vespadelus troughtoni
- Euphrasia arguta

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 200 400m

1:11,000

F9-2 Impacts Requiring Offset

Garoo Solar Farm and BESS
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GreenPulse Solar Farm and BESS Unit Trust

ERM

Legend

- Project Area
- Development Footprint
- Planted Native Vegetation
- Planted Non Native Vegetation
- BESS Container
- OHL Interconnection
- PCS Station
- Substation Interior
- Fence
- Inverters
- Transgrid Substation Area
- Customer Substation Area
- Parking and Laydown Area
- Internal Road
- PV (Mounting Structure - Full Table)
- PV (Mounting Structure - Half Table)
- Culvert
- Bridge

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025

Created By: NB

Drawing Size: A3

0 200 400m

1:11,000

F9-3 Impacts Not Requiring Offset

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

Legend

- Project Area
- Development Footprint

PCTName

- Blakelys Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
- Blakelys Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
- Not classified
- River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion
- White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion
- White Box shrubby open forest on hills mainly in the Nandewar Bioregion

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 18/08/2025
Created By: NB
Drawing Size: A3

0 200 400m

1:11,000

F9-4 Areas Not Requiring Assessment

Garoo Solar Farm and BESS
Biodiversity Development Assessment Report
GreenPulse Solar Farm and BESS Unit Trust

ERM

9.2.4 IMPACTS ON MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The Commonwealth Government's Bilateral Assessment Requirements stipulate that an EIS (through the BDAR) must include the identification of any MNES that have not been offset using the BAM and details of how impacts requiring offset correlate to the MNES impacts.

These details are provided in Table 9-6. The entities detailed in Table 9-6 are those provided in the EPBC Referral Assessment that were considered to have potential impacts occur as a result of the project and were identified as listed predicted species, known candidate species, or species known to occur within the Subject Land. Further assessment of MNES entities is provided in the EPBC Act Referral Assessment in Appendix I of this report.

TABLE 9-6 MNES ENTITIES IMPACTED BY THE PROJECT

MNES Matter	EPBC Act status	Impact(s)	Comments
White Box – Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	Removal of 0.11 ha of vegetation in the form of: • open woodland (0.07 ha); and • derived native grassland (0.04 ha) The project has the potential to result in indirect and prescribed impacts on this CEEC.	The Subject Land will retain 12.92 ha of the EPBC listing of CEEC, including: • 4.98 ha open woodland; and • 7.94 ha derived native grassland. • Impacts are to be mitigated through the following mechanisms: • Retirement of Ecosystem Credits under the Bilateral Agreement through PCT association; and • Management and mitigation through various management plans and mitigation measures detailed in Table 8-5and Table 8-8 of this report.
Bluegrass (Dichanthium setosum)	*V*	Removal of 0.11 ha of assumed suitable vegetation in the form of: • open woodland (0.07 ha); and derived native grassland (0.04 ha).	This species has been assumed present in accordance with the BAM due to insufficient survey. Impacts are to be mitigated through the following mechanisms: • Retirement of candidate species credits; and Management and mitigation through various management plans and mitigation measures detailed in Table 8-5 and Table 8-8 of this report.
Euphrasia arguta	CE	Removal of 0.110 ha of assumed suitable vegetation in the form of: • open woodland (0.07 ha); and • derived native grassland (0.04 ha).	This species has been assumed present in accordance with the BAM due to insufficient survey. Impacts are to be mitigated through the following mechanisms: • Retirement of candidate species credits; and • Management and mitigation through various management plans and mitigation measures detailed in Table 8-5 and Table 8-8 of this report.

10. APPLYING THE NO NET LOSS STANDARD

The offset liability for the Project is calculated in the following sections. The Credit Summary Report associated with impacts to native vegetation (other than scattered trees) is provided in Appendix J. The Credit Summary Report associated with impacts to scattered trees is provided in Appendix K.

10.1 OFFSET REQUIREMENTS FOR DIRECT IMPACTS

10.1.1 ECOSYSTEM CREDITS

Ecosystem credits required to offset the development are summarised in Table 10-1 as per subsection 9.2.1(1) and Appendix B (5) of the BAM.

Like-for-like trading options apply to the ecosystem credit classes, as outlined in the Biodiversity Credit Reports in Appendix J (native vegetation) and Appendix K (scattered trees) for the development footprint. Note: Amendments to the BC Act that came into effect from the 7th March 2025 mean that approval can no longer be granted for proponents to use the variation rules set out in the BC Regulation.

10.1.2 SPECIES CREDITS

The residual impact calculated for candidate species is the extent of known or assumed presence following consideration of survey results, impact avoidance and application of species credit polygon rules.

Candidate species requiring an offset for impacts or assumed impacts within the development footprint are presented in Table 10-2 below. The Credit Summary Report is provided in Appendix J. The area from which the species credits can be obtained is limited to the state of NSW.

10.2 OFFSET STRATEGY

The No Net Loss standard involves the retirement of ecosystem and species credits for Project related direct impacts in accordance with the BOS. The BOS requires all biodiversity impacts to be calculated using the BAM-C, which provides an output determining the final Species credit and Ecosystem credit obligations for the Project. Typically, the final credit obligations are to be 'retired' prior to construction or in accordance with an approved staged approach.

The Applicant is currently developing a biodiversity offset strategy. This strategy will detail the offset approach to be undertaken to retire credit obligations and is likely to be achieved by:

- Retiring 'like for like' credits as specified in Section 10.1 to the amount and from the regions indicated.
- Entering into a Strategic Offset Delivery Agreement (SODA) with the NSW Government, if eligible, where the Applicant pays NSW DCCEEW to undertake actions to meet their biodiversity offset obligations through the retirement of like-for-like biodiversity credits or the funding of a suitable biodiversity conservation action; or
- Payment into the Biodiversity Conservation Trust (BCT) in lieu of satisfying the offset liability specified in Section 10.1.

The fee associated with the latter option is determined through formal consultation with the Biodiversity Conservation Trust (BCT).

TABLE 10-1 IMPACTS THAT REQUIRE AN OFFSET – ECOSYSTEM CREDITS

IBRA Subregion	PCT Name	TEC Name / Offset Trading Group	Vegetation Formation / Class	Vegetation Zone	HBTs	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Number of ecosystem credits required
Peel IBRA Subregion	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands	Grassy Woodlands / Western Slopes Grassy Woodlands	PCT 599 VZ1_Open_Woodland	Yes	0.07	73.8	0	-73.8	3
				PCT 599 VZ2_Scattered_Trees	Yes	1.57	NA	NA	NA	37
				PCT 599 VZ3_Derived Grasslands	No	0.04	46.8	0	-46.8	1

TABLE 10-2 IMPACTS THAT REQUIRE OFFSET – SPECIES CREDITS

IBRA Subregion	Kingdom	Candidate Species	BC Act	EPBC Act	Biodiversity Risk Weighting	Loss of habitat (ha)	Number of species credits required
Peel IBRA Subregion	Flora	Bluegrass *(Dichanthium setosum)*	V	V	2	0.11	4
		Euphrasia arguta	CE	CE	3	0.11	5
		Finger Panic Grass (*Digitaria porrecta*)	E	-	2	0.11	4
	Fauna	Eastern Cave Bat (*Vespadelus troughtoni)*	CE	-	3	0.11	5

11. CONCLUSION

This BDAR has been prepared to assess the proposed Solar Farm and Battery Energy Storage System (BESS) against potential and likely impacts to threatened ecological communities, threatened species and their habitats in accordance with the BC Act 2016 and BAM 2020, as well as address matters raised in public and agency submissions, particularly agency advice provided by the Biodiversity Conservation and Science (BCS) Directorate.

The Subject Land largely consists of Category 1 Exempt Lands under the Draft Native Vegetation Regulatory Map and confirmed through site surveys with native vegetation occurring across 15.73 ha of the Subject Land being representative of the Critically Endangered Ecological Community (CEEC) White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland and is also a potential SAII entity. Native vegetation described as open woodland, and derived grasslands are considered to meet the criteria to be considered representative of the CEEC listing under the BC Act and EPBC Act and a referral has been made under the EPBC Act for Matters of National Environmental Significance (MNES). Areas identified as scattered trees and planted do not meet the criteria of the EPBC Act listing.

Impacts to this TEC have been avoided and minimised with the total area of impact to this TEC, identified as PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion being 1.68 ha and consisting of open woodland, scattered trees and derived native grassland. Relative to the total extent of this TEC in NSW this impact of 1.68 ha is estimated to be between 0.0006% and 0.00008%. (i.e. 1.68 ha of 250,729 ha and 168 ha of 1,963,579 ha) and will require formal offsetting under the Biodiversity Offset Scheme through the retirement of 41 Ecosystem Credits as detailed in Chapter 10 of this BDAR. Additionally, impacts to riparian habitats, waterways and Key Fish Habitat have been avoided with the project design aimed at minimising disturbance and impacts to aquatic habitats by utilising existing crossings and tracks where possible.

Four candidate species were identified as requiring offsets for the impacts to 0.11 ha of open woodland and derived grassland habitats, and have attracted the following offset requirements:

- Bluegrass (*Dichanthium setosum*) – 4 species credits;
- *Euphrasia arguta* – 5 species credits;
- Finger Panic Grass (*Digitaria porrecta*) – 4 species credits; and
- Eastern Cave Bat (*Vespadelus troughtoni*) – 5 species credits.

Euphrasia arguta (flora) and Eastern Cave Bat (*Vespadelus troughtoni*) are identified as candidate species at risk of SAII. This report has provided an SAII assessment for SAII entities within Section 9.1 of the BDAR.

To ameliorate impacts, in additional to the offset requirements, a suite of mitigation measures to avoid and further minimise direct, indirect and prescribed impacts will be implemented, such as the development and implementation of a BMP and CEMP.

As a result, the proposed development is unlikely to significantly impact on any extent of TEC across the Subject Land and within the broader landscape and impacts to threatened species and their habitats have been appropriately assessed and identified impacts will be minimal. It is considered that the proposed mitigation measures, along with the offsetting of residual impacts will provide suitable ameliorative measures to support the long-term functionality of habitat on the Subject Land.

The Applicant is currently developing a biodiversity offset strategy. This strategy will detail the offset approach to be undertaken to retire credit obligations.

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APPENDIX A ERM LAND CATEGORISATION ASSESSMENT REPORT

Garoo Solar Farm and BESS

Land Category Assessment Report

PREPARED FOR
Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust.

DATE
4 June 2025

REFERENCE
0751705



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Garoo Solar Farm and BESS

Land Category Assessment Report

0751705



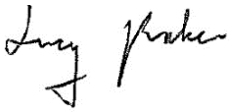
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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016 (NSW)
BDAR	Biodiversity Development Assessment Report
DPE	(Former) Department of Planning and Environment (NSW)
EIS	Environmental Impact Statement
ERM	Environmental Resources Management Australia Pty Ltd
ha	hectare
IGGAM	Interim Grasslands and other Groundcover Assessment Method
km	kilometre
LCA	Land Category Assessment
LGA	Local government area
LLS Act	Local Land Services Act 2013 (NSW)
LLS Regulation	Local Land Services Regulation 2014 (NSW)
m	metre
NSW	New South Wales
NSW DCCEEW	Department of Climate Change, Energy, the Environment and Water (NSW)
NV Act	Native Vegetation Act 2003 (NSW) (repealed)
NVR map	Native Vegetation Regulatory map
PCT	Plant Community Type
PVP	Property Vegetation Plan
SVTM	State Vegetation Type Map
VIS	Vegetation Integrity Score

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) has been engaged by Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust (Greenpulse or the Proponent) to prepare a Land Category Assessment (LCA) report for the proposed Garoo Solar Farm and BESS (the Project). The Project is situated within the Tamworth Regional Council Local Government Area (LGA) in New South Wales (NSW). The Project is approximately 40 kilometres (km) south of the town of Tamworth. The Project area covers approximately 369.07 hectares (ha) of land (the Subject Land).

The development of the Subject Land will require assessment using the NSW Biodiversity Assessment Method (BAM), as well as the preparation of a Biodiversity Development Assessment Report (BDAR) to support the submission of the Project Environmental Impact Statement (EIS). Part 6 Division 2 section 6.8 (3) of the NSW *Biodiversity Conservation Act 2016* (BC Act) determines that the BAM is to exclude the assessment of the impacts of clearing of native vegetation and loss of habitat on Category 1 - exempt land (within the meaning of Part 5A of the NSW *Local Land Services Act 2013* (LLS Act)), other than prescribed impacts (e.g., impacts on the habitat of threatened species). This determination is repeated in section 1.5(1)(d) of the BAM.

Mapped extents of Category 1 – exempt land and Category 2 – regulated land for the Subject Land is not publicly available on the transitional Native Vegetation Regulatory (NVR) map. However, mapped extents of Category 2 – sensitive regulated land (environmentally sensitive land), Category 2 – vulnerable regulated land (steep or highly erodible, protected riparian or special category land) and excluded land (land excluded from Part 5A of the LLS Act) are available and have legal effect.

All land categorisation layers are visible on the draft NVR map. This draft NVR map does not have legal effect, but it has been published to enable landholders to review the accuracy of the mapped land categorisations on their land before the NVR map is finalised.

During the transitional period or until all layers are publicly available and in force, BAM accredited assessors may establish a reasonable approximation of land categorisation for the Environment Agency Head to consider. An outline of an evidence-based approach to identifying NVR map land categorisation and the biodiversity assessment requirements in relation to Category 1 – exempt land is provided in the guide *Determining native vegetation land categorisation for application in the Biodiversity Offsets Scheme* (State Government of NSW and Department of Planning and Environment (DPE), 2023).

This report outlines the reasonable approximation of land categorisation for the Subject Land of the Project, based on the transitional NVR map and legislation pertaining to land categorisation, and with reference to the draft NVR map and site assessment.

1.1 LEGISLATIVE PROVISIONS FOR DETERMINING CATEGORY 1 – EXEMPT LAND

The legislative provisions for determining land categorisation are outlined in the sections below.

1.1.1 LAND CATEGORY DEFINITIONS

Part 5A, Division 2, Sections 60H and 60I of the LLS Act define Category 1 – exempt land and Category 2 - regulated land. The definitions are summarised in **Table 1-1** below.

TABLE 1-1 LAND CATEGORY DEFINITIONS UNDER THE LOCAL LAND SERVICES ACT 2013

Land Category	Colour on the transitional and / or draft NVR Map	Definition
Category 1 – exempt land	Not visible (transitional NVR map) Blue (draft NVR map)	• Land cleared of native vegetation on 1 January 1990 or lawfully cleared after 1 January 1990; • Low conservation grasslands; • Land containing only low conservation groundcover (not being grasslands); • Native vegetation identified as regrowth in a Property Vegetation Plan (PVP) under the repealed *Native Vegetation Act 2003*, only where the PVP specifies a regrowth date; and/or • Land bio-certified under the BC Act.
Category 2 – regulated land	Not visible (transitional NVR map) Yellow (draft NVR map)	• Land not cleared on 1 January 1990 or unlawfully cleared after 1 January 1990; • Native vegetation growth with the assistance of public funds; • Land that was subject to private native forestry PVP that is no longer in force; • Grasslands that are neither low nor high conservation grasslands (the latter being Category 2 – sensitive regulated land);Land containing low conservation grasslands beneath the canopy or drip line of woody vegetation; and/or • Travelling stock reserves, apart from travelling stock reserves in the Western Division.
Category 2 – vulnerable regulated land	Orange (transitional and draft NVR maps)	• Steep or highly erodible land; • Protected riparian areas; and/or • Land susceptible to erosion, or land that is otherwise environmentally sensitive.
Category 2 – sensitive regulated land	Pink (transitional and draft NVR maps)	• Rainforest and old-growth forest; • High conservation grasslands; • Coastal wetlands and littoral rainforest (*Coastal Management Act 2016*); • Land mapped as containing critically endangered plants and/or critically endangered ecological communities; • Land that is subject to a private land, property or trust conservation agreement; • Land subject to a bio-certification conservation measure; • A set-aside under the NSW Land Management (Native Vegetation) Code 2018; • Land comprising an offset under a PVP or set-aside under a code under the repealed *Native Vegetation Act 2003;* • Land identified as Koala habitat (of a kind prescribed by the regulations) in a plan of management made under *State Environmental Planning Policy (Biodiversity Conservation) 2021*; • Land subjected to remedial action or conservation measures under the BC Act;

Land Category	Colour on the transitional and / or draft NVR Map	Definition
		• Land recommended for listing as an Area of Outstanding Biodiversity Value; • Conservation Areas under the Southern Mallee Land Use Agreement; • Native vegetation that must be retained under the NSW *Plantation and Reafforestation Act 1999*; and/or • Land subject to a condition of development consent requiring the land to be set aside for conservation purposes under the NSW *Environment Planning and Assessment Act 1979.*
Excluded Land	Grey (transitional and draft NVR maps)	• Land excluded from the LLS Act, such as urban land, national park estate and state forestry land.

1.1.2 SECTION 60F OF THE NSW LOCAL LAND SERVICES ACT 2013

Under Part 5A Division 2 section 60F of the LLS Act, matters are described relating to transitional arrangements in place until the finalisation of the NVR Map.

Section 60F includes a provision that, 'an area is taken, during the transitional period, to be low conservation value grasslands if it comprises only groundcover whose clearing was permitted by section 20 of the NSW *Native Vegetation Act 2003*' (NV Act). It also notes that section 20 of the NV Act 'permitted clearing if the vegetation comprised less than 50% of indigenous species of vegetation'.

1.1.3 SECTION 60J OF THE NSW LOCAL LAND SERVICES ACT 2013

Under Part 5A Division 2 section 60J of the LLS Act, matters relating to the determination of mapped Category 1 - exempt land or Category 2 - regulated land include:

- 60J (2) Native vegetation that comprises grasslands or other non-woody vegetation is taken to have been cleared if the native vegetation was significantly disturbed or modified. The regulations (NSW *Local Land Services Regulation 2014* (LLS Regulation)) may make provision for the purposes of determining whether native vegetation has been significantly disturbed or modified for the purposes of this Division.

The clearing of native vegetation after 1990 must have been done legally, and the vegetation must have been cleared as of 1 January 1990 or between 1 January 1990 and 25 August 2017. Satellite imagery may be used to determine the native vegetation clearing.

1.1.4 SECTION 114 OF THE NSW LOCAL LAND SERVICES REGULATION 2014

Part 14 Division 2 section 114 of the LLS Regulation outlines how to determine whether native vegetation has been significantly disturbed or modified.

1. Native vegetation that comprises grasslands or other non-woody vegetation is taken to have been significantly disturbed or modified (and therefore cleared) only if –
   a) there has been a detectable variation (from information obtained from aerial or satellite imagery) in the structure or composition, or both, of non-woody vegetation; and
   b) that variation is consistent with management of pasture or crops for agricultural purposes; and

c) that variation has been sustained for at least 12 months on more than one occasion before the commencement of Part 5A of the Act (the LLS Act); and

d) that variation has not been caused only by grazing on the land; and

e) that variation occurred (from information obtained from aerial or satellite imagery) between 1 January 1990 and the date of commencement of Part 5A of the Act (the LLS Act).

2. METHODOLOGY

The LCA detailed in this document followed the guidelines detailed in *Determining Native Land Categorisation for Application in the Biodiversity Offsets Scheme* (DPE, 2023). The steps used in this assessment are summarised in **Figure 2-1**. Note that reference has been made to Category 1 – exempt land and Category 2 – regulated land layers visible on the draft NVR map in relation to the Subject Land, but the final land categorisation determination made by ERM has been based on legislative provisions and supported by site assessment.

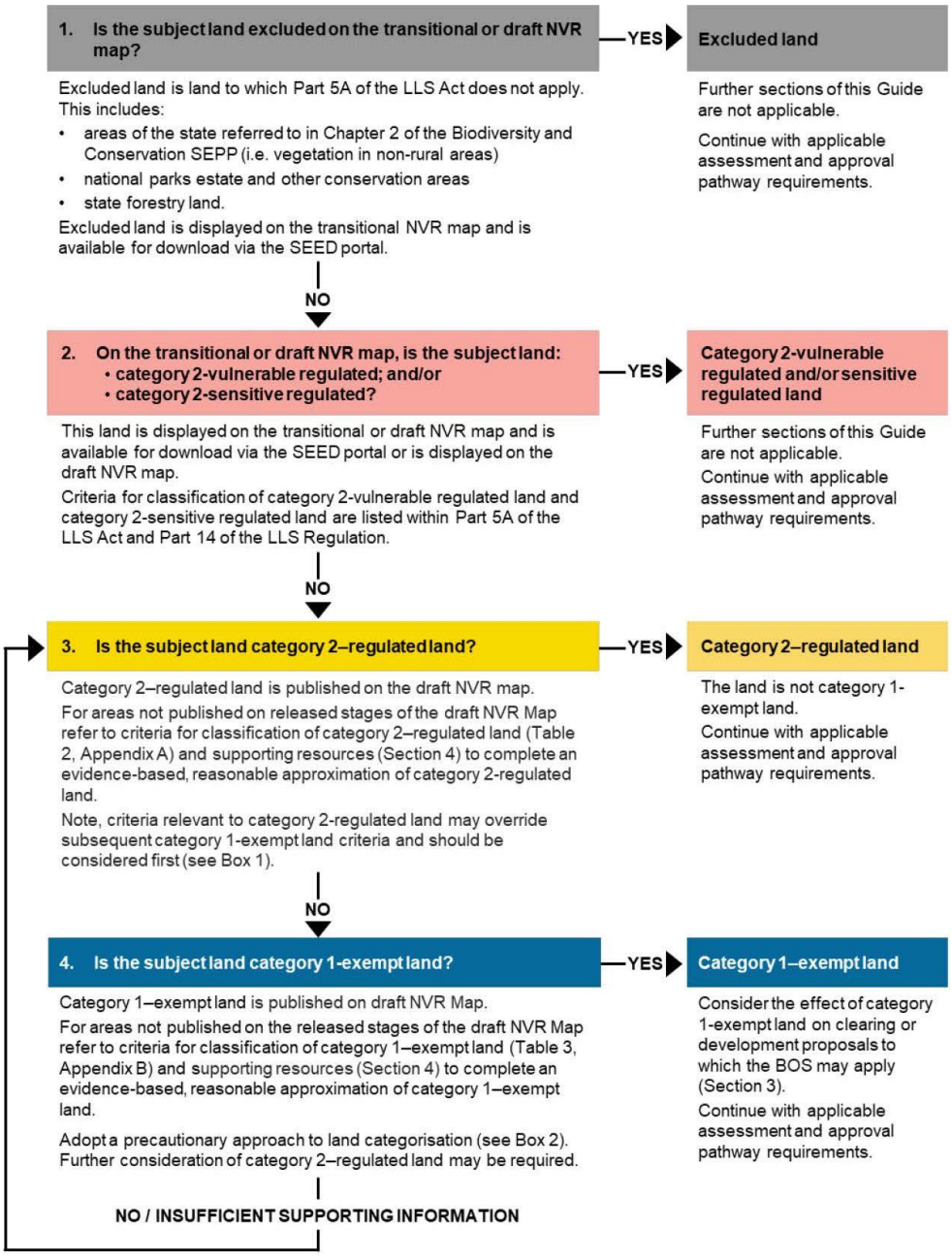


FIGURE 2-1 PROCESS FOR DETERMINING LAND CATEGORISATION IN NSW (DPE, 2023)

2.1 DESKTOP ANALYSIS

A desktop analysis of the Subject Land was performed as part of this assessment. The land categories identified in **Table 1-1** were used to make a determination, as well as the following provisions of the LLS Act and LLS Regulation:

- Section 60F;
- Section 60J; and
- Section 114.

2.1.1 SPATIAL DATA

Spatial data used in this assessment included the following:

- The transitional NVR map (Department of Climate Change, Energy, the Environment and Water) (DCCEEW), 2024a).

  This was used to determine land categorisations on the Subject Land with legal effect, in other words, Category 2 – sensitive regulated land, Category 2 – vulnerable regulated land and Excluded land (https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/native-vegetation-regulatory-map/transitional-native-vegetation-regulatory-map).

  Refer to **Figure 2-2**;
- NSW ePlanning Spatial Viewer (DPE, 2022).

  This was used to determine the land zoning of the Subject Land (https://www.planningportal.nsw.gov.au/spatialviewer).

  Refer to **Figure 2-3**;
- The Historical Imagery Viewer (Spatial Services, 2021).

  This was used to obtain imagery from 1990, or from years surrounding 1990, for the Subject Land. Imagery was obtained for 1989, 1993 and 1998 as no historical imagery was available for 1990 (https://www.spatial.nsw.gov.au/products_and_services/aerial_and_historical_imagery).

  Refer to **Figure 2-4** (1989), **Figure 2-5** (1993) and **Figure 2-6** (1998);
- NSW Landuse 2017 dataset v1.5 (DPE, 2020).

  This spatial layer was used to determine how land is being used on the Subject Land, as mapped by the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW).

  (https://datasets.seed.nsw.gov.au/dataset/nsw-landuse-2017-v1p5-f0ed-clone-a95d).

  Refer to **Figure 2-7**;
- NSW Native Vegetation Extent Raster 5 m v1.4 (DCCEEW, 2019).

  This spatial layer was used to delineate native tree cover and woodlands from groundcover vegetation, water and non-native woody vegetation on the Subject Land (https://datasets.seed.nsw.gov.au/dataset/nsw-native-vegetation-extent-5m-raster-v1-0).

  Refer to **Figure 2-8**;

- NSW State Vegetation Type Map (SVTM) (release C2.0M2.0, December 2023) (DCCEEW, 2022).

  This spatial layer was used to determine regional-scale mapping of NSW Plant Community Types (PCT), as mapped by NSW DCCEEW (https://datasets.seed.nsw.gov.au/dataset/nsw-state-vegetation-type-map).

  Refer to **Figure 2-9**;
- The draft NVR map (DCCEEW, 2024b).

  This was used to determine draft land categorisations without legal effect, in other words, Category 1 – exempt land and Category 2 – regulated land (https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/native-vegetation-regulatory-map/draft-native-vegetation-regulatory-map).

  Refer to **Figure 2-10**; and
- Vegetation mapping developed by ERM through data collected during site assessments undertaken in September 2024.

  Refer to **Figure 2-11**.

2.1.2 HISTORICAL IMAGERY

Historical aerial imagery was used to determine whether areas of the Subject Land were significantly disturbed or modified in 1990. Images were sourced from the Historical Imagery Viewer, managed by Spatial Services (a division of the NSW Department of Customer Service).

Historic aerial imagery was not available for 1990 from Spatial Services, therefore images from 1989, 1993 and 1998 have been used in this assessment. These images provide a reasonable indication of what the Subject Land may have looked like in 1990.

The 1989, 1993 and 1998 historical aerial images of the Subject Land were reviewed and analysed for significant disturbance or modification of non-woody vegetation. This is demonstrated through evidence of intensive agricultural activity sustained over a period of 12 months or more between 1 January 1990 and 25 August 2017. Evidence included cropping lines and contour banks created through the use of agricultural machinery, bare ground or bright green vegetation indicating pasture modification.

Legend

- Subject Land
- Local Road
- Local Track-Vehicular
- Non-perennial Watercourse
- Lots
- Waterbodies

Transitional Native Vegetation Regulatory Map

- Category 2 - Vulnerable Regulated Land

Transmission Lines (existing)

- 330kV



7005/DP96516
21/DP755341
5/DP755341
39/DP755341
34/DP755341
36/DP755341
38/DP755341
33/DP755341
1/DP1108524
1/DP130318
3/DP114643
4/DP114643
66/DP755341
28/DP755341
41/DP755341
42/DP755341
12/DP114643
1/DP322520
3/DP1108524
4/DP1108524
2/DP1108524
5/DP1108524
6/DP1108524
7/DP1108524
15/DP755341
14/DP755341
2/DP755341
17/DP755341
22/DP755341
81/DP1046675
16/DP755341
1/DP755341
20/DP755341
1/DP33146
1/DP250846
19/DP755341
1/DP37636
Muswellbrook 330 to Tamworth
Liddell to Tamworth

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System: GDA2020 MGA Zone 56
Date: 03/06/2025
Created By: NB
Drawing Size: A3
0 400m
1:11,000

2-2 Land Categorisation Mapping (Transitional NVR Map, in-force)

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

0751705_SolarAndBESS_LCA_G001_R0.aprx

Legend

- Subject Land
- Waterbodies
- Major Watercourse
- Minor Watercourse
- Local Road
- Track-Vehicular

Transitional Native Vegetation Regulatory Map

- Category 2 - Vulnerable Regulated Land
- Cadastre (Lot)

Land Zoning

- RU1 Primary Production

SUGARLOAF CREEK

TAMARANG CREEK

RU1

BULLS ROAD



Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

2-3 Land Zoning

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

0751705_SolarAndBESS_LCA_G001_R0.aprx

Legend

- Subject Land
- Local Road
- Track-Vehicular

Transitional Native Vegetation Regulatory Map

- Category 2 - Vulnerable Regulated Land

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025
Created By: NB
Drawing Size: A3

0 400m

1:11,000

2-4 1989 Historical Aerial Imagery

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

Legend

- Subject Land
- Local Road
- Track-Vehicular

Transitional Native Vegetation Regulatory Map

- Category 2 - Vulnerable Regulated Land

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

2-5 1993 Historical Aerial Imagery

Garoo Solar Farm and BESS
Land Category assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

0751705_SolarAndBESS_LCA_G001_R0.aprx

Legend

- Subject Land
- Local Road
- Track-Vehicular

Transitional Native Vegetation Regulatory Map

- Category 2 - Vulnerable Regulated Land

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

2-6 1998 Historical Aerial Imagery

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

0751705_SolarAndBESS_LCA_G001_R0.aprx

Legend

- Subject Land
- Local Road
- Track-Vehicular
- Major Watercourse
- Minor Watercourse
- Lots

Transitional Native Vegetation Regulatory Map

- Category 2 - Vulnerable Regulated Land

NSW Landuse 2017 (NSW DCCEEW, 2023)

- 2.1.0 Grazing native vegetation
- 3.2.0 Grazing modified pastures
- 3.3.0 Cropping
- 5.7.0 Transport and communication

SUGARLOAF CREEK

GAROO ROAD

TAMARANG CREEK

BULLS ROAD

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

2-7 Land Use Mapping

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

0751705_SolarAndBESS_LCA_G001_R0.aprx

Legend

- Subject Land
- Local Road
- Track-Vehicular
- Lots

Transitional Native Vegetation Regulatory Map

- Category 2 - Vulnerable Regulated Land

Vegetation Extent

- Not Native
- Tree Cover
- Candidate Native Grasslands
- Water
- Tree Cover Matrix

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

2-8 Native Vegetation Extent Mapping

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

Legend

- Subject Land
- Local Road
- Track-Vehicular
- Major Watercourse
- Minor Watercourse
- Lots
- Waterbodies

PCT

- 0 - Not Classified
- 433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion
- 599 - Blakelys Red Gum - yellow Box grassy tall woodland on flats and hills in hte Brigalow Belt South Bioregion and Nandewar Bioregion

SUGARLOAF CREEK

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery
PCTs: SVTM Mapping (SEED, 2025)

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

2-9 NSW State Vegetation Type Mapping

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

Legend

- Subject Land
- Local Road
- Local Track-Vehicular
- Lots

Draft Native Vegetation Regulatory (NVR) Map

- Category 1 - Exempt (draft)
- Category 2 - Regulated Land (draft)
- Category 2 - Vulnerable Regulated Land (in-force)

SUGARLOAF CREEK

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025
Created By: NB
Drawing Size: A3

0 400m

1:11,000

2-10 Land Categorisation Mapping (Draft NVR Map)

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

0751705_SolarAndBESS_LCA_G001_R0.aprx

2.2 SITE ASSESSMENT

Site assessment on the Subject Land, relevant to land categorisation determination, was conducted by ERM ecologists from 24th to 28th September 2024.

Surveys on these dates included rapid assessment, ground truthing of the NSW SVTM through vegetation integrity and classification plots (BAM Plots) and mapping of PCTs within the Subject Land. Scattered trees were also assessed across the Subject Land in accordance with the streamlined assessment module for scattered trees under Appendix B of the BAM.

Additionally, the survey effort included assessment in accordance with Stage 2 and Stage 3 of *Interim Grasslands and other Groundcover Assessment Methods: determining conservation value of grasslands and groundcover vegetation in NSW* (Office of Environment and Heritage (OEH), 2018) for areas where candidate Category 1 - exempt land was suspected to occur. This included point to point transects (LCA transects) and BAM plots in areas containing a large proportion of exotic vegetation to determine the coverage percentage of exotic and native species.

In total, ERM conducted twenty-three (23) LCA transects within the Subject Land (Stage 2 assessment). Twenty-one (21) BAM Plots were completed at the same location as LCA transects if the area was found to have 50% or less exotic perennial cover (i.e., candidate Category 1 - exempt land) (Stage 3 assessment). An additional four (4) BAM Plots were undertaken within areas of native woody vegetation (Category 2 – regulated land).

Survey effort completed on the Subject Land relevant to this assessment is summarised in **Table 2-1** below.

TABLE 2-1 SURVEY EFFORT COMPLETED TO DATE

Survey Method	Quantity	Qualified Staff
BAM Plots	21 (associated with an LCA Transect) 4 (associated with Category 2 – regulated land)	• Lorena Boyle, Senior Ecologist / BAM Accredited Assessor • Sophie Draganic, Ecologist • Mikki Gourlis, Ecologist • Jemma Boyce, Ecologist
LCA Transects	23	
Scattered Tree Assessment	47	

The vegetation composition, structure, function and condition were determined in accordance with the relevant guidelines during the survey events listed above.

BAM plot and LCA transect data are included in **Appendix A** and **Appendix B** respectively.

Following completion of the site assessment and subsequent data analysis, vegetation mapping was undertaken within the Subject Land. Refer to **Figure 2-11**.

Legend

- Subject Land
- Local Road
- Local Track-Vehicular
- Major Watercourse
- Waterbodies

Survey Points

- LCA Transect
- NSW BAM Plot
- Rapid Vegetation Assessment

Transmission Lines (existing)

- 330kV

PCT Mapping

- 0 - Non-Native Grassland
- 0 - Non-Native Grassland (Cropping and earthworks)
- 0 - Planted Native Vegetation
- 0 - Planted Non Native Vegetation
- 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregionl and Nandewar Bioregion
- 0 - Dam
- 0 - infrastructure

Vegetation Zones

- 0 - Cropped Oats
- 0 - Cropped Wheat
- 0 - Cropping (unknown)
- 0 - Non Native Grassland
- 0 - Previous earthwork

SUGARLOAF CREEK

Muswellbrook 330 to Tamworth

Liddell to Tamworth

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

2-11 ERM Site Assessment Mapping

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

3. ANALYSIS AND RESULTS

This section summarises the findings obtained through the desktop analysis and site assessment.

Layers available from the transitional NVR map have been analysed and it was determined that Category 2 – vulnerable regulated land is present on site, associated with Tamarang Creek running north to south through the centre of the Subject Land, and areas of Sugarloaf Creek bordering the site in the west. No Category 2 – sensitive regulated land and no Excluded land are present within the Subject Land. Refer to **Figure 2-2.**

3.1 IMAGERY

Analysis of the historical aerial imagery from 1989, 1993 and 1998 determined that significant agricultural activity occurred within the Subject Land prior to 1990 to the present day. Spatial imagery shows that significant groundcover disturbance has occurred through cropping activities and pasture modification. In addition to this, areas that were cleared of woody vegetation prior to 1990 have remained cleared from 1990 until the present day. These images assisted in understanding historical use of the Subject Land and how those uses have influenced existing vegetation composition and structure. Refer to **Figure 2-4**, **Figure 2-5** and **Figure 2-6**.

3.2 INTERIM GRASSLANDS AND GROUNDCOVER ASSESSMENT METHOD

Data collected during site assessment identified vegetation cover, comprising exotic and native species, that was significantly disturbed in both composition and structure. This disturbed vegetation was delineated into three vegetation zones, present as discontinuous patches across the site however in a similar broad condition state. These Category 1 vegetation zones are detailed below in **Table 3-1.**

PCTs separated into '0-Non-native grassland (cropping and earthworks)' and '0-Non-native grassland' where used as the Category 1-vegetation zones as shown in **Table 3-1** due to their distinct floristic assemblages. Surplus LCA transects have been completed in these areas.

TABLE 3-1 CATEGORY 1 VEGETATION ZONES

PCT	Vegetation Zone	Area (ha)	Combined area (ha)	Stage 2: LCA Transects required	Stage 2: LCA Transects completed	Stage 3: BAM Plots completed
0 - Non-native grassland (cropping and earthworks)	Cropped Oats	80.43	203.58	6	14	14
	Cropped Wheat	33.50				
	Cropping unknown	5.57				
	Previous Earthworks	83.98				
0 - Non-native grassland	Non-Native Grassland	144.71	144.71	6	9	7

PCT	Vegetation Zone	Area (ha)	Combined area (ha)	Stage 2: LCA Transects required	Stage 2: LCA Transects completed	Stage 3: BAM Plots completed
		Total	348.29	12	23	21

Where Stage 2 LCA transects resulted in 50 per cent (%) or less cover of exotic perennials, including in areas of cropped wheat (*Triticum spp*.) and cropped oats (*Avena spp*.)(exotic annuals), a BAM Plot was undertaken in accordance with Stage 3 of the Interim Grasslands and other Groundcover Assessment Method. In two instances (LCA09_LM and LCA05_210_SDJM) the LCA Transect resulted in >50% exotic perennial cover, therefore a BAM Plot was not undertaken. These locations were dominated by *Trifolium repens*, also present across the remainder of the Subject Land.

The exotic species observed were predominantly annual or short-lived perennial species, such as wheat (*Triticum spp*.), oats (*Avena spp*.), ryegrass (*Lolium* spp.), and medics (*Medicago* spp.). As these species are not 'perennials' they do not meet the definition of 'exotic' in the *Interim Grasslands and other Groundcover Assessment Methods: determining conservation value of grasslands and groundcover vegetation in NSW* (OEH, 2018). On this basis, LCA transects indicated native vegetation was present. However, results show that these areas all contained less than 50% native groundcover and can be defined as low conservation value grasslands under Section 60F of the LLS Act.

The native vegetation present was often in the form of opportunistic species known to occupy disturbed habitat such as lawns and pasture, these included *Cynodon dactylon* (widely cultivated as a lawn grass and for pasture) and *Cotula australis* (known to grow in open grassy situations, a roadside and lawn weed). No naturally occurring pre-European PCTs are described in the BioNet Vegetation Database as being dominated by the limited native species recorded. It is considered likely the Subject Land consisted of PCT 599 *Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion* (PCT 599) prior to european settlement and historical disturbance pre-1990.

The Interim Grasslands and Groundcover Assessment Method (IGGAM) calculator was used to assess the groundcover vegetation and a conservative approach was applied of only counting perennial exotic vegetation, as per the IGGAM guidelines. Input was based on PCT 599 where the Subject Land entirely within the Nandewar IBRA Bioregion, the Peel IBRA Subregion, and within the Nundle Hills Mitchell Landscape.

The IGGAM calculator returned a 'Low' conservation result for each vegetation zone. The Vegetation Integrity Score (VIS) was also calculated for the two vegetation zones. Therefore, the IGGAM calculator identified areas mapped as '0 – Non-native grasslands' and '0 – Non-native grasslands (Cropping and Earthworks)' on **Figure 2-11** as being Category 1 - exempt land. Results from the IGGAM are shown in **Table 3-2**, and output is provided in **Appendix C**.

TABLE 3-2 INTERIM GGAM RESULTS

Vegetation Zone	Area (ha)	VIS	Conservation Value
Non-native Grassland	144.71	6.1	Low
Non-native Grassland (Cropping and Earthworks)	203.58	3.2	Low

3.3 BAM PLOT DATA

In addition to the 23 LCA transects conducted within the Project Area, 21 BAM Plots were completed at the same location as LCA transects if the area was found to have 50% or less exotic perennial cover. An additional four BAM Plots were undertaken within areas of native woody vegetation. A summary of this data is displayed in **Table 3-3** with the detailed results provided in Appendix A.

TABLE 3-3 BAM PLOT DATA

BAM plot ID	Native Species Richness	Native Species Cover	Exotic Species Richness	Exotic Species Cover	Categorisation (proposed by ERM)	Vegetation Zone
BAM01_LM	7	4.4	17	111.0	Category 1 – Exempt Land	Non Native Grassland
BAM02_LM	4	8.2	19	98.3	Category 1 – Exempt Land	Non Native Grassland
BAM03_LM	6	34.5	19	80.7	Category 1 – Exempt Land	Previous Earthworks
BAM04_LM	1	0.1	7	84.5	Category 1 – Exempt Land	Cropped Wheat
BAM05_LM	1	0.1	3	95.1	Category 1 – Exempt Land	Cropped Wheat
BAM06_LM	2	2.1	19	73.0	Category 1 – Exempt Land	Cropped Oats
BAM07_LM	0	0.0	2	90.5	Category 1 – Exempt Land	Cropped Wheat
BAM08_LM	7	20.5	16	81.8	Category 1 – Exempt Land	Previous earthworks
BAM10_LM	0	0.0	7	5.5	Category 1 – Exempt Land	Cropped wheat
BAM_A	21	38.2	22	38.7	Category 2 – Regulated Land	Open Woodland
BAM_B	25	108.7	23	54.5	Category 2 – Regulated Land	Open Woodland
BAM_C	17	42.4	25	35.3	Category 2 – Vulnerable Regulated Land	Open Woodland
BAM_D	25	60.2	19	69.3	Category 2 – Regulated Land	Open Woodland
BAM_01_SJ	11	10.4	23	90.6	Category 1 – Exempt Land (directly adjacent to Category 2 – Regulated Land)	Non Native Grassland
BAM_02_SJ	10	8.1	13	24.9	Category 1 – Exempt Land	Non Native Grassland
BAM_03_SJ	4	0.9	19	123.7	Category 1 – Exempt Land	Previous earthworks

BAM plot ID	Native Species Richness	Native Species Cover	Exotic Species Richness	Exotic Species Cover	Categorisation (proposed by ERM)	Vegetation Zone
BAM_04_SJ	2	1.1	13	88.9	Category 1 – Exempt Land	Cropped Oats
BAM_05_SJ	4	0.5	15	101.9	Category 1 – Exempt Land	Non Native Grassland
BAM_06_SJ	7	31.9	18	52.5	Category 1 – Exempt Land	Previous earthworks
BAM_07_SJ	12	33.2	21	56.2	Category 1 – Exempt Land (directly adjacent to Category 2 – regulated land)	Non Native Grassland
BAM_08_SJ	1	2.5	7	116.3	Category 1 – Exempt Land	Cropped Oats
BAM_09_SJ	2	3.0	13	101.4	Category 1 – Exempt Land	Cropped Oats
BAM_10_SJ	2	5.2	8	77.4	Category 1 – Exempt Land	Cropped Oats
BAM_11_SJ	3	6.6	16	73.5	Category 1 – Exempt Land	Cropped Oats
BAM_12_SJ	5	28.2	17	97.3	Category 1 – Exempt Land	Non Native Grassland

3.4 DISTURBANCE HISTORY

The composition and structure of vegetation proposed as Category 1 – exempt land is consistent with a history of significant disturbance. This disturbance is associated with intensive agricultural land uses, such as cropping and modified pasture management.

Imagery from 1989 clearly shows heavy disturbance in all areas mapped as '0 – Non-native grasslands' and '0 – Non-native grasslands (Cropping and earthworks), with clear differences evident between the disturbed groundcover and remnant tree vegetation.

The areas of the site used for cropping as evident in the 1989 imagery are largely consistent with current agricultral uses and findings across the Subject Land, including agriculture machinery lines and tonal differences from adjoining groundcover.

Section 60F of the LLS Act provide provisions for determining low conservation value grasslands, and 60J of the LLS Act, supported by section 114 of the LLS Regulation, allows for the classification of native vegegation to be taken as cleared if it can be demonstrated that it is significantly disturbed or modified. These provisions are addressed in **Table 3-4** and supported by **Figure 2-4**, **Figure 2-5**, **Figure 2-6** and **Figure 2-11**.

TABLE 3-4 ASSESSMENT OF LLS ACT AND LLS REGULATION PROVISIONS RELATING TO THE SUBJECT LAND

Legislation	Legislative Description	Assessment
LLS Act – Section 60F	An area is taken, during the transitional period, to be low conservation value grasslands if it comprises only groundcover whose clearing was permitted by section 20 of the NV Act. Section 20 of the NV Act states that 'the clearing of native vegetation that comprises only groundcover is permitted if: (a) the vegetation comprises less than 50% of indigenous species of vegetation, and (b) not less than 10% of the area is covered with vegetation (whether dead or alive), and (c) those percentages are calculated in accordance with the regulations.	All LCA transects contained less than 50% native groundcover vegetation. The percentage of bare ground was never more than 90% in all LCA transects.
LLS Regulation (Section 114) (which supports LLS Act (Section 60J))	(a) there has been a detectable variation (from information obtained from aerial or satellite imagery) in the structure or composition, or both, of non-woody vegetation, and	Tonal differences evident in the 1989 imagery, and still present in 1993, 1998 and currently, support a structural and/or compostional difference between lands mapped as non-native grasslands and adjoining areas.
	(b) that variation is consistent with management of pasture or crops for agricultural purposes, and	The visible machinery lines in cropping areas and high presence of exotic species (mainly annuals) in areas mapped as '0-non-native grassland (cropping and earthworks)' and '0-non-native grassland' support the view that this area has been managed for agricultural purposes, including cropping and modified pastures.
	(c) that variation has been sustained for at least 12 months on more than one occasion before the commencement of Part 5A of the Act, and	Significant vegetation disturbance and modification, demonstrated through tonal differences and machinery lines, was present in 1989. This disturbance and modification remained in place in 1993, 1998 and to the present day. This variation has been sustained for over 12 months.
	(d) that variation has not been caused only by grazing on the land, and	Clear machinery lines and tonal differences from all historical imagery indicate that the disturbance was not solely related to livestock grazing in areas used for cropping. In remaining areas the land is managed and used as modified grazing for livestock.

Legislation	Legislative Description	Assessment
	(e) that variation occurred (from information obtained from aerial or satellite imagery) between 1 January 1990 and the date of commencement of Part 5A of the Act.	The aerial imagery from 1989 (a surrogate for imagery from 1990) demonstrates significant groundcover disturbance was present on 1 January 1990, and the continuation of the disturbance is visible in historical aerial imagery from 1993 and 1998.

3.5 SUMMARY

Please refer to a summary of the analyses of the data sources in **Table 3-5**. The proposed land categorisation by ERM has been provided in Section 4. Supporting site assessment data is provided in **Appendices A - B**.

TABLE 3-5 SUMMARY OF ANALYSES OF SPATIAL DATA AND OTHER SOURCES

Data Source	Proposed Category 1 – Exempt Land	Proposed Category 2 – Regulated Land	Excluded Land	Notes
Transitional NVR Map (**Figure 2-2**)	-	The Transitional NVR Map includes areas of Category 2 – vulnerable regulated land which corresponds with the areas of woody vegetation, including scattered trees.	-	No Category 2 – sensitive regulated land occurs within the Subject Land.
Land zoning (**Figure 2-3**)	-	-	-	The development site is predominantly zoned rural (RU1 – Primary production) therefore Part 5A of the LLS Act applies and land categorisation can be determined.
Historical aerial imagery 1989 (**Figure 2-4**), 1993 (**Figure 2-5**) and 1998 (**Figure 2-6**)	A review of the historical aerial imagery confirms that significant groundcover modification and disturbance was present in 1989 and remained in place in 1993 and 1998. These areas of proposed Category 1 lands includes all areas that show evidence of cropping and / or modified pastures, as demonstrated by tonal differences, clear machinery lines, bare ground and, in some cases, bright green vegetative cover.	Areas of woody vegetation, including scattered trees, present in the 1989, 1993 and 1998 historical aerial imagery.	-	Historical aerial imagery is not available for 1990 for the Subject Land. Historical aerial imagery from 1989, 1993 and 1998 have been used as surrogates for 1990.
NSW Land Use 2017 (**Figure 2-7**)	Land use identified as: • Cropping • Grazing modified pastures	Land use identified as: • Grazing native vegetation (only small portion in northwest of the Project Area, along Sugarloaf Creek)	-	Note that some areas with 'Cropping,' and 'grazing modified pastures' land uses have not been classified as Category 1 – exempt land, as they contain scattered native trees.

Data Source	Proposed Category 1 – Exempt Land	Proposed Category 2 – Regulated Land	Excluded Land	Notes
NSW Native Vegetation Extent Raster 5m v1.4 (**Figure 2-8**)	Areas mapped as containing 'non-native' where there is historical evidence of significant groundcover disturbance or modification.	Vegetation that is identified as: • 'Tree Cover' • 'Tree Cover Matrix'	-	Areas mapped as candidate native grassland have been confirmed through detailed site investigations as non-native.
NSW State Vegetation Type Map (**Figure 2-9**)	Areas mapped as containing 'Not classified', where there is historical evidence of significant groundcover disturbance or modification.	Areas containing mapped PCTs.	-	Note where native scattered tree species occurred within land mapped as 'Not classified', these have been classified as Category 2 – regulated land.
ERM Vegetation Mapping (**Figure 2-11**)	Areas mapped as '0-non-native grassland (cropping and earthworks)' and '0-non-native grassland' These areas contain modified vegetation, with less than 50% native groundcover vegetation, and showed evidence of significant disturbance during site assessment.	Areas containing mapped PCTs and scattered trees.	-	Only areas which contained clear historical evidence of significant groundcover disturbance and modification, and contained less than 50% native groundcover vegetation, have been mapped as '0-non-native grassland (cropping and earthworks)' and '0-non-native grassland'.

3.6 PHOTOGRAPHIC EXAMPLES

This section includes photographic examples of areas proposed by ERM as Category 1 – exempt land and Category 2 – regulated land.

Images are displayed in **Table 3-6** below.

TABLE 3-6 SITE PHOTOGRAPHS AND DESCRIPTIONS

Image	Description
	Example of Category 1 – exempt land (LCA05_LM) September 2024 associated with 'Category 1 – Cropped Wheat' in the central-north of the Subject Land
	Example of Category 1 – exempt land (LCA06_LM) September 2024 associated with 'Category 1 - Cropped Oats' in the central-north of the Subject Land

Image	Description
	Example of Category 1 – exempt land (LCA07_SDJB) September 2024 associated with 'Category 1 - Non Native Grassland' in the south east of the Subject Land
	Example of Category 1 – exempt land (LCA01_LM) September 2024 associated with 'Category 1 - Non Native Grassland' in the north west of the Subject Land

Image	Description
	Example of Category 2 – regulated land (BAMa_LM) September 2024 associated with remnant vegetation along a drainage line in the south west of the Subject Land
	Example of Category 2 – regulated land. Scattered Tree recorded in September 2024, in the north west of the Subject Land

3.7 ASSESSMENT OF WHITE BOX – YELLOW BOX – BLAKELY'S RED GUM GRASSY WOODLAND AND DERIVED NATIVE GRASSLAND (CRITICALLY ENDANGERED ECOLOGICAL COMMUNITY)

3.7.1 CONTEXT ON THE ECOLOGICAL COMMUNITY

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions (referred to as Box Gum Woodland CEEC hereafter) is listed as a Critically Endangered Ecological Community (CEEC) under Part 1 of Schedule 2 of the BC Act. The Box Gum Woodland CEEC features a ground layer dominated by perennial tussock grasses and herbs interspersed with a range of forb species within the families Asteraceae and Fabaceae (Prober et al., 2017). The understorey shrubs are generally sparse or absent, and canopy species are dominated by *Eucalyptus albens* (White box)*, Eucalyptus mellidora* (Yellow box) or *Eucalyptus* (Blakely's red gum) (NSW TSSC, 2020a). The CEEC is characterised by widely spaced trees with canopies that do not touch, a projected foliage cover rarely exceeding 30%, and tree heights ranging from approximately 15 – 30 m (Prober *et al.,* 2017).

The Box Gum Woodland CEEC has experienced a large reduction in its geographic distribution due to extensive clearing which has resulted in small, isolated and highly fragmented remnants that predominantly occur in cleared landscapes with highly modified understoreys. This CEEC is also subject to threatening processes such as dryland salinity and elevated soil nitrogen that are likely to cause a continuing decline in quality of this ecological community within the near future (NWS TSSC, 2020b). Modifications to fire regimes have also been determined as an influencing factor for the decline in the structure and composition of this community, as a result of competitive interactions among understorey species decreasing species diversity (Lunt & Morgan, 2002).

The Box Gum Woodland CEEC can occur as a derived native grassland where the floristic composition and abundance can significantly vary. With the upper layer absent, there is different access to light, nutrients and soil water, some species may become more abundant than others. As such, grassland areas may be comminated by only a few characteristic species. The following species have been listed as those that are now only confined to least-disturbed remnants of the Box Gum Woodland CEEC (NSW TSSC, 2020b):

- *Dianella revoluta;*
- *Diuris dendrobioides;*
- *Microseris lanceolata;*
- *Pimelea curviflora;* and
- *Templetonia stenophylla.*

With increased grazing there has been a shift in dominant pasture species from *Themeda triandra, Austrostipa aristiglumis* and *Poa* spp to *Austrostipa falcata, Rytidosperma* spp. and *Bothriochloa macra (*NSW TSSC, 2020b). Areas of derived native grasslands that have been subject to grazing usually retain some native species and functioning ecological processes.

Agricultural production is known to have very severe impacts to the Box Gum Woodland CEEC (NSW TSSC, 2020b).

3.7.2 ASSESSMENT

Data collected from September 2024 surveys (and supported by following surveys) conducted by ERM ecologists involved conducting BAM plots and LCA transects throughout the Subject Land. Within ERM proposed Category 1 – exempt land, surveys identified flora consisted of exotic species, with native species present predominantly composed of non-endemic flora. Smaller sections of native woody vegetation have been mapped as Category 2 – regulated land by ERM. The Box Gum Woodland CEEC is characterised by the assemblage of various species as outlined in the Final Determination for the CEEC (NSW TSSC, 2020a). Several of these species were identified during field surveys, although were rarely dominant. Following identification of areas with higher native species richness and cover, a reasonable estimation of land categorisation within the Subject Land has been made largely consisting of Category 1 – exempt land. amended to exclude areas these more native areas. Areas containing patches of native woody vegetation, inclusive of scattered native trees, and areas currently mapped as Category 2 – Regulated Land on the in-force NVR Map, have been mapped as Category 2 – Regulated Land, as further discussed in **Section 4.**

Appendix A and Appendix B detail the results of the BAM plots and the LCA transects. As shown in the data of BAM_A, BAM_B, BAM_C, BAM_D, these plots consist of the highest native species cover and native species richness. These four BAM plots are located within proposed Category 2 – regulated land or Category 2 – vulnerable regulated land (in-force) mapped areas. None of the five species which are noted to be confined to least-disturbed remnants of the Box Gum Woodland CEEC were present in any plots.

The BAM plots conducted within the proposed Category 1 – exempt land area have a low native species cover and richness. The native species cover did not exceed 35% with most sitting below 10%. No BAM plots consisted of more than 12 native species present in each plot. Due to the low coverage of native grasses and forbs recorded within the site, and the high presence of exotic perennial and annual species present, it is unlikely that this CEEC would persist in land mapped as Category 1 – exempt land.

The non-native grassland areas of the Subject Land have been shown on **Figure 2-11.**

Given the extensive clearing and associated agricultural activities that have occurred at this site, and the lack of target threatened species or characteristic flora of this CEEC being present at the site based on land categorisation assessments conducted by ERM, it is highly unlikely that White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland has persisted at the site post European settlement and disturbance post 1990 and its presence cannot be confirmed.

A large proportion of the Subject Land has been subject to extensive cropping and modification of the upper soil horizons through earthworks associated with contour banks for pasture improvement. The restoration and re-establishment of this CEEC following conversion to cropping and from earthworks is highly unlikely (NSW TSSC, 2020b). Both grazing and pasture improvement lead to the reduction in understorey species diversity and richness. There is evidence of some attempts to restore woodland habitat located to the east of Tamarang Creek. During field investigations, ecologists noted that several woodland species had been planted, although were in poor condition and did not appear rehabilitating successfully.

From the results obtained from the September 2024 field surveys and historical imagery and spatial analysis, assessment of the grasslands within the proposed Category 1 – exempt land does not meet the determination for Box-Gum Woodland CEEC. There has been extensive grazing, cropping and earthworks that has occurred in the Subject Land and there is a low likelihood of persistence and re-establishment of this CEEC in the context of the landscape of Garoo Solar Farm and BESS.

4. CONCLUSION

Based on the Subject Land analysis outlined in **Sections 2 and 3,** a reasonable estimation of land categorisation for Category 1 – exempt land and Category 2 – regulated land is shown in **Figure 4-1**. Note that the Subject Land does not contain Category 2 – vulnerable regulated land, Category 2 – sensitive regulated land or Excluded Land.

4.1 CATEGORY 2 - REGULATED LAND

Areas containing patches of native woody vegetation, inclusive of scattered native trees, and areas currently mapped as Category 2 – Regulated Land on the in-force NVR Map, have been mapped as Category 2 – Regulated Land.

4.2 CATEGORY 1 - EXEMPT LAND

Areas that were cleared of woody vegetation in 1989, remained cleared between 1993, 1998 and 2024, and showed evidence of significant disturbance in the historical aerial imagery, have been mapped as Category 1 – exempt land. These areas have been modified through agricultural activity involving machinery and earthworks (i.e. irrigation channel construction) followed by cropping, irrigation and livestock grazing on modified pastures.

Site assessment through BAM plots and LCA transects, and subsequent analysis using the IGGAM calculator, returned a result of 'Low' conservation value.

Following consideration of sections 60F and 60J of the LLS Act, and section 114 of the LLS Regulation, areas mapped as '0 – Non native grassland' and '0 – Non native grassland (cropping and earthworks) in **Figure 2-11** were determined as low conservation grasslands and significantly disturbed or modified. In these circumstances, it is reasonable to conclude that these lands are taken to be cleared and are classifiable as Category 1 – exempt land.

The proposed land categorisation mapping is supported by the 2017 Land Use Dataset (State Government of NSW and Department of Planning and Environment (DPE), 2020) which indicates that areas mapped as Category 1 – exempt land have been subject to cropping and grazing of modified pastures.

The Category 1 – exempt land mapping is supported by the NSW Native Vegetation Extent 5m Raster v1.4 (State Government of NSW and DPE, 2019) which indicates that areas that were cleared of woody vegetation remained consistently cleared of woody vegetation, and vice versa.

The Category 1 – exempt land mapping is also supported by NSW State Vegetation Mapping (State Government of NSW and DPE, 2022), where most areas mapped as 'Not classified' correspond to areas demonstrating significant groundcover modification and disturbance and which contained less than 50% native groundcover vegetation, and have been mapped as Category 1 – exempt land. Note that areas that have been mapped as containing PCTs on the NSW SVTM correspond to Category 2 – regulated land.

Lastly, ERM's proposed land categorisation is supported by the draft NVR map, with areas of Category 1 – exempt land and Category 2 – regulated land predominantly corresponding to ERM's determination.

The approximate total area of Category 1 – exempt land has been determined as 348.89 ha and the approximate total area of Category 2 – regulated land has been determined as 16.39 ha. Proposed land categorisation is presented in **Figure 4-1**.

Legend

- Subject Land
- Local Road
- Track-Vehicular
- Lots
- Major Watercourse
- Minor Watercourse

Transmission Lines (existing)

- 330kV

ERM Proposed Land Categorisation

- Category 1 - Exempt Land
- Category 2 - Regulated Land
- Dam
- Infrastructure

Transitional Native Vegetation Regulatory Map

- (In-force) Category 2 - Vulnerable Regulated Land

SUGARLOAF CREEK

SUGARLOAF CREEK

GAROO ROAD

Muswellbrook 330 to Tamworth

Liddell to Tamworth

BULLS ROAD

TAMARANG CREEK

TAMARANG CREEK

Source:
Boundary: Client Provided (20250415)
Base Data: NSW DCDB/DTDB.
Imagery: ESRI World Imagery

Coordinate System:
GDA2020 MGA Zone 56

Date: 03/06/2025

Created By: NB

Drawing Size: A3

0 400m

1:11,000

4-1 Proposed Land Categorisation Mapping

Garoo Solar Farm and BESS
Land Category Assessment
GreenPulse Solar Farm and BESS Unit Trust

ERM

0751705_SolarAndBESS_LCA_G001_R0.aprx

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APPENDIX A BIODIVERSITY ASSESSMENT METHOD PLOT DATA

BAM01_LM					
Site Sheet #	BAM01_LM	Date	24/09/2024	Recorders	LB + MG
Coordinates	301086 E 6521449 N			**Orientation of midline**	292
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	2	1	0	0
15	3	0	0	0
25	2	0	0	0
35	3	0	0	0
45	2	0	0	0
Average	2.4	0.2	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Briza minor	15.0	500	-	Not Listed	-
Bromus catharticus	1.0	20	-	Not Listed	-
Capsella bursa-pastoris	0.1	1	-	Not Listed	-
Carex inversa	3.0	600	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	25.0	1,000	-	Not Listed	-
Cirsium vulgare	0.2	30	-	Not Listed	-
Cotula australis	0.1	20	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	20.0	1,000	-	Not Listed	-
Cynodon dactylon	5.0	50	Grass & grasslike (GG)	Not Listed	-
Geranium solanderi	0.1	20	Forb (FG)	Not Listed	-
Hypochaeris radicata	0.1	20	-	Not Listed	-
Lolium rigidum	0.1	10	-	Not Listed	-
Lysimachia arvensis	0.1	20	-	Not Listed	-
Medicago polymorpha	5.0	200	-	Not Listed	-
Plantago lanceolata	0.1	20	-	Not Listed	-
Rumex brownii	0.1	20	Forb (FG)	Not Listed	-
Setaria parviflora	0.1	1	-	Not Listed	-
Sonchus spp.	0.1	2	Forb (FG)	Not Listed	-
Sporobolus creber	1.0	15	Grass & grasslike (GG)	Not Listed	-
Trifolium repens	20.0	500	-	Not Listed	-
Trifolium subterraneum	15.0	500	-	Not Listed	-
Verbena litoralis	0.1	2	-	Not Listed	-
Veronica arvensis	4.0	300	-	Not Listed	-
Vulpia bromoides	0.1	20	-	Not Listed	-

BAM02_LM					
Site Sheet #	BAM02_LM	Date	24/09/2024	Recorders	LB + MG
Coordinates	300974 E 6521066 N			Orientation of midline	199
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	0	0	0
15	2	0	0	0
25	3	0	0	0
35	2	0	0	0
45	1	0	0	0
Average	1.8	0	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	1.0	50	-	Not Listed	-
Capsella bursa-pastoris	0.1	20	-	Not Listed	-
Carex inversa	3.0	500	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	2.0	100	-	Not Listed	-
Cirsium vulgare	0.2	15	-	Not Listed	-
Cyclospermum leptophyllum	0.5	500	-	Not Listed	-
Cynodon dactylon	5.0	300	Grass & grasslike (GG)	Not Listed	-
Geranium solanderi	0.1	20	Forb (FG)	Not Listed	-
Hirschfeldia incana	0.1	2	-	Not Listed	-
Lolium rigidum	25.0	800	-	Not Listed	-
Lysimachia arvensis	0.1	20	-	Not Listed	-
Malva parviflora	0.1	6	-	Not Listed	-
Medicago polymorpha	10.0	500	-	Not Listed	-
Modiola caroliniana	0.1	5	-	Not Listed	-
Plantago lanceolata	2.0	100	-	Not Listed	-
Rumex brownii	0.1	30	Forb (FG)	Not Listed	-
Silybum marianum	0.1	5	-	Not Listed	-
Soliva sessilis	1.0	100	-	Not Listed	-
Trifolium arvense	1.0	100	-	Not Listed	-
Trifolium repens	20.0	500	-	Not Listed	-
Trifolium subterraneum	25.0	800	-	Not Listed	-
Veronica arvensis	5.0	1,000	-	Not Listed	-
Vulpia bromoides	5.0	800	-	Not Listed	-

BAM03_LM					
Site Sheet #	BAM03_LM	Date	24/09/2024	Recorders	LB + MG
Coordinates	301287 E 6521200 N			Orientation of midline	174
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	4	1	0	0
15	2	1	0	0
25	2	0	0	0
35	1	0	0	0
45	3	1	0	0
Average	2.4	0.6	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	0.1	20	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	2.0	100	-	Not Listed	-
Bromus hordeaceus	0.2	20	-	Not Listed	-
Capsella bursa-pastoris	0.1	6	-	Not Listed	-
Carex inversa	0.1	20	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.2	200	-	Not Listed	-
Cirsium vulgare	0.2	30	-	Not Listed	-
Cyclospermum leptophyllum	15.0	800	-	Not Listed	-
Cynodon dactylon	30.0	1,000	Grass & grasslike (GG)	Not Listed	-
Geranium solanderi	0.1	2	Forb (FG)	Not Listed	-
Lactuca spp.	0.1	10	-	Not Listed	-
Lolium rigidum	2.0	200	-	Not Listed	-
Lysimachia arvensis	0.2	60	-	Not Listed	-
Medicago polymorpha	20.0	500	-	Not Listed	-
Plantago lanceolata	0.2	50	-	Not Listed	-
Rumex brownii	0.1	20	Forb (FG)	Not Listed	-
Sherardia arvensis	0.1	10	-	Not Listed	-
Silybum marianum	0.1	4	-	Not Listed	-
Sporobolus creber	4.0	100	Grass & grasslike (GG)	Not Listed	-
Trifolium arvense	5.0	200	-	Not Listed	-
Trifolium repens	15.0	200	-	Not Listed	-
Trifolium subterraneum	20.0	500	-	Not Listed	-
Verbena litoralis	0.2	200	-	Not Listed	-
Vulpia bromoides	0.1	20	-	Not Listed	-
Wahlembergia spp.	0.1	15	Forb (FG)	Not Listed	-

BAM04_LM					
Site Sheet #	BAM04_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301616 E 6521266 N			Orientation of midline	2
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	35	0	0
15	5	70	0	0
25	15	50	0	0
35	3	40	0	0
45	4	70	0	0
Average	6.4	53	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	2.0	80	-	Not Listed	-
Cyclospermum leptophyllum	0.1	2	-	Not Listed	-
Hordeum vulgare	0.2	50	-	Not Listed	-
Lolium rigidum	2.0	100	-	Not Listed	-
Medicago polymorpha	0.1	5	-	Not Listed	-
Oxalis perennans	0.1	2	Forb (FG)	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Triticum aestivum	80.0	800	-	Not Listed	-

BAM05_LM					
Site Sheet #	BAM05_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301749 E 6521107 N			Orientation of midline	164
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	1	0	0
15	10	1	0	0
25	10	3	0	0
35	10	4	0	0
45	10	1	0	0
Average	9	2	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Hordeum vulgare	0.1	5	-	Not Listed	-
Lolium rigidum	5.0	100	-	Not Listed	-
Oxalis perennans	0.1	2	Forb (FG)	Not Listed	-
Triticum aestivum	90.0	100	-	Not Listed	-

BAM06_LM					
Site Sheet #	BAM06_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301885 E 6521044 N			Orientation of midline	156
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	4	1	0	0
15	2	1	0	0
25	2	0	0	0
35	1	0	0	0
45	3	1	0	0
Average	2.4	0.6	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Arctotheca calendula	1.0	30	-	Not Listed	-
Avena sativa	40.0	500	-	Not Listed	-
Capsella bursa-pastoris	1.0	100	-	Not Listed	-
Cerastium glomeratum	1.0	200	-	Not Listed	-
Cirsium vulgare	0.1	1	-	Not Listed	-
Cotula australis	2.0	1,000	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	50	Forb (FG)	Not Listed	-
Erodium cicutarium	0.1	50	-	Not Listed	-
Lamium amplexicaule	0.1	5	-	Not Listed	-
Lepidium africanum	0.1	10	-	Not Listed	-
lysimachia arvensis	0.1	5	-	Not Listed	-
Malva parviflora	0.1	5	-	Not Listed	-
Medicago polymorpha	5.0	200	-	Not Listed	-
Plantago lanceolata	0.2	40	-	Not Listed	-
Poa annua	5.0	60	-	Not Listed	-
Polygonum aviculare	1.0	100	-	Not Listed	-
Soliva pterosperma	1.0	60	-	Not Listed	-
Sonchus oleraceus	0.1	1	-	Not Listed	-
Spergularia rubra	0.1	3	-	Not Listed	-
Trifolium repens	15.0	500	-	Not Listed	-
Trifolium subterraneum	2.0	200	-	Not Listed	-

BAM07_LM					
Site Sheet #	BAM07_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301374 E 6520948 N			Orientation of midline	50
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	30	10	0	0
15	15	30	0	0
25	25	30	0	0
35	15	40	0	0
45	15	40	0	0
Average	20	30	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Hordeum vulgare	0.5	20	-	Not Listed	-
Triticum aestivum	90.0	1,000	-	Not Listed	-

BAM08_LM					
Site Sheet #	BAM08_LM	Date	26/09/2024	Recorders	LB + MG
Coordinates	300902 E 6520509 N			Orientation of midline	205
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	5	0	0
15	2	15	0	0
25	1	5	0	0
35	1	2	0	0
45	1	5	0	0
Average	1.2	6.4	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	0.1	10	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.1	10	-	Not Listed	-
Capsella bursa-pastoris	0.2	100	-	Not Listed	-
Carex inversa	0.1	30	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.1	20	-	Not Listed	-
Cirsium vulgare	0.1	5	-	Not Listed	-
Cotula australis	0.1	50	Forb (FG)	Not Listed	-
Cynodon dactylon	15.0	100	Grass & grasslike (GG)	Not Listed	-
Hordeum vulgare	0.1	1	-	Not Listed	-
Lolium rigidum	5.0	200	-	Not Listed	-
Medicago polymorpha	25.0	200	-	Not Listed	-
Phalaris spp.	0.5	150	-	Not Listed	-
Plantago lanceolata	0.1	30	-	Not Listed	-
Poa annua	0.1	20	-	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Rumex brownii	0.1	1	Forb (FG)	Not Listed	-
Sonchus oleraceus	0.1	1	-	Not Listed	-
Sporobolus creber	5.0	40	Grass & grasslike (GG)	Not Listed	-
Trifolium repens	50.0	1,000	-	Not Listed	-
Trifolium subterraneum	0.1	20	-	Not Listed	-
Veronica arvensis	0.1	50	-	Not Listed	-
Vulpia bromoides	0.1	50	-	Not Listed	-
Wahlenbergia spp.	0.1	15	Forb (FG)	Not Listed	-

BAM010_LM					
Site Sheet #	BAM10_LM	Date	27/09/2024	Recorders	LB + MG
Coordinates	301434 E 6520723 N			Orientation of midline	12
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	2	20	0	0
15	1	5	0	0
25	1	20	0	0
35	0	20	0	0
45	2	30	0	0
Average	1.2	19	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	0.1	1	-	Not Listed	-
Lolium rigidum	0.1	10	-	Not Listed	-
Medicago polymorpha	0.1	5	-	Not Listed	-
Polygonum aviculare	0.1	1	-	Not Listed	-
Trifolium repens	0.1	2	-	Not Listed	-
Triticum aestivum	5.0	800	-	Not Listed	-

BAMA_LM					
Site Sheet #	BAMA_LM	Date	26/09/2024	Recorders	LB + MG
Coordinates	300747 E 6520372 N			Orientation of midline	330
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	10	5	0	0
15	10	5	0	0
25	5	8	0	0
35	20	2	0	1
45	5	10	0	1
Average	10	6	0	0.4

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Acaena novae-zelandiae	0.1	5	Forb (FG)	Not Listed	-
Asperula conferta	0.1	10	Forb (FG)	Not Listed	-
Bothriochloa decipiens	0.2	10	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.1	5	-	Not Listed	-
Capsella bursa-pastoris	0.1	5	-	Not Listed	-
Carex inversa	0.1	20	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.5	200	-	Not Listed	-
Chloris ventricosa	0.5	30	Grass & grasslike (GG)	Not Listed	-
Chrysocephalum apiculatum	0.5	20	Forb (FG)	Not Listed	-
Cirsium vulgare	0.1	20	-	Not Listed	-
Cotula australis	0.1	30	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.5	50	-	Not Listed	-
Cynodon dactylon	20.0	500	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.1	5	Other (OG)	Not Listed	-
Dichondra repens	0.5	200	Forb (FG)	Not Listed	-
Echium plantagineum	0.1	5	-	Not Listed	-
Einadia nutans	0.1	5	Forb (FG)	Not Listed	-
Eucalyptus albens	15.0	3	Tree (TG)	Not Listed	-
Galium aparine	0.1	30	-	Not Listed	-
Geranium solanderi	0.1	200	Forb (FG)	Not Listed	-
Goodenia pinnatifida	0.1	2	Forb (FG)	Not Listed	-
Hirschfeldia incana	0.1	2	-	Not Listed	-
Lamium amplexicaule	0.1	2	-	Not Listed	-
Lobelia purpurascens	0.1	10	Forb (FG)	Not Listed	-
Lolium rigidum	20.0	500	-	Not Listed	-
Lomandra filiformis	0.1	5	Grass & grasslike (GG)	Not Listed	-
Malva parviflora	0.1	1	-	Not Listed	-
Medicago polymorpha	0.1	50	-	Not Listed	-
Oxalis perennans	0.1	3	Forb (FG)	Not Listed	-
Paronychia brasiliana	0.1	20	-	Not Listed	-

BAMA_LM					
Plantago debilis	0.1	5	Forb (FG)	Not Listed	-
Plantago lanceolata	0.5	50	-	Not Listed	-
Poa annua	0.1	20	-	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Rosa rubiginosa	0.5	4	-	Not Listed	High Threat Weed
Rumex brownii	0.1	4	Forb (FG)	Not Listed	-
Sherardia arvensis	15.0	200	-	Not Listed	-
Silybum marianum	0.1	2	-	Not Listed	-
Sonchus oleraceus	0.1	15	-	Not Listed	-
Stellaria media	0.2	20	-	Not Listed	-
Trifolium repens	0.1	20	-	Not Listed	-
Urtica incisa	0.1	6	Forb (FG)	Not Listed	-
Zornia dyctiocarpa	0.1	4	Forb (FG)	Not Listed	-

BAMB_LM					
Site Sheet #	BAMB_LM	Date	27/09/2024	Recorders	LB + MG
Coordinates	300420 E 6520584 N			Orientation of midline	220
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	35	0	0	0
15	25	0	0	0
25	30	0	0	0
35	20	0	0	0
45	30	20	0	1
Average	28	4	0	0.2

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Acaena novae-zelandiae	0.1	2	Forb (FG)	Not Listed	-
Angophora floribunda	5.0	0	Tree (TG)	Not Listed	-
Bothriochloa decipiens	0.1	10	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	1.0	50	-	Not Listed	-
Chloris ventricosa	0.1	6	Grass & grasslike (GG)	Not Listed	-
Capsella bursa-pastoris	0.2	50	-	Not Listed	-
Carex inversa	20.0	600	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.1	100	-	Not Listed	-
Chrysocephalum apiculatum	0.1	50	Forb (FG)	Not Listed	-
Cirsium vulgare	0.5	20	-	Not Listed	-
Carex breviculmis	0.1	5	Grass & grasslike (GG)	Not Listed	-
Cotula australis	0.1	60	Forb (FG)	Not Listed	-
Cynodon dactylon	40.0	1,000	Grass & grasslike (GG)	Not Listed	-
Desmodium spp.	2.0	100	Other (OG)	Not Listed	-
Desmodium varians	0.1	15	Other (OG)	Not Listed	-
Dichondra repens	2.0	500	Forb (FG)	Not Listed	-
Einadia nutans	0.1	10	Forb (FG)	Not Listed	-
Eucalyptus blakelyi	15.0	3	Tree (TG)	Not Listed	-
Galium aparine	1.0	50	-	Not Listed	-
Geranium solanderi	15.0	200	Forb (FG)	Not Listed	-
Glycine tabacina	0.1	10	Other (OG)	Not Listed	-
Goodenia pinnatifida	0.2	20	Forb (FG)	Not Listed	-
Hirschfeldia incana	0.1	1	-	Not Listed	-
Hydrocotyle hirta	5.0	200	Forb (FG)	Not Listed	-
Lactuca spp.	0.1	5	-	Not Listed	-
Lolium rigidum	30.0	500	-	Not Listed	-
Lysimachia arvensis	0.1	10	-	Not Listed	-
Medicago orbicularis	0.1	20	-	Not Listed	-
Medicago polymorpha	15.0	200	-	Not Listed	-
Modiola caroliniana	0.1	5	-	Not Listed	-

BAMB_LM					
Olearia elliptica	0.1	1	Shrub (SG)	Not Listed	-
Paronychia brasiliana	0.1	20	-	Not Listed	-
Plantago lanceolata	2.0	60	-	Not Listed	-
Polygonum aviculare	0.1	10	-	Not Listed	-
Rosa rubiginosa	0.1	1	-	Not Listed	-
Rumex brownii	0.1	10	Forb (FG)	Not Listed	-
Senecio spp.	0.1	2	Forb (FG)	Not Listed	-
Sherardia arvensis	0.1	50	-	Not Listed	-
Solanum chenopodinum	0.1	1	Shrub (SG)	Not Listed	-
Sonchus oleraceus	0.1	20	-	Not Listed	-
Sporobolus creber	3.0	30	Grass & grasslike (GG)	Not Listed	-
Stellaria media	1.0	60	-	Not Listed	-
Trifolium arvense	0.1	100	-	Not Listed	-
Trifolium glomeratum	0.1	10	-	Not Listed	-
Trifolium repens	2.0	50	-	Not Listed	-
Trifolium subterraneum	0.5	50	-	Not Listed	-
Urtica incisa	0.1	10	Forb (FG)	Not Listed	-
Wahlenbergia spp.	0.1	2	Forb (FG)	Not Listed	-

BAMC_LM					
Site Sheet #	BAMC_LM	Date	27/09/2024	Recorders	LB + MG
Coordinates	301442 E 6520399 N			Orientation of midline	150
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	20	80	0	0
15	5	20	0	4
25	2	30	0	60
35	10	30	0	0
45	5	10	15	45
Average	8.4	34	3	21.8

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Angophora floribunda	5.0	3	Tree (TG)	Not Listed	-
Ssperula conferta	0.1	30	Forb (FG)	Not Listed	-
Bidens pilosa	0.1	40	-	Not Listed	High Threat Weed
Bromus catharticus	0.1	20	-	Not Listed	-
Capsella bursa-pastoris	0.1	40	-	Not Listed	-
Carex inversa	0.2	30	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.2	100	-	Not Listed	-
Cirsium vulgare	0.1	20	-	Not Listed	-
Cotula australis	0.1	50	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	20	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.1	100	-	Not Listed	-
Cynodon dactylon	20.0	1,000	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.1	10	Other (OG)	Not Listed	-
Dichondra repens	0.2	30	Forb (FG)	Not Listed	-
Einadia nutans	0.1	2	Forb (FG)	Not Listed	-
Erodium cicutarium	0.1	20	-	Not Listed	-
Galium aparine	0.5	100	-	Not Listed	-
Geranium solanderi	0.5	100	Forb (FG)	Not Listed	-
Hardenbergia violacea	0.1	20	Other (OG)	Not Listed	-
Lactuca spp.	0.1	2	-	Not Listed	-
Lamium amplexicaule	0.1	10	-	Not Listed	-
Lysimachia arvensis	0.1	20	-	Not Listed	-
Medicago orbicularis	2.0	50	-	Not Listed	-
Medicago polymorpha	20.0	1,000	-	Not Listed	-
Modiola caroliniana	0.1	20	-	Not Listed	-
Notelaea microcarpa	15.0	1	Tree (TG)	Not Listed	-
Phalaris spp.	0.1	10	-	Not Listed	-
Plantago lanceolata	0.1	50	-	Not Listed	-
Polygonum arenastrum	0.1	30	-	Not Listed	-
Rosa rubiginosa	0.1	10	-	Not Listed	High Threat Weed

BAMC_LM					
Rumex brownii	0.1	4	Forb (FG)	Not Listed	-
Schinus molle	10.0	0	-	Not Listed	-
Sherardia arvensis	0.1	10	-	Not Listed	-
Sida rhombifolia	0.5	20	-	Not Listed	-
Solanum chenopodinum	0.1	3	Shrub (SG)	Not Listed	-
Soliva sessilis	0.2	60	-	Not Listed	-
Sonchus oleraceus	0.1	1	-	Not Listed	-
Sporobolus creber	0.1	2	Grass & grasslike (GG)	Not Listed	-
Trifolium glomeratum	0.1	30	-	Not Listed	-
Trifolium repens	0.2	200	-	Not Listed	-
Urtica incisa	0.5	30	Forb (FG)	Not Listed	-
Zornia dyctiocarpa	0.1	15	Forb (FG)	Not Listed	-

BAMD_LM					
Site Sheet #	BAMD_LM	Date	27/06/2024	Recorders	LB + MG
Coordinates	300827 E 6521208 N			Orientation of midline	300
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	20	40	0	10
15	16	2	0	0
25	30	0	0	8
35	20	0	0	0
45	10	0	0	0
Average	19.2	8.4	0	3.6

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Asperula conferta	10.0	300	Forb (FG)	Not Listed	-
Austrostipa spp.	0.2	15	Grass & grasslike (GG)	Not Listed	-
Bothriochloa decipiens	0.2	30	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.1	10	--	Not Listed	-
Bursaria spinosa	10.0	8	Shrub (SG)	Not Listed	-
Calotis spp.	0.1	5	Forb (FG)	Not Listed	-
Capsella bursa-pastoris	0.1	20		Not Listed	-
Carex inversa	0.5	100	Grass & grasslike (GG)	Not Listed	-
Chloris spp.	0.1	10	Grass & grasslike (GG)	Not Listed	-
Chrysocephalum apiculatum	0.1	50	Forb (FG)	Not Listed	-
Cirsium vulgare	0.1	10	-	Not Listed	-
Cynodon dactylon	5.0	100	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.5	20	Other (OG)	Not Listed	-
Dichondra repens	0.1	20	Forb (FG)	Not Listed	-
Einadia nutans	0.1	10	Forb (FG)	Not Listed	-
Eucalyptus albens	15.0	2	Tree (TG)	Not Listed	-
Eucalyptus melliodora	8.0	1	Tree (TG)	Not Listed	-
Galium aparine	0.1	60	-	Not Listed	-
Geranium solanderi	0.2	40	Forb (FG)	Not Listed	-
Glycine tabacina	0.2	50	Other (OG)	Not Listed	-
Hydrocotyle hirta	4.0	500	Forb (FG)	Not Listed	-
Lolium rigidum	50.0	1,000	-	Not Listed	-
Lomandra multiflora	0.1	2	Grass & grasslike (GG)	Not Listed	-
Medicago arabica	0.1	10	-	Not Listed	-
Medicago orbicularis	0.1	10	-	Not Listed	-
Medicago polymorpha	10.0	500	-	Not Listed	-
Modiola caroliniana	0.1	5	-	Not Listed	-
Notelaea microcarpa	0.1	1	Tree (TG)	Not Listed	-
Plantago lanceolata	2.0	100	-	Not Listed	-
Rosa rubiginosa	0.1	3	-	Not Listed	High Threat Weed - not manageable

BAMD_LM					
Rumex brownii	0.1	6	Forb (FG)	Not Listed	-
Schinus molle	3.0	0	-	Not Listed	-
Sherardia arvensis	0.1	20	-	Not Listed	-
Silybum marianum	0.1	10	-	Not Listed	-
Solanum chenopodinum	0.1	2	Shrub (SG)	Not Listed	-
Sonchus oleraceus	0.1	15	-	Not Listed	-
Sporobolus creber	5.0	60	Grass & grasslike (GG)	Not Listed	-
Stellaria media	1.0	80	-	Not Listed	-
Trifolium arvense	0.1	10	-	Not Listed	-
Trifolium glomeratum	0.1	10	-	Not Listed	-
Trifolium repens	2.0	60	-	Not Listed	-
Urtica incisa	0.2	20	Forb (FG)	Not Listed	-

BAM01_SJ					
Site Sheet #	BAM01_SJ	Date	24/09/2024	Recorders	SD + JB
Coordinates	303389 E 6521145 N			Orientation of midline	236
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	0	0	0
15	1	0	0	0
25	0	0	0	1
35	1	0	0	0
45	0	0	0	0
Average	0.6	0	0	0.2

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	0.2	20	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	5.0	150	-	Not Listed	-
Bromus hordeaceus	2.5	85	-	Not Listed	-
Capsella bursa-pastoris	0.1	20	-	Not Listed	-
Carex inversa	1.0	150	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	4.0	250	-	Not Listed	-
Chrysocephalum apiculatum	0.1	30	Forb (FG)	Not Listed	-
Cirsium vulgare	0.2	25	-	Not Listed	-
Cotula australis	0.2	100	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	4.0	300	-	Not Listed	-
Cynodon dactylon	7.0	350	Grass & grasslike (GG)	Not Listed	-
Festuca pratensis	0.2	20	-	Not Listed	-
Geranium solanderi	1.0	100	Forb (FG)	Not Listed	-
Hordeum leporinum	0.1	5	-	Not Listed	-
Hypochaeris glabra	0.1	10	-	Not Listed	-
Juncus usitatus	0.1	4	Grass & grasslike (GG)	Not Listed	-
Lactuca serriola	0.1		-	Not Listed	-
Lolium perenne	5.0	350	-	Not Listed	-
Lolium rigidum	45.0	1,000	-	Not Listed	-
Lysimachia arvensis	0.1	12	-	Not Listed	-
Medicago polymorpha	10.0	350	-	Not Listed	-
Modiola caroliniana	0.1	25	-	Not Listed	-
Poa annua	0.2	10	-	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Ranunculus sessiliflorus	0.1	30	Forb (FG)	Not Listed	-
Rumex brownii	0.1	4	Forb (FG)	Not Listed	-
Rytidosperma fulvum	0.3	75	Grass & grasslike (GG)	Not Listed	-
Sonchus oleraceus	0.1	6	-	Not Listed	-
Sporobolus creber	0.3	50	Grass & grasslike (GG)	Not Listed	-
Trifolium arvense	0.1	20	-	Not Listed	-

BAM01_SJ					
Trifolium campestre	10.0	300	-	Not Listed	-
Trifolium glomeratum	0.1	50	-	Not Listed	-
Trifolium subterraneum	1.0	200	-	Not Listed	-
Vulpia myuros	2.5	35	-	Not Listed	-

BAM02_SJ					
Site Sheet #	BAM02_SJ	Date	24/09/2024	Recorders	SD + JB
Coordinates	303095 E 6520624 N			Orientation of midline	236
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	0.5	0	1
15	1	1	0	0
25	1	1	0	0
35	0	0	0	2
45	1	0	0	1
Average	0.8	0.5	0	0.8

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	2.0	30	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	1.0	15	-	Not Listed	-
Capsella bursa-pastoris	0.1	6	-	Not Listed	-
Carex inversa	2.5	350	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.2	50	-	Not Listed	-
Cirsium vulgare	0.5	12	-	Not Listed	-
Cyclospermum leptophyllum	5.0	1,000	-	Not Listed	-
Cynodon dactylon	2.0	35	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.1	3	Other (OG)	Not Listed	-
Glycine tabacina	0.1	4	Other (OG)	Not Listed	-
Juncus australis	1.0	6	Grass & grasslike (GG)	Not Listed	-
Lolium perenne	1.0	15	-	Not Listed	-
Medicago polymorpha	5.0	500	-	Not Listed	-
Poa annua	1.0	50	-	Not Listed	-
Rumex brownii	0.1	5	Forb (FG)	Not Listed	-
Rytidosperma fulvum	0.1	3	Grass & grasslike (GG)	Not Listed	-
Setaria parviflora	1.0	75	-	Not Listed	-
Sida corrugata	0.1	7	Forb (FG)	Not Listed	-
Sonchus oleraceus	0.1	8	-	Not Listed	-
Trifolium arvense	2.0	50	-	Not Listed	-
Trifolium campestre	5.0	500	-	Not Listed	-
Trifolium subterraneum	3.0	200	-	Not Listed	-
Wahlenbergia spp.	0.1	10	Forb (FG)	Not Listed	-

BAM03_SJ					
Site Sheet #	BAM03_SJ	Date	24/09/2024	Recorders	SD + JB
Coordinates	302876 E 6520972 N			Orientation of midline	345
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0	0	0	0
15	0.1	0.1	0	0
25	0.1	0	0	0
35	0.1	0	0	0
45	0.5	0	0	0
Average	0.16	0.02	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Briza minor	0.5	100	-	Not Listed	-
Bromus catharticus	20.0	150	-	Not Listed	-
Bromus hordeaceus	5.0	150	-	Not Listed	-
Capsella bursa-pastoris	0.1	10	-	Not Listed	-
Carex inversa	0.5	50	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	2.0	75	-	Not Listed	-
Cirsium vulgare	1.0	30	-	Not Listed	-
Cotula australis	0.1	25	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	2.0	200	-	Not Listed	-
Juncus australis	0.2	3	Grass & grasslike (GG)	Not Listed	-
Lactuca serriola	0.1	5	-	Not Listed	-
Lolium perenne	25.0	500	-	Not Listed	-
Medicago polymorpha	10.0	500	-	Not Listed	-
Modiola caroliniana	0.2	50	-	Not Listed	-
Poa annua	5.0	350	-	Not Listed	-
Rumex brownii	0.1	3	Forb (FG)	Not Listed	-
Soliva sessilis	0.1	25	-	Not Listed	-
Sonchus asper	0.1	8	-	Not Listed	-
Trifolium repens	2.5	350	-	Not Listed	-
Trifolium subterraneum	50.0	1,000	-	Not Listed	-
Veronica arvensis	0.1	5	-	Not Listed	-

BAM04_SJ					
Site Sheet #	BAM04_SJ	Date	25/09/2024	Recorders	SD + JB
Coordinates	302226 E 6520531 N			Orientation of midline	62
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	50	40	0	0.1
15	40	20	0	0.5
25	10	20	0	0.1
35	5	10	0	0.1
45	5	20	0	0
Average	22	22	0	0.16

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	40.0	1,000	-	Not Listed	-
Capsella bursa-pastoris	0.5	200	-	Not Listed	-
Cerastium glomeratum	0.1	100	-	Not Listed	-
Cotula australis	1.0	500	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	25	Forb (FG)	Not Listed	-
Conyza sumatrensis	0.1	12	-	Not Listed	-
Hordeum leporinum	0.1	2	-	Not Listed	-
Juncus bufonius	0.5	200	-	Not Listed	-
Lolium perenne	40.0	1,000	-	Not Listed	-
Medicago polymorpha	0.2	100	-	Not Listed	-
Poa annua	2.0	500	-	Not Listed	-
Polycarpon tetraphyllum	0.1	30	-	Not Listed	-
Polygonum aviculare	5.0	800	-	Not Listed	-
Sonchus oleraceus	0.1	10	-	Not Listed	-
Trifolium subterraneum	0.2	25	-	Not Listed	-

BAM05_SJ					
Site Sheet #	BAM05_SJ	Date	25/09/2024	Recorders	SD + JB
Coordinates	302991 E 6519965 N			Orientation of midline	52
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0	0	0	0
15	0	0	0	0
25	0.1	0	0	0
35	0.1	0	0	0
45	0.1	0	0	0
Average	0.06	0	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	6.0	300	-	Not Listed	-
Bromus hordeaceus	5.0	250	-	Not Listed	-
Capsella bursa-pastoris	0.5	350	-	Not Listed	-
Carex inversa	0.1	25	Grass & grasslike (GG)	Not Listed	-
Centaurea solstitialis	0.8	50	-	Not Listed	-
Cerastium glomeratum	0.2	100	-	Not Listed	-
Cirsium vulgare	3.0	50	-	Not Listed	-
Cotula australis	0.1	30	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.5	500	-	Not Listed	-
Cynodon dactylon	0.2	12	Grass & grasslike (GG)	Not Listed	-
Erodium cicutarium	0.1	35	-	Not Listed	-
Hordeum leporinum	15.0	1,000	-	Not Listed	-
Lolium perenne	20.0	1,000	-	Not Listed	-
Lysimachia arvensis	0.1	15	-	Not Listed	-
Medicago polymorpha	25.0	1,000	-	Not Listed	-
Poa annua	0.5	200	-	Not Listed	-
Rumex crispus	0.2	15	-	Not Listed	-
Trifolium subterraneum	25.0	1,000	-	Not Listed	-
Urtica incisa	0.1	3	Forb (FG)	Not Listed	-

BAM06_SJ					
Site Sheet #	BAM06_SJ	Date	25/09/2024	Recorders	SD + JB
Coordinates	302798 E 6520255 N			Orientation of midline	3
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0.2	0.1	0	0.1
15	0.4	0.2	0	0
025	0.1	0.1	0	0.1
35	0.4	0.2	0	0.1
45	0.5	0.5	0	0.1
Average	0.32	0.22	0	0.08

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Capsella bursa-pastoris	0.2	200	-	Not Listed	-
Cerastium glomeratum	0.2	200	-	Not Listed	-
Chloris truncata	0.1	4	Grass & grasslike (GG)	Not Listed	-
Cirsium vulgare	0.5	30	-	Not Listed	-
Cotula australis	1.0	500	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	1.0	250	-	Not Listed	-
Cynodon dactylon	30.0	1,000	Grass & grasslike (GG)	Not Listed	-
Juncus australis	0.5	8	Grass & grasslike (GG)	Not Listed	-
Juncus bufonius	0.2	100	-	Not Listed	-
Lolium perenne	15.0	1,000	-	Not Listed	-
Lolium rigidum	15.0	1,000	-	Not Listed	-
Lysimachia arvensis	0.1	200	-	Not Listed	-
Lythrum hyssopifolia	0.1	4	Forb (FG)	Not Listed	-
Malva parviflora	0.2	85	-	Not Listed	-
Medicago polymorpha	2.0	200	-	Not Listed	-
Medicago sativa	10.0	500	-	Not Listed	-
Modiola caroliniana	0.5	250	-	Not Listed	-
Rumex brownii	0.1	3	Forb (FG)	Not Listed	-
Senecio spp.	0.1	10	Forb (FG)	Not Listed	-
Soliva sessilis	0.1	20	-	Not Listed	-
Sonchus oleraceus	0.1	25	-	Not Listed	-
Trifolium arvense	0.2	100	-	Not Listed	-
Trifolium campestre	0.2	100	-	Not Listed	-
Trifolium repens	5.0	250	-	Not Listed	-
Trifolium subterraneum	2.0	350	-	Not Listed	-

BAM07_SJ					
Site Sheet #	BAM07_SJ	Date	26/09/2024	Recorders	SD + JB
Coordinates	303564 E 6521103 N			Orientation of midline	84
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0.1	0.5	0	0
15	0.1	0.5	0	0.1
025	0.2	0.5	0	0.1
35	0.2	0.1	0	0
45	0.2	0.1	0	0.1
Average	0.16	0.34	0	0.06

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Ammi majus	0.1	15	-	Not Listed	-
Austrostipa verticillata	0.1	2	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.2	15	-	Not Listed	-
Bromus hordeaceus	0.5	180	-	Not Listed	-
Capsella bursa-pastoris	0.2	300	-	Not Listed	-
Carex inversa	0.2	200	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	2.0	500	-	Not Listed	-
Chloris truncata	1.0	40	Grass & grasslike (GG)	Not Listed	-
Cirsium vulgare	0.5	20	-	Not Listed	-
Cotula australis	5.0	500	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	100	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	25.0	1,000	-	Not Listed	-
Cymbonotus preissianus	0.1	15	Forb (FG)	Not Listed	-
Eragrostis parviflora	5.0	50	Grass & grasslike (GG)	Not Listed	-
Erodium cicutarium	0.1	30	-	Not Listed	-
Geranium solanderi	0.1	200	Forb (FG)	Not Listed	-
Hordeum leporinum	0.1	6	-	Not Listed	-
Hypericum perforatum	0.2	50	-	Not Listed	High Threat Weed
Juncus australis	1.0	10	Grass & grasslike (GG)	Not Listed	-
Lactuca serriola	0.1	25	-	Not Listed	-
Lolium rigidum	5.0	250	-	Not Listed	-
Medicago polymorpha	15.0	800	-	Not Listed	-
Plantago lanceolata	1.5	800	-	Not Listed	-
Polygonum aviculare	0.1	50	-	Not Listed	-
Rumex brownii	0.5	35	Forb (FG)	Not Listed	-
Sherardia arvensis	0.1	150	-	Not Listed	-
Soliva sessilis	0.1	35	-	Not Listed	-
Sporobolus creber	20.0	500	Grass & grasslike (GG)	Not Listed	-
Trifolium campestre	0.2	150	-	Not Listed	-
Trifolium glomeratum	0.1	15	-	Not Listed	-

BAM07_SJ					
Trifolium subterraneum	5.0	800	-	Not Listed	-
Verbena bonariensis	0.1	30	-	Not Listed	-
wahlenbergia spp.	0.1	5	Forb (FG)	Not Listed	-

BAM08_SJ					
Site Sheet #	BAM08_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302409 E 6521214 N			Orientation of midline	320
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	10	0	0
15	1	20	0	0
025	40	10	0	0
35	5	10	0	0
45	10	20	0	0
Average	12.2	14	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	50.0	1,000	-	Not Listed	-
Capsella bursa-pastoris	1.0	100	-	Not Listed	-
Cotula australis	2.5	500	Forb (FG)	Not Listed	-
Lamium amplexicaule	0.2	150	-	Not Listed	-
Lolium perenne	35.0	1,000	-	Not Listed	-
Poa annua	5.0	500	-	Not Listed	-
Polygonum aviculare	25.0	850	-	Not Listed	-
Sonchus oleraceus	0.1	25	-	Not Listed	-

BAM09_SJ					
Site Sheet #	BAM09_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302235 E 6520850 N			Orientation of midline	225
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	30	40		0.1
15	20	50		0.5
025	10	60		1
35	10	40		1
45	30	40		1
Average	20	46	0	0.72

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	60.0	1,000	-	Not Listed	-
Capsella bursa-pastoris	2.0	300	-	Not Listed	-
Cotula australis	2.0	300	Forb (FG)	Not Listed	-
Cynodon dactylon	1.0	50	Grass & grasslike (GG)	Not Listed	-
Lamium amplexicaule	0.7	200	-	Not Listed	-
Lolium perenne	30.0	1,000	-	Not Listed	-
Malva parviflora	0.1	15	-	Not Listed	-
Poa annua	2.0	300	-	Not Listed	-
Polygonum aviculare	5.0	500	-	Not Listed	-
Sonchus asper	0.1	25	-	Not Listed	-
Sonchus oleraceus	0.2	100	-	Not Listed	-
Trifolium campestre	0.1	20	-	Not Listed	-
Trifolium glomeratum	1.0	150	-	Not Listed	-
Trifolium repens	0.1	2	-	Not Listed	-
Argemone ochroleuca	0.1	5	-	Not Listed	-

BAM10_SJ					
Site Sheet #	BAM10_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	301721 E 6520301 N			Orientation of midline	037
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	50	0	0.1
15	10	20	0	0.5
025	10	30	0	0.1
35	30	20	0	0
45	40	10	0	0
Average	19	26	0	0.14

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Arctotheca calendula	2.0	350	-	Not Listed	-
Avena sativa	70.0	1,000	-	Not Listed	-
Cotula australis	0.2	100	Forb (FG)	Not Listed	-
Cynodon dactylon	5.0	500	Grass & grasslike (GG)	Not Listed	-
Hordeum leporinum	0.1	2	-	Not Listed	-
Lysimachia arvensis	0.1	25	-	Not Listed	-
Medicago polymorpha	1.0	300	-	Not Listed	-
Poa annua	2.0	300	-	Not Listed	-
Polygonum aviculare	2.0	400	-	Not Listed	-
Sonchus oleraceus	0.2	100	-	Not Listed	-

BAM11_SJ					
Site Sheet #	BAM11_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302097 E 6520145 N			Orientation of midline	342
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	1	0	0
15	5	1	0	0.1
025	2	1	0	0
35	10	0.5	0	0.1
45	10	1	0	0.1
Average	6.4	0.9	0	0.06

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	30.0	1,000	-	Not Listed	-
Bromus catharticus	3.0	300	-	Not Listed	-
Capsella bursa-pastoris	1.0	350	-	Not Listed	-
Cerastium glomeratum	0.1	50	-	Not Listed	-
Cotula australis	1.5	500	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	15	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.5	300	-	Not Listed	-
Cynodon dactylon	5.0	300	Grass & grasslike (GG)	Not Listed	-
Hordeum leporinum	1.0	50	-	Not Listed	-
Lepidium bonariense	0.1	20	-	Not Listed	-
Lolium perenne	20.0	1,000	-	Not Listed	-
lysimachia arvensis	0.1	100	-	Not Listed	-
Medicago polymorpha	0.2	100	-	Not Listed	-
Poa annua	2.0	350	-	Not Listed	-
Polycarpon tetraphyllum	0.1	25	-	Not Listed	-
Polygonum aviculare	15.0	1,000	-	Not Listed	-
Sonchus oleraceus	0.1	50	-	Not Listed	-
Trifolium campestre	0.2	50	-	Not Listed	-
Trifolium repens	0.1	50	-	Not Listed	-

BAM12_SJ					
Site Sheet #	BAM12_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302536 E 6520898 N			Orientation of midline	3
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0.1	0.1	0	0
15	0.1	0.1	0	0.1
025	0.1	0.5	0	0.1
35	0.1	0.1	0	0
45	0.1	0.1	0	0.2
Average	0.1	0.18	0	0.08

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Briza minor	0.1	50	-	Not Listed	-
Bromus catharticus	5.0	300	-	Not Listed	-
Capsella bursa-pastoris	0.1	100	-	Not Listed	-
Cerastium glomeratum	0.5	200	-	Not Listed	-
Cirsium vulgare	2.0	175	-	Not Listed	-
Cotula australis	25.0	800	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.2	200	-	Not Listed	-
Cynodon dactylon	2.0	250	Grass & grasslike (GG)	Not Listed	-
Daucus glochidiatus	0.1	25	Forb (FG)	Not Listed	-
Einadia nutans	0.1	5	Forb (FG)	Not Listed	-
Erodium cicutarium	0.1	40	-	Not Listed	-
Lepidium bonariense	0.1	25	-	Not Listed	-
Lolium perenne	10.0	200	-	Not Listed	-
Medicago polymorpha	3.0	500	-	Not Listed	-
Poa annua	2.0	300	-	Not Listed	-
Rumex crispus	0.1	25	-	Not Listed	-
Soliva sessilis	1.0	500	-	Not Listed	-
Sonchus oleraceus	0.1	50	-	Not Listed	-
Sporobolus creber	1.0	150	Grass & grasslike (GG)	Not Listed	-
Trifolium arvense	22.0	800	-	Not Listed	-
Trifolium subterraneum	50.0	1,000	-	Not Listed	-
Vulpia bromoides	1.0	150	-	Not Listed	-

APPENDIX B LAND CATEGORY ASSESSMENT TRANSECT DATA

Date	Plot ID	Vegetation Zone	Native	Exotic Perennial	Exotic Annual	Bare
Non-native Grassland (Cropping and Earthworks)						
25/09/2024	LCA06_LM	Cropped Oats	47	36	57	17
25/09/2024	LCA04_062_SDJB	Cropped Oats	4	33	48	15
26/09/2024	LCA08_084_SDJB	Cropped Oats	28	3	59	10
27/09/2024	LCA09_320_SDJB	Cropped Oats	2	0	82	16
27/09/2024	LCA10_225_SDJB	Cropped Oats	2	5	74	19
27/09/2024	LCA11_037_SDJB	Cropped Oats	0	0	85	15
25/09/2024	LCA04_LM	Cropped Wheat	0	0	58	42
25/09/2024	LCA05_LM	Cropped Wheat	0	0	85	15
25/09/2024	LCA07_LM	Cropped Wheat	0	0	72	28
26/09/2024	LCA10_LM	Cropped Wheat	0	0	56	44
24/09/2024	LCA03_LM	Previous Earthworks	44	14	84	1
25/09/2024	LCA08_LM	Previous Earthworks	27	61	52	2
24/09/2024	LCA03_345_SDJB	Previous Earthworks	2	38	60	0
25/09/2024	LCA07_005_SDJB	Previous Earthworks	28	46	23	3
Results			**13.14**	**16.86**	**63.93**	**16.21**
Non-native Grassland						
24/09/2024	LCA01_LM	Non-native Grassland	19	46	85	0
24/09/2024	LCA02_LM	Non-native Grassland	2	54	90	2
26/09/2024	LCA09_LM	Non-native Grassland	12	52	72	3
24/09/2024	LCA01_236_SDJB	Non-native Grassland	14	15	67	4
24/09/2024	LCA02_195_SDJB	Non-native Grassland	12	2	83	3
25/09/2024	LCA05_210_SDJB	Non-native Grassland	10	60	27	3
25/09/2024	LCA06_053_SDJB	Non-native Grassland	4	1	94	1
27/09/2024	LCA12_342_SDJB	Non-native Grassland	7	3	80	10
27/09/2024	LCA13_003_SDJB	Non-native Grassland	7	3	90	0
Result			**9.67**	**26.22**	**76.44**	**2.89**

APPENDIX C INTERIM GGAM CALCULATOR RESULTS

Interim GGAM Calculator

Version:1.2.2.00 Last updated: 19/07/2018

1. Assessment details ✓ 2. Site context ✓ 3. Vegetation ✓

All fields marked with an asterisk (*) are mandatory

Plant community types (PCT) & ecological communities

Delete	Formation *	Class *	Plant community type *	PCT % cleared	Associated TEC *	NSW listing status	Action
✖	Grassy Woodlands	Western Slopes Grassy Woodlands	**599** - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion **Note:** "Selected PCT will be assessed as a Derived Native Grassland"	80	Not a TEC		ADD VEG ZONE Modify default benchmarks

ADD ANOTHER PCT

IMPORT SITE Vegetation zones (Current vegetation integrity score)

Delete	Import	Number	PCT code	Condition class *	Vegetation zone name	Area (ha) *	Location	Exotic perennial / Native cover	Composition condition score	Structure condition score	Current vegetation integrity score	Conservation value
✖		1	599	Non-native_grassland	599_Non-native_grassland	144.71		0.7	9.3	4	6.1	Low
✖		2	599	Cropping_earthworks	599_Cropping_earthworks	203.58		0.6	2.1	4.7	3.2	Low

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APPENDIX B PLANTED NATIVE VEGETATION DECISION-KEY

PLANTED NATIVE VEGETATION ASSESSMENT

The Subject Land has three (3) Vegetation Zones (VZ) identified as Planted Native Vegetation that require consideration against Appendix D – Planted Native Vegetation of the Biodiversity Assessment Method (2020) (BAM). These three 3 VZs are identified in Table 1 below. **Figure X** illustrates the locations of PNV on the Subject Land.

TABLE 1: AREAS OF PLANTED NATIVE VEGETATION ON THE SUBJECT LAND

Landcover Character	Draft NVM Land Category	Area on Subject Land (ha)	Area of impact (ha)
Non-native – Planted	Category 1	0.58	0.57
Mixed Planted (VZ4_Mixed_Plantings)	Category 2	0.47	0.0
Planted Native Vegetation (PNV)	Category 2	0.68	0.68

Assessment has been provided for each area of PNV below.

B.1 NON-NATIVE PLANTED VEGETATION (CATEGORY 1)

Approximately 0.58 ha of non-native planted vegetation occurs across the Subject Land within areas of Category 1 exempt Lands on the Draft Native Vegetation Regulatory map. The extent of this non-native planted vegetation consists of low conservation value plantings that offer little habitat for threatened species to inhabit or reliably forage.

Due to the extent of this planted vegetation type occurring within Category 1 exempt lands and consisting of non-native vegetation, no assessment under Appendix D is required.

B.2 MIXED PLANTED (CATEGORY 2)

Approximately 0.47 hectares (ha) of mixed vegetation occurs on the Subject Land within areas adjoining existing infrastructure. The vegetation consists of a mosaic of planted native and non-native species overseen by remnant native canopy species, including White Box (*Eucalyptus albens*) and Rough-barked Apple (*Angophora floribunda*) with a sparse understorey of Native Olive (*Notolaea microcarpa*). The extent of this vegetation occurs on Category 2 regulated lands and has been recognised in the Biodiversity Development Assessment Report (BDAR) as VZ_4_Mixed-Planting.

Assessment of this Mixed Planted vegetation using the PNV Decision-Key is provided in Table 2.

TABLE 2: DECISION-KEY FOR VZ4_MIXED_PLANTINGS

Decision		Outcome	Justification
1	Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native	Yes The PNV must be allocated to the best-fit PCT and the BAM must be applied.	The 0.47 ha of mixed plantings consists of planted native and non-native species overseen by remnant native canopy species, including White Box (*Eucalyptus albens*) and Rough-barked Apple (*Angophora floribunda*)

Decision		Outcome	Justification
	vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?		with a sparse understorey of Native Olive (*Notolaea microcarpa*). It is considered that the area of mixed planted vegetation forms part of the mapped PCT 599 *Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion.* As such, it has been assigned as to PCT 599 and assessed as VZ4_Mixed_Plantings within the BDAR in accordance with the BAM. No further assessment under Appendix D required.

Assessment under the PNV decision-key determined that this vegetation is able to be associated with PCT 599 due to existing remnant canopy vegetation. Therefore, the use of the Planted Native Vegetation Streamlined Assessment module of the BAM has not been applied for the area of planted native vegetation that forms part of PCT 599.

The extent of 0.47 ha of mixed planted vegetation has been assigned to PCT 599 and further assessed within the BDAR. Nonetheless, this patch has been avoided by the Development Footprint and no impacts are proposed.

B.3 PLANTED NATIVE VEGETATION (CATEGORY 2)

The Subject Land contains 0.68 ha of wholly PNV on Category 2 lands associated with the previous land uses for agricultural purposes. The area of PNV is reflective of a mix of native vegetation and plantings that have been established for aesthetic and functional horticultural purposes, including windbreaks in the agricultural landscape and landscaping to gardens surrounding existing infrastructure on the Subject Land.

TABLE 3: DECISION-KEY FOR PLANTED NATIVE VEGETATION

Decision		Outcome	Justification
1	Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	No. Go to Q2.	Although the 0.68 ha of PNV consists of native vegetation, it does not contain remnant native vegetation and consists wholly of planted natives for the purpose of aesthetics and functional horticulture associated with agricultural land use (i.e. wind breaks).
2	Is the Planted Native Vegetation: a. Planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2), and b. The primary objective was to replace or regenerate a PCT or threatened plant species population or its habitat?	No. Go to Q3.	The native plantings that occur across the 0.68ha of the Subject Land are not considered to form plantings that were part of any environmental rehabilitation or restoration purpose. The plantings consists of mixed native vegetation and have been planted in such a way that reflects plantings to support

Decision		Outcome	Justification
			horticultural purpose, including wind breaks as well as provide aesthetic value to existing infrastructure. Additionally, no area of the Subject Land forms part of an existing conservation obligation.
3	Is the PNV or translocated native vegetation individuals of a threatened species or other native species planted / translocated for the purpose of providing threatened species habitat under one of the following: a. A species recovery project; b. Saving our Species project; c. Other types of government funded restoration project; d. Condition of Consent for a DA that required those species to be planted or translocated for the purpose of providing threatened species habitat; e. Legal obligation as part of a Condition or ruling of Court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or Native Vegetation Act); f. Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan; or g. Approved Vegetation Management Plan (e.g. as required as part of a controlled activity approval for works on waterfront land under the NSW Water Management Act 2000)?	No. Go to Q4.	The extent of this patch of PNV was established for aesthetic and functional horticultural purposes, including windbreaks in the agricultural landscape and landscaping to gardens surrounding existing infrastructure. The PNV, although provides suitable potential foraging resources for a range of fauna species, it was not established for purpose of improving or rehabilitation threatened species habitats by any means identified under Q3.
4	Was the PNV (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	No. Go to Q5.	The area of PNV was undertaken on a voluntary basis to enhance the aesthetic value of the land surrounding existing infrastructure and to also create functional windbreaks. The PNV was not undertaken for the purpose of revegetation or environmental rehabilitation. Additionally, no threatened flora species form part of the PNV.
5	Is the native vegetation (including individuals of threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as windbreak in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in	**Yes.** Go to D.2 Assessment of PNV for threatened species habitat (the use of Chapters 4	The 0.68 ha of PNV was established for the purposes of improving aesthetics to existing infrastructure and also providing functional horticulture in the landscape by creating lined windbreaks associated with the agricultural land use of the Subject Land. Historical aerial

Decision		Outcome	Justification
	parks, gardens and sports fields / complexes, macadamia plantations or Teatree farms?	and 5 of the BAM are not required to be applied).	imagery identified that the area of PNV was planted after 2001 and for functional purpose. It is unlikely that the small extent of PNV would form an important or reliable source of foraging or roosting habitat for fauna species on the Subject Land given the location and purpose of plantings being associated with infrastructure and windbreaks. No further assessment under Appendix D required.

The total 0.68 ha extent of this PNV will be impacted by the development footprint. Although it was determined through the decision-key that the 0.68 ha of identified PNV on Category 2 lands does not require assessment under Chapter 4 and Chapter 5 of the BAM consideration of potential foraging and roosting habitats has occurred in the BDAR for use by threatened species.

APPENDIX C SPECIES OBSERVATION LIST (FLORA AND FAUNA)

Scientific Name	Common Name	BC Act	EPBC Act
Flora			
Acaena novae-zelandiae	Bidgee-widgee	-	-
Acer bulgeranium	Trident Maple	-	-
Agapanthus orientalis	Agapanthus	-	-
Albizia julibrissin	Mimosa	-	-
*Ammi majus**	Bishop's Weed	-	-
Angophora floribunda	Rough-barked Apple	-	-
*Arctotheca calendula**	Capeweed	-	-
*Argemone ochroleuca**	Mexican Poppy	-	-
Asperula conferta	Common Woodruff	-	-
Auranticarpa rhombifolia	Diamond Leaf Pittosporum	-	-
Austrostipa spp.		-	-
Austrostipa verticillata	Slender Bamboo Grass	-	-
*Avena sativa**	Oats	-	-
Bauhinia spp.	Orchid Tree	-	-
*Bidens pilosa**	Cobbler's Pegs	-	-
Bothriochloa decipiens	Pitted Bluegrass	-	-
Bougainvillea spectabilis	Bougainvillea	-	-
Brachychiton discolor	Lacebark Tree	-	-
Brachychiton populneus subsp. populneus	Kurrajong	-	-
Brassica rapa	Field Mustard	-	-
*Briza minor**	Shivery Grass	-	-
*Bromus catharticus**	Praire Grass	-	-
*Bromus hordeaceus**	Soft Brome	-	-
Bursaria spinosa	Native Blackthorn	-	-
Callistemon viminalis	Weeping Bottlebrush	-	-
Callitris spp.		-	-
Callitris glaucophylla	White Cypress Pine	-	-

Scientific Name	Common Name	BC Act	EPBC Act
Calotis spp.		-	-
Canna spp.	Canna Lily	-	-
*Capsella bursa-pastoris**	Shepherd's Purse	-	-
Carex breviculmis		-	-
Carex inversa	Knob Sedge	-	-
*Centaurea solstitialis**	St Barnabys Thistle	-	-
*Cerastium glomeratum**	Mouse-ear Chickweed	-	-
Chenopodium album	Fat Hen	-	-
Chloris spp.		-	-
Chloris truncata	Windmill Grass	-	-
Chloris ventricosa	Tall Chloris	-	-
Chloris ventricosa		-	-
Chrysocephalum apiculatum	Common Everlasting	-	-
Circium vulgare	Bull Thistle	-	-
*Cirsium vulgare**	Spear Thistle	-	-
Citrus spp.	Citris (likely Lemon)	-	-
Conyza spp.	Fleabane	-	-
*Conyza sumatrensis**	Tall fleabane	-	-
Cormus domestica	Service Tree	-	-
Corymbia citriodora	Lemon-scented Gum	-	-
Corymbia tortelliana	Cadaghi	-	-
Cotinus coggygria	Smoketree	-	-
Cotula australis	Common Cotula	-	-
Crassula sieberiana	Australian Stonecrop	-	-
*Cyclospermum leptophyllum**	Slender Celery	-	-
Cymbonotus preissianus	Austral Bear's Ear	-	-
Cynodon dactylon	Common Couch	-	-
Cypress spp.	Cypress	-	-

Scientific Name	Common Name	BC Act	EPBC Act
Daucus glochidiatus	Native Carrot	-	-
Desmodium spp.	Tick-trefoil	-	-
Desmodium varians		-	-
Dichondra repens	Kidney Weed	-	-
Dimorphotheca fruticose	White Trailing Daisy	-	-
*Echium plantagineum**	Patterson's Curse	-	-
Einadia nutans	Climbing Saltbush	-	-
Eragrostis parviflora	Weeping Lovegrass	-	-
Eriobotrya japonica	Loquat	-	-
*Erodium cicutarium**	Common Crowfoot	-	-
Erodium crinitum		-	-
Eucalyptus albens	White Box	-	-
Eucalyptus blakelyi	Blakely's Red Gum	-	-
Eucalyptus camaldulensis	River Red Gum	-	-
Eucalyptus crebra	Narrow-leaved Red Ironbark	-	-
Eucalyptus leucoxylon	Large Fruited Yellow Gum	-	-
Eucalyptus melliodora	Yellow Box	-	-
Eucalyptus sideroxylon	Mugga Ironbark	-	-
Eucalyptus woodwardii	Lemon-flowered Gum	-	-
*Festuca pratensis**	Meadow Fescue	-	-
Ficus rubiginosa	Port Jackson Fig	-	-
Franxinus angustifolia	Desert Ash	-	-
*Galium aparine**	Goosegrass	-	-
Geranium solanderi	Native Geranium	-	-
Gleditsia tricanthus	Honey Locust	-	-
Glycine tabacina	Variable Glycine	-	-
Gomphocarpus fruticosus	Narrow-leaved Cottonbush	-	-

Scientific Name	Common Name	BC Act	EPBC Act
Goodinea pinnatifolia	Scrambles Eggs	-	-
Hardenbergia violacea	False Sarsaparilla	-	-
*Hirschfeldia incana**	Buchan Weed	-	-
*Hordeum leporinum**	Barley Grass	-	-
*Hordeum vulgare**	Barley	-	-
Hydrocotyle hirta	Hairy Pennywort	-	-
*Hypericum perforatum**	St. Johns Wort	-	-
*Hypochaeris glabra**	Smooth Catsear	-	-
*Hypochaeris radicata**	Catsear	-	-
Jacaranda mimosifolia	Jacaranda	-	-
Juncus australis	Rush	-	-
*Juncus bufonius**	Toad Rush	-	-
Juncus usitatus		-	-
Juniperus spp.	Juniper (likely J. Squamata)	-	-
*Lactuca serriola**	Prickly Lettuce	-	-
*Lactuca spp.**		-	-
*Lamium amplexicaule**	Dead Nettle	-	-
Lavandula spp.	Lavendar	-	-
*Lepidium africanum**	Common Peppercress	-	-
*Lepidium bonariense**	Argentine Peppercress	-	-
Lobelia purpurascens	whiteroot	-	-
*Lolium perenne**	Perennial Ryegrass	-	-
*Lolium rigidum**	Wimmera Ryegrass	-	-
Lolium spp.	Ryegrass	-	-
Lomandra filiformis	Wattle Matt-rush	-	-
Lomandra multiflora	Many-flowered Mat-rush	-	-
Lycianthes rantonnetii	Blue Potato Bush	-	-
*Lysimachia arvensis**	Scarlet Pimpernel	-	-

Scientific Name	Common Name	BC Act	EPBC Act
Lythrum hyssopifolia	Hyssop Loosestrife	-	-
Malus spp.	Crabapple	-	-
*Malva parviflora**	Small-flowered Mallow	-	-
*Medicago arabica**	Spotted Burr Medic	-	-
*Medicago orbicularis**	Button Medic	-	-
*Medicago polymorpha**	Burr Medic	-	-
*Medicago sativa**	Lucerne	-	-
Melaleuca bracteate	Black Tea-tree	-	-
Melaleuca styphelioides	Prickly-leaved Melaleuca	-	-
*Modiola caroliniana**	Red-flowered Mallow	-	-
Morus alba	White Mulberry	-	-
Morus nigra	Black Mulberry	-	-
Myoporum spp.		-	-
Nerium oleander	Oleander	-	-
Notelaea microcarpa	Native Olive	-	-
Olea europea	Olive Tree	-	-
Olearia elliptica	Sticky Daisy-bush	-	-
Oxalis perennans		-	-
*Paronychia brasiliana**	Chilean Whitlow Wort, Brazilian Whitlow	-	-
Paspalum dilatum	Paspalum	-	-
Passiflora caerulea	Passionfruit Vine	-	-
Pelargonium zonale	Horseshoe Geranium	-	-
Petroselinum crispum	Parsley	-	-
*Phalaris spp.**		-	-
Pistacia chinensis	Chinese Pistachio	-	-
Plantago debilis	Shade Plantain	-	-
*Plantago lanceolata**	Lamb's Tongues	-	-
Plumbago auriculata	Plumbago	-	-
*Poa annua**	Winter Grass	-	-

Scientific Name	Common Name	BC Act	EPBC Act
Poa spp.	Poa	-	-
*Polycarpon tetraphyllum**	Four-leaved Allseed	-	-
*Polygonum arenastrum**	Wireweed	-	-
*Polygonum aviculare**	Wireweed	-	-
Portulaca oleracea	Common Purslane	-	-
Prunus amygdalus	Sweet Almond	-	-
Ranunculus sessiliflorus	Small-flowered Buttercup	-	-
*Rosa rubiginosa**	Sweet Briar	-	-
Rumex brownii	Swamp Dock	-	-
*Rumex crispus**	Curled Dock	-	-
Rytidosperma fulvum	Wallaby Grass	-	-
*Schinus molle**	Pepper Tree	-	-
Senecio spp.	Groundsel, Fireweed	-	-
*Setaria parviflora**		-	-
*Sherardia arvensis**	Field Madder	-	-
Sida corrugata	Corrugated Sida	-	-
*Sida rhombifolia**	Paddy's Lucerne	-	-
*Silybum marianum**	Variegated Thistle	-	-
Solanum chenopodinum		-	-
*Soliva pterosperma**	Bindyi	-	-
*Soliva sessilis**	Bindyi	-	-
*Sonchus asper**	Prickly Sowthistle	-	-
*Sonchus oleraceus**	Common Sowthistle	-	-
Sonchus spp.	Sowthistle	-	-
*Spergularia rubra**	Sandspurry	-	-
Sporobolus creber	Slender Rat's Tail Grass	-	-
*Stellaria media**	Common Chickweed	-	-
Trifolium angustifolium	Narrow-leaved Clover	-	-

Scientific Name	Common Name	BC Act	EPBC Act
*Trifolium arvense**	Haresfoot Clover	-	-
*Trifolium campestre**	Hop Clover	-	-
*Trifolium glomeratum**	Clustered Clover	-	-
*Trifolium repens**	White Clover	-	-
*Trifolium subterraneum**	Subterranean Clover	-	-
Trifolum arvense		-	-
*Triticum aestivum**	Wheat	-	-
Ulmus parvifolia	Elm	-	-
Unknown	Stone Fruit Tree	-	-
Urtica incisa	Stinging Nettle	-	-
*Verbena bonariensis**	Purpletop	-	-
*Verbena litoralis**		-	-
*Veronica arvensis**	Wall Speedwell	-	-
*Vulpia bromoides**	Squirrel Tail Fesque	-	-
*Vulpia myuros**	Rat's Tail Fescue	-	-
Wahlenbergia spp.	Native Bluebell	-	-
Wisteria sinensis	Wisteria	-	-
Yucca elephantipes	Yucca	-	-
Zornia dyctiocarpa	Zornia	-	-
Birds			
Threskiornis spinicollis	Straw-necked Ibis	-	-
Manorina melanocephala	Noisy Miner	-	-
Eolophus roseicapilla	Galah	-	-
Platycercus elegans	Crimson Rosella	-	-
*Sturnus vulgaris**	Common Starling	-	-
Cacatua galerita	Sulphur-crested Cockatoo	-	-
Platycercus eximius	Eastern Rosella	-	-
Alisterus scapularis	Australian King Parrot	-	-

Scientific Name	Common Name	BC Act	EPBC Act
Rhipidura leucophrys	Willy Wagtail	-	-
Grallina cyanoleuca	Magpie-lark	-	-
Gymnorhina tibicen	Australian Magpie	-	-
Psephotus haematonotus	Red-rumped Parrot	-	-
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	-	-
Falco cenchroides	Nankeen Kestrel	-	-
Cacatua sanguinea	Little Corella	-	-
Phalacrocorax varius	Australian Pied Cormorant	-	-
Coracina novaehollandiae	Black-faced Cuckooshrike	-	-
Egretta novaehollandiae	White-faced Heron	-	-
Mammals			
*Vulpes vulpes**	European Fox	-	-
*Bos Taurus**	Cow	-	-
Osphranter robustus	Common wallaroos	-	-
Nyctophilus corbeni	Corben's Long-eared Bat	V	V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-
Vespadelus troughtoni	Eastern Cave Bat	V	-
Reptiles			
Pseudechis porphyriacus	Red-bellied Black Snake	-	-

* indicates non-native species

APPENDIX D SCATTERED TREE ASSESSMENT DATA

Tree ID	Species	Class	Height	DBH	Hollow details (Height from base of tree x Width of hollow)		Sightings
T1	*Angophora floribunda*	3	10m	80cm	H:4m	W:10cm	Eastern rosellas in tree
T2	*Angophora floribunda*	3	10m	80cm	H:3m	W:20cm	Lizard in hollow
					H:6m	W:20cm	
					H:8m	W:5cm	
T3	*Eucalyptus albens*	3	16	100+	H:4m	W:5cm	Active Magpie lark nest (active)
					H:12m	W:4cm	
					H:8m	W:6cm	
					H:8m	W:5cm	
					H:9m	W:10cm	
					H:8m	W:5cm	
					H:8m	W:5cm	
T4	*Eucalyptus albens*	3	12	100+	H:50m	W:20cm	N/A
T5	*Eucalyptus albens*	3	12	200+	H:25cm	W:20cm	Red rumped parrot nesting in smaller hollow
					H:20cm	W:15cm	
					H:10cm	W:5cm	
T6	*Eucalyptus albens*	3	20	50	H:6m	W:15cm	
					H:5m	W: 5cm	
T7	*Eucalyptus albens*	3	15	100+	H:4m	W:10cm	
					H:8m	W:15cm	
T8	*Eucalyptus albens*	3	12	100	H:15cm	W15cm	Galah nesting in hollow
T9	*Eucalyptus albens*	3	12	100	H:10cm	W:5cm	
T10	*Eucalyptus albens*	3	14	100+	H: 5m	W:8cm	Cockatoo in hollow
					H: 3m	W:40cm	
					H: 6m	W:25cm	
T11	*Angophora floribunda*	3	13	100+			

Tree ID	Species	Class	Height	DBH	Hollow details (Height from base of tree x Width of hollow)		Sightings
T12	*Eucalyptus blakelyi*	3	15	100+	H:6m	W:20cm	
					H:9m	W:25 cm	
T13	*Eucalyptus albens*	3	18	100+	H: 10m	W:5cm	Australian King Parrot in a hollow. Stick nest present (20cm)
					H:14m	W:20cm	
					H:12m	W:5cm	
					H: 10m	W:15cm	
					H: 10m	W:4cm	
T16	*Eucalyptus albens*	3	15	100+			
T17	*Eucalyptus albens*	3	14	200+	H: 5m	W:10cm	
					H: 4m	W:8cm	
T18	*Eucalyptus albens*	3	15	100+	H:4m	W:8cm	
					H:5m	W:10cm	
					H:7m	W:10cm	
					H:1m	W:40cm	
T19	*Eucalyptus blakelyi*	3	14	100+	H:8m	W:50cm	
					H:5m	W:50cm	
T20	*Eucalyptus albens*	3	12	200+	H:5m	W:5cm	
T21	*Eucalyptus albens*	3	17	100+	H:8m	W:15cm	Stick nest
					H:10m	W:15cm	
					H:12m	W:30cm	
T22	*Eucalyptus albens*	3	16	100+	H:5m	W:10cm	
					H:5m	W:40cm	
T23	*Eucalyptus albens*	3	14	100+	H:5m	W:20cm	
					H:2m	W:25cm	
T24	*Eucalyptus albens*	3	16	100+	H:6m	W:40cm	
					H:10m	W:10cm	
					H:9m	W:12cm	

Tree ID	Species	Class	Height	DBH	Hollow details (Height from base of tree x Width of hollow)		Sightings
					H:8m	W:30cm	
T25	*Eucalyptus blakelyi*	3	15	100+	H:8m	W:20cm	Little Corella nesting in hollow
					H:10m	W:15cm	
T26	*Eucalyptus blakelyi*	3	13	100	H: 10	W:10cm	Two stick nests
T27	*Eucalyptus albens*	3	14	100	H:8m	W:30cm	Potential for owl hollow, prey items found beneath tree.
					H:5m	W:20cm	
T28	*Eucalyptus albens*	3	15	80	H: 7m	W:35cm	Potential owl hollow, down feathers at entrance of hollow, whitewash and prey items present at base of tree.
					H 8m	W:15cm	
T29	*Angophora floribunda*	3	13	100+	H:10	W:5cm	
T30	*Eucalyptus albens*	3	14	100+	H:8m	W:20cm	Small stick nest (20cm)
					H:6m	W:20cm	
					H:9m	W:5cm	
					H:6m	W:20cm	
					H:6m	W:15cm	
					H:5m	W:20cm	
					H:5m	W:15cm	
					H:10m	W:10cm	
T31	*Eucalyptus albens*	3	10	100	H:5m	W:5cm	
					H:5m	W:5cm	
					H:6m	W:3cm	
T32	Planted *Eucalyptus sp.*	1	5	5			Two fenced planted *Eucalyptus sp.*
T33	*Eucalyptus albens*	3	9	100	H:4m	W:5cm	Galahs in tree, Small stick nest (10-15cm)
					H:3m	W:10cm	
					H:4m	W:5cm	
T1032	*Eucalyptus albens*	3	10	100+	H:3cm	W:8cm	
					H:10m	W:20cm	

Tree ID	Species	Class	Height	DBH	Hollow details (Height from base of tree x Width of hollow)		Sightings
T1033	*Eucalyptus albens*	3	14	100+	H:5m	W:30cm	
					H:7m	W:30cm	
T1034	*Eucalyptus albens*	3	13	100+	H:5m	W:10cm	
					H:2m	W:3cm	
T1035	*Eucalyptus albens*	3	15	100+	H:4m	W:30cm	One hollow used as beehive
					H:8m	W:4cm	
T1036	*Eucalyptus albens*	3	18	100+	H:10m	W:2cm	Two hollows used has beehives. Hollowed out as base of tree
					H:6	W:3cm	
T1037	*Angophora floribunda*	3	15	100	H:5m	W:15cm	
T1038	*Eucalyptus albens*	3	13	80	N/A	N/A	
T1039	*Eucalyptus albens*	3	10	100+	N/A	N/A	Two stick nests
T1040	*Eucalyptus albens*	3	12	100+	H:5m	W:40cm	
					H:6m	20cm	
T1041	*Eucalyptus albens*	3	11	100+	H:4m	W:4cm	
					H:2m	W:10cm	
					H:5m	W:6cm	
T1042	*Eucalyptus albens*	3	11	100+	H:3m	W:5cm	Stick nest present
					H:5m	W:3cm	
T1043	*Eucalyptus albens*	3	13	100+	H:6m	W:20cm	
					H:8m	W:6cm	
					H:7m	H:7cm	
T1044	*Eucalyptus albens*	3	15	100+	H:7m	W:20cm	
					H:8m	W:25cm	
					H:7m	W:20cm	

Tree ID	Species	Class	Height	DBH	Hollow details (Height from base of tree x Width of hollow)		Sightings
T1045	*Callitris glaucophylla*	3	9	70	N/A	N/A	
T1046	*Eucalyptus blakelyi*	3	16	80	H:10m	W:25cm	
T1047	*Eucalyptus albens*	3	12	50	H:6m	W:15cm	Bark fissuring also present
					H:7m	W:15cm	
T1048	*Eucalyptus albens*	3	14	100+	H:6m	W:5cm	
					H:6m	W:15cm	
T1049	*Brachychiton populnea*	2	5	20	N/A	N/A	
T1050	*Brachychiton populnea*	2	6	25			Mistletoe on the tree
T1051	*Brachychiton populnea*	2	4	25	N/A	N/A	
T1052	*Eucalyptus albens*	3	15	85+	H:6m	W:10cm	
T1053	*Eucalyptus albens*	3	12	100+	H:8m	W:15cm	
					H:6m	W:5cm	
T1054	*Eucalyptus albens*	3	18	300	H:2m	W:40cm	
					H:10m	W:10cm	
T1055	*Eucalyptus albens*	3	15	200	H:6m	W:15cm	
					H7m	W:15cm	
T1056	*Eucalyptus blakelyi*	3	14	100	N/A	N/A	
T1057	*Angophora floribunda*	2	9	30	N/A	N/A	
T1058	*Eucalyptus albens*	3	15	50	H:8m	W:10cm	

Tree ID	Species	Class	Height	DBH	Hollow details (Height from base of tree x Width of hollow)		Sightings
T1059	*Eucalyptus albens*	3			N/A	N/A	
T1060	*Eucalyptus albens*	3	18	150+	H:4m	W:30cm	

APPENDIX E BAM PLOT DATA AND BAM FLORISTIC DATA

Date	Plot ID	Vegetation Zone	Native	Exotic Perennial	Exotic Annual	Bare
Non-native Grassland (Cropping and Earthworks)						
9/25/2024	LCA06_LM	Cropped Oats	47	36	57	17
9/25/2024	LCA04_062_SD JB	Cropped Oats	4	33	48	15
9/26/2024	LCA08_084_SD JB	Cropped Oats	28	3	59	10
9/27/2024	LCA09_320_SD JB	Cropped Oats	2	0	82	16
9/27/2024	LCA10_225_SD JB	Cropped Oats	2	5	74	19
9/27/2024	LCA11_037_SD JB	Cropped Oats	0	0	85	15
9/25/2024	LCA04_LM	Cropped Wheat	0	0	58	42
9/25/2024	LCA05_LM	Cropped Wheat	0	0	85	15
9/25/2024	LCA07_LM	Cropped Wheat	0	0	72	28
9/26/2024	LCA10_LM	Cropped Wheat	0	0	56	44
9/24/2024	LCA03_LM	Previous Earthworks	44	14	84	1
9/25/2024	LCA08_LM	Previous Earthworks	27	61	52	2
9/24/2024	LCA03_345_SD JB	Previous Earthworks	2	38	60	0
9/25/2024	LCA07_005_SD JB	Previous Earthworks	28	46	23	3
Results			**13.14**	**16.86**	**63.93**	**16.21**
Non-native Grassland						
9/24/2024	LCA01_LM	Non-native Grassland	19	46	85	0
9/24/2024	LCA02_LM	Non-native Grassland	2	54	90	2
9/26/2024	LCA09_LM	Non-native Grassland	12	52	72	3
9/24/2024	LCA01_236_SD JB	Non-native Grassland	14	15	67	4
9/24/2024	LCA02_195_SD JB	Non-native Grassland	12	2	83	3
9/25/2024	LCA05_210_SD JB	Non-native Grassland	10	60	27	3
9/25/2024	LCA06_053_SD JB	Non-native Grassland	4	1	94	1
9/27/2024	LCA12_342_SD JB	Non-native Grassland	7	3	80	10
9/27/2024	LCA13_003_SD JB	Non-native Grassland	7	3	90	0
Result			9.67	26.22	76.44	2.89

BAM01_LM

Site Sheet #	BAM01_LM	Date	24/09/2024	Recorders	LB + MG
Coordinates	301086 E 6521449 N			**Orientation of midline**	292
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	2	1	0	0
15	3	0	0	0
25	2	0	0	0
35	3	0	0	0
45	2	0	0	0
Average	2.4	0.2	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Briza minor	15.0	500	-	Not Listed	-
Bromus catharticus	1.0	20	-	Not Listed	-
Capsella bursa-pastoris	0.1	1	-	Not Listed	-
Carex inversa	3.0	600	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	25.0	1,000	-	Not Listed	-
Cirsium vulgare	0.2	30	-	Not Listed	-
Cotula australis	0.1	20	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	20.0	1,000	-	Not Listed	-
Cynodon dactylon	5.0	50	Grass & grasslike (GG)	Not Listed	-
Geranium solanderi	0.1	20	Forb (FG)	Not Listed	-
Hypochaeris radicata	0.1	20	-	Not Listed	-
Lolium rigidum	0.1	10	-	Not Listed	-
Lysimachia arvensis	0.1	20	-	Not Listed	-
Medicago polymorpha	5.0	200	-	Not Listed	-
Plantago lanceolata	0.1	20	-	Not Listed	-
Rumex brownii	0.1	20	Forb (FG)	Not Listed	-
Setaria parviflora	0.1	1	-	Not Listed	-
Sonchus spp.	0.1	2	Forb (FG)	Not Listed	-
Sporobolus creber	1.0	15	Grass & grasslike (GG)	Not Listed	-
Trifolium repens	20.0	500	-	Not Listed	-
Trifolium subterraneum	15.0	500	-	Not Listed	-
Verbena litoralis	0.1	2	-	Not Listed	-
Veronica arvensis	4.0	300	-	Not Listed	-
Vulpia bromoides	0.1	20	-	Not Listed	-

BAM02_LM					
Site Sheet #	BAM02_LM	Date	24/09/2024	Recorders	LB + MG
Coordinates	300974 E 6521066 N			Orientation of midline	199
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	0	0	0
15	2	0	0	0
25	3	0	0	0
35	2	0	0	0
45	1	0	0	0
Average	1.8	0	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	1.0	50	-	Not Listed	-
Capsella bursa-pastoris	0.1	20	-	Not Listed	-
Carex inversa	3.0	500	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	2.0	100	-	Not Listed	-
Cirsium vulgare	0.2	15	-	Not Listed	-
Cyclospermum leptophyllum	0.5	500	-	Not Listed	-
Cynodon dactylon	5.0	300	Grass & grasslike (GG)	Not Listed	-
Geranium solanderi	0.1	20	Forb (FG)	Not Listed	-
Hirschfeldia incana	0.1	2	-	Not Listed	-
Lolium rigidum	25.0	800	-	Not Listed	-
Lysimachia arvensis	0.1	20	-	Not Listed	-
Malva parviflora	0.1	6	-	Not Listed	-
Medicago polymorpha	10.0	500	-	Not Listed	-
Modiola caroliniana	0.1	5	-	Not Listed	-
Plantago lanceolata	2.0	100	-	Not Listed	-
Rumex brownii	0.1	30	Forb (FG)	Not Listed	-
Silybum marianum	0.1	5	-	Not Listed	-
Soliva sessilis	1.0	100	-	Not Listed	-
Trifolium arvense	1.0	100	-	Not Listed	-
Trifolium repens	20.0	500	-	Not Listed	-
Trifolium subterraneum	25.0	800	-	Not Listed	-
Veronica arvensis	5.0	1,000	-	Not Listed	-
Vulpia bromoides	5.0	800	-	Not Listed	-

BAM03_LM

Site Sheet #	BAM03_LM	Date	24/09/2024	Recorders	LB + MG
Coordinates	301287 E 6521200 N			Orientation of midline	174
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	4	1	0	0
15	2	1	0	0
25	2	0	0	0
35	1	0	0	0
45	3	1	0	0
Average	2.4	0.6	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	0.1	20	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	2.0	100	-	Not Listed	-
Bromus hordeaceus	0.2	20	-	Not Listed	-
Capsella bursa-pastoris	0.1	6	-	Not Listed	-
Carex inversa	0.1	20	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.2	200	-	Not Listed	-
Cirsium vulgare	0.2	30	-	Not Listed	-
Cyclospermum leptophyllum	15.0	800	-	Not Listed	-
Cynodon dactylon	30.0	1,000	Grass & grasslike (GG)	Not Listed	-
Geranium solanderi	0.1	2	Forb (FG)	Not Listed	-
Lactuca spp.	0.1	10	-	Not Listed	-
Lolium rigidum	2.0	200	-	Not Listed	-
Lysimachia arvensis	0.2	60	-	Not Listed	-
Medicago polymorpha	20.0	500	-	Not Listed	-
Plantago lanceolata	0.2	50	-	Not Listed	-
Rumex brownii	0.1	20	Forb (FG)	Not Listed	-
Sherardia arvensis	0.1	10	-	Not Listed	-
Silybum marianum	0.1	4	-	Not Listed	-
Sporobolus creber	4.0	100	Grass & grasslike (GG)	Not Listed	-
Trifolium arvense	5.0	200	-	Not Listed	-
Trifolium repens	15.0	200	-	Not Listed	-
Trifolium subterraneum	20.0	500	-	Not Listed	-
Verbena litoralis	0.2	200	-	Not Listed	-
Vulpia bromoides	0.1	20	-	Not Listed	-
Wahlembergia spp.	0.1	15	Forb (FG)	Not Listed	-

BAM04_LM

Site Sheet #	BAM04_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301616 E 6521266 N			Orientation of midline	2
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	35	0	0
15	5	70	0	0
25	15	50	0	0
35	3	40	0	0
45	4	70	0	0
Average	6.4	53	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	2.0	80	-	Not Listed	-
Cyclospermum leptophyllum	0.1	2	-	Not Listed	-
Hordeum vulgare	0.2	50	-	Not Listed	-
Lolium rigidum	2.0	100	-	Not Listed	-
Medicago polymorpha	0.1	5	-	Not Listed	-
Oxalis perennans	0.1	2	Forb (FG)	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Triticum aestivum	80.0	800	-	Not Listed	-

BAM05_LM					
Site Sheet #	BAM05_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301749 E 6521107 N			Orientation of midline	164
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	1	0	0
15	10	1	0	0
25	10	3	0	0
35	10	4	0	0
45	10	1	0	0
Average	9	2	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Hordeum vulgare	0.1	5	-	Not Listed	-
Lolium rigidum	5.0	100	-	Not Listed	-
Oxalis perennans	0.1	2	Forb (FG)	Not Listed	-
Triticum aestivum	90.0	100	-	Not Listed	-

BAM06_LM

Site Sheet #	BAM06_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301885 E 6521044 N			Orientation of midline	156
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	4	1	0	0
15	2	1	0	0
25	2	0	0	0
35	1	0	0	0
45	3	1	0	0
Average	2.4	0.6	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Arctotheca calendula	1.0	30	-	Not Listed	-
Avena sativa	40.0	500	-	Not Listed	-
Capsella bursa-pastoris	1.0	100	-	Not Listed	-
Cerastium glomeratum	1.0	200	-	Not Listed	-
Cirsium vulgare	0.1	1	-	Not Listed	-
Cotula australis	2.0	1,000	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	50	Forb (FG)	Not Listed	-
Erodium cicutarium	0.1	50	-	Not Listed	-
Lamium amplexicaule	0.1	5	-	Not Listed	-
Lepidium africanum	0.1	10	-	Not Listed	-
lysimachia arvensis	0.1	5	-	Not Listed	-
Malva parviflora	0.1	5	-	Not Listed	-
Medicago polymorpha	5.0	200	-	Not Listed	-
Plantago lanceolata	0.2	40	-	Not Listed	-
Poa annua	5.0	60	-	Not Listed	-
Polygonum aviculare	1.0	100	-	Not Listed	-
Soliva pterosperma	1.0	60	-	Not Listed	-
Sonchus oleraceus	0.1	1	-	Not Listed	-
Spergularia rubra	0.1	3	-	Not Listed	-
Trifolium repens	15.0	500	-	Not Listed	-
Trifolium subterraneum	2.0	200	-	Not Listed	-

BAM07_LM					
Site Sheet #	BAM07_LM	Date	25/09/2024	Recorders	LB + MG
Coordinates	301374 E 6520948 N			Orientation of midline	50
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	30	10	0	0
15	15	30	0	0
25	25	30	0	0
35	15	40	0	0
45	15	40	0	0
Average	20	30	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Hordeum vulgare	0.5	20	-	Not Listed	-
Triticum aestivum	90.0	1,000	-	Not Listed	-

BAM08_LM

Site Sheet #	BAM08_LM	Date	26/09/2024	Recorders	LB + MG
Coordinates	300902 E 6520509 N			Orientation of midline	205
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	5	0	0
15	2	15	0	0
25	1	5	0	0
35	1	2	0	0
45	1	5	0	0
Average	1.2	6.4	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	0.1	10	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.1	10	-	Not Listed	-
Capsella bursa-pastoris	0.2	100	-	Not Listed	-
Carex inversa	0.1	30	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.1	20	-	Not Listed	-
Cirsium vulgare	0.1	5	-	Not Listed	-
Cotula australis	0.1	50	Forb (FG)	Not Listed	-
Cynodon dactylon	15.0	100	Grass & grasslike (GG)	Not Listed	-
Hordeum vulgare	0.1	1	-	Not Listed	-
Lolium rigidum	5.0	200	-	Not Listed	-
Medicago polymorpha	25.0	200	-	Not Listed	-
Phalaris spp.	0.5	150	-	Not Listed	-
Plantago lanceolata	0.1	30	-	Not Listed	-
Poa annua	0.1	20	-	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Rumex brownii	0.1	1	Forb (FG)	Not Listed	-
Sonchus oleraceus	0.1	1	-	Not Listed	-
Sporobolus creber	5.0	40	Grass & grasslike (GG)	Not Listed	-
Trifolium repens	50.0	1,000	-	Not Listed	-
Trifolium subterraneum	0.1	20	-	Not Listed	-
Veronica arvensis	0.1	50	-	Not Listed	-
Vulpia bromoides	0.1	50	-	Not Listed	-
Wahlenbergia spp.	0.1	15	Forb (FG)	Not Listed	-

BAM010_LM

Site Sheet #	BAM10_LM	Date	27/09/2024	Recorders	LB + MG
Coordinates	301434 E 6520723 N			Orientation of midline	12
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	2	20	0	0
15	1	5	0	0
25	1	20	0	0
35	0	20	0	0
45	2	30	0	0
Average	1.2	19	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	0.1	1	-	Not Listed	-
Lolium rigidum	0.1	10	-	Not Listed	-
Medicago polymorpha	0.1	5	-	Not Listed	-
Polygonum aviculare	0.1	1	-	Not Listed	-
Trifolium repens	0.1	2	-	Not Listed	-
Triticum aestivum	5.0	800	-	Not Listed	-

BAMA_LM					
Site Sheet #	BAMA_LM	Date	26/09/2024	Recorders	LB + MG
Coordinates	300747 E 6520372 N			Orientation of midline	330
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	10	5	0	0
15	10	5	0	0
25	5	8	0	0
35	20	2	0	1
45	5	10	0	1
Average	10	6	0	0.4

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Acaena novae-zelandiae	0.1	5	Forb (FG)	Not Listed	-
Asperula conferta	0.1	10	Forb (FG)	Not Listed	-
Bothriochloa decipiens	0.2	10	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.1	5	-	Not Listed	-
Capsella bursa-pastoris	0.1	5	-	Not Listed	-
Carex inversa	0.1	20	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.5	200	-	Not Listed	-
Chloris ventricosa	0.5	30	Grass & grasslike (GG)	Not Listed	-
Chrysocephalum apiculatum	0.5	20	Forb (FG)	Not Listed	-
Cirsium vulgare	0.1	20	-	Not Listed	-
Cotula australis	0.1	30	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.5	50	-	Not Listed	-
Cynodon dactylon	20.0	500	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.1	5	Other (OG)	Not Listed	-
Dichondra repens	0.5	200	Forb (FG)	Not Listed	-
Echium plantagineum	0.1	5	-	Not Listed	-
Einadia nutans	0.1	5	Forb (FG)	Not Listed	-
Eucalyptus albens	15.0	3	Tree (TG)	Not Listed	-
Galium aparine	0.1	30	-	Not Listed	-
Geranium solanderi	0.1	200	Forb (FG)	Not Listed	-
Goodenia pinnatifida	0.1	2	Forb (FG)	Not Listed	-
Hirschfeldia incana	0.1	2	-	Not Listed	-
Lamium amplexicaule	0.1	2	-	Not Listed	-
Lobelia purpurascens	0.1	10	Forb (FG)	Not Listed	-
Lolium rigidum	20.0	500	-	Not Listed	-
Lomandra filiformis	0.1	5	Grass & grasslike (GG)	Not Listed	-
Malva parviflora	0.1	1	-	Not Listed	-
Medicago polymorpha	0.1	50	-	Not Listed	-
Oxalis perennans	0.1	3	Forb (FG)	Not Listed	-
Paronychia brasiliana	0.1	20	-	Not Listed	-
Plantago debilis	0.1	5	Forb (FG)	Not Listed	-
Plantago lanceolata	0.5	50	-	Not Listed	-

Poa annua	0.1	20	-	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Rosa rubiginosa	0.5	4	-	Not Listed	High Threat Weed
Rumex brownii	0.1	4	Forb (FG)	Not Listed	-
Sherardia arvensis	15.0	200	-	Not Listed	-
Silybum marianum	0.1	2	-	Not Listed	-
Sonchus oleraceus	0.1	15	-	Not Listed	-
Stellaria media	0.2	20	-	Not Listed	-
Trifolium repens	0.1	20	-	Not Listed	-
Urtica incisa	0.1	6	Forb (FG)	Not Listed	-
Zornia dyctiocarpa	0.1	4	Forb (FG)	Not Listed	-

BAMB_LM

Site Sheet #	BAMB_LM	Date	27/09/2024	Recorders	LB + MG
Coordinates	300420 E 6520584 N			Orientation of midline	220
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	35	0	0	0
15	25	0	0	0
25	30	0	0	0
35	20	0	0	0
45	30	20	0	1
Average	28	4	0	0.2

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Acaena novae-zelandiae	0.1	2	Forb (FG)	Not Listed	-
Angophora floribunda	5.0	0	Tree (TG)	Not Listed	-
Bothriochloa decipiens	0.1	10	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	1.0	50	-	Not Listed	-
Chloris ventricosa	0.1	6	Grass & grasslike (GG)	Not Listed	-
Capsella bursa-pastoris	0.2	50	-	Not Listed	-
Carex inversa	20.0	600	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.1	100	-	Not Listed	-
Chrysocephalum apiculatum	0.1	50	Forb (FG)	Not Listed	-
Cirsium vulgare	0.5	20	-	Not Listed	-
Carex breviculmis	0.1	5	Grass & grasslike (GG)	Not Listed	-
Cotula australis	0.1	60	Forb (FG)	Not Listed	-
Cynodon dactylon	40.0	1,000	Grass & grasslike (GG)	Not Listed	-
Desmodium spp.	2.0	100	Other (OG)	Not Listed	-
Desmodium varians	0.1	15	Other (OG)	Not Listed	-
Dichondra repens	2.0	500	Forb (FG)	Not Listed	-
Einadia nutans	0.1	10	Forb (FG)	Not Listed	-
Eucalyptus blakelyi	15.0	3	Tree (TG)	Not Listed	-
Galium aparine	1.0	50	-	Not Listed	-
Geranium solanderi	15.0	200	Forb (FG)	Not Listed	-
Glycine tabacina	0.1	10	Other (OG)	Not Listed	-
Goodenia pinnatifida	0.2	20	Forb (FG)	Not Listed	-
Hirschfeldia incana	0.1	1	-	Not Listed	-
Hydrocotyle hirta	5.0	200	Forb (FG)	Not Listed	-
Lactuca spp.	0.1	5	-	Not Listed	-
Lolium rigidum	30.0	500	-	Not Listed	-
Lysimachia arvensis	0.1	10	-	Not Listed	-
Medicago orbicularis	0.1	20	-	Not Listed	-
Medicago polymorpha	15.0	200	-	Not Listed	-
Modiola caroliniana	0.1	5	-	Not Listed	-
Olearia elliptica	0.1	1	Shrub (SG)	Not Listed	-
Paronychia brasiliana	0.1	20	-	Not Listed	-

Plantago lanceolata	2.0	60	-	Not Listed	-
Polygonum aviculare	0.1	10	-	Not Listed	-
Rosa rubiginosa	0.1	1	-	Not Listed	-
Rumex brownii	0.1	10	Forb (FG)	Not Listed	-
Senecio spp.	0.1	2	Forb (FG)	Not Listed	-
Sherardia arvensis	0.1	50	-	Not Listed	-
Solanum chenopodinum	0.1	1	Shrub (SG)	Not Listed	-
Sonchus oleraceus	0.1	20	-	Not Listed	-
Sporobolus creber	3.0	30	Grass & grasslike (GG)	Not Listed	-
Stellaria media	1.0	60	-	Not Listed	-
Trifolium arvense	0.1	100	-	Not Listed	-
Trifolium glomeratum	0.1	10	-	Not Listed	-
Trifolium repens	2.0	50	-	Not Listed	-
Trifolium subterraneum	0.5	50	-	Not Listed	-
Urtica incisa	0.1	10	Forb (FG)	Not Listed	-
Wahlenbergia spp.	0.1	2	Forb (FG)	Not Listed	-

BAMC_LM					
Site Sheet #	BAMC_LM	Date	27/09/2024	Recorders	LB + MG
Coordinates	301442 E 6520399 N			Orientation of midline	150
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	20	80	0	0
15	5	20	0	4
25	2	30	0	60
35	10	30	0	0
45	5	10	15	45
Average	8.4	34	3	21.8

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Angophora floribunda	5.0	3	Tree (TG)	Not Listed	-
Ssperula conferta	0.1	30	Forb (FG)	Not Listed	-
Bidens pilosa	0.1	40	-	Not Listed	High Threat Weed
Bromus catharticus	0.1	20	-	Not Listed	-
Capsella bursa-pastoris	0.1	40	-	Not Listed	-
Carex inversa	0.2	30	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.2	100	-	Not Listed	-
Cirsium vulgare	0.1	20	-	Not Listed	-
Cotula australis	0.1	50	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	20	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.1	100	-	Not Listed	-
Cynodon dactylon	20.0	1,000	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.1	10	Other (OG)	Not Listed	-
Dichondra repens	0.2	30	Forb (FG)	Not Listed	-
Einadia nutans	0.1	2	Forb (FG)	Not Listed	-
Erodium cicutarium	0.1	20	-	Not Listed	-
Galium aparine	0.5	100	-	Not Listed	-
Geranium solanderi	0.5	100	Forb (FG)	Not Listed	-
Hardenbergia violacea	0.1	20	Other (OG)	Not Listed	-
Lactuca spp.	0.1	2	-	Not Listed	-
Lamium amplexicaule	0.1	10	-	Not Listed	-
Lysimachia arvensis	0.1	20	-	Not Listed	-
Medicago orbicularis	2.0	50	-	Not Listed	-
Medicago polymorpha	20.0	1,000	-	Not Listed	-
Modiola caroliniana	0.1	20	-	Not Listed	-
Notelaea microcarpa	15.0	1	Tree (TG)	Not Listed	-
Phalaris spp.	0.1	10	-	Not Listed	-
Plantago lanceolata	0.1	50	-	Not Listed	-
Polygonum arenastrum	0.1	30	-	Not Listed	-
Rosa rubiginosa	0.1	10	-	Not Listed	High Threat Weed
Rumex brownii	0.1	4	Forb (FG)	Not Listed	-
Schinus molle	10.0	0	-	Not Listed	-

Sherardia arvensis	0.1	10	-	Not Listed	-
Sida rhombifolia	0.5	20	-	Not Listed	-
Solanum chenopodinum	0.1	3	Shrub (SG)	Not Listed	-
Soliva sessilis	0.2	60	-	Not Listed	-
Sonchus oleraceus	0.1	1	-	Not Listed	-
Sporobolus creber	0.1	2	Grass & grasslike (GG)	Not Listed	-
Trifolium glomeratum	0.1	30	-	Not Listed	-
Trifolium repens	0.2	200	-	Not Listed	-
Urtica incisa	0.5	30	Forb (FG)	Not Listed	-
Zornia dyctiocarpa	0.1	15	Forb (FG)	Not Listed	-

BAMD_LM					
Site Sheet #	BAMD_LM	Date	27/06/2024	Recorders	LB + MG
Coordinates	300827 E 6521208 N			Orientation of midline	300
PCT	599				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	20	40	0	10
15	16	2	0	0
25	30	0	0	8
35	20	0	0	0
45	10	0	0	0
Average	19.2	8.4	0	3.6

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Asperula conferta	10.0	300	Forb (FG)	Not Listed	-
Austrostipa spp.	0.2	15	Grass & grasslike (GG)	Not Listed	-
Bothriochloa decipiens	0.2	30	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.1	10	--	Not Listed	-
Bursaria spinosa	10.0	8	Shrub (SG)	Not Listed	-
Calotis spp.	0.1	5	Forb (FG)	Not Listed	-
Capsella bursa-pastoris	0.1	20		Not Listed	-
Carex inversa	0.5	100	Grass & grasslike (GG)	Not Listed	-
Chloris spp.	0.1	10	Grass & grasslike (GG)	Not Listed	-
Chrysocephalum apiculatum	0.1	50	Forb (FG)	Not Listed	-
Cirsium vulgare	0.1	10	-	Not Listed	-
Cynodon dactylon	5.0	100	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.5	20	Other (OG)	Not Listed	-
Dichondra repens	0.1	20	Forb (FG)	Not Listed	-
Einadia nutans	0.1	10	Forb (FG)	Not Listed	-
Eucalyptus albens	15.0	2	Tree (TG)	Not Listed	-
Eucalyptus melliodora	8.0	1	Tree (TG)	Not Listed	-
Galium aparine	0.1	60	-	Not Listed	-
Geranium solanderi	0.2	40	Forb (FG)	Not Listed	-
Glycine tabacina	0.2	50	Other (OG)	Not Listed	-
Hydrocotyle hirta	4.0	500	Forb (FG)	Not Listed	-
Lolium rigidum	50.0	1,000	-	Not Listed	-
Lomandra multiflora	0.1	2	Grass & grasslike (GG)	Not Listed	-
Medicago arabica	0.1	10	-	Not Listed	-
Medicago orbicularis	0.1	10	-	Not Listed	-
Medicago polymorpha	10.0	500	-	Not Listed	-
Modiola caroliniana	0.1	5	-	Not Listed	-
Notelaea microcarpa	0.1	1	Tree (TG)	Not Listed	-
Plantago lanceolata	2.0	100	-	Not Listed	-
Rosa rubiginosa	0.1	3	-	Not Listed	High Threat Weed - not manageable
Rumex brownii	0.1	6	Forb (FG)	Not Listed	-
Schinus molle	3.0	0	-	Not Listed	-

Sherardia arvensis	0.1	20	-	Not Listed	-
Silybum marianum	0.1	10	-	Not Listed	-
Solanum chenopodinum	0.1	2	Shrub (SG)	Not Listed	-
Sonchus oleraceus	0.1	15	-	Not Listed	-
Sporobolus creber	5.0	60	Grass & grasslike (GG)	Not Listed	-
Stellaria media	1.0	80	-	Not Listed	-
Trifolium arvense	0.1	10	-	Not Listed	-
Trifolium glomeratum	0.1	10	-	Not Listed	-
Trifolium repens	2.0	60	-	Not Listed	-
Urtica incisa	0.2	20	Forb (FG)	Not Listed	-

BAM01_SJ

Site Sheet #	BAM01_SJ	Date	24/09/2024	Recorders	SD + JB
Coordinates	303389 E 6521145 N			Orientation of midline	236
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	0	0	0
15	1	0	0	0
25	0	0	0	1
35	1	0	0	0
45	0	0	0	0
Average	0.6	0	0	0.2

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	0.2	20	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	5.0	150	-	Not Listed	-
Bromus hordeaceus	2.5	85	-	Not Listed	-
Capsella bursa-pastoris	0.1	20	-	Not Listed	-
Carex inversa	1.0	150	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	4.0	250	-	Not Listed	-
Chrysocephalum apiculatum	0.1	30	Forb (FG)	Not Listed	-
Cirsium vulgare	0.2	25	-	Not Listed	-
Cotula australis	0.2	100	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	4.0	300	-	Not Listed	-
Cynodon dactylon	7.0	350	Grass & grasslike (GG)	Not Listed	-
Festuca pratensis	0.2	20	-	Not Listed	-
Geranium solanderi	1.0	100	Forb (FG)	Not Listed	-
Hordeum leporinum	0.1	5	-	Not Listed	-
Hypochaeris glabra	0.1	10	-	Not Listed	-
Juncus usitatus	0.1	4	Grass & grasslike (GG)	Not Listed	-
Lactuca serriola	0.1		-	Not Listed	-
Lolium perenne	5.0	350	-	Not Listed	-
Lolium rigidum	45.0	1,000	-	Not Listed	-
Lysimachia arvensis	0.1	12	-	Not Listed	-
Medicago polymorpha	10.0	350	-	Not Listed	-
Modiola caroliniana	0.1	25	-	Not Listed	-
Poa annua	0.2	10	-	Not Listed	-
Polygonum aviculare	0.1	20	-	Not Listed	-
Ranunculus sessiliflorus	0.1	30	Forb (FG)	Not Listed	-
Rumex brownii	0.1	4	Forb (FG)	Not Listed	-
Rytidosperma fulvum	0.3	75	Grass & grasslike (GG)	Not Listed	-
Sonchus oleraceus	0.1	6	-	Not Listed	-
Sporobolus creber	0.3	50	Grass & grasslike (GG)	Not Listed	-
Trifolium arvense	0.1	20	-	Not Listed	-
Trifolium campestre	10.0	300	-	Not Listed	-
Trifolium glomeratum	0.1	50	-	Not Listed	-

Trifolium subterraneum	1.0	200	-	Not Listed	-
Vulpia myuros	2.5	35	-	Not Listed	-

BAM02_SJ

Site Sheet #	BAM02_SJ	Date	24/09/2024	Recorders	SD + JB
Coordinates	303095 E 6520624 N			Orientation of midline	236
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	1	0.5	0	1
15	1	1	0	0
25	1	1	0	0
35	0	0	0	2
45	1	0	0	1
Average	0.8	0.5	0	0.8

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bothriochloa decipiens	2.0	30	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	1.0	15	-	Not Listed	-
Capsella bursa-pastoris	0.1	6	-	Not Listed	-
Carex inversa	2.5	350	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	0.2	50	-	Not Listed	-
Cirsium vulgare	0.5	12	-	Not Listed	-
Cyclospermum leptophyllum	5.0	1,000	-	Not Listed	-
Cynodon dactylon	2.0	35	Grass & grasslike (GG)	Not Listed	-
Desmodium varians	0.1	3	Other (OG)	Not Listed	-
Glycine tabacina	0.1	4	Other (OG)	Not Listed	-
Juncus australis	1.0	6	Grass & grasslike (GG)	Not Listed	-
Lolium perenne	1.0	15	-	Not Listed	-
Medicago polymorpha	5.0	500	-	Not Listed	-
Poa annua	1.0	50	-	Not Listed	-
Rumex brownii	0.1	5	Forb (FG)	Not Listed	-
Rytidosperma fulvum	0.1	3	Grass & grasslike (GG)	Not Listed	-
Setaria parviflora	1.0	75	-	Not Listed	-
Sida corrugata	0.1	7	Forb (FG)	Not Listed	-
Sonchus oleraceus	0.1	8	-	Not Listed	-
Trifolium arvense	2.0	50	-	Not Listed	-
Trifolium campestre	5.0	500	-	Not Listed	-
Trifolium subterraneum	3.0	200	-	Not Listed	-
Wahlenbergia spp.	0.1	10	Forb (FG)	Not Listed	-

BAM03_SJ

Site Sheet #	BAM03_SJ	Date	24/09/2024	Recorders	SD + JB
Coordinates	302876 E 6520972 N			Orientation of midline	345
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0	0	0	0
15	0.1	0.1	0	0
25	0.1	0	0	0
35	0.1	0	0	0
45	0.5	0	0	0
Average	0.16	0.02	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Briza minor	0.5	100	-	Not Listed	-
Bromus catharticus	20.0	150	-	Not Listed	-
Bromus hordeaceus	5.0	150	-	Not Listed	-
Capsella bursa-pastoris	0.1	10	-	Not Listed	-
Carex inversa	0.5	50	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	2.0	75	-	Not Listed	-
Cirsium vulgare	1.0	30	-	Not Listed	-
Cotula australis	0.1	25	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	2.0	200	-	Not Listed	-
Juncus australis	0.2	3	Grass & grasslike (GG)	Not Listed	-
Lactuca serriola	0.1	5	-	Not Listed	-
Lolium perenne	25.0	500	-	Not Listed	-
Medicago polymorpha	10.0	500	-	Not Listed	-
Modiola caroliniana	0.2	50	-	Not Listed	-
Poa annua	5.0	350	-	Not Listed	-
Rumex brownii	0.1	3	Forb (FG)	Not Listed	-
Soliva sessilis	0.1	25	-	Not Listed	-
Sonchus asper	0.1	8	-	Not Listed	-
Trifolium repens	2.5	350	-	Not Listed	-
Trifolium subterraneum	50.0	1,000	-	Not Listed	-
Veronica arvensis	0.1	5	-	Not Listed	-

BAM04_SJ

Site Sheet #	BAM04_SJ	Date	25/09/2024	Recorders	SD + JB
Coordinates	302226 E 6520531 N			Orientation of midline	62
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	50	40	0	0.1
15	40	20	0	0.5
25	10	20	0	0.1
35	5	10	0	0.1
45	5	20	0	0
Average	22	22	0	0.16

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	40.0	1,000	-	Not Listed	-
Capsella bursa-pastoris	0.5	200	-	Not Listed	-
Cerastium glomeratum	0.1	100	-	Not Listed	-
Cotula australis	1.0	500	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	25	Forb (FG)	Not Listed	-
Conyza sumatrensis	0.1	12	-	Not Listed	-
Hordeum leporinum	0.1	2	-	Not Listed	-
Juncus bufonius	0.5	200	-	Not Listed	-
Lolium perenne	40.0	1,000	-	Not Listed	-
Medicago polymorpha	0.2	100	-	Not Listed	-
Poa annua	2.0	500	-	Not Listed	-
Polycarpon tetraphyllum	0.1	30	-	Not Listed	-
Polygonum aviculare	5.0	800	-	Not Listed	-
Sonchus oleraceus	0.1	10	-	Not Listed	-
Trifolium subterraneum	0.2	25	-	Not Listed	-

BAM05_SJ

Site Sheet #	BAM05_SJ	Date	25/09/2024	Recorders	SD + JB
Coordinates	302991 E 6519965 N			Orientation of midline	52
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0	0	0	0
15	0	0	0	0
25	0.1	0	0	0
35	0.1	0	0	0
45	0.1	0	0	0
Average	0.06	0	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Bromus catharticus	6.0	300	-	Not Listed	-
Bromus hordeaceus	5.0	250	-	Not Listed	-
Capsella bursa-pastoris	0.5	350	-	Not Listed	-
Carex inversa	0.1	25	Grass & grasslike (GG)	Not Listed	-
Centaurea solstitialis	0.8	50	-	Not Listed	-
Cerastium glomeratum	0.2	100	-	Not Listed	-
Cirsium vulgare	3.0	50	-	Not Listed	-
Cotula australis	0.1	30	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.5	500	-	Not Listed	-
Cynodon dactylon	0.2	12	Grass & grasslike (GG)	Not Listed	-
Erodium cicutarium	0.1	35	-	Not Listed	-
Hordeum leporinum	15.0	1,000	-	Not Listed	-
Lolium perenne	20.0	1,000	-	Not Listed	-
Lysimachia arvensis	0.1	15	-	Not Listed	-
Medicago polymorpha	25.0	1,000	-	Not Listed	-
Poa annua	0.5	200	-	Not Listed	-
Rumex crispus	0.2	15	-	Not Listed	-
Trifolium subterraneum	25.0	1,000	-	Not Listed	-
Urtica incisa	0.1	3	Forb (FG)	Not Listed	-

BAM06_SJ

Site Sheet #	BAM06_SJ	Date	25/09/2024	Recorders	SD + JB
Coordinates	302798 E 6520255 N			Orientation of midline	3
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0.2	0.1	0	0.1
15	0.4	0.2	0	0
025	0.1	0.1	0	0.1
35	0.4	0.2	0	0.1
45	0.5	0.5	0	0.1
Average	0.32	0.22	0	0.08

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Capsella bursa-pastoris	0.2	200	-	Not Listed	-
Cerastium glomeratum	0.2	200	-	Not Listed	-
Chloris truncata	0.1	4	Grass & grasslike (GG)	Not Listed	-
Cirsium vulgare	0.5	30	-	Not Listed	-
Cotula australis	1.0	500	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	1.0	250	-	Not Listed	-
Cynodon dactylon	30.0	1,000	Grass & grasslike (GG)	Not Listed	-
Juncus australis	0.5	8	Grass & grasslike (GG)	Not Listed	-
Juncus bufonius	0.2	100	-	Not Listed	-
Lolium perenne	15.0	1,000	-	Not Listed	-
Lolium rigidum	15.0	1,000	-	Not Listed	-
Lysimachia arvensis	0.1	200	-	Not Listed	-
Lythrum hyssopifolia	0.1	4	Forb (FG)	Not Listed	-
Malva parviflora	0.2	85	-	Not Listed	-
Medicago polymorpha	2.0	200	-	Not Listed	-
Medicago sativa	10.0	500	-	Not Listed	-
Modiola caroliniana	0.5	250	-	Not Listed	-
Rumex brownii	0.1	3	Forb (FG)	Not Listed	-
Senecio spp.	0.1	10	Forb (FG)	Not Listed	-
Soliva sessilis	0.1	20	-	Not Listed	-
Sonchus oleraceus	0.1	25	-	Not Listed	-
Trifolium arvense	0.2	100	-	Not Listed	-
Trifolium campestre	0.2	100	-	Not Listed	-
Trifolium repens	5.0	250	-	Not Listed	-
Trifolium subterraneum	2.0	350	-	Not Listed	-

BAM07_SJ

Site Sheet #	BAM07_SJ	Date	26/09/2024	Recorders	SD + JB
Coordinates	303564 E 6521103 N			Orientation of midline	84
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0.1	0.5	0	0
15	0.1	0.5	0	0.1
025	0.2	0.5	0	0.1
35	0.2	0.1	0	0
45	0.2	0.1	0	0.1
Average	0.16	0.34	0	0.06

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Ammi majus	0.1	15	-	Not Listed	-
Austrostipa verticillata	0.1	2	Grass & grasslike (GG)	Not Listed	-
Bromus catharticus	0.2	15	-	Not Listed	-
Bromus hordeaceus	0.5	180	-	Not Listed	-
Capsella bursa-pastoris	0.2	300	-	Not Listed	-
Carex inversa	0.2	200	Grass & grasslike (GG)	Not Listed	-
Cerastium glomeratum	2.0	500	-	Not Listed	-
Chloris truncata	1.0	40	Grass & grasslike (GG)	Not Listed	-
Cirsium vulgare	0.5	20	-	Not Listed	-
Cotula australis	5.0	500	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	100	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	25.0	1,000	-	Not Listed	-
Cymbonotus preissianus	0.1	15	Forb (FG)	Not Listed	-
Eragrostis parviflora	5.0	50	Grass & grasslike (GG)	Not Listed	-
Erodium cicutarium	0.1	30	-	Not Listed	-
Geranium solanderi	0.1	200	Forb (FG)	Not Listed	-
Hordeum leporinum	0.1	6	-	Not Listed	-
Hypericum perforatum	0.2	50	-	Not Listed	High Threat Weed
Juncus australis	1.0	10	Grass & grasslike (GG)	Not Listed	-
Lactuca serriola	0.1	25	-	Not Listed	-
Lolium rigidum	5.0	250	-	Not Listed	-
Medicago polymorpha	15.0	800	-	Not Listed	-
Plantago lanceolata	1.5	800	-	Not Listed	-
Polygonum aviculare	0.1	50	-	Not Listed	-
Rumex brownii	0.5	35	Forb (FG)	Not Listed	-
Sherardia arvensis	0.1	150	-	Not Listed	-
Soliva sessilis	0.1	35	-	Not Listed	-
Sporobolus creber	20.0	500	Grass & grasslike (GG)	Not Listed	-
Trifolium campestre	0.2	150	-	Not Listed	-
Trifolium glomeratum	0.1	15	-	Not Listed	-
Trifolium subterraneum	5.0	800	-	Not Listed	-
Verbena bonariensis	0.1	30	-	Not Listed	-

wahlenbergia spp.	0.1	5	Forb (FG)	Not Listed	-

BAM08_SJ

Site Sheet #	BAM08_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302409 E 6521214 N			Orientation of midline	320
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	10	0	0
15	1	20	0	0
025	40	10	0	0
35	5	10	0	0
45	10	20	0	0
Average	12.2	14	0	0

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	50.0	1,000	-	Not Listed	-
Capsella bursa-pastoris	1.0	100	-	Not Listed	-
Cotula australis	2.5	500	Forb (FG)	Not Listed	-
Lamium amplexicaule	0.2	150	-	Not Listed	-
Lolium perenne	35.0	1,000	-	Not Listed	-
Poa annua	5.0	500	-	Not Listed	-
Polygonum aviculare	25.0	850	-	Not Listed	-
Sonchus oleraceus	0.1	25	-	Not Listed	-

BAM09_SJ					
Site Sheet #	BAM09_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302235 E 6520850 N			Orientation of midline	225
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	30	40		0.1
15	20	50		0.5
025	10	60		1
35	10	40		1
45	30	40		1
Average	20	46	0	0.72

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	60.0	1,000	-	Not Listed	-
Capsella bursa-pastoris	2.0	300	-	Not Listed	-
Cotula australis	2.0	300	Forb (FG)	Not Listed	-
Cynodon dactylon	1.0	50	Grass & grasslike (GG)	Not Listed	-
Lamium amplexicaule	0.7	200	-	Not Listed	-
Lolium perenne	30.0	1,000	-	Not Listed	-
Malva parviflora	0.1	15	-	Not Listed	-
Poa annua	2.0	300	-	Not Listed	-
Polygonum aviculare	5.0	500	-	Not Listed	-
Sonchus asper	0.1	25	-	Not Listed	-
Sonchus oleraceus	0.2	100	-	Not Listed	-
Trifolium campestre	0.1	20	-	Not Listed	-
Trifolium glomeratum	1.0	150	-	Not Listed	-
Trifolium repens	0.1	2	-	Not Listed	-
Argemone ochroleuca	0.1	5	-	Not Listed	-

BAM10_SJ

Site Sheet #	BAM10_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	301721 E 6520301 N			Orientation of midline	037
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	50	0	0.1
15	10	20	0	0.5
025	10	30	0	0.1
35	30	20	0	0
45	40	10	0	0
Average	19	26	0	0.14

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Arctotheca calendula	2.0	350	-	Not Listed	-
Avena sativa	70.0	1,000	-	Not Listed	-
Cotula australis	0.2	100	Forb (FG)	Not Listed	-
Cynodon dactylon	5.0	500	Grass & grasslike (GG)	Not Listed	-
Hordeum leporinum	0.1	2	-	Not Listed	-
Lysimachia arvensis	0.1	25	-	Not Listed	-
Medicago polymorpha	1.0	300	-	Not Listed	-
Poa annua	2.0	300	-	Not Listed	-
Polygonum aviculare	2.0	400	-	Not Listed	-
Sonchus oleraceus	0.2	100	-	Not Listed	-

BAM11_SJ					
Site Sheet #	BAM11_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302097 E 6520145 N			Orientation of midline	342
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	5	1	0	0
15	5	1	0	0.1
025	2	1	0	0
35	10	0.5	0	0.1
45	10	1	0	0.1
Average	6.4	0.9	0	0.06

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Avena sativa	30.0	1,000	-	Not Listed	-
Bromus catharticus	3.0	300	-	Not Listed	-
Capsella bursa-pastoris	1.0	350	-	Not Listed	-
Cerastium glomeratum	0.1	50	-	Not Listed	-
Cotula australis	1.5	500	Forb (FG)	Not Listed	-
Crassula sieberiana	0.1	15	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.5	300	-	Not Listed	-
Cynodon dactylon	5.0	300	Grass & grasslike (GG)	Not Listed	-
Hordeum leporinum	1.0	50	-	Not Listed	-
Lepidium bonariense	0.1	20	-	Not Listed	-
Lolium perenne	20.0	1,000	-	Not Listed	-
lysimachia arvensis	0.1	100	-	Not Listed	-
Medicago polymorpha	0.2	100	-	Not Listed	-
Poa annua	2.0	350	-	Not Listed	-
Polycarpon tetraphyllum	0.1	25	-	Not Listed	-
Polygonum aviculare	15.0	1,000	-	Not Listed	-
Sonchus oleraceus	0.1	50	-	Not Listed	-
Trifolium campestre	0.2	50	-	Not Listed	-
Trifolium repens	0.1	50	-	Not Listed	-

BAM12_SJ					
Site Sheet #	BAM12_SJ	Date	27/09/2024	Recorders	SD + JB
Coordinates	302536 E 6520898 N			Orientation of midline	3
PCT	0				

Vegetation Integrity Function

Subplots	Litter cover (%)	Bare ground cover (%)	Cryptogram cover (%)	Rock Cover(%)
5	0.1	0.1	0	0
15	0.1	0.1	0	0.1
025	0.1	0.5	0	0.1
35	0.1	0.1	0	0
45	0.1	0.1	0	0.2
Average	0.1	0.18	0	0.08

Vegetation

Taxon	Cover	Abundance	OEH Live Form	Status	High Threat Weed
Briza minor	0.1	50	-	Not Listed	-
Bromus catharticus	5.0	300	-	Not Listed	-
Capsella bursa-pastoris	0.1	100	-	Not Listed	-
Cerastium glomeratum	0.5	200	-	Not Listed	-
Cirsium vulgare	2.0	175	-	Not Listed	-
Cotula australis	25.0	800	Forb (FG)	Not Listed	-
Cyclospermum leptophyllum	0.2	200	-	Not Listed	-
Cynodon dactylon	2.0	250	Grass & grasslike (GG)	Not Listed	-
Daucus glochidiatus	0.1	25	Forb (FG)	Not Listed	-
Einadia nutans	0.1	5	Forb (FG)	Not Listed	-
Erodium cicutarium	0.1	40	-	Not Listed	-
Lepidium bonariense	0.1	25	-	Not Listed	-
Lolium perenne	10.0	200	-	Not Listed	-
Medicago polymorpha	3.0	500	-	Not Listed	-
Poa annua	2.0	300	-	Not Listed	-
Rumex crispus	0.1	25	-	Not Listed	-
Soliva sessilis	1.0	500	-	Not Listed	-
Sonchus oleraceus	0.1	50	-	Not Listed	-
Sporobolus creber	1.0	150	Grass & grasslike (GG)	Not Listed	-
Trifolium arvense	22.0	800	-	Not Listed	-
Trifolium subterraneum	50.0	1,000	-	Not Listed	-
Vulpia bromoides	1.0	150	-	Not Listed	-

APPENDIX F BAM PREDICTED SPECIES REPORT

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00057908/BAAS20028/25/00057994	Garoo Solar Farm and BESS - Scattered Tree Assesssment	05/08/2025
Assessor Name	Report Created	BAM Data version *
Ashleigh M E McTackett	29/01/2026	Current classification (live - default) (82)
Assessor Number	BAM Case Status	Date Finalised
BAAS20028	Finalised	29/01/2026
Assessment Revision	BOS entry trigger	Assessment Type
1	Major Project	Scattered Trees

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

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

Common Name	Scientific Name
Black Falcon	Falco subniger
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae
Dusky Woodswallow	Artamus cyanopterus cyanopterus
Flame Robin	Petroica phoenicea
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis
Little Eagle	Hieraaetus morphnoides
Little Lorikeet	Glossopsitta pusilla
Little Pied Bat	Chalinolobus picatus
Painted Honeyeater	Grantiella picta
Regent Honeyeater	Anthochaera phrygia
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami
South-eastern Hooded Robin	Melanodryas cucullata cucullata
Speckled Warbler	Chthonicola sagittata
Spotted Harrier	Circus assimilis
Swift Parrot	Lathamus discolor

Varied Sittella	Daphoenositta chrysoptera
White-bellied Sea-Eagle	Haliaeetus leucogaster
White-throated Needletail	Hirundapus caudacutus
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00057908/BAAS20028/25/00057909	Garoo Solar Farm and BESS	05/08/2025
Assessor Name	Report Created	BAM Data version *
Ashleigh M E McTackett	29/01/2026	Current classification (live - default) (82)
Assessor Number	Assessment Type	BAM Case Status
BAAS20028	Major Projects	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
2		29/01/2026

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

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

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Black-striped Wallaby	Macropus dorsalis	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Corben's Long-eared Bat	Nyctophilus corbeni	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Diamond Firetail	Stagonopleura guttata	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

Dusky Woodswallow	Artamus cyanopterus cyanopterus	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Flame Robin	Petroica phoenicea	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Little Eagle	Hieraaetus morphnoides	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Little Lorikeet	Glossopsitta pusilla	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Little Pied Bat	Chalinolobus picatus	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Regent Honeyeater	Anthochaera phrygia	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
South-eastern Hooded Robin	Melanodryas cucullata cucullata	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Speckled Warbler	Chthonicola sagittata	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Spotted Harrier	Circus assimilis	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

Square-tailed Kite	Lophoictinia isura	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Swift Parrot	Lathamus discolor	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Turquoise Parrot	Neophema pulchella	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Varied Sittella	Daphoenositta chrysoptera	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
White-throated Needletail	Hirundapus caudacutus	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Painted Honeyeater	Grantiella picta	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Painted Honeyeater	Grantiella picta	Habitat constraints
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat constraints

APPENDIX G BAM CANDIDATE SPECIES REPORT

BAM Candidate Species Report

Proposal Details

Assessment Id 00057908/BAAS20028/25/00057909	Proposal Name Garoo Solar Farm and BESS	BAM data last updated * 05/08/2025
Assessor Name Ashleigh M E McTackett	Report Created 29/01/2026	BAM Data version * Current classification (live - default) (82)
Assessor Number BAAS20028	Assessment Type Major Projects	BAM Case Status Finalised
Assessment Revision 2	BOS entry trigger	Date Finalised 29/01/2026

* 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.

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia atrox Myall Creek Wattle	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☑ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Adelotus brevis - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Aprasia parapulchella Pink-tailed Legless Lizard	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?

Burhinus grallarius Bush Stone-curlew	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Cercartetus nanus Eastern Pygmy-possum	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Delma vescolineata Hunter Valley Delma	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Dichanthium setosum Bluegrass	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Digitaria porrecta Finger Panic Grass	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Euphrasia arguta Euphrasia arguta	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed) *Survey months are outside of the months specified in Bionet.	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	No (surveyed) *Survey months are outside of the months specified in Bionet.	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Hoplocephalus bitorquatus Pale-headed Snake	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Litoria booroolongensis Booroolong Frog	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox connivens Barking Owl	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Petauroides volans Southern Greater Glider	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascolarctos cinereus Koala	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Prasophyllum sp. Wybong Prasophyllum sp. Wybong	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Swainsona sericea Silky Swainson-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☑ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Tylophora linearis Tylophora linearis	No (surveyed) *Survey months are outside of the months specified in Bionet.	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☑ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☑ Survey month outside the specified months?

Tyto novaehollandiae Masked Owl	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Uvidicolus sphyrurus Border Thick-tailed Gecko	No (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Vespadelus troughtoni Eastern Cave Bat	Yes (surveyed)	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

Common Name	Scientific Name
Southern Greater Glider	Petauroides volans

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Austral Toadflax	Thesium australe	Habitat degraded
Belson's Panic	Homopholis belsonii	Habitat degraded
Callistemon pungens	Callistemon pungens	Habitat degraded
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Hawkweed	Picris evae	Habitat degraded
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat degraded Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints

South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Habitat degraded Habitat constraints
Swift Parrot	Lathamus discolor	Habitat constraints

APPENDIX H BAT CALL ANALYSIS REPORT

Bat Call Analysis Report

Gararo Solar Farm

Prepared for ERM

Prepared by:

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Document Records - Quality

TITLE	Bat Analysis for the Gararo Solar Farm
FILED AS	ME25003_Gararo Solar Farm

Revision	Date	Description	Prepared by	Reviewed by
Version A	23/04/2025	First draft	KM	ERM

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1.0 Introduction

1.1 Background

Green Tape Solutions was commissioned to undertake bat call analysis for the Gararo Solar Farm project located south of Tamworth in New South Wales.

1.2 Scope of Work

The specific scope of work for this report includes the following:

- Outline the methodology used to analyse the microbat call within the subject site; and,
- Present the findings of all of the bat call surveys conducted at the project site.

2.0 Methodology

2.1 Capture Technique

Microbat calls were sampled using four detectors (Titley Electronics). Passive monitoring was undertaken from 15 to 23 January 2025. The original call files display Australian Eastern Standard Time. The data was analysed using Anabat Insight.

Monitoring commenced at dusk (approximately 1800 hours) and continued until dawn (approximately 0530 hours). Ultrasonic call monitoring surveys on anabat detectors were conducted using full-spectrum fitted with omnidirectional ultrasonic microphone.

2.2 Call Identification

Anabat recordings were analysed using Anabat software (Anabat Insight). Identifications were made by categorising call shape and frequency, with a species match given in consideration to region, known bat distributions, and habitats present. The focus of the bat surveys was to assess the presence of bat species found within the Project Area, and to assess the potential for rare and threatened species to occur.

Call identification for this dataset was based on call keys and descriptions published for Queensland (Reinhold *et al.*, 2001) and New South Wales (Pennay *et al.*, 2004).

Species' identification was further refined using the probability of occurrence of each species based on their geographic distribution (Churchill, 2008, Van Dyck and Strahan, 2008). Species nomenclature used in this report follows Churchill (2008).

The reliability of identification is as follows:

- **Definite** - one or more calls where there is no doubt about the identification of the species;
- **Probable** - most likely to be the species named, low probability of confusion with species that use similar calls; and,
- **Possible -** call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls.

2.3 National Standard

The format and content of this report complies with the nationally accepted standards for the interpretation and reporting of Anabat and Songmeter data (Reardon, 2003), which is currently available from the Australasian Bat Society at www.ausbats.org.au.

3.0 Results

3.1 Total Species Recorded

The location of each detector, including both the locality and GPS coordinates, is included in **Table 1.**

Table 1: Detector Locations

Detector	Coordinates	Locality
CHORUS08	-31.432060, 150.916550	South of Tamworth
CHORUS13	-31.432056, 150.927704	South of Tamworth
CHORUS14	-31.429422, 150.905716	South of Tamworth
CHORUS25	-31.431820, 150.927902	South of Tamworth

A summary of the species identified through bat call analysis is provided in **Table 2**. The total number of calls per detector is also given in **Table 2**. This number is indicative of bat activity but may still include some background noise or poor-quality calls that were not identifiable. While some call sequences were recognised as bat calls, the quality was not sufficient to assign species identification.

Table 2: Summary of bat call analysis

Species	BC Act	EPBC Act	CHORUS 08	CHORUS 13	CHORUS 14	CHORUS 25
Total Calls (Noise and poor bat call)			**1671 (1341)**	**5233 (4264)**	**12440 (9982)**	**27283 (22013)**
Austronomus australis	LC	NOC	Definite	Definite	Definite	Definite
Chalinolobus gouldi	LC	NOC	Definite	Definite	Definite	Definite
Nyctophilus corbeni	V	V	Possible	Possible	Possible	Possible
Nyctophilus geoffroyi	LC	NOC	Possible	Possible	Possible	Possible
Nyctophilus gouldi	LC	NOC	Possible	Possible	Possible	Possible
Ozimops planiceps	LC	NOC	Definite	Definite	Definite	Definite
Ozimops ridei	LC	NOC	Definite	Definite	Definite	Definite

Species	BC Act	EPBC Act	CHORUS 08	CHORUS 13	CHORUS 14	CHORUS 25
Saccolaimus flaviventris	V	NOC	Definite	Definite	Definite	Definite
Scotorepens greyii	LC	NOC	Possible	Probable	Probable	Probable
Vespadelus regulus	LC	NOC	Possible	Possible	Possible	Possible
Vespadelus troughtoni	V	NOC	Possible	Possible	Possible	
Vespadelus vulturnus	LC	NOC	Possible	Possible	Possible	Possible

LC: Least Concern, NOC: Not of Concern, V: Vulnerable

3.2 Samples of Calls / Sequences Files

Samples of call extracted from the dataset for each species identified is provided in the following figures.

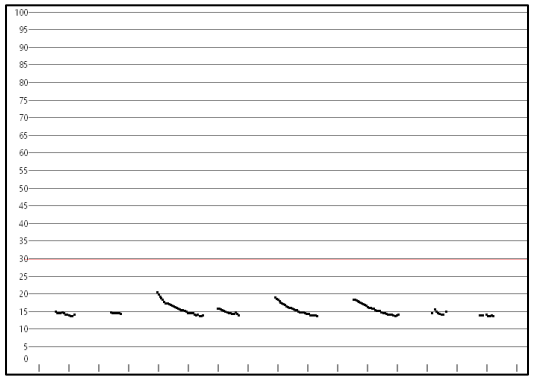
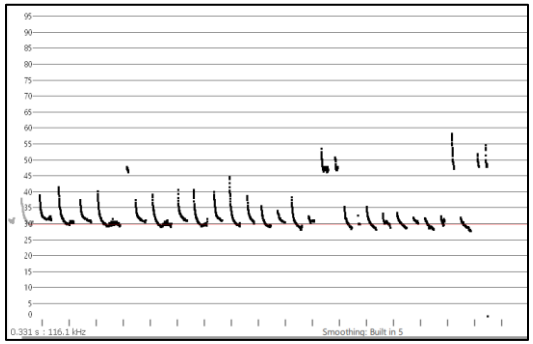
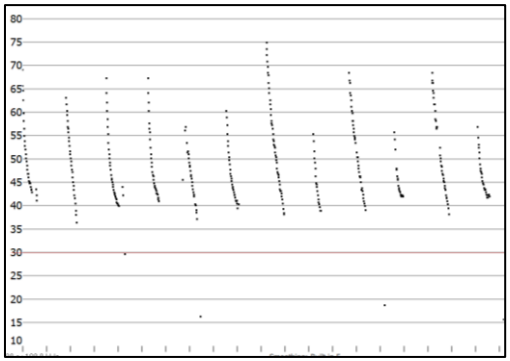
Species	Calls	Known distribution (Extract from Ausbats maps from Australian Bat Society)
Figure 1: *Austronomus australis* Definite call. This bat is easily recognised by its constant frequency calls range in bandwidth from 10.5 to 15 kHz (Pennay *et al.*, 2004).		
Figure 2: *Chalinolobus gouldi* Definite call. This species has a curved shape call with characteristic frequency 28 to 34kHz. Pulse alternates in frequency and mostly down-sweeping tail or no tail.		

Figure 3: *Nyctophilus spp*



Possible call.

This species displays a near-vertical pulse, characteristic frequency between 80 and 35KHz (Pennay *et al*, 2004).

The species from this genus cannot be distinguished from each other. 3 species are known to occur in the project area.



N. corbeni

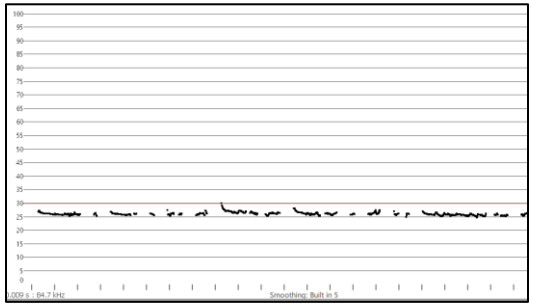


N. geoffroyi



N. gouldi

Figure 4: *Ozimops planiceps*

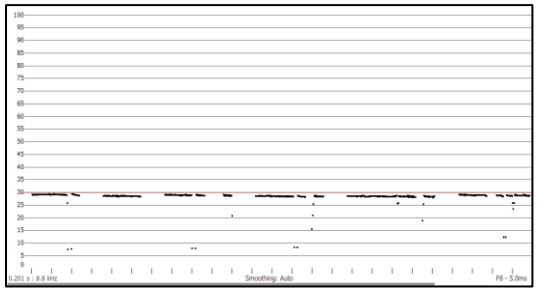


Definite call.

Characteristic frequency 26 to 31 kHz in New South Wales.



Figure 5: *Ozimops ridei*

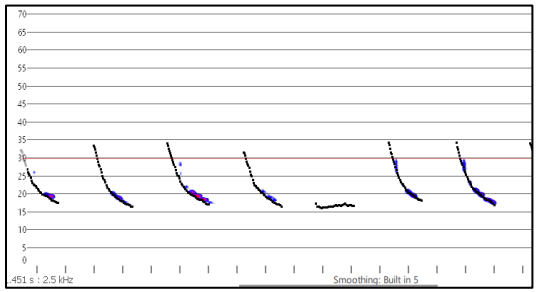




Definite call.

O. ridei calls are flat and sometimes a bit curved with frequency a bit lower than 30kHz. Characteristic frequency of this species is between 28 to 36 kHz.

Figure 6: *Saccolaimus flaviventris*



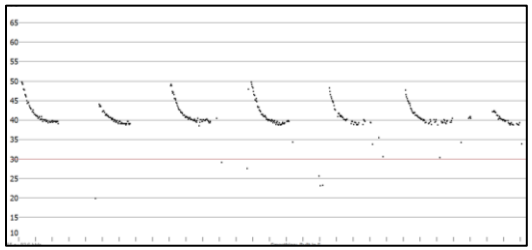


Definite call.

Curved, characteristic frequency 18 to 21.5 kHz. The characteristic frequency does not go above 22 kHz. Other species that could overlap do not occur in this area.

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Figure 7: *Scotorepens greyii*

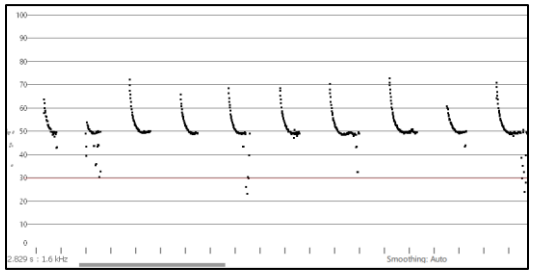




Probable call.

S. greyii has a curved and up-sweeping tail pulse. Its characteristic frequency is between 36 to 41.5 kHz. The up-sweeping tail and time of characteristic section + tail exceeding time of pre-characteristic section will distinguish this from *Falsistrellus tasmaniensis* most of the time.

Figure 8: *Vespadelus regulus*

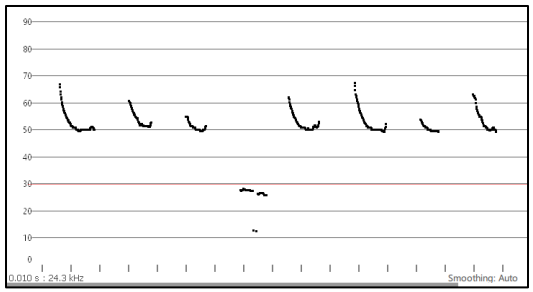


Possible call.

Characteristic frequency varies significantly over the distribution from 40 to 55 kHz (n = 95). Call shape also varies between regions. Curved with up-sweeping tail.



Figure 9: *Vespadelus troughtoni*

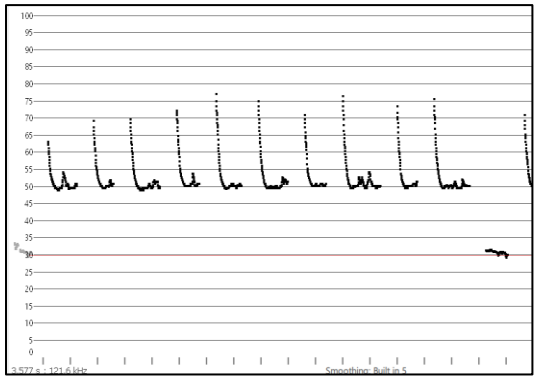


Possible call.

This species displays a curved pulse with a non-prominent up-sweeping tail. Its characteristic frequency is between 48.5 to 55 kHz (Pennay *et al*, 2004). If the end, frequency is lower than 51 kHz, then the call can be identified to *V. troughtoni.*



Figure 10: *Vespadelus vulturnus*





Probable call.

Curved and up-sweeping tail calls with characteristic frequency between 45 to 53 kHz.

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4.0 Conclusion

A total of 12 microbat species were either confirmed ‘definite’, ‘probable’ or ‘possible’ within the Project area. All bats identified on the site were expected to be present within the region.

Calls from *Nyctophilus sp* have been confirmed across the project areas. Three species of *Nyctophilus* possibly occur within the Project Area. *N corbeni* is listed Vulnerable under the EPBC Act and BC Act. The call of this species cannot be distinguished from each other.

5.0 References

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PWCNT 2002. Key to the Bat Calls of the Top End of the Northern Territory. *In:* PARKS AND WILDLIFE COMMISSION OF THE NORTHERN TERRITORY (ed.). Damian J. Milne.

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APPENDIX I EPBC ACT MNES REFERRAL ASSESSMENT

Garoo Solar Farm and BESS

Application Number: **02758** Commencement Date: **29/01/2025** Status: **Submitted**

1. About the project

1.1 Project details

1.1.1 Project title *

Garoo Solar Farm and BESS

1.1.2 Project industry type *

Energy Generation and Supply (renewable)

1.1.3 Project industry sub-type

Solar Farm

1.1.4 Estimated start date *

01/08/2026

1.1.4 Estimated end date *

31/12/2069

1.2 Proposed Action details

1.2.1 Provide an overview of the proposed action, including all proposed activities. *

Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust (the Proponent) proposes to construct and operate the Garoo Solar Farm and Battery Energy Storage System (BESS) (the Proposed Action), a renewable energy development situated in the rural locality of Garoo, New South Wales (NSW), within the Tamworth Regional Local Government Area (LGA). The Proposed Action sits on the Traditional Lands of the Kamilaroi Nation and sits within the Nungaroo Local Aboriginal Land Council (LALC).

The Proponent is a trustee of Greenpulse Solar Farm and BESS Unit Trust. Jinko Power Australia | Pty Ltd (Jinko) is the operating entity of one of the proponent shareholders. The second company's shareholder is an Australian owned entity, RE Solar Star Pty Ltd.

The Proposed Action involved the construction, operation and decommissioning of an alternating current solar farm, a BESS, and associated supporting and ancillary infrastructure. The Proposed Action proposes to construct and operate a 133.76 MW Alternating Current (AC) solar farm, and a 360 MW BESS, with up to 1,440 MWh.

The Proposed Action is located on the Eastern side of New England Highway, situated in the rural locality of Garoo NSW 2340.

The Proposed Action would compromise but not be limited to the following:

- Energy generation:
  - Solar Photovoltaic (PV panels) installed with a capacity of up to 133.76 MW
  - Mounted solar arrays
- Power Conversion Units:
  - Inverter, DC-AC transformer and associated equipment
- Electrical reticulation network:
  - On-site substation and 330 kV switching station
  - Internal electrical reticulation network (medium voltage)
  - 360 MW capacity BESS with up to 4 hours duration of storage. Associated electrical equipment providing connection to the existing 330kV transmission network
- Access roads to site
- Ancillary activities and infrastructure:
  - Temporary on-site infrastructure
  - Permanent operations and maintenance infrastructure

The Project Area covers a total of approximately 369.08 hectares (ha). This has since been refined due to the presence of identified biodiversity values. Subsequently the Proposed Action is anticipated to be nestled within the smaller Disturbance Footprint (306.49 ha) which fits entirely within the Project Area. Notably, the Disturbance Footprint (Development Footprint) has been reduced to avoid much of the riparian habitat associated with Tamarang Creek that runs through the centre of the Project Area. An Avoidance Area has been established following desktop and field surveys. A Threatened Ecological Community (TEC) has been identified (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland) and excluded from the Disturbance Footprint (the Avoidance Area).

The Proposed Action is declared State Significant Development (SSD) under Clause 2.6(1) of the State Environmental Planning Policy (Planning Systems) 2024 (Planning Systems SEPP). The Proponent is seeking development consent for the Proposed Action under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act). As part of the SSD consent process, the Proponent has engaged Environmental Resources Management Australia Pty Ltd (ERM) to prepare this Environmental Impact Statement (EIS) for the Proposed Action. The EIS would consider both the temporary and operational Disturbance Footprint areas, noting the temporary impacted areas would be rehabilitated post construction completion. The main potential impacts of the Proposed Action (during construction and operation) on biodiversity that would need to be assessed include:

- Loss of extant native vegetation communities and associated fauna and flora habitat and the subsequent impacts to local population of native species, particularly threatened species;
- Increased habitat fragmentation;
- Mortality and injury from vehicle strike and vegetation clearing.

The Proposed Action is situated on multiple lots outlined below:

- Deposited Plan (DP) 755341: Lots 1, 2, 14, 15, 16, 17, 19, 20, 22 (freehold);
- DP 1108524: Lots 2, 3, 4, 5, 6, 7 (freehold);
- DP 114643: Lots 3, 4 (freehold); and
- DP 250846: Lot 1 (Crown Land).

1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?

No

1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? *

Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report (**Att** A, section 2) for the Proposed Action outlines the specific Commonwealth legislation associated with the proposed development. Additionally, State and local legislation has been outlined below.

Commonwealth legislation

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This referral addresses the potential impact on matters of national environmental significance and whether the Proposed Action is expected to be a controlled action requiring environmental approval.
- *Native Title Act 1993.* A review of the potential for native title will be undertaken for the Proposed Action. The Project Area is not located within the boundaries of a native title claim or determination.

State (NSW) legislation

- *Environmental Planning and Assessment Act 1979* (EP&A Act). Under Section 4.2, the Proposed Action requires land use and development consent in accordance with Clause 2.35 of the State Environmental Planning Policy (Transport and Infrastructure) 2007, being a development of “electricity generating works” in a prescribed zone (RU1). Specifically, the Proposed Action is a state significant development in accordance with Section 2.6(1) of the Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP).
- *Biodiversity Conservation Act 2016* (BC Act). Under Section 7.9, a biodiversity development assessment report (BDAR) must be prepared because the Proposed Action is a State Significant Development.

The Bilateral Agreement established between the Commonwealth and NSW Governments allows the Federal Minister for the Environment to rely on the NSW environmental impact assessment processes when assessing actions under the EPBC Act. The Bilateral Agreement applies to certain types of major projects under the EP&A Act including projects for State Significant Development that also require assessment and approval under the EPBC Act. The Commonwealth may elect to issue supplementary assessment requirements to address specific matters not covered by the Bilateral Agreement.

The Bilateral Agreement allows for the use of the NSW Biodiversity Offset Scheme (BOS) to address any residual impacts arising from the Proposed Action. Offsets are determined by application of the NSW Biodiversity Assessment Method and associated Biodiversity Assessment Method Calculator to the satisfaction of the NSW Environment Agency head and Minister for Planning.

1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. *

The Proponent recognises that successful renewable energy projects are built on strong relationships with local communities and collaboration with relevant authorities. Community and stakeholder engagement commenced in late 2024. Consultation is summarised as follows:

- Government engagement:
  - Held an on-line meeting with Tamworth Regional Council staff to introduce the Proposed Action and hear feedback
- Engaged landowners and neighbours:
  - Sent an introductory letter to 28 landowners within 5km of the Proposed Action boundary
- Communications channels and tools
  - Published a Proposed Action website, www.garoosolarfarm.com.au, which provides project information and is a key interface for stakeholders
  - Established a project ‘contact us’ page and project phone number, 1800 979 858

Eight agencies were emailed to request the names of Registered Aboriginal Parties (RAPs) for the Project Area. Heritage NSW provided a list of RAPs that may be interest. Registered Aboriginal Owners within the area of Bulagaranda were also flagged as having potential interest and that the Nungaroo Local Aboriginal Land Council (LALC) may wish to participate. Registration of interest letters were sent in late 2024. At Gomilaroi Cultural Consultancy, Corroboree Aboriginal Corporation, Didge Ngunawal Clan, Guyinbaraay people Clan group, Gomery Cultural Consultants, Wurrumay Culture Heritage Consultants, Long Cully Cultural Services, Ngagga Ngagga and two stakeholders registered yes to expression of interest.

Community and stakeholder engagement during the preparation of the EIS would build on relationships established through early engagement activities and complement formal consultation required under planning regulations. Future engagement activities would involve:

- One-on-one meetings with government, Traditional Owners, host landholders, neighbours;
- Stakeholder briefings with Government, business, industry and interest groups;
- Community information and engagement sessions with community (who neither own land surrounding the Proposed Action or host Proposed Action infrastructure), business, industry and interest groups;
- Communications materials;
- Toll-free community information number; and
- Project website.

1.3.1 Identity: Referring party

Privacy Notice:

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

The Department of Climate Change, Energy, the Environment and Water (the department) collects your personal information (as defined by the Privacy Act 1988) through this platform for the purposes of enabling the department to consider your submission and contact you in relation to your submission. If you fail to provide some or all of the personal information requested on this platform (name and email address), the department will be unable to contact you to seek further information (if required) and subsequently may impact the consideration given to your submission.

Personal information may be disclosed to other Australian government agencies, persons or organisations where necessary for the above purposes, provided the disclosure is consistent with relevant laws, in particular the Privacy Act 1988 (Privacy Act). Your personal information will be used and stored in accordance with the Australian Privacy Principles.

See our Privacy Policy to learn more about accessing or correcting personal information or making a complaint. Alternatively, email us at privacy@awe.gov.au.

☑ **Confirm that you have read and understand this Privacy Notice ***

1.3.1.1 Is Referring party an organisation or business? *

Yes

Referring party organisation details

ABN/ACN	12002773248
Organisation name	ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA PTY LIMITED
Organisation address	Level 14 207 Kent Street Sydney NSW 2000

Referring party details

Name	Miranda Crossley
Job title	Senior Consultant
Phone	+61285848823
Email	miranda.crossley@erm.com
Address	Level 14/207 Kent St, Sydney NSW 2000

1.3.2 Identity: Person proposing to take the action

1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

No

1.3.2.2 Is Person proposing to take the action an organisation or business? *

Yes

Person proposing to take the action organisation details

ABN/ACN	679065377
Organisation name	Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust
Organisation address	Suite 906 821 Pacific Highway, Chatswood, NSW 2067

Person proposing to take the action details

Name	Yifan Wang
Job title	Director - Jinko Power Australia I Pty Ltd
Phone	0413198119
Email	ethan.wang@jinkopower.com
Address	Suite 1024, 219-227 Elizabeth Street, Sydney, NSW, 2000

1.3.2.14 Are you proposing the action as part of a Joint Venture? *

No

1.3.2.15 Are you proposing the action as part of a Trust? *

Yes

1.3.2.16 Describe the nature of the trust arrangement in relation to the proposed action. *

The trust deed has been provided in **Att D – Trust Deed for GreenPulse Solar Farm and BESS**. GreenPulse Solar Farm and BESS Pty Ltd is the Trustee. The Trustee is GreenPulse Solar Farm and BESS Unit Trust. The Unitholders are Jink Power Investment Pty. Ltd and RE Solar Stary Ptd Ltd as a trustee of Solar Star 1 Family Trust.

Jinko Power Australia | Pty Ltd is the operating entity of one of the proponent shareholders. The second company's shareholder is an Australian owned entity with the name "RE Solar Star Pty Ltd".

1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. *

The Proponent is an Australian organisation that specialises in the development, operation and maintenance of large-scale assets, predominantly focusing on wind, solar and industrial scale battery storage. The Proponent is a trustee and has not submitted any EPBC referrals. The operating entity of one of the proponent shareholders, Jinko, has one EPBC referral under assessment (in Queensland). The EPBC Number for this referral is 2024/10010. There are no other history applications for Jinko nor the Proponent (as of February 2025).

1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

The Proponent aims to contribute to the transition to a carbon-neutral economy by providing innovative, sustainable energy solutions to households, businesses, communities and cities as part of the NSW Government's ambitious target to halve emissions by 2030, achieve net zero by 2050 and to establish a reliable, affordable and clean energy system.

The Environmental Policy and Planning Framework for Jinko has been provided in **Att C (Jinko Environmental Policy and Planning Framework)**.

Jinko is the operating entity of one of the proponent shareholders for the Proposed Action. Jinko is a leading clean energy supplier and service provider with the mission of "changing the energy structure and taking responsibility for the future". Jinko recognises that integrating environmental management into industrial development is crucial for the development of the PV industry. Jinko hopes to improve the overall environmental management performance, to promote the green transformation of global energy. Jinko strictly abides by the laws, regulations, and standards of the countries where it operates, including those related to environmental protection, air pollution prevention and control, water pollution prevention and control, solid waste pollution prevention and control, and energy conservation.

1.3.3 Identity: Proposed designated proponent

1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

Yes

Proposed designated proponent organisation details

ABN/ACN	679065377
Organisation name	Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust
Organisation address	Suite 906 821 Pacific Highway, Chatswood, NSW 2067

Proposed designated proponent details

Name	Yifan Wang
Job title	Director - Jinko Power Australia I Pty Ltd
Phone	0413198119
Email	ethan.wang@jinkopower.com
Address	Suite 1024, 219-227 Elizabeth Street, Sydney, NSW, 2000

1.3.4 Identity: Summary of allocation

Confirmed Referring party's identity

The Referring party is the person preparing the information in this referral.

ABN/ACN	12002773248
Organisation name	ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA PTY LIMITED
Organisation address	Level 14 207 Kent Street Sydney NSW 2000
Representative's name	Miranda Crossley
Representative's job title	Senior Consultant
Phone	+61285848823
Email	miranda.crossley@erm.com
Address	Level 14/207 Kent St, Sydney NSW 2000

Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	679065377
Organisation name	Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust
Organisation address	Suite 906 821 Pacific Highway, Chatswood, NSW 2067
Representative's name	Yifan Wang
Representative's job title	Director - Jinko Power Australia I Pty Ltd
Phone	0413198119
Email	ethan.wang@jinkopower.com
Address	Suite 1024, 219-227 Elizabeth Street, Sydney, NSW, 2000

Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

1.4 Payment details: Payment exemption and fee waiver

1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)? *

No

1.4.3 Have you applied for or been granted a waiver for full or partial fees under Regulation 5.21A? *

No

1.4.5 Are you going to apply for a waiver of full or partial fees under EPBC Regulation 5.21A?

No

1.4.7 Has the department issued you with a credit note? *

No

1.4.9 Would you like to add a purchase order number to your invoice? *

No

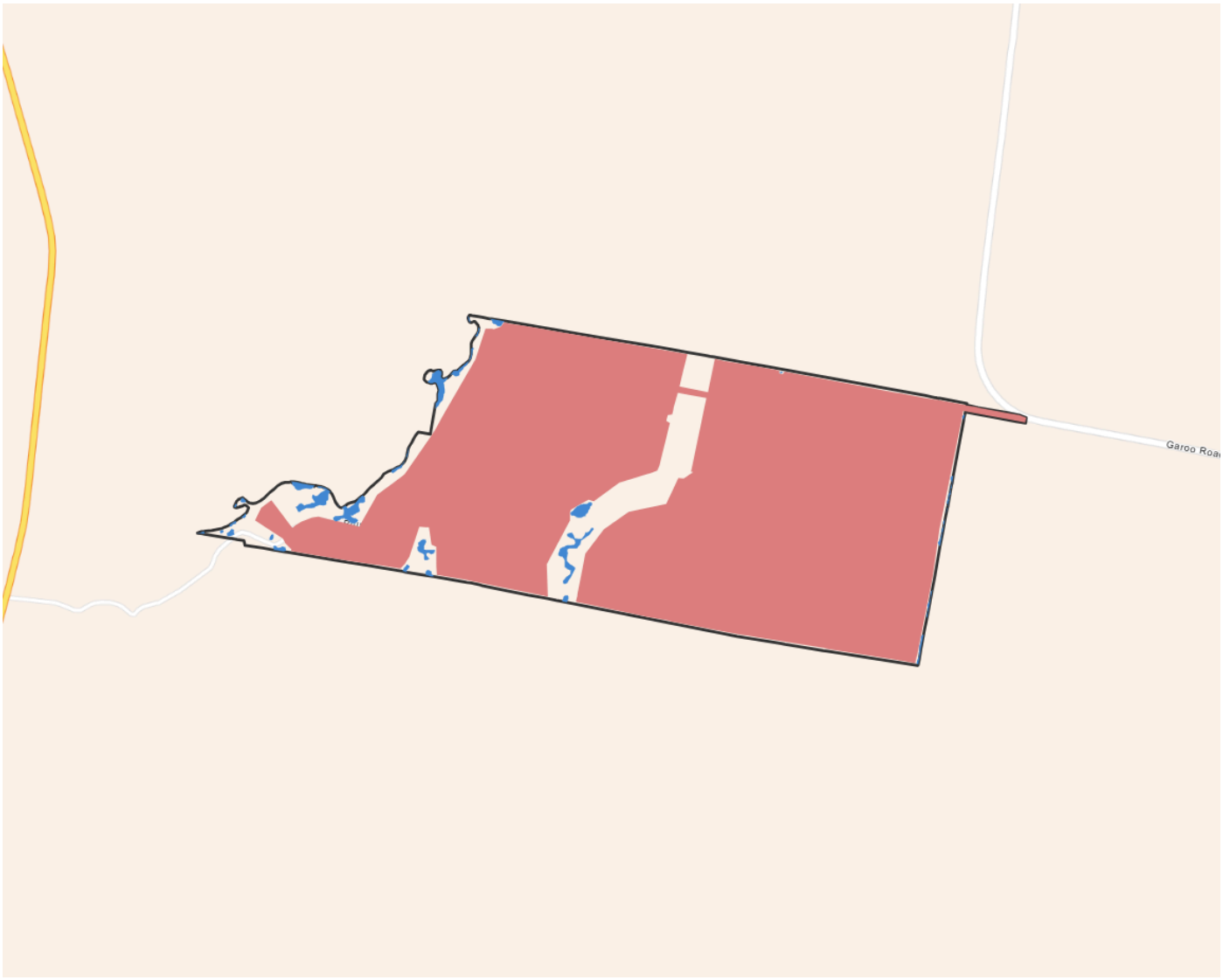
1.4 Payment details: Payment allocation

1.4.11 Who would you like to allocate as the entity responsible for payment? *

Person proposing to take the action

2. Location

2.1 Project footprint



Project Area: 369.15 Ha **Disturbance Footprint:** 319.91 Ha **Avoidance Area:** 5.46 Ha

2.2 Footprint details

2.2.1 What is the address of the proposed action? *

Proposed Action: 291 Garoo Road, Garoo NSW 2340 within Tamworth Regional LGA. The Project Area comprises of several allot

2.2.2 Where is the primary jurisdiction of the proposed action? *

New South Wales

2.2.3 Is there a secondary jurisdiction for this proposed action? *

No

2.2.5 What is the tenure of the action area relevant to the project area? *

The land is currently under a five-year licence/option to purchase agreement. The properties are currently freehold with exception of DP 250846: Lot 1 which is Crown Land.

3. Existing environment

3.1 Physical description

3.1.1 Describe the current condition of the project area's environment.

The Proposed Action is located approximately 370 km northwest of Sydney, 40 km south of Tamworth and 14 km west of Wallabadah.

The Project Area falls within the Nandewar Bioregion which is characterised by box woodlands that occur on clay or loam soils, typically at low to mid elevation in agriculturally productive areas. The Nandewar Interim Biogeographic Regionalisation for Australia (IBRA) bioregion falls in northern NSW and across the Queensland border. The Project Area is entirely within the Peel subregion of the Nandewar IBRA bioregion.

The Project Area is zoned entirely as RU1 – Primary Production under the Tamworth Regional LEP 2010 which is consistent with the known uses of the property. The existing land uses surrounding the Project Area predominantly comprise agricultural grazing and irrigated cropping. The Disturbance Footprint would remain consistent with RU1 and would meet the objective of the RU1 zone to encourage sustainable primary industry production. No rezoning is expected.

The Project Area can be accessed via Garoo Road off the Lindsays Gap Road (subject to assessment in the EIS phase). Internal access tracks would be established as part of the Proposed Action.

Large portions of land within the Project Area have been disturbed and are characterised by grazed native and modified grasslands resulting from vegetation clearing, cropping and livestock grazing.

Native vegetation is present within the Project Area. However, this is highly fragmented due to historical clearing and current agricultural land uses. Scattered trees remain throughout the Project Area as paddock trees, primarily providing shelter to stock and habitat values for native fauna. Much of the Project Area is dominated by non-native grasslands, cropping land and pasture with patches of planted vegetation. One patch is considered to form part of the mapped Plant Community Type (PCT) 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion. This patch is present as a mix of planted and remnant native vegetation.

The Disturbance Footprint has been established avoiding all areas of Woodland Formation and Mixed Vegetation condition states of PCT 599. The extent of PCT 599 and non-native vegetation has been mapped in **Figure 4-1** in **Att A (Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report).**

3.1.2 Describe any existing or proposed uses for the project area.

Existing Uses:

The Project Area covers approximately 369.08 ha of and is currently used for agricultural grazing and cropping. A review of historical aerial imagery shows a history of intensive agricultural activities such as cropping and pasture modification. Imagery from 1993 shows significant groundcover disturbance through agriculture machinery lines and tonal differences from adjoining groundcover shown in **Att B – Garoo Solar Farm and BESS Scoping Report** (Appendix C – Preliminary Biodiversity Assessment, Figure 4-1 1993 Historical Imagery).

Proposed uses:

Approximately 306.49 ha of the Project Area (the Disturbance Footprint) would be used for the Solar Farm, BESS, electrical reticulation network, access tracks, associated infrastructure, temporary construction facilities and permanent operation and maintenance infrastructure. Most of the Disturbance Footprint coincides with agricultural and cropping lands present within the Project Area. The remainder of the Project Area is not expected to result in any land use change.

3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

There are no relevant outstanding natural features or important and unique values associated with the Project Area.

3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The Project Area has elevation ranging from approximately 640 m near the south-west boundary, to approximately 566 m in the northern area around Tamarang Creek, which runs through the centre of the Project Area. The land slopes up from Tamarang Creek to low-lying ridges present on the eastern and western boundaries.

3.2 Flora and fauna

3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.

ERM has completed a Preliminary Biodiversity Assessment **(Appendix C in Att B – Garoo Solar Farm and BESS Scoping Report)**, a EPBC Act Significant Impact Assessment Report **(Att A - Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report)** and a **Land Category Assessment (LCA)**. A Biodiversity Development Assessment Report (BDAR) is currently being prepared to support an Environmental Impact Statement (EIS) for approval as State Significant Development under the NSW *Environmental Planning and Assessment Act 1979*.

The following field surveys have been conducted across the Project Area:

- 24-28 September 2024: rapid vegetation assessment, Biodiversity Assessment Method (BAM) plots/vegetation integrity plots), LCA transects, scattered tree assessments, habitat assessments of landscape and habitat features
- 28 October – 1 November 2024: targeted flora transect surveys, targeted nocturnal aural visual surveys for frogs and targeted reptile surveys.
- 12-20 January 2025: nocturnal spotlighting and call playback, diurnal bird surveys, deploy anabat and camera trap recorders, Koala scat (SAT) searches, targeted flora transect surveys, and planted native vegetation assessment.

The field investigations, methods and locations are presented in the Preliminary Biodiversity Assessment (PBA) Appendix **C in Att B – Garoo Solar Farm and BESS Scoping Report**

Plant Communities and Threatened Ecological Communities

Ecological assessments of the Project Area has determined the presence of one native Plant Community Type (PCT), being PCT 599 Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion. This PCT has the potential to be associated with the EPBC Act listed TEC, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. This Threatened Ecological Community (TEC) is found within the Project Area. However, through design refinement, it has been excluded from the Disturbance Footprint.

Scattered trees associated with PCT 599 are found within the Disturbance Footprint. However, these areas have been excluded from the TEC mapping as they do not meet the definition of a continuous area and therefore do not constitute a patch as per the EPBC Act Conservation Advice for the TEC. These areas are largely individual trees, surrounded by a predominantly exotic groundcover, and an absence of native shrubs. Most of the patches mapped as PCT 599 within the Disturbance Footprint are also at least 75 m between each other (containing less than five trees). As a result, these areas are not considered patch of the TEC.

The majority of the Disturbance Footprint is disturbed due to the historical land use of the site. Non-native grasslands within the Disturbance Footprint have been separated into 'PCT 0 – non-native grasslands' which consists of degraded and modified land with potential to provide habitat for some threatened species and 'PCT 0 – non-native grasslands (Cropping and Earthworks)' which has been subject to extensive disturbance and lacks suitable habitat for threatened species.

Threatened Flora

Targeted 10m parallel transect searches were conducted for threatened species throughout associated PCTs (599) for *Prasophyllum* sp. *Wybong* (critically endangered) (during the October 2024 survey event. No threatened flora species have been identified during October 2024 field surveys within the Disturbance Footprint. These survey efforts have been completed in full.

Targeted surveys in native habitat and in 'PCT 0 - non-native grassland' habitat conducted for the following species during the January 2025 survey event:

- Prickly Bottlebrush (*Callistemon pungens)*
- Bluegrass (*Dichanthium setosum*)
- Eyebrights (*Euphrasia arguta)*
- Belson's Panic (*Homopholis belsonii)*
- Hawkweed (*Picris evae)*
- Austral Toadflax (*Thesium australe)*
- *Tylophora linearis* also referred to as *Vincetoxicum forsteri*

The majority of 'PCT 0 – non-native grassland' was surveyed. These vegetation communities, whilst degraded from agricultural land uses, are marginally suitable for Austral Toadflax and Bluegrass. Prickly Bottlebrush, Eyebrights, Belson's Panic, Hawkweed and *Tylophora linearis* were considered unlikely to occur within the Project Area due to an absence of suitable habitat (and surveys are being completed as required under the BAM). Notably, they are unlikely to occur in non-native grasslands.

The likelihood of occurrence assessment conducted in **Att A - Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report**, identified Bluegrass (*Dicanthium setosum)* and Austral Toadflax (*Thesium australe*) with the potential to occur within the Disturbance Footprint. Both species have not been recorded in the broader locality. However, the Project Area is within the species distribution. No threatened plants were identified within areas surveyed. Targeted flora survey transects are shown within **Figure 3-3** in **Att A - Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report.**

No further threatened flora species are expected to be identified within the Project Area.

Threatened Fauna

Targeted fauna surveys for threatened fauna with a potential or higher likelihood of occurrence to occur within the Project Area were undertaken for the following species:

- Pink-tailed Legless Lizard (*Aprasia parapulchella*)
    - Searches in suitable rocky habitat confirmed the species was not present
- Border Thick-tailed Gecko (*Uvidicolus sphyrurus*)
    - Searches in suitable habitat with loose rocks confirmed the species was not present
- Booroolong Frog (*Litoria booroolongensis)*
    - Nocturnal aural-visual and call playback surveys with spotlighting transects confirmed the species was not present

- Koala (*Phascolarctos cinerea*)
  - Scat searches and nocturnal spotlighting confirmed the species was not present
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
  - Nocturnal spotlighting and call playback did not reveal any presence of the species
- Corben's Long-eared Bat (*Nyctophilus corbeni*), Large-eared Pied Bat (*Chalinolobus dwyeri*) and Large Bent-winged Bat (*Miniopterus magnater*)
  - Anabat analysis has been undertaken to meet survey efforts for the BDAR and were not deemed necessary as part of the EPBC Act Referral. Corben's Long-eared Bat (*Nyctophilus corbeni*) received a 'possible' result. There is a low residual risk associated with this species and therefore a significant impact assessment was not necessary for any bat species.
- South-eastern Glossy Black-Cockatoo (*Calyptorhynchus lathami lathami)*
  - Diurnal bird surveys in hollow bearing trees confirmed there was no evidence of breeding habitat
- Spotted-tailed Quoll (*Dasyurus maculatus*)
  - Camera traps confirmed the species was not present
- Yellow-bellied Glider (*Petaurus australis*) and Southern Greater Glider (*Petauroides Volans*)
  - Spotlighting transects and call playback surveys confirmed there was no evidence of the species.

Several additional bird species were considered to have a potential or higher likelihood of occurrence. While no targeted surveys for these species have been conducted, diurnal bird surveys involve noting any bird species observed including any threatened birds if observed. These species are as follows:

- Diamond Firetail (*Stagonopleura guttata)*
- Brown Treecreeper (Eastern subspecies) (*Climacteris picumnus victoriae)*
- Hooded Robin (South-eastern) (*Melanodryas cucullata cucullata)*
- White-throated Needletail (*Hirundapus caudacutus)*
- Swift Parrot (*Lathamus discolor)*
- Blue-winged Parrot (*Neophema chrysostoma)*
- Australian Painted Snipe (*Rhipidura rufifrons)*

The majority of the Disturbance Footprint consists of grasslands, agricultural and cropping land that are predominantly non-native. Therefore, the above fauna species that rely on or utilise woodland habitat are only considered potentially or likely present in limited sections of the Disturbance Footprint (ie the Koala, Spotted-tail Quoll, Corben's Long-eared Bat, Grey-headed Flying-fox and Swift Parrot). Habitat connectivity for native fauna throughout the Disturbance Footprint is also considered low with only small patches of scattered native trees.

Threatened Ecological Communities

The White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland is a critically endangered ecological community under the EPBC Act. It is associated with PCT 599 and is found within the Project Area. However, through project design it has been excluded from the Disturbance Footprint. The TEC assessment has been conducted for the patches within the Project Area in the PBA **(Appendix C in Att B – Garoo Solar Farm and BESS Scoping Report)** and in the EPBC Act SIA Report **(Att A Garoo Solar Farm and BESS EPBC Act Self-Assessment Report)**. The SIA Report also justifies why the scattered trees mapped as PCT 599 are not consistent with the key diagnostic criteria and condition thresholds to be considered an EPBC Act listed TEC.

No other TECs were considered to have the potential to occur within the Disturbance Footprint.

3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

The biodiversity values within the Project Area have been disturbed through historical and current agricultural land use and are characterised by grazed native and modified grasslands resulting from vegetation clearing, cropping and livestock grazing. Native vegetation is present within the Project Area; however, this is highly fragmented due to historical clearing and current agricultural land uses. Scattered trees remain throughout the Project Area as paddock trees providing shelter to stock and play an important role to local wildlife. There are no karsts, caves, crevices, cliffs of other geological features of significance present within the Disturbance Footprint.

Approximately 299.46 ha of the Disturbance Footprint consists of grasslands with predominately non-native vegetation. PCT 599 is present within the Project Area consisting of four distinct zones: derived grassland, scattered trees, woodland formation and mixed vegetation. The Disturbance Footprint has been refined to avoid all areas of woodland formation and mixed vegetation condition states of PCT 599. Approximately two hectares of PCT 599 falls within the Disturbance Footprint, although predominantly as scattered, isolated trees.

Soil mapping indicates the Project Area is found within the Fullwoods Hill soil landscape. This landscape contains red-brown chromosols, dark brown silty loam, yellow and brown solodic soils and brown heavy clay soils. No soil testing was undertaken during the field surveys.

3.3 Heritage

3.3.1 Describe any Commonwealth Heritage Places Overseas or other places recognised as having heritage values that apply to the project area.

There are no identified Commonwealth Heritage Places or other places that have heritage values relevant to the Project Area.

3.3.2 Describe any Indigenous heritage values that apply to the project area.

An Aboriginal Cultural Heritage Assessment Report (ACHAR) is currently underway as part of the EIS.

The Nandewar bioregion is dominated by a sub-humid climate characterised by hot summers and typically drier season in the low-lying areas. The Nandewar area was traditionally home to the *Anaiwan, Kamilaroi, Bingara, Weraerai, and Kwaimbul* language groups, of the Gomeroi People. The region holds significant intangible value, as evidenced by ceremonial bora grounds, art sites, and carved trees. Many local towns, such as Bingara ("shallow crossing") and Barraba ("camp by the riverbank"), derive their names from the Aboriginal words connected to the landscape, usually associated with water.

Under Section 13 of the *Native Title Act 1993* (NT Act), an individual can apply to the Federal Court for a determination of native title. A detailed review of the potential for native title will be undertaken for the Proposed Action in the EIS, however the Native Title Vision online mapping tool (NNTT, 2024) currently indicates there is an active claim over the Project Area.

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) database was conducted on 24 October 2024 as detailed in **Att B – Garoo Solar Farm and BESS Scoping Report**. No registered sites are located within the boundary of the Project Area. However, the lack of sites does not indicate that no sites are present but rather that a lack of, or, limited archaeological survey has occurred to date within the Project Area. Cultural heritage and landform sensitivity mapping and the results from previous archaeological reports from the region demonstrate that areas of high and moderate potential exist within the Project Area. Results of further investigations including pedestrian field surveys and consultation with Aboriginal stakeholders would be detailed in the ACHAR. Upon completion of the ACHAR, a Cultural Heritage Management Plan (CHMP) would be prepared to ensure appropriate management of any identified cultural heritage throughout the construction process.

3.4 Hydrology

3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. *

The Project Area is located within the Namoi Catchment which covers an area of 42,000 km2. Elevations across the catchment vary from over 1,500 m to the south and east, to approximately 100 m on the alluvial floodplain of the lower catchment, west of Narrabri. The catchment supports a range of water users including local councils, water utilities, dryland agriculture, livestock grazing and forestry. There are three major water storages in the catchment area: Keepit Dam, Split Rock Dam and Cheffey Dam.

Tamarang Creek is the only named watercourse within the Project Area, flowing in a south to north direction through the central region of Project Area. Tamarang Creek is a tributary of Sugarloaf Creek, which traverses the western boundary of the Project Area, flowing north until it meets the Goonoo Goonoo Creek. Tamarang Creek has largely been excluded from the Disturbance Footprint, with no solar panels located within the riparian zone. The only impacts to this area are associated with a creek crossing, which is a requirement for the Project. There are additional minor unnamed creeks within the Project Area, all of which also flow in a south to north direction, merging with either Tamarang or Sugarloaf Creek.

There are no wetlands of international importance or nationally important wetlands within the Project Area. The watercourses present within the Project Area and the surroundings are presented in **Figure 6-6** in **Att B – Garoo Solar Farm and BESS Scoping Report**.

No aquatic, terrestrial or subterranean Groundwater Dependent Ecosystems were mapped withing the Project Area, and the probability of GDEs has not been identified.

A Flooding and Hydrology Assessment and a Water Impact Assessment will be conducted. These assessments will involve the following:

- Assessing the existing and post development flood behaviour
- Reviewing the CEMP to aim to minimise mitigation and management measures
- Assessing impacts on hydrology and groundwater
- Determining if a water access license is required under the *Water Management Act 2000*.

Noting all required licenses and approvals would be obtained prior to the commencement of construction activities.

4. Impacts and mitigation

4.1 Impact details

Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.

EPBC Act section	Controlling provision	Impacted	Reviewed
S12	World Heritage	No	Yes
S15B	National Heritage	No	Yes
S16	Ramsar Wetland	No	Yes
S18	Threatened Species and Ecological Communities	Yes	Yes
S20	Migratory Species	No	Yes
S21	Nuclear	No	Yes
S23	Commonwealth Marine Area	No	Yes
S24B	Great Barrier Reef	No	Yes
S24D	Water resource in relation to large coal mining development or coal seam gas	No	Yes
S26	Commonwealth Land	No	Yes
S27B	Commonwealth Heritage Places Overseas	No	Yes
S28	Commonwealth or Commonwealth Agency	No	Yes

4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

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4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

Not identified within the Project Area of within a 50 km radius.

4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

Not identified within the Project Area of within a 50 km radius.

4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Ramsar wetland
Yes		Banrock Station Wetland Complex
Yes		Riverland
Yes		The Coorong, and Lakes Alexandrina and Albert Wetland

4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.3.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

No RAMSAR Wetlands are within the locality. The Proposed Action is located between 900 and 1200km upstream from three RAMSAR sites, ‘Riverland’, ‘Banrock station wetland complex’ and ‘The coorong, and lakes alexandrina and albert wetland’. No RAMSAR sites are expected to be impacted by the construction, operation and/or decommissioning of the Proposed Action.

4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Threatened species

Direct impact	Indirect impact	Species	Common name
No	No	Anthochaera phrygia	Regent Honeyeater
No	No	Aphelocephala leucopsis	Southern Whiteface
No	No	Aprasia parapulchella	Pink-tailed Worm-lizard, Pink-tailed Legless Lizard
No	No	Botaurus poiciloptilus	Australasian Bittern
No	No	Cadellia pentastylis	Ooline
No	No	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo
No	No	Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat
No	No	Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)
No	No	Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)
No	No	Dichanthium setosum	bluegrass
No	No	Eucalyptus nicholii	Narrow-leaved Peppermint, Narrow-leaved Black Peppermint
No	No	Euphrasia arguta	
No	No	Falco hypoleucos	Grey Falcon
No	No	Gallinago hardwickii	Latham's Snipe, Japanese Snipe
No	No	Grantiella picta	Painted Honeyeater
No	No	Hirundapus caudacutus	White-throated Needletail
No	No	Lathamus discolor	Swift Parrot
No	No	Litoria booroolongensis	Booroolong Frog
No	No	Melanodryas cucullata cucullata	South-eastern Hooded Robin, Hooded Robin (south-eastern)
No	No	Neophema chrysostoma	Blue-winged Parrot
No	No	Nyctophilus corbeni	Corben's Long-eared Bat, South-eastern Long-eared Bat
No	No	Petaurus australis australis	Yellow-bellied Glider (south-eastern)
No	No	Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)
No	No	Polytelis swainsonii	Superb Parrot
No	No	Pomaderris brunnea	Rufous Pomaderris, Brown Pomaderris
No	No	Prasophyllum sp. Wybong (C.Phelps ORG 5269)	a leek-orchid
No	No	Pseudomys novaehollandiae	New Holland Mouse, Pookila
No	No	Pteropus poliocephalus	Grey-headed Flying-fox
No	No	Rostratula australis	Australian Painted Snipe

Direct impact	Indirect impact	Species	Common name
Yes	Yes	Stagonopleura guttata	Diamond Firetail
No	No	Thesium australe	Austral Toadflax, Toadflax
No	No	Uvidicolus sphyrurus	Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko
No	No	Vincetoxicum forsteri	

Ecological communities

Direct impact	Indirect impact	Ecological community
No	No	Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland
No	No	New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands
No	No	Weeping Myall Woodlands
No	No	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.4.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

MNES identified as potentially present within the Disturbance Footprint have been subject to a risk assessment. **Att A** identified the residual consequence of the Proposed Action warranting the following species to be subject to a significant impact assessment (SIA).

Koala

Targeted surveys for the Koala were undertaken and no evidence of Koalas has been identified on site. Several Koala feed trees were identified as scattered trees in the Disturbance Footprint (*Eucalyptus albens* and *Angophora floribunda).* The current Disturbance Footprint occurs predominately in modified and cleared areas.

The Proposed Action design has been refined to avoid most woodland habitat. It is unlikely that koala habitat will be adversely affected as potential habitat areas within the Disturbance Footprint are insufficiently sized for long-term species occupation and primarily disconnected from adjoining bushland areas. It is unlikely that the disturbance of this reduced area of habitat would lead to long-term decrease in species population size.

Approximately 2.38ha of critical habitat for the Koala within the Development Footprint consists of the follow vegetation zones:

- PCT0–Planted Native Vegetation (0.68ha) which may consist of some feed trees in poor condition
- PCT599-Scattered Trees (1.57ha) in an agricultural landscape
- PCT599–Open Woodland (0.13ha)

The removal of this low-quality habitat is unlikely to impact linkages to habitat in the broader locality, with greater connectivity provided via habitat in the surrounding landscape.

Indirect impacts from the Proposed Action are not expected. There is no evidence to suggest construction and/or operation activities would introduce diseases known to impact Koalas, such as Koala retrovirus or Chlamydia. Biosecurity measures would be outlined in the Biosecurity Management Plan. The Proposed Action is not expected increase presence of dogs - a key threat to the Koala. As the species was not identified, accidental killing or injury of Koalas from Construction vehicles is very unlikely.

Austral Toadflax

Non-native grasslands within the Disturbance Footprint are mapped as two vegetation zones:

- PCT0–non-native grassland (cropping and earthworks): which is not suitable habitat due to extensive disturbance and therefore was not surveyed.
- PCT0–non-native grassland

While the Austral Toadflax is not expected to occur, 108.17ha of suitable habitat for the Austral Toadflax within the Development Footprint consists of the follow vegetation zones:

- PCT599–Derived Grassland (0.27ha)
- PCT0-Non-native grassland (107.90ha)

The majority of this potentially suitable habitat was subject to targeted transect surveys.

Detailed assessment outlined in **Section 6.5** in **Att A** expands on the absence of the species during survey efforts within suitable habitat and the lack of species primary host plant (Kangaroo Grass). It is therefore less likely for the species to be present within the remaining habitat.

There is no adopted or made recovery plan for the Austral Toadflax. No important populations in or adjacent to the Project Area have been identified as necessary for maintaining genetic diversity nor as a key source population for breeding or dispersal. The Proposed Action is not situated at the limit of the species range. The Conservation Advice has not defined habitat critical to the survival of the species. Targeted surveys occurred within the most suitable habitat for the species; the absence of the species within these areas suggests it is unlikely that the Proposed Action will adversely affect habitat.

Indirect impacts on the Austral Toadflax are not expected. Weed invasion is a listed key threat to the species. Biosecurity measures would aim to minimise introduction or exacerbation of potential invasive species in the Disturbance Footprint. The Proposed Action is expected to change surface water hydrology potentially impacting vegetation and water quality. There are no known records within the immediate vicinity of the Project Area. As a result, indirect impacts to the species such as changes to runoff adjacent to the Disturbance Footprint are not expected. During operation, vegetated surfaces/grasses would remain between the solar arrays, providing opportunities for the species to establish, if present nearby.

Diamond Firetail

The LoO assessment identified the Diamond Firetail as likely to occur. The species has been recorded within the locality of the Disturbance Footprint. There is the potential for the Diamond Firetail to occur in habitat across the Disturbance Footprint associated with PCT599.

The population is not identified as necessary for maintaining genetic diversity for the species nor as a key source population for breeding or dispersal. Further, the Proposed Action is not situated at the limit of the species range. As such, the potential individuals within the Disturbance Footprint do not form part of an ‘important population’.

Approximately 2.38ha of suitable potential foraging habitat for the species would be directly impacted which consists of the following vegetation zones:

- PCT0–Planted Native Vegetation (0.68ha)
- PCT599-Scattered Trees (1.57ha)
- PCT599–Open Woodland (0.13ha)

Direct clearing to grasslands within the Disturbance Footprint may also provide foraging habitat. No breeding habitat is expected to be impacted by the Proposed Action as birds roost in dense shrubs, which are not present in the Disturbance Footprint.

Indirect impacts during construction may include noise, light, dust, runoff and erosion. The species is highly mobile and therefore only marginal negative impacts on connectivity are expected and populations would not be fragmented.

Grey-headed Flying-fox (GHFF)

Targeted surveys were undertaken for the GHFF and there was no evidence of the species.

There are two Nationally Important Flying-Fox Camps located roughly 40km north of the Disturbance Footprint. Commuting distances are often less than 20km (though can be up to 50km) to feed each night. The Disturbance Footprint contains important seasonal foraging resources considered habitat critical to the survival of the GHFF. All colonies are considered to form part of an important population.

Approximately 2.38ha of potential foraging habitat, notably including important seasonal feeding habitat, would be removed for the Proposed Action. As the GHFF was not identified during field surveys, no direct impacts to the species are expected. No direct impacts to roosting sites or camps are expected therefore the breeding cycle would not be disturbed.

The closest camp is not a sensitive receiver to an increase in light and noise during construction. The Proposed Action is unlikely to result in an increase in potentially harmful invasive species or diseases. Biosecurity measures would be outlined in the Biosecurity Management Plan.

South-eastern Glossy Black-cockatoo (SEGBC)

The SEGBC rely on She-oaks (*Allocasuarina* and *Casuarina* sp.) for feeding and require suitably sized hollows (at least 15cm and 1m deep) for breeding (usually in *Eucalyptus* sp.).

Approximately 2.38ha of potentially suitable habitat for the species is within Disturbance Footprint which consists of the following vegetation zones:

- PCT0–Planted Native Vegetation (0.68ha)
- PCT599-Scattered Trees (1.47ha)
- PCT599–Open Woodland (0.13ha)

The SEGBC was not identified during targeted diurnal bird surveys. No direct impacts are expected on the species and there is no suitable foraging habitat within the Disturbance Footprint. While hollow-bearing trees are present, targeted surveys did not reveal any evidence of the species. As such, no breeding habitat would be directly impacted, with suitable habitat of greater value occurring within the local landscape.

As there was no evidence of the species within the Disturbance Footprint, it is not expected that the Proposed Action would result in indirect impacts.

Further information including a MNES Significant Impact Assessment has been provided in **Section 6.9** of **Att A**. The Proposed Action is not expected to result in a significant impact on the SEGBC.

Bluegrass

The species is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture. Associated species e.g. *Eucalyptus albens* has been identified in the Disturbance Footprint.

No populations within or adjacent to the Disturbance Footprint are identified as necessary for maintaining genetic diversity for the species nor as a key source population for breeding or dispersal. Further, the Proposed Action is not situated at the limit of the species range. As such, the potential individuals within the Disturbance Footprint do not form part of an ‘important population’.

‘PCT0–non-native grassland (cropping and earthworks)’ has been subject to extensive cropping and historical earthworks therefore no suitable habitat for the Bluegrass is available. As such, targeted surveys were not completed in this area.

The Proposed Action is expected to directly impact 110.55ha of potentially suitable habitat which consists of the following vegetation zones:

- PCT0–Planted Native Vegetation (0.68ha)
- PCT599-Scattered Trees (1.57ha)
- PCT599–Open Woodland (0.13ha)
- PCT599–Derived Grassland (0.27ha)
- PCT0–Non-native grassland (107.90ha)

The majority of this potentially suitable habitat was subject to targeted transect surveys. As such the species is not expected occur and therefore direct impact are not expected.

Indirect impacts are not expected to the species. Weed invasion is a listed key threat to the species. Biosecurity measures would aim to minimise introduction or exacerbation of potential invasive species. There are no known records within the immediate vicinity of the Project Area. As a result, indirect impacts to the species such as changes to runoff adjacent to the Disturbance Footprint are not expected. During operation, vegetated surfaces will remain between the solar arrays, providing opportunities for the species to establish if present nearby.

4.1.4.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact? *

No

4.1.4.6 Describe why you do not consider this to be a Significant Impact. *

A Significant Impact Assessment for the Koala, Austral Toadflax, Diamond Firetail, Booroolong Frog, Grey-headed Flying-Fox, South-eastern Glossy Black-cockatoo and Bluegrass were conducted following the MNES Significant Impact Guidelines 1.1 EPBC Act (Significant Impact Guidelines) (DoE, 2013). No criteria were triggered for any species due to the limited extent of impacts and avoidance of large-scale direct impacts.

The Proposed Action has the potential to adversely affect habitat critical to the survival of the Bluegrass. The species Conservation Advice has not defined habitat critical to the survival of this species. The species is known to inhabit disturbed grazing land, most of which was subject to targeted surveys and did not identify the species. Given the survey effort has been assessed to be sufficient to detect Bluegrass, and none were identified, the Project Area considered unlikely to support a population of this species. As such, the Proposed Action is not expected to result in a significant impact on the species.

The full Significant Impact Assessments are available in **Section 6** of **Att A (Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report).**

4.1.4.7 Do you think your proposed action is a controlled action? *

No

4.1.4.9 Please elaborate why you do not think your proposed action is a controlled action. *

Section 6 of the Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report **(Att A)** discusses the potential MNES. These impacts are limited in extent and are not expected to result in a significant impact to any MNES. As such, the Proposed Action is not expected to be a controlled action.

4.1.4.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

The design has been subject to refinement which has resulted in substantially less direct clearing of threatened species habitat. Initial investigations identified PCT 599 in four distinct vegetation zones (derived grassland, scattered trees, woodland formation and mixed vegetation). The Disturbance Footprint has been refined and as a result avoids all areas of Woodland Formation and Mixed Vegetation condition states of PCT 599. The Avoidance Area which consists of a TEC is 5.46 ha.

The design of the Proposed Action will require ongoing review during the Scoping Report and subsequent EIS process as a result of preliminary findings. The design process has and will continue to be subject to revision focusing on three main principles:

- Minimising and/or avoiding negative environmental and social impacts;
- Maximising solar energy production; and
- Incorporating feasible and reasonable mitigation/management measures, safeguards and provisions (e.g. for compliance monitoring) into the construction and operational aspects of the Proposed Action.

Potential impacts of the proposed activities will be managed in a manner consistent with the management approaches for solar farm activities, and, where relevant, additional measures will be implemented as described in **Att A Garoo Solar Farm and BESS EPBC Act Significant Impact Assessment Report** and in **Att B – Garoo Solar Farm and BESS Scoping Report.**

To effectively avoid and minimise impacts associated with the Proposed Action, the following management recommendations have been suggested for each identified impact:

- Loss of existing native vegetation
    - Areas of remnant and regrowth vegetation to be avoided at the design and micro siting stages, where practicable;
- Threatened species
    - Areas of threatened flora and fauna habitat to be avoided at the design and micro siting stages, where practicable;
    - Landscape features, such as wildlife corridors, stepping stones of vegetation, waterways and other aquatic habitat to be preserved or enhanced, where practicable;
    - If loss of habitat features is required, actions are taken to provide alternative habitat, such as constructed hollows (however no hollow bearing trees are expected to be directly impacted);
    - A stop works protocol would be engaged if EPBC listed species such as the Booroolong Frog, Koala, Grey-headed Flying-fox that were not present during targeted surveys are identified during construction of the Proposed Action. This stop works protocol would also be implemented if the South-eastern Glossy Black-cockatoo is identified using breeding habitat (ie hollow bearing trees).
- Weed and pest control:
    - A Pest Management Plan will be developed and implemented for the Proposed Action. This will include measures such as vehicle wash downs, weed certification and obligations to stick to access tracks throughout the Project Area;
    - Weed management and control methods will depend upon the location, weed species identified, the degree of the infestation, relevant landholder agreement or conduct and compensation agreements provisions, and local, state and national regulatory requirements;
    - Imported material able to transport weed seed will be assessed to ensure they are free of contamination, disease and invasive weeds; and
    - WoNS and Invasive species will be identified and monitored in the Project Area. Appropriate weed monitoring would occur to ensure new weed species are identified, recorded and managed appropriately.
- Mortality or injury to native fauna:
    - No driving will occur in unauthorised areas, and in other areas will be carried out at safe speeds adopted suitable for the road conditions; and
    - During vegetation clearing, fauna management will be implemented that includes pre-clearing surveys, fauna spotter-catcher would be present.
    - Injured, sick or dead fauna will be recorded and reported during construction. This can be carried out by a trained fauna spotter-catcher supervision and methods to reduce impacts set out in a biodiversity management plan.

A Biodiversity Management Plan (BMP) will be prepared to satisfy the NSW Planning Minister as part of any post approvals documentation prepared in response to the Proposed Action consent conditions. The focus of the BMP will be to limit the influence of edge effects, proliferation of weeds and management of feral fauna. Mortality due to vehicle strike is possible yet unlikely as the internal roads would be infrequently utilised at safe speeds.

4.1.4.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

The Biodiversity Assessment that will be prepared to accompany the EIS will provide a discussion of the management and protection of listed threatened species of native flora and fauna and assess biodiversity offsets consistent with the Biodiversity Offset Scheme.

4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Species	Common name
Yes		Actitis hypoleucos	Common Sandpiper
Yes		Apus pacificus	Fork-tailed Swift
Yes		Calidris acuminata	Sharp-tailed Sandpiper
Yes		Calidris ferruginea	Curlew Sandpiper
Yes		Calidris melanotos	Pectoral Sandpiper
Yes		Gallinago hardwickii	Latham's Snipe, Japanese Snipe
Yes		Hirundapus caudacutus	White-throated Needletail
Yes		Motacilla flava	Yellow Wagtail

4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.5.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The PMST search and likelihood of occurrence assessment indicated that the White-throated Needletail (*Hirundapus caudacutus)* would potentially be present within the Disturbance Footprint. However, following a risk matrix assessment, the residual consequences of the Proposed Action on the species would be low. Therefore, no direct and/or indirect impacts are expected to the White-throated Needletail nor other migratory species identified in the PMST search.

4.1.6 Nuclear

4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.6.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project does not involve a nuclear action.

4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.7.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

Commonwealth Marine area was not identified within the Project Area.

4.1.8 Great Barrier Reef

4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

Not identified within the Project Area or within 50 km radius.

4.1.9 Water resource in relation to large coal mining development or coal seam gas

4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.9.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project does not involve coal seam gas or coal mining development.

4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.10.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project does not involve any Commonwealth Land.

4.1.11 Commonwealth Heritage Places Overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. *

The Project does not involve work outside the Project Area or will impact on Commonwealth Heritage places outside the Australian jurisdiction.

4.1.12 Commonwealth or Commonwealth Agency

4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? *

No

4.2 Impact summary

Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

None

Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Threatened Species and Ecological Communities (S18)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth Heritage Places Overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

4.3 Alternatives

4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? *

No

4.3.8 Describe why alternatives for your proposed action were not possible. *

Alternatives to the Proposed Action have been explored, including the alternative sourcing of energy, site layouts and not carrying out the development.

Not carrying out the development

The Project Area is currently used for agricultural land uses. Not carrying out the Proposed Action would allow for continued use of the site for agricultural production. However, it would also lead to a missed opportunity to generate additional renewable energy and to reduce Australia's dependency on fossil fuels for energy generations and the consequential emissions of Greenhouse Gases (GHGs). Not carrying out the development would lead to a missed opportunity to contribute approximately 133.76 MW of renewable energy supply into the energy grid, as well as a BESS facility to regulate the supply of energy. Similarly, not proceeding with the Proposed Action would forgo social and economic benefits, including the provision of direct and indirect employment and economic stimulus, and contributions to local community facilities.

Alternative Sourcing of energy

The alternative to using solar energy or other renewable energy is the continued use of fossil fuel, including coal and natural gas. The reliance of these energy sources results in the release of GHG emissions such as CO2 and contributes to the harmful effects of climate change.

The Australian Government's mandated Renewable Energy Target (RET) and NSW Renewable Energy Action Plan (REAP) outline the commitment by Australia and NSW in reducing greenhouse gas emissions and have set targets for increasing the generation of renewable energy.

Other forms of large-scale renewable energy accounted for in the RET include hydro, biomass, wind and tidal energy. With the exception of wind energy, these alternative sources are in the early stages of development and are generally not 'market ready' nor as viable as solar energy in Australia.

Due to the abundance of solar resources, existing 330kV transmission line, avoidance of densely populated areas, it is considered that large-scale solar technology is an optimum form of energy generation.

The Proposed Action is at scale potentially adding significant amounts of renewable energy supply. Large-scale solar technology is now one of the cheapest forms of new energy generation, reducing cost pressures on consumers and is completely renewable, reducing emissions.

Design Evolution and Alternatives

Since the conception of the Proposed Action, the design has evolved through consideration of constraints or opportunities relating to the technical, environmental, social, and commercial aspects. As a result of design evolution, an Avoidance Area has been established and the Disturbance Footprint has been reduced. The Avoidance Area prioritises avoiding impacts to a TEC.

5. Lodgement

5.1 Attachments

1.2.6 Commonwealth or state legislation, planning frameworks or policy documents that are relevant to the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att A-0751705_Garoo Solar Farm and BESS_EPBC Significant Impact Assessment Report_V03_20250530.pdf Significant Impact Assessment Report (MNES Report) for Garoo Solar Farm	29/05/2025	No	High

1.3.2.16 (Person proposing to take the action) Nature of the trust arrangement in relation to the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att D- Trust Deed for GreenPulse Solar Farm and BESS.pdf	29/07/2024	Yes	

1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att C- Jinko Environmental Policy and Planning Framework.pdf Sustainability/Environmental Policy and Planning Framework for Jinko Power Technology Co., Ltd.	31/07/2024	No	High

3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att A-0751705_Garoo Solar Farm and BESS_EPBC Significant Impact Assessment Report_V03_20250530.pdf Significant Impact Assessment Report (MNES Report) for Garoo Solar Farm	30/05/2025	No	High

3.1.2 Existing or proposed uses for the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Garoo Solar Farm and BESS Scoping Report https://majorprojects.planningportal.nsw.gov.au/..			High

3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att A-0751705_Garoo Solar Farm and BESS_EPBC Significant Impact Assessment Report_V03_20250530.pdf Significant Impact Assessment Report (MNES Report) for Garoo Solar Farm	29/05/2025	No	High
#2.	Link	Garoo Solar Farm and BESS Scoping Report https://majorprojects.planningportal.nsw.gov.au/..			High

3.3.2 Indigenous heritage values that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Garoo Solar Farm and BESS Scoping Report https://majorprojects.planningportal.nsw.gov.au/..			High

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Garoo Solar Farm and BESS Scoping Report https://majorprojects.planningportal.nsw.gov.au/..			High

4.1.4.2 (Threatened Species and Ecological Communities) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att A-0751705_Garoo Solar Farm and BESS_EPBC Significant Impact Assessment Report_V03_20250530.pdf Significant Impact Assessment Report (MNES Report) for Garoo Solar Farm	29/05/2025	No	High

4.1.4.6 (Threatened Species and Ecological Communities) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att A-0751705_Garoo Solar Farm and BESS_EPBC Significant Impact Assessment Report_V03_20250530.pdf Significant Impact Assessment Report (MNES Report) for Garoo Solar Farm	29/05/2025	No	High

4.1.4.9 (Threatened Species and Ecological Communities) Why you do not think your proposed action is a controlled action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att A-0751705_Garoo Solar Farm and BESS_EPBC Significant Impact Assessment Report_V03_20250530.pdf Significant Impact Assessment Report (MNES Report) for Garoo Solar Farm	29/05/2025	No	High

4.1.4.10 (Threatened Species and Ecological Communities) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att A-0751705_Garoo Solar Farm and BESS_EPBC Significant Impact Assessment Report_V03_20250530.pdf Significant Impact Assessment Report (MNES Report) for Garoo Solar Farm	29/05/2025	No	High
#2.	Link	Garoo Solar Farm and BESS Scoping Report https://majorprojects.planningportal.nsw.gov.au/..			High

5.2 Declarations

Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

ABN/ACN	12002773248
Organisation name	ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA PTY LIMITED
Organisation address	Level 14 207 Kent Street Sydney NSW 2000
Representative's name	Miranda Crossley
Representative's job title	Senior Consultant
Phone	+61285848823
Email	miranda.crossley@erm.com
Address	Level 14/207 Kent St, Sydney NSW 2000

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ By checking this box, I, **Miranda Crossley of ENVIRONMENTAL RESOURCES MANAGEMENT AUSTRALIA PTY LIMITED**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	679065377
Organisation name	Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust
Organisation address	Suite 906 821 Pacific Highway, Chatswood, NSW 2067
Representative's name	Yifan Wang
Representative's job title	Director - Jinko Power Australia I Pty Ltd
Phone	0413198119
Email	ethan.wang@jinkopower.com
Address	Suite 1024, 219-227 Elizabeth Street, Sydney, NSW, 2000

☑ Check this box to indicate you have read the referral form. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

☑ I, **Yifan Wang of Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

☑ I would like to receive notifications and track the referral progress through the EPBC portal. *

Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

Same as Person proposing to take the action information.

- [x] Check this box to indicate you have read the referral form. *

- [x] I would like to receive notifications and track the referral progress through the EPBC portal. *

- [x] I, **Yifan Wang of Greenpulse Solar Farm and BESS Pty Ltd as the trustee for Greenpulse Solar Farm and BESS Unit Trust**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

- [ ] I would like to receive notifications and track the referral progress through the EPBC portal. *



APPENDIX J BAM CREDIT SUMMARY REPORT

BAM Credit Summary Report

Proposal Details

Assessment Id
00057908/BAAS20028/25/00057909

Proposal Name
Garoo Solar Farm and BESS

BAM data last updated *
05/08/2025

Assessor Name
Ashleigh M E McTackett

Report Created
29/01/2026

BAM Data version *
Current classification (live - default) (82)

Assessor Number
BAAS20028

BAM Case Status
Finalised

Date Finalised
29/01/2026

Assessment Revision
2

BOS entry trigger

Assessment Type
Major Projects

* 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	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion												
1	599_VZ1_Mod_Open_Woodlan	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	73.8	73.8	0.07	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	3

2	599_VZ3_DNG	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	46.8	46.8	0.04	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	1
											Subtotal	**4**
											Total	**4**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

Dichanthium setosum / Bluegrass (Flora)									
599_VZ1_Mod_Open_Woodlan	73.8	73.8	0.07	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	3
599_VZ3_DNG	46.8	46.8	0.04	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	1
								Subtotal	**4**
Digitaria porrecta / Finger Panic Grass (Flora)									
599_VZ1_Mod_Open_Woodlan	73.8	73.8	0.07	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Not Listed	False	3
599_VZ3_DNG	46.8	46.8	0.04	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Endangered	Not Listed	False	1
								Subtotal	**4**

Euphrasia arguta / Euphrasia arguta (Flora)									
599_VZ1_Mod_Open_Woodlan	73.8	73.8	0.07	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Critically Endangered	Critically Endangered	True	4
599_VZ3_DNG	46.8	46.8	0.04	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Critically Endangered	Critically Endangered	True	1
								Subtotal	**5**
Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
599_VZ1_Mod_Open_Woodlan	73.8	73.8	0.07	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	4
599_VZ3_DNG	46.8	46.8	0.04	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	1
								Subtotal	**5**

APPENDIX K BAM CREDIT SUMMARY REPORT (SCATTERED TREES)

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00057908/BAAS20028/25/00057994	Garoo Solar Farm and BESS - Scattered Tree Assesssment	05/08/2025
Assessor Name	**Report Created**	**BAM Data version ***
Ashleigh M E McTackett	29/01/2026	Current classification (live - default) (82)
Assessor Number	**BAM Case Status**	**Date Finalised**
BAAS20028	Finalised	29/01/2026
Assessment Revision	**BOS entry trigger**	**Assessment Type**
1	Major Project	Scattered Trees

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

Scattered Trees Credit Requirement

Class	Contains hollows	Number of trees	Ecosystem credits
599-Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion			
2	False	3.0	2
3	True	3.0	3
3	False	1.0	1
3	True	26.0	26
3	False	4.0	3
3	True	2.0	2
			37
			37

Species credits for threatened species

The scattered tree module is not applicable. This species much be assessed using chapter 5 of the BAM and BAM-C development module

Lathamus discolor Swift Parrot

BAM Credit Summary Report

Anthochaera phrygia
Regent Honeyeater

APPENDIX L AQUATIC HABITAT ASSESSMENT

Aquatic Ecology Assessment

Garoo Solar Farm and Battery Energy Storage System

Prepared For: Environmental Resources Management Australia Pty Ltd

Report Date: 4 November 2025



H2O Consulting Group Pty Ltd

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Document Details	
Report Title	Aquatic Ecology Assessment
Project Title	Garoo Solar Farm and Battery Energy Storage System
Prepared For	Environmental Resources Management Australia Pty Ltd
Report Date	4 November 2025
Job Number	2556
Project Team	Dr David Cummings, Alex Swanson, Simon Kirgis, Teagan Pyne

Document Control

Version	Author	Reviewer	Approved by	Date
D0	Alex Swanson	Dr David Cummings	David Cummings	16/07/25
D1	Alex Swanson	Dr David Cummings	David Cummings	22/07/25
R0	Alex Swanson	Sophie Butcher (ERM)	David Cummings	6/08/2025
R1	Alex Swanson	Dr David Cummings	David Cummings	4/11/2025

Disclaimer:

The information provided in this document is based on knowledge, understanding and field observations at the time of review of associated materials and/or site survey. The report should be read and considered in its entirety including consideration of the limitations described in the report.

H2O Consulting Group Pty Ltd has completed this assessment in accordance with the relevant federal, state and local legislation. H2O Consulting Group Pty Ltd accepts no liability or responsibility for contents of this report in respect of any use of, or reliance upon, by any third party or for any use other than the purposes for which it was commissioned. Unauthorised use of this document is prohibited.

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Cover Photo: Tamarang Creek at Garoo

Executive Summary

H2O Consulting Group has been engaged by Environmental Resources Management Australia Pty Ltd (ERM) to prepare an Aquatic Ecology Assessment (AEA) for the proposed Garoo Solar Farm and Battery Energy Storage System (BESS) Project ("the project") in Tamworth to support an Environmental Impact Statement (EIS). The proposed project is a renewable energy development situated in Garoo, New South Wales (NSW), within the Tamworth Regional Council Local Government Area (LGA) and is a State Significant Development (SSD). The project involves the construction, operation and decommissioning of a 133.76 Megawatt (MW) Alternating Current (AC) solar farm, a 360 MW BESS, with up to 1,440-Megawatt hour (MWh), and associated supporting and ancillary infrastructure.

This report provides assessment of aquatic (freshwater) ecology and the associated riparian habitat, to provide supporting information for the EIS being prepared by ERM to assess the potential for environmental impacts from the proposed project. The purpose of this report is to assess the direct and indirect impacts of the project in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013), addressing all direct and indirect impacts of the project and associated works on Key Fish Habitat (KFH) and associated flora and fauna, including threatened species, populations, and communities, during construction, operation and decommissioning for the life of the project.

The assessment included desktop review of existing ecological data, mapping and threatened species, and site surveys of aquatic and riparian habitats within the Project Area. Searches of threatened and migratory species databases identified three threatened freshwater fish, one endangered population and one Endangered Ecological Community (EEC) for further consideration.

The Study Area includes semi-permanent and permanent aquatic habitat provided by Sugarloaf and Tamarang Creeks (4th order streams) and existing agricultural dams. Sugarloaf Creek provides Type 1 KFH with various important aquatic habitat features, whilst Tamarang Creek provides areas of both Type 1 and Type 3 KFH. Both creeks contain pool and riffle habitats, with gravel beds, snags, and aquatic macrophytes that likely support various aquatic fauna at times. The eastern 4th order tributary provides Type 3 KFH, and the eastern 2nd order tributary and other 1st and 2nd order tributaries were identified as non-KFH. These waterways were predominantly observed to have no obvious beds, banks or aquatic vegetation stands and are ephemeral drainage lines that provide very minimal aquatic habitat value.

No threatened aquatic flora species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), *Biodiversity Conservation Act 2016* (BC Act) or *Fisheries Management Act 1994* (FM Act) are likely to occur within the Study Area. No threatened aquatic fauna species listed under the EPBC Act, BC Act or FM Act were observed to occur within the Study Area, however, Sugarloaf Creek may provide some marginal potential habitat for the Southern Purple Spotted Gudgeon (*Mogurnda adspersa*) (listed as endangered under the FM Act). No direct impacts are expected to occur to Sugarloaf Creek and a 7-Part Test concluded that the viability of the Southern Purple Spotted Gudgeon population that may utilise habitat in the vicinity of the proposal is unlikely to be significantly affected by the proposed activity.

The proposal has avoided direct disturbances to all Type 1 KFH and most Type 3 KFH within the Project Area. Direct disturbances to KFH are expected to be limited to 180 m^2 of Type 3 KFH associated with a road crossing over the eastern 4th order tributary. Impacts to this habitat are expected to be of a lesser magnitude as the tributary lacks defined creek banks and bed, has no aquatic vegetation and likely provides only ephemeral aquatic habitat after rainfall. Some additional impacts may occur to a small section of Type 3 KFH in Tamarang Creek associated with the single lane bridge, dependent on the final location of supporting piers during the detailed design stage, with potential to impact approximately 25 m^2 of Type 3 KFH. Where all structures are located outside of creek banks, direct impacts are not expected. The construction of the photovoltaic (PV) panel modules and internal roads over the eastern 2nd order tributary will directly impact on the ephemeral drainage line, however, this tributary was classed as non-KFH. Additional direct impacts may occur to various other 1st and 2nd order tributaries across the Project Area where they lie within the footprint of PV panels and ancillary infrastructure. This may include trenching to facilitate the installation

of underground cables, which may impact on creek bed and bank morphology and temporary disturbances to aquatic fauna that may be inhabiting ephemeral aquatic habitat at the time of works. Temporary barriers to fish passage may be required if bunding of ephemeral drainage lines are required, which will require appropriate management. As these 1st and 2nd order streams were predominantly dry during surveys, with no defined bed or banks, the magnitude of these impacts is not expected to be of ecological significance. Direct impacts to riparian vegetation have also been mostly avoided by design, with appropriate buffers to riparian zones and creeks across the Project Area.

The primary indirect impacts with potential to occur includes the exacerbation of erosion and disturbance and/or mobilisation of sediments, and the associated mobilisation of sediment-laden waters to adjacent riparian zones and aquatic habitats with potential to impact on water and habitat quality. These indirect impacts are likely largely confined to the construction and decommissioning phases and appropriate erosion and sediment control measures are considered suitable to mitigate these impacts. A Water Quality Monitoring Program and Stream Bank Erosion Monitoring Plan have been recommended to monitor these indirect impacts during the life of the project. A series of recommendations have been provided to avoid or mitigate impacts to aquatic ecology across the life of the project, including the implementation of buffer zones, design and construction of waterway crossings in accordance with policy, detailed design of the single land bridge to include pier placement outside of aquatic habitat, implementation of management and monitoring plans, rehabilitation of riparian vegetation and offsetting of unavoidable impacts to KFH. With the implementation of these recommendations, the proposal is considered unlikely to have a significant impact on matters of aquatic ecology.

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1 Background

1.1 Overview

H2O Consulting Group has been engaged by Environmental Resources Management Australia Pty Ltd (ERM) to prepare an Aquatic Ecology Assessment (AEA) for the proposed Garoo Solar Farm and Battery Energy Storage System (BESS) Project ("the project") in Tamworth to support an Environmental Impact Statement (EIS). The proposed project is a renewable energy development situated in Garoo, New South Wales (NSW), within the Tamworth Regional Council Local Government Area (LGA) and is a State Significant Development (SSD) under Clause 2.6(1) of the State Environmental Planning Policy (Planning Systems) 2024 (Planning Systems SEPP). The project involves the construction, operation and decommissioning of a 133.76 Megawatt (MW) Alternating Current (AC) solar farm, a 360 MW BESS, with up to 1,440-Megawatt hour (MWh), and associated supporting and ancillary infrastructure.

This report provides assessment of aquatic (freshwater) ecology and the associated riparian habitat, to support the EIS being prepared by ERM to assess the potential for environmental impacts from the proposed project. The purpose of this report is to assess the direct and indirect impacts of the project in accordance with the Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013), addressing all direct and indirect impacts of the project and associated works on Key Fish Habitat (KFH) and associated flora and fauna, including threatened species, populations and communities, during construction, operation and decommissioning for the life of the project.

The report considers all ecological items listed under the Aquatic Ecology requirements of the Secretary's Environmental Assessment Requirements (SEARS) (Table 1-3). Relevant matters protected under the Fisheries Management 1994 (FM Act), Biodiversity Conservation Act 2016 (BC Act), and Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) are assessed in this report.

The report will consider these items, matters and impacts within the relevant waterways and waterbodies within the Project Area, including the proposed solar farm and associated ancillary infrastructure at Garoo. Areas of investigation in those aquatic habitats that traverse or are within the Project will be referred to throughout this assessment as the 'Study Area', which includes a 50 m buffer of these areas.

1.2 Description of the Proposal

The project involves the construction, operation and decommissioning of a 133.76 MW AC solar farm, a 360 MW BESS, with up to 1,440-MWh, and associated supporting and ancillary infrastructure. The Project Area is located at 291 Garoo Road, Garoo, NSW, on the eastern side of the New England Highway and encompasses approximately 369 hectares (ha). The maximum area directly impacted by Project construction and operation, is expected to be approximately 306.14 ha.

Indicative components of the proposed project have been outlined in Table 1-1 (ERM 2025). A preliminary project layout is provided in Appendix 1 (ERM 2025).

Table 1-1: Indicative components of the proposed project

Project Terminology	Summary
Project Elements	
Solar Panels	• Approximately 234,000 Solar Photovoltaic (PV) modules (solar panels); and • Maximum generation capacity of 133.76 MW AC.
BESS	• Storage capacity of approximately 360 MW / 1,440 MWh; and • Located on Lot 16 DP755341;
Electrical Reticulation Infrastructure	• Two onsite substations (330 kV), including switching station, transformers and associated structures; and • Approximately 16.6 kilometres (km) of underground electrical reticulation connecting solar panels to the substations and associated infrastructure.

	• Conduits housing electrical reticulation will be attached to the Tamarang Creek bridge crossing.
Access	• The Project will be accessed via Garoo Road, at the northwest corner of the Project Area.
Emergency Access	• There are two emergency access points, one will be via Garoo Road, at the northwest corner of the Project Area and the second emergency access will be via Bulls Road from the southwest corner of the Project Area.
On-site Supporting Infrastructure	• Permanent Operations & Maintenance (O&M) compound including: ◦ A control room; ◦ Storage facilities; ◦ Supervisory Control and Data Acquisition (SCADA) facilities, ◦ Basic office amenities; and ◦ Car parking area; • Laydown area; • New or upgraded access roads; ◦ Single lane bridge with attached Megavolt (MV) conduit across Tamarang Creek (Lot 1 and Lot 2, DP 755341). Bridge has a width of 8.5 m and a length of 246.8 m, and will be supported by 4 sets of 2 m diameter double piers; • New or upgraded drainage system; and • Security fencing and lighting.
Off-site Supporting Infrastructure	• Existing transport network; • Existing telecommunications network; • Waste and wastewater disposal facilities • Temporary quarry for construction material (if required); and • Temporary accommodation/housing for construction workers (if required).
Construction	
Construction Duration	• Approximately 18 months
Construction Hours	• As per standard daytime construction working hours (or as defined in the EIS).
Construction Workforce	• Approximately 250 Full Time Equivalent (FTE) during peak construction.
On-site Temporary Infrastructure	• Temporary construction compounds with offices, car parking and amenities; • Temporary workers accommodation camp (capacity 250 FTE) for 15 months (see Table 1-2 for details); • On-site borrow pits, laydown and storage areas, fencing, and access; and • Utilities, including water sourcing, power supply, and communications.
Ancillary Activities	• Delivery of Project components, including solar panels, battery modules, substations, transformers and associated components; • Installation of underground and overhead cabling, maintenance and environmental managements processes and equipment; • Access road upgrades; and • Earthworks, as required.
Services and Utilities	• Adjustment, protection or relocation of existing utilities, including: ◦ Liddell-Tamworth transmission line; and ◦ Public roads.
Transport Route	• Main equipment and Over Size Over Mass (OSOM) deliveries via Port of Newcastle; and • Associated external road upgrades (also used for operational maintenance or decommissioning activities)
Operations	
Duration	• Development Consent in perpetuity • Infrastructure life minimum of 30 years
Hours of Operation	• 24 hours a day, seven days a week.
Operational Workforce	• Approximately ten FTE staff to operate the Project, once constructed.

A temporary workforce accommodation camp (the camp) would be established within the Eastern section of the Project Area, covering an area of approximately 5 ha. The camp would have the capacity to house 250 workers, accommodating the peak construction workforce. The occupation rate of the camp is likely to vary throughout the different stages of construction, depending on the type of activities being undertaken and associated workforce requirements.

Construction of the camp is anticipated to commence in late Q4 2026, and would be ready for occupation prior to main construction activities commencing. The camp would be operational for approximately 15 months and decommissioned at the final stages of construction (Q1 2028), allowing the final solar arrays to be installed. Construction workforce will be housed offsite for the final stages of Project construction. Indicative components of the proposed temporary workforce accommodation camp have been outlined in Table 1-2 (ERM 2025). A preliminary project layout including the location of the camp is provided in Appendix 1 (ERM 2025).

Table 1-2: Indicative components of the temporary workforce accommodation camp

Facilities / Items	Summary
Accommodation	• Portable cabins (4x 4x15 m).
Ancillary buildings	• Laundry, amenities blocks (Showers / washrooms), gymnasiums, recreation facilities, site office, storage, training room, retail shop and maintenance container; and • First aid facilities with an on-site nurse.
Amenities infrastructure	The following infrastructure would be provided to the amenities: • Electricity – generator with solar panels, A/C unit; • Water – Water storage for potable water, fire water, fire pump and fire hydrant; • Sewerage – Grey wastewater treatment plant, including compost toilets; and • Internet and telecommunication services – mobile facilities.
Waste facilities	• Grease trap; and • Waste collection area. All wastewater will be disposed offsite to a suitably licenced waste management provider.
Fuel/ Gas/ Chemical storage	• Storage facility for generator fuel; • 210kg Gas container; and • Chemical container for WWTP.
Transport and parking	• The camp will be accessed via two site access points connected to internal access roads; • Car parking for up to 125 car spaces; • Four shuttle bus parking; and • Truck loading / unloading area

1.3 Locality and Regional Context

1.3.1 Locality

The Project Area is located in the rural locality of Garoo of the Tamworth Regional Council LGA in the New England region of NSW. It is situated approximately 40 km south of Tamworth and 14 km west of Wallabadah. Garoo is within the New England Tablelands Interim Biogeographic Regionalisation for Australia (IBRA).

The Project Area encompasses approximately 369 ha and includes the specific lots listed below:

- Lot 1, 2, 14, 15, 16, 17, 19, 20, 22: DP 7555341 (Freehold),
- Lot 2, 3, 4, 5, 6, 7: DP 1108524 (Freehold),
- Lot 3, 4: DP 114643 (Freehold); and
- Lot 1: DP 250846 (Crown Land).

1.3.2 Catchment and Hydrology

The Project Area is located in the Peel River sub-catchment of the broader Namoi River catchment and greater Murray-Darling Basin (MDB). Four major tributaries, including two named waterways, run through the Project Area from the southern boundary to the northern boundary, including Sugarloaf Creek, Tamarang Creek and two tributaries of Sugarloaf Creek that confluence with the primary creek downstream and to the north of the Project Area. Sugarloaf and Tamarang Creek flow into Goonoo Goonoo Creek approximately 6.7 km downstream of the Project Area. A further 45 km downstream, Goonoo Goonoo Creek confluences with the Peel River at Tamworth. The Peel River rises on the northern slopes of the Liverpool Range at the junction of the Great Dividing Range and Mount Royal Range and flows in a general northwest direction, with a catchment area of approximately 4,700 km^2. Chaffey Dam, located approximately 43 km southeast of Tamworth, regulates the Peel River and augments water supply to Tamworth (WaterNSW 2024; NSW DPIE 2025). Major tributaries of the Peel River include Goonoo Goonoo Creek, Cockburn River and Dungowan Creek, whilst the Peel River joins the Namoi River upstream of Boggabri. The broader Namoi River catchment is bound by the Great Dividing Range in the east, the Liverpool Ranges and Warrumbungle Ranges in the south, and the Nandewar Ranges and Mount Kaputar to the north. It includes a catchment area of 42,000 km^2, with elevations ranging from over 1,500 m in the south and east to just 100 m on the alluvial floodplain in the lower catchment. Elevations within the Project Area range from approximately 640 m near the southwest boundary to 566 m in the north near to Tamarang Creek.

The NSW Water Quality and River Flow Objectives for the Namoi River identifies environmental values for the uncontrolled streams of the catchment (which include the streams in the Study Area) to include aquatic ecosystems, visual amenity, primary and secondary contact recreation, livestock and irrigation water supply, homestead and drinking water supply and aquatic foods (DECCW 2006). Water Quality Objectives relevant to aquatic ecosystems are derived from the ANZECC 2000 Guidelines default trigger values, which have been used in this assessment to interpret water quality in an ecological context.

Climate in the region is temperate, with mean maximum daily temperatures in summer reaching 32^oC and mean minimum daily temperatures in winter reaching 1^oC, based on climate statistics from the Bureau of Meteorology Quirindi Post Office station 055049 from 1907 to 2025, located approximately 30 km southwest the Project Area (BoM 2025). Average annual rainfall in the region has been recorded as 681.5 mm, based on data from 1882 to 2025, with slightly higher rainfall in spring and summer (BoM 2025).

1.3.3 Surrounding Land Use

The Project Area and surrounding land has historically been subjected to vegetation clearing for agricultural uses, primarily grazing and irrigated cropping, whilst the wider region also supports mining. Existing land use within the Project Area comprises agricultural production, including grazing and cropping. An existing single dwelling is located in the western section of the Project Area, whilst ancillary infrastructure including a working shed, roads and vehicle tracks are present throughout the site. The Project Area is located east of the New England Highway and Bulls Road and west of Garoo Road and contains a minor unsealed road running in a southeast to northeast direction connecting Bulls Road with Garoo Road.

There are no national parks or conservation areas, including wetlands, in proximity to the Project Area, with the closest protected areas including Wallabadah Nature Reserve, 17.5 km to the south and Hanging Rock State Forest, 22 km to the east.

1.4 Background Information

The Sustainable Rivers Audit (SRA) is a comprehensive assessment of the ecological health of rivers in the Murray-Darling Basin, based on data collected at the end of the millenium drought (2008 to 2010) (MDBA 2012). Audit 2 of this assessment identified Namoi Valley river ecosystem to have poor health across the lowland, slopes, upland and

montane zones. Ecosystem health showed a large difference from reference condition for the Namoi Valley as a whole. The river system's fish, benthic macroinvertebrate and riverine vegetation communities were in very poor, moderate and poor condition, respectively while physical form and hydrology were in moderate and good condition, respectively (MBDA 2012).

The Peel River catchment provides refuge, breeding and migration habitat for a range of aquatic fauna, including fish, invertebrates, reptiles and platypus. Important species known to occur in the river include the Murray Cod (*Maccullochella peelii*) (listed as vulnerable under the *Environmental Protection and Biodiversity Conservation Act 1999*) (EPBC Act), Eel-tailed Catfish (*Tandanus tandanus*) (listed as an endangered population in the MDB under the (*Fisheries Management Act 1994*) (FM Act), Golden Perch (*Macquaria ambigua*), Silver Perch (*Bidyanus bidyanus*) (listed as endangered under the EPBC Act and vulnerable under the FM Act), northern River Blackfish (listed as an endangered population in the Snowy River under the FM Act), and the protected platypus (*Ornithorhynchus anatinus)* (DCCEEW 2023). These species are monitored in the Peel River by NSW DPIRD Fisheries. The lowland Darling River Endangered Ecological Community (EEC) also occurs in the Peel River downstream of Chaffey Dam, which includes all native fish and aquatic invertebrates within all natural waterways, excluding watercourses above 500 m elevation not named in the EEC recommendation (Fisheries Scientific Committee 2003), thus excluding the Project Area.

Ecosystems and their associated biota are naturally resilient to a variety of natural disturbances which may impact on flora and fauna populations and disturb natural ecosystem processes (Lake et. al. 2000). Although ecosystems are generally resilient to natural disturbances, anthropogenic influence such as construction and operational impacts introduces a new set of disturbances for these ecosystems. Typically, anthropogenic disturbances can have a detrimental impact on biodiversity and important ecological processes through changes in biota presence and biochemical factors (Lake et. al., 2000; Le Roux et. al., 2014). Biota that inhabit freshwater streams and sediment are particularly sensitive to these changes due to the direct changes in their habitat that may arise from changes in organic matter, nutrients and sediment that wash into streams from adjacent terrestrial environments.

Solar power is used as one of the most widespread renewable energy technologies around the world, as a valuable alternative to fossil fuels. Solar-powered technologies can provide environmental and financial benefits, however, existing studies on the impacts of solar farms on the environment have identified potential for some impacts to adjacent ecosystems. As a broad summary, some of the identified potential impacts include (Anderson et al., 2025):

- Alteration of microclimates by shifts in ground temperature, vegetation patterns, surface runoff, water infiltration and wind direction and speed,
- Habitat destruction or fragmentation as a result of changed land use, particularly on previously undeveloped land,
- Changes to soil condition and erosion patterns,
- Disruption of migration routes or habitat connectivity,
- Noise and light pollution from ancillary infrastructure,
- Increased presence of environmental contaminants, which are required for PV panels, including heavy metals.

The potential impacts to aquatic ecology and receiving waterways in the Study Area are assessed as part of this report.

1.5 Secretary's Environmental Assessment Requirements

The NSW Department of Planning, Housing and Infrastructure (DPHI) has issued the SEARs for the project. A description of the relevant SEARs requirements and where they have been addressed in this Aquatic Ecology Assessment is provided in Table 1-3.

Table 1-3: Relevant DPHI SEARs – Biodiversity and Water

Requirement/Description	Document Reference
Biodiversity	
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.	Section 4 and Section 5
A cumulative impact assessment of biodiversity values in the region from nearby developments.	Section 4.10 (relevant to aquatic ecology only)
If an offset is required, details of the measures proposed to address the offset obligations.	Section 5.5 (relevant to aquatic ecology only)
Water	
An assessment of the likely impacts of the development (including flooding and flood modelling) on surrounding watercourses (including their Strahler Stream Order), groundwater resources and surface water movements, and measures proposed to monitor, reduce and mitigate these impacts including water management, having regard to the Solar Guideline.	Section 4 and Section 5 (relevant to aquatic ecology only)
A description of the erosion and sediment control measures that would be implemented to mitigate any impacts in accordance with Managing Urban Stormwater: Soils & Construction (Landcom, 2004) and Managing Urban Stormwater: Soils and construction – Volume 2A manual (Landcom, 2008);	Section 5 (relevant to aquatic ecology only)
Where the project involves works within 40 metres of any river, lake or wetlands (collectively waterfront land), identify likely impacts to the waterfront land and key fish habitat, and how the activities are to be designed and implemented in accordance with the DPI Guidelines for Controlled Activities on Waterfront Land (2018) and (if necessary) Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (DPI 2003), and Policy & Guidelines for Fish Habitat Conservation & Management (DPE, 2013);	Section 4 and Section 5 (relevant to aquatic ecology only)

Additional specific requirements from NSW Department of Primary Industries and Regional Development (DPIRD) Fisheries have also been provided and are described below.

Table 1-4: NSW DPIRD Fisheries requirements - Aquatic Ecology

Requirement/Description	Document Reference
Aquatic Ecology An aquatic ecological assessment is required that addresses all direct and indirect impacts of the Garoo Solar Farm Project on Key Fish Habitat and associated flora and fauna including threatened species, populations, and communities during construction and operation for the life of the asset. The Aquatic Ecological Assessment should cover the assessment requirements outlined in Chapter 3 of the Policy and Guidelines for Fish Habitat Conservation and Management (2013) including:	
Recent aerial photograph (preferably colour), map or GIS of the locality which details the Key Fish Habitat of the development site, all habitats impacted by the development, and waterway classification (CLASS) as defined in Tables 1 and 2 of the Policy and Guidelines for Fish Habitat Conservation and Management (2013).	Section 3, Figure 4
Location details of all temporary and permanent infrastructure and construction activities, such as waterway crossings, powerlines, access tracks, etc.	Section 1, Figure 1, Figure 5
Mapping of the full aerial extent of Key Fish Habitat types that will be impacted either directly or indirectly by the development and subsequent operation of the Garoo Solar Farm Project, with impacted habitats clearly identified on recent aerial photographs, maps or GIS.	Section 3, Figure 4 Section 4, Figure 5
Description, quantification, and mapping of all aquatic and riparian vegetation communities potentially impacted by the development. This should include an	Section 3, Figure 3, Figure 4

assessment of the extent and condition of aquatic and riparian vegetation and the presence of significant habitat features (e.g. gravel beds, snags, reed beds, rock bars, etc).	
Quantification of the extent of aquatic and riparian habitat removal, modification or inundation (whether temporary or permanent) that will result from the proposed development.	Section 4
Development of mitigation measures during construction (e.g. Environmental Management Plans) and operation (e.g. Operational Management Plan) including monitoring of proposed mitigation measures and plans to confirm their effectiveness.	Section 5
An assessment under Part 7A of the FM Act 1994 is required to address whether there are likely to be any significant impacts on listed threatened species, populations or ecological communities. Assessment of the impacts may require initial 'Seven-Part Test's.	Section 4, Appendix 4

1.6 Relevant Legislation and Policies

The following legislation and policies have been considered in this ecological assessment:

- NSW *Fisheries Management Act 1994*
- NSW *Biodiversity Conservation Act 2016*
- NSW *Environmental Planning and Assessment Act 1979*
- NSW *Water Management Act 2000*
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The legislative context for the assessment is outlined in the following sections.

The Large-Scale Solar Energy Guideline (NSW DPE 2022) has also been considered in this ecological assessment.

1.6.1 Fisheries Management Act 1994

The objectives of the FM Act are to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. This includes for all 'Fish' under the definition of the FM Act 'that are identified as 'marine, estuarine or freshwater fish or other aquatic animal life at any stage of their life history (whether alive or dead)'. However, it excludes whales, mammals, reptiles, birds and amphibians which are managed under other legislation.

To meet the primary objectives, Part 7 of the FM Act deals with the protection of aquatic habitats, with Part 7A addressing the conservation of threatened species. Part 7 commonly applies to reclamation and dredging works, protection of marine vegetation including mangroves and seagrass, protection of spawning of certain fish, and noxious fish and marine vegetation.

To assist in applying the legislative requirements of the FM Act in assessing developments in NSW, NSW DPIRD Fisheries have prepared the 'Policy and guidelines for fish habitat conservation and management' (Fairfull 2013).

Listings of threatened species, populations and ecological communities gazetted under the FM Act are relevant to this assessment. Threatened biota impacted by this construction proposal must be assessed with consideration of the factors identified in Section 5A of the EP&A Act known as the '7 Part Test'.

Key Fish Habitat Policy

NSW DPIRD recognises that certain types of activities have varying degrees of impact on key fish habitats and, as such, require different levels of control and regulation. As a general principle, NSW DPIRD requires that proponents should, as a first priority, aim to avoid impacts upon key fish habitats. Where avoidance is impossible or impractical,

proponents should then aim to minimise impacts. For any unavoidable remaining impacts consideration is to be given to establishment of suitable offsets or compensation.

Where key fish habitat is impacted by this construction proposal, suitable offsets or compensation may be required to be negotiated with NSW DPIRD Fisheries.

1.6.2 Biodiversity Conservation Act 2016

The BC Act provides for legal protections of biodiversity and threatened species in NSW. In regard to this assessment, it includes for marine birds and shorebirds, whales, marine and aquatic mammals, and marine or aquatic reptiles. Listed items of threatened biodiversity under the BC Act with potential to be impacted by this proposal will require further consideration. The BC Act sets the criteria for determining whether a proposal is likely to have a significant impact on threatened biodiversity listed under the BC Act.

1.6.3 Environmental Planning and Assessment Act 1979

Development in NSW falls under the provisions of the EP&A Act and subordinate legislation. Under Section 5.1 of the EP&A Act, there is a duty for the determining authority to consider the environmental impacts of proposed activities. The specific aspects of these environmental considerations are detailed in Clause 171 of the EP&A Regulation 2021. Under section 5.1 of the EP&A Act, determining authorities are required to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity. These include items of biodiversity listed under the BC and FM Acts.

1.6.4 Water Management Act 2000

The objectives of the WM Act are to provide for the sustainable and integrated management of the water sources of the state for the benefit of both present and future generations and, in particular, ecologically sustainable development and to protect, enhance and restore watercourses.

The Department of Climate Change, Energy, the Environment & Water (DCCEEW) and WaterNSW share the responsibility for granting and managing water licences and approvals in NSW. The Natural Resources Access Regulator (NRAR) is the independent regulator that ensures compliance with these licences and approval.

Lands within 40 m of the riverbank are considered waterfront land under the WM Act and a controlled activity approval may be required before undertaking any work or development.

1.6.5 Environmental Protection and Biodiversity Conservation Act 1999

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on Matters of National Environmental Significance (MNES) undergo an assessment and approval process. Under the EPBC Act, an action includes a project, undertaking, development, or activity. An action that 'has, will have or is likely to have a significant impact on a MNES' is deemed to be a controlled action and may not be undertaken without prior approval from the Commonwealth Minister for the DCCEEW.

The MNES that will require consideration as part of this assessment include:

- Threatened species and ecological communities
- Migratory species

Listings of MNES identified with potential to be impacted by this proposal will require further considered under the guidance provided by the EPBC Act. This guidance is referred to as the 'Significant Impact Guidelines' and provides a set of criteria known as the 'Significant Impact Criteria' that must be followed to determining whether an action is likely to have a significant impact on a MNES.

1.7 Assessment Objectives

The objectives of this assessment are to:

- Identify any potential impacts from the proposed project on threatened biodiversity, MNES, water quality, fish habitat, freshwater vegetation and fauna, and areas of outstanding biodiversity value; and
- Provide recommendations regarding adoption of environmental controls and mitigation measures into the Construction Environmental Management Plan (CEMP) or equivalent document and identify any additional permitting and approval requirements under the FM Act, including any requirements for a Species Impact Statement (SIS).

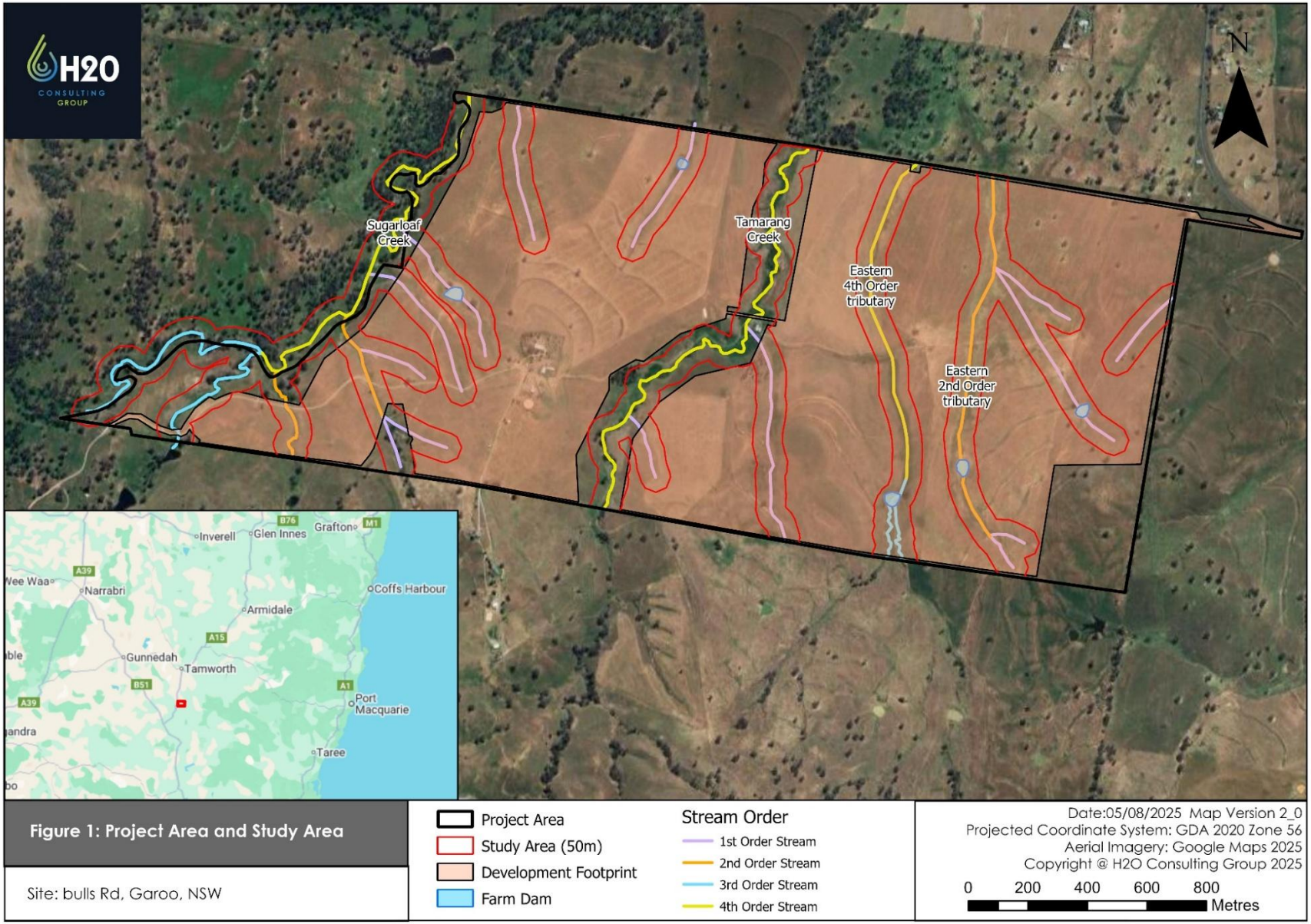


Figure 1: Location of the Project Area, Study Area and proposed development and subdivision sites.

2 Methodology and Approach

2.1 Desktop Review

2.1.1 Threatened Species Searches

Relevant databases were searched during July 2025, applying a 10 km radius around the Study Area at Garoo (locality) to identify threatened biodiversity, MNES and biodiversity values that may potentially occur within the locality. The following databases and information sources were searched:

- Atlas of Living Australia Spatial Data Portal (ALA 2025)
- NSW BioNet, Atlas of NSW Wildlife (NSW Environment and Heritage 2025),
- Protected Matters Search Tool (PMST) for listings of MNES under the EPBC Act (DCCEEW 2025a)
- NSW DPIRD Fisheries Threatened species lists (NSW DPIRD Fisheries 2025a); and
- Species Profile and Threats Database (SPRAT) (DCCEEW 2025b).

2.1.2 Ecological Mapping

Mapping of existing aquatic ecological features important to this assessment, applying a 10 km radius around the Study Area at Garoo (locality) was reviewed using the following online tools:

- Fisheries NSW Spatial Data Portal mapping of KFH and Freshwater Fish Community Status (NSW DPIRD Fisheries 2025b),
- NSW DPIRD Fish Stocking Map (NSW DPIRD 2025c); and
- Directory of important wetlands (NSW DCCEEW 2021).

A review of the potential environmental constraints identified via these maps was undertaken.

2.1.3 Existing Ecological Information

The following ecological assessments and information relevant to the project were reviewed:

- EPBC Act Significant Impact Assessment Report (SIAR), Garoo Solar Farm and BESS (ERM 2025)

2.1.4 Key Threatening Processes

Listings of Key Threatening Processes (KTPs) were reviewed to identify potential KTPs that may occur at the Study Area under the FM Act, BC Act and EPBC Act.

2.2 Site Investigations

Site surveys of the Project Area including aquatic habitats, and riparian habitats within 50 m of waterways, (i.e. the 'Study Area' – see Figure 2), were completed over three days in June 2025. This included a description of general habitat, creek bank flora and fauna and subtidal flora and fauna within and adjacent to the proposed development footprint. More detailed site assessments were conducted at 12 sites within the Study Area, whilst aquatic habitat features, and KFH was mapped across the Study Area. The Quirindi Post Office station recorded 2.6 mm of rainfall in the two weeks prior to surveys (BoM 2025).

2.2.1 Habitat Mapping

Existing mapped KFH conducted by NSW DPI (2025a) was verified *in-situ* at all waterways in the Study Area, as per the classification schemes detailed in section 3.2.1 and 3.2.2 of the Policy and guidelines for fish habitat conservation and

management (Fairfull 2013). This included a categorisation of KFH Type (sensitivity) and classification of the waterway class (function) (Fairfull 2013).

Important aquatic habitat features were mapped across the waterways in the Study Area via a walk-over, including native aquatic macrophytes, snags, instream gravel beds and rock bars. Coverage of riparian trees with the Study Area were also mapped, using a combination of field-verification points and review of aerial imagery.

Mapping data were collected *in-situ* using a specialised data-form collection application with GPS integration. Data were then imported into GIS-based mapping software, which created shapefiles, points and polygons based on interpretation of the following data sources:

- Previous KFH mapping data (NSW DPIRD Fisheries Spatial Data Portal 2025),
- *In situ* KFH, aquatic habitat features and riparian mapping data; and
- Recent aerial imagery (Google Imagery 2024).

These data were used to create habitat maps of the Study Area, showing important ecological features.

2.2.2 Surveys and Site Assessments

Field surveys included more detailed at 12 sites across the Study Area (Table 2-1) (Figure 2). These assessments included a detailed site habitat and riparian assessment, and water quality assessment.

Table 2-1: Waterways and survey sites in the Study Area and associated site investigations

Site	Strahler Stream Order	Location	Watercourse in Study Area	Surveys Conducted
1	3rd order	150.8962980°E 31.4360120°S	Sugarloaf Creek	KFH, R, AHF, WQ
2	4th order	150.9027838°E 31.4255368°S	Sugarloaf Creek	KFH, R, AHF, WQ
3	4th order	150.9089405°E 31.4370116°S	Tamarang Creek	KFH, R, AHF, WQ
4	4th order	150.9150060°E 31.4312816°S	Tamarang Creek	KFH, R, AHF, WQ
5	4th order	150.99170968°E 31.4262114°S	Tamarang Creek	KFH, R, AHF, WQ
6	3rd order	150.9207230°E 31.4368078°S	Eastern 4th order tributary (of Sugarloaf Creek)	KFH, R, AHF
7	4th order	150.9201906°E 31.4309411°S	Eastern 4th order tributary (of Sugarloaf Creek)	KFH, R, AHF
8	4th order	150.9216356°E 31.4266006°S	Eastern 4th order tributary (of Sugarloaf Creek)	KFH, R, AHF
9	2nd order	150.9244233°E 31.4289184°S	Eastern 2nd order tributary (of Sugarloaf Creek)	KFH, R, AHF
10	2nd order	150.9248488°E 31.4265236°S	Eastern 2nd order tributary (of Sugarloaf Creek)	KFH, R, AHF
11	4th order	150.8995806°E 31.4316700°S	Sugarloaf Creek	KFH, R, AHF, WQ
12	2nd order	150.9234177°E 31.4346221°S	Eastern 2nd order tributary (of Sugarloaf Creek)	KFH, R, AHF, WQ

Surveys conducted at each site include KFH – Key Fish Habitat mapping, WQ – Water Quality, AHF – Aquatic Habitat Features mapping, R – Riparian Assessment.

The assessments described in the following sections were completed at each site.

2.2.2.1 Detailed Habitat and Riparian Assessment

A visual assessment of aquatic habitat and the riparian zone was undertaken at each site along a 100 m stretch of the creek and creek bank. The riparian assessment is derived from the Australian Rivers Assessment System (AUSRIVAS) riparian protocols, including physical characteristics of the stream, site observations, bed and bank substrate description, stream features, disturbances and catchment land use, riparian characteristics and composition and observable macrophytes (Parsons et. al., 2002).

2.2.2.2 Water Quality Assessment

In-situ physico-chemical water quality variables were measured at each site using a Horiba U-52 multiparameter water quality meter. The water quality meter was calibrated prior to and upon conclusion of sampling. Three replicate water quality measurements were taken at each site to allow for analysis of average results. Where possible, measurements were taken in areas of flow at a depth of approximately 0.5 metres. Water quality variables measured at each site included temperature (^{o}C), pH, Oxidation Reduction Potential (ORP) (mV), electrical conductivity (µS/cm), turbidity (Nephelometric Turbidity Unit) (NTU), dissolved oxygen (% saturation and mg/L), total dissolved solids (g/L) and salinity (ppt).

Descriptions of average stream width and depth were calculated using five measurements along the surveyed stream section. Visual observations of water level (low <25%, moderate 25-50%, and high (>75%), water flow (no obvious flow, low flow, moderate flow, and high flow), and water appearance (clear or turbid water, presence of surface films, odour, and algal blooms) were also recorded.

2.2.3 Data Analysis

Environmental data, including chemical and biological, were analysed to assess environmental habitat health within the Study Area. Water quality measurements taken at each site (3) were averaged and compared against standard ANZECC & ARMCANZ Guidelines (2000) for slightly disturbed ecosystems in southeast Australia against upland river values. The Guidelines provide a framework for assessing and managing water quality to protect environmental values including aquatic ecosystems, recreation, drinking water, agricultural use and industrial water use. The Guidelines provide default guideline trigger values for various water quality attributes that can be used to assess and manage water quality, based on the regional environmental context. Relevant to this assessment, default guideline values (DGVs) available included dissolved oxygen (% saturation), pH, electrical conductivity (µS/cm) and turbidity (NTU).

2.3 Threatened Species Assessment

The threatened species assessment was undertaken by desktop review of 'sightings', assessment of the habitat in the Study Area, and determining the likelihood of occurrence of each species using the criteria outlines in Table 2-2. Once the likelihood of occurrence has been established, the likelihood of impact (none, unlikely, possible or likely), which considered the occurrence and proposed action itself is assigned to each species. Those species with moderate or higher likelihood of occurrence and possible likelihood or higher of being impacted will trigger further assessment through the 5 / 7 Part Test and/ or Impact Assessment criteria processes.

Table 2-2: Likelihood of occurrence criteria

Likelihood of occurrence	Criteria
Known	The species was observed within the Study Area. The species is known to inhabit the Study Area.
High	The species has frequently been recorded previously in the Study Area or similar habitats in the locality. The species is known or likely to maintain resident populations surrounding the Study Area. It is likely that the species utilises habitat or resources that are abundant or in good condition within the Study Area.

	The species is known or likely to visit the Study Area during regular seasonal movements or migrations.
Moderate	The species has infrequently been recorded previously in the Study Area or similar habitats in the locality. The Study Area contains potential marginal and/or modified habitat and resources for the species, which it may occasionally utilise. The species is unlikely to maintain sedentary populations but may seasonally use resources within the Study Area opportunistically or during migrations.
Low	The species has not been recorded previously in the Study Area or similar habitats in the locality. The Study Area is beyond the current distribution range of the species. If present in the Study Area, the species would likely be a transient visitor. The Study Area contains only very marginal habitat for the species, which would not be relied upon for its on-going local existence.
Unlikely	The species is highly restricted to certain geographical areas not including the Study Area. The habitat within the Study Area is unsuitable for the species.

2.4 Limitations

The impact assessment is limited to freshwater flora and fauna, including fish, reptiles, monotremes and invertebrates. Additional habitat descriptions of terrestrial/riparian vegetation communities have been provided and general recommendation provided. However, this assessment does not include for detailed impact assessment of terrestrial biodiversity values.

Fauna surveys included an assessment of aquatic habitat values present within the Study Area and was limited to observations of seasonal species present at the time of survey. Habitat assessments are conservative, defaulting to assume presence where there is insufficient knowledge to determine otherwise.

Mapping is limited to broad-scale GPS mapping and a typical accuracy of +/- 3 m. More detailed spatial and temporal mapping may be required to identify more precise boundaries and seasonal changes in habitat.

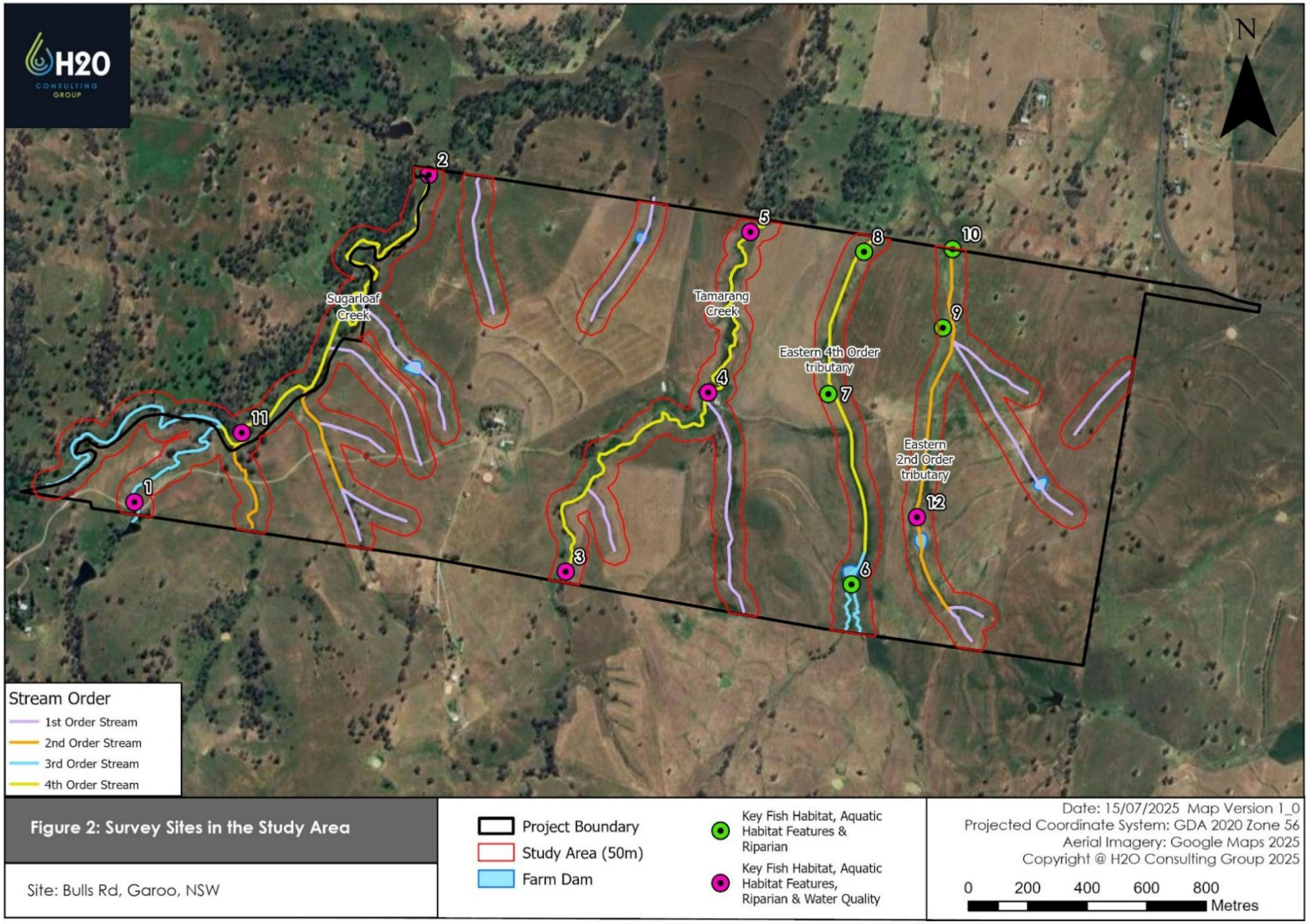


Figure 2: Map of the survey sites and watercourses within the Study Area

3 Results and Findings

3.1 Desktop Review

3.1.1 Threatened Biodiversity and Protected Matters

The NSW DPIRD Fisheries Threatened Species List identified the following threatened freshwater species relevant to this study with distribution areas in proximity to the Study Area:

- One threatened freshwater fish,
- One Endangered Population (EP); and
- One Endangered Ecological Community (EEC).

Searches of the Bionet database for listings under the BC Act within a 10 km radius of the Project Area did not identify any threatened aquatic reptiles.

The EPBC Protected Matters Report Search identified two MNES relevant to this study (i.e., freshwater aquatic species) within 10 km radius of the Project Area.

In total, three threatened freshwater fish, one EP and one EEC was identified for further consideration (Table 3-1).

Table 3-1: Threatened and migratory species identified from searches that have been considered further as part of this assessment.

Common Name	Scientific Name	NSW Status	Comm. Status	Records (ALA) (FM Act only)	Likelihood of Occurrence
Fish					
Hunter Galaxias	*Galaxias* sp. nov. 'Hunter'		CE	NA	Unlikely – Current distribution includes seven highly isolated and fragmented sites between 300-650 m elevation in the north-east corner of Hunter River catchment. The upper sections of these tributaries occur to the south of the Study Area near Murrurundi and Scone, however, drain within the Hunter catchment and do not include tributaries in the Namoi River catchment (DCCEEW 2023).
Murray Cod	*Maccullochella peelii peelii*		V	NA	Low – Historically distributed throughout the Murray-Darling Basin up to 1,000 m elevation. Utilises diverse habitat from clear, rocky streams to slow-flowing, turbid lowland rivers. No sightings within 10 km of Study Area, however, have been recorded upstream and downstream of Chaffey Dam along the Peel River (ALA 2025). The Study Area provides minimal habitat for this species. Approximately 4,500 Murray Cod were released into the Peel River just upstream of Tamworth over the 2023/24

					period as part of fish stocking by NSW DPIRD (NSW DPIRD 2025c).
Southern Purple Spotted Gudgeon	*Mogurnda adspersa*	E		**0**	**Moderate** – Indicative distribution mapping includes Sugarloaf Creek and its tributaries within the Project Area. No sightings of the species has been recorded in the wider Namoi River catchment (ALA 2025). The Study Area provides marginal habitat for this species.
Populations					
Murray-Darling Basin population of Eel Tailed Catfish	*Tandanus tandanus*	EP		1 (frozen tissue sample)	Low – Species distributed throughout the Murray-Darling Basin. They prefer clear, sluggish or still waters, but can also be found in flowing streams with turbid waters and typically only have a 5 km home range. Sightings within 10 km of the Study are confined to one frozen tissue sample collected by Online Zoological Collections of Australian Museums in Quirindi Creek, which is connected to the Namoi River at Gunnedah. Sightings have been recorded in the Peel River downstream of Chaffey Dam.
Ecological Communities					
Lowland Darling River aquatic ecological community		EEC		NA	None – The EEC includes all native fish and aquatic invertebrates within all natural creeks, rivers, streams and associated lagoons, billabongs, lakes, flow diversions to anabranches, the anabranches, and the floodplains of the Darling River within the State of New South Wales and including Menindee Lakes and the Barwon River. This includes the Peel River from Chaffey Dam (31°31'S; 151°08'E). However, EEC description states 'other watercourses above 500 m not specifically named in this recommendation are excluded'. The Project Area elevations range from 566 m to 640 m (ERM 2025), thus creeks within the Project Area are excluded from this listing.

V = Vulnerable, E = Endangered, CE = Critically Endangered, EP = Endangered Population, EEC = Endangered Ecological Community

3.1.2 Existing Ecological Mapping and Data

3.1.2.1 Key Fish Habitat

The creeks within the Project Area are mapped as KFH by NSW DPIRD Fisheries (NSW DPIRD Fisheries 2025b). The entirety of Sugarloaf Creek (4th order) along the Project Area's western boundary (including both 3rd order tributaries) is mapped as KFH (based on modelled Threatened Species Distribution – Southern Purple Spotted Gudgeon). The entirety of Tamarang Creek within the Project Area is mapped as KFH (as it is a Strahler 3rd order or higher). The entirety of the eastern 4th order tributary (Sugarloaf Creek) is mapped as KFH (Strahler 3rd order or higher). The entirety of eastern 2nd order tributary (Sugarloaf Creek) is mapped as KFH (based on modelled Threatened Species Distribution – Southern Purple Spotted Gudgeon). Three dams along the tributaries in the Project Area are also mapped as KFH.

No mapped barriers to fish passage occur along Sugarloaf Creek or its tributaries. Numerous barriers to fish passage, including fords and bridges, are mapped to occur along Goonoo Creek, downstream of the Project Area.

3.1.2.2 Fish Communities

Mapping of freshwater fish community status does not exist for the creeks within the Project Area. The closest connecting waterway (Goonoo Creek), approximately 6.7 km downstream of the Project Area is mapped to have 'poor' freshwater fish community status (NSW DPIRD Fisheries 2025b).

Indicative mapping of threatened freshwater fish distribution includes mapping of for the Southern Purple Spotted Gudgeon in Sugarloaf Creek along the Project Area western boundary and in the eastern 2nd order tributary (Sugarloaf Creek). Mapping also identifies distribution of the Eel-tailed Catfish in Goonoo Creek, outside and downstream (approximately 6.7 km downstream) of the Study Area (NSW DPIRD Fisheries 2025b).

Review of fish stocking data indicates that approximately 4,500 Murray Cod (*M. peelii*) and 5,500 Golden Perch (*Macquaria ambigua*) were released into the Peel River, just upstream of Tamworth over the 2023/24 period (NSW DPIRD 2025c), approximately 35 km north of the Project Area.

3.1.2.3 Other Ecological Mapping

There are no wetlands of international importance (Ramsar wetlands) within the Study Area or within 10 km of the Project Area. The nearest wetlands of international importance identified by the EPBC Act Protected Matter Search Tool are the Hunter Estuary Wetlands, which are 150-200 km south-east of the Project Area and not hydraulically connected.

The nearest wetlands of national importance hydraulically connected to the Project Area are the Macquarie Marshes, which are associated with the floodplains of the Macquarie River and its tributaries, and are located over 300 km to the west (DCCEEW 2021). The waterways in the Project Area are part of the Namoi River catchment and are connected to the Macquarie Marshes by the Barwon River system, of which the Namoi River and Macquarie River are major tributaries.

3.1.3 Key Threatening Processes

A review of KTPs under relevant legislation identified the following processes that may occur within the Study Area.

Relevant KTPs under the FM Act:

- Degradation of native riparian vegetation along New South Wales watercourses,
- Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams; and
- Removal of large woody debris from NSW rivers and streams.

Relevant KTPs under the BC Act:

- Alteration to natural flow regimes of rivers, streams, floodplains and wetlands,
- Clearing of native vegetation; and
- Removal of dead wood and dead trees.

Relevant KTPs under the EPBC Act:

- Land clearance.

The potential impacts of these KTPs in association with identified habitat and the proposed developments in the Study Area are detailed in Section 4.

3.2 Description of Habitat and Biota

3.2.1 Indicators of the Environment

3.2.1.1 Physio-chemical - Water Quality

The average values of water quality variables measured *in-situ* at each site are presented below and have been compared with the Default Guidelines Values (DGVs) within the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) for upland rivers (those stream >150 m altitude) for south-east Australia (hereafter referred to as the ANZECC DGV). Water quality measurements were taken at Sites 1-5 and 11-12, however, could not be taken at Sites 6-10 due to a lack of water.

Dissolved Oxygen

Average values for Dissolved Oxygen (DO) saturation (%) were low across the Study Area and did not meet the ANZECC DGV for upland rivers of 90-110%. Sites along Sugarloaf Creek recorded average DO saturation between 51.87 – 82.27%, with the highest reading across the Study Area at Site 11 along the western boundary, at the confluence of the two 3rd order streams of Sugarloaf Creek. Sites along Tamarang Creek recorded average DO saturation between 46.93 – 71.57%, with higher DO saturation recorded at Site 3 (upstream) in the south of the Project Area where the creek maintained a greater and more consistent flow. The lowest saturation was recorded at Site 12 within the dam on the eastern 2nd order tributary.

Electrical conductivity

With the exception of Site 12 within the dam on the eastern 2nd order tributary, all sites along Sugarloaf and Tamarang Creeks recorded average Electrical Conductivity (EC) values that exceeded the ANZECC DGV of 30 – 350 µS/cm. Average EC along Sugarloaf Creek ranged from 631.33 – 1073.33 µS/cm, whilst values along Tamarang Creek ranged from 768.33 – 981.33 µS/cm. Factors influencing EC are discussed in Section 4.

pH

The pH of streams across the Study Area was typically within the ANZECC DGV of 6.5 – 8.0, with the exception of Site 3 which recorded an average pH of 8.23. The remainder of the sites were consistent and recorded slightly alkaline average pH values between 7.36 – 7.67.

Turbidity

Average turbidity was highly variable across the Study Area, with values less than, within and exceeding ANZECC DGV of 2-25 NTU. All sites along Sugarloaf Creek recorded an average 0 NTU; a large portion of the Sugarloaf Creek bed comprises bedrock, boulders, cobble and gravel with minimal fines, whilst water was observed to be very clear, and low turbidity would be expected. Sites 3 and 4 along Tamarang Creek recorded elevated average turbidity values, whilst turbidity at Site 5 was within Guideline (2000) values. Differences in turbidity along Tamarang Creek is likely

attributed to changes in creek and bank substrate composition and the influence of vehicle access tracks and disturbance by a high presence of stock animals.

Oxidation-Reduction Potential

Average Oxidation-Reduction Potential (ORP) in Sugarloaf and Tamarang Creeks ranged from 129.67 – 154.33 mV. ORP values between +100 and +350 mV typically indicate that a system is in an oxidising state, allowing for nitrification (conversion of ammonia to nitrate) to occur.

Table 3-2: Average physical and chemical water quality variables measured at sites in the Study Area. ANZECC (2000) Guidelines for upland rivers (>150 m altitude) in south-east Australia are provided.

	Physical and Chemical Variables								
Site	Temperature (°C)	pH	Turbidity (NTU)	Dissolved Oxygen (DO) (%)	DO (mg/L)	Salinity (ppt)	Electrical Conductivity (µS/cm)	Total Dissolved Solids	Oxidation-Reduction Potential (mV)
ANZECC (2000) Guidelines	n/a	6.5-8.0	2-25	90-110	n/a	n/a	30-350	n/a	n/a
1	11.10	7.36	0	51.87	5.35	0.31	631.33	0.40	144.67
2	12.79	7.66	0	72.70	7.67	0.53	1073.33	0.69	154.33
3	10.32	8.23	110.7	71.57	8.01	0.48	981.33	0.63	129.67
4	8.09	7.67	70.03	46.93	5.58	0.46	933.67	0.61	152.00
5	9.76	7.61	4.30	50.60	5.74	0.37	768.33	0.49	153.00
6 - 10	Not sampled due to lack of water in streams.								
11	10.42	7.68	0	82.27	9.15	0.48	986.33	0.63	138.00
12 (Dam only)	8.18	7.56	927	29.30	3.45	0.12	252.50	0.16	19.50

*Average values shown in red are below or exceed the ANZECC (2000) Guidelines.

Water quality in Sugarloaf and Tamarang Creeks is likely to support suitable permanent habitat for native aquatic flora and fauna species. The dam along the eastern 2nd order tributary has poor water quality in terms of DO and ORP, however, may still provide suitable habitat for some fauna species.

3.2.2 Physical – Habitat Values (Riparian and Aquatic)

3.2.2.1 Sugarloaf Creek

Sugarloaf Creek is located adjacent to the western boundary of the Project Area, flowing south to north. The main creek becomes a 4th order Strahler stream at the confluence of two 3rd order Strahler sections in the southwest of the Project Area, whilst seven other smaller tributaries of Sugarloaf Creek are present within the Project Area, including the eastern 4th and 2nd order tributaries which flow into the creek downstream of the Project Area. Aquatic habitat along Sugarloaf Creek was typically complex, with consistent presence of important habitat features including gravel beds, aquatic macrophytes and snags, that likely provide suitable habitat for native aquatic fauna species, whilst creek bank substrata transitioned between clays and rock. Outside bends often showed a high amount of scouring. Downstream areas of the creek comprised large stretches of bedrock, which formed areas of riffle between pools. Riparian vegetation typically provided a moderate amount of shading along the creek.

Table 3-3: Riparian and aquatic habitat at Site 1

Site 1 – Sugarloaf Creek	
Location	Site 1 is located along the upstream reaches of a 3rd order tributary of Sugarloaf Creek in the the southwest corner of Study Area.
Site Description	The site is situated just downstream of the Bulls Road crossing along the southern boundary of the Project Area. An existing pipe culvert is present underneath the road crossing. Surrounding

	land use includes a mix of native and non-native grazing lands, with point disturbances from the road, culvert and shoreline grazing.
Stream Characteristics (Waterfront Land)	Defined bank: Yes Watercourse Type: Type 4 – Laterally Unconfined Discontinuous Watercourse features present: Pools. High bank: Type 4
Aquatic Habitat	Two pools are present either side of the road, with low flow evident. Within approximately 15 m downstream of Bull's Road, the creek does not possess defined banks, and comprises of small, isolated pools with low overland flow. At approximately 15 m downstream, the creek transitions to larger, interconnected pools with relatively defined creek banks, with the creek typically spanning between 1-4 m wide. The creek maintained an average depth of approximately 0.6 m and had a moderate (25-50%) water level at the time of survey with clear water, no surface films or odours and the presence of some algal blooms. The creek bed substrata was dominated by clay, sand, gravel and pebble, with loose silt lying on 10-35% of the creek bed, 5-20% of the bed covered by coarse particulate matter/organic detritus (<10 cm), and <5% of the stream had large snags. The site had minimal bank overhang and moderate amount of trailing vegetation. Macrophytes were confined to emergent rushes that occurred along approximately 35% of the stream at Site 1. These rushes commonly inhabited instream habitat along the lower creek banks or along the overland flow routes. Important aquatic habitat features that were present at Site 1 included instream macrophytes, snags, trailing vegetation and gravel beds.
Riparian Habitat	Riparian habitat at Site 1 occurred in occasional clumps, with moderate disturbance evident. Vegetation included approximately 10 large trees (with 90% over 10 metres in height) dominated by native species (*Eucalyptus* spp.), minimal shrubs, and extensive non-native grasses. The site is minimally shaded by riparian vegetation, however, received some late afternoon shading by the northern creek bank. Trees at Site 1 were consistent with the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland TEC, as also identified in the EPBC Act SIAR (ERM 2025).

Table 3-4: Riparian and aquatic habitat at Site 11

Site 11 – Sugarloaf Creek	
Location	Site 11 is located along the 4th order section of Sugarloaf Creek, approximately 150 m downstream of the confluence of the two 3rd order tributaries, in the southwest of the Project Area near to the western boundary.
Site Description	The site is located downstream of the confluence of the two 3rd order tributaries of Sugarloaf Creek and an additional 2nd order tributary that flows into the creek from the south. Surrounding land use is rural and includes a mix of native and non-native grazing lands, with point disturbances from shoreline grazing, an upstream causeway and subsidence of banks. An irrigation pipe runs across the creek but did not appear to extract water from the creek.
Stream Characteristics (Waterfront Land)	Defined bank: Yes Watercourse Type: Type 5 – Partly Confined Valley (partly confined, bedrock controlled, frequent elevated rock bars, narrow floodplain strips on inside bends, relatively step banks except on inside bends) Watercourse features present: Pools, riffle, erosion High bank: Type
Aquatic Habitat	At Site 11, Sugarloaf Creek meanders from the west to flow towards the north, with the creek ranging between 1-3 m in width. At this location, the creek had defined banks and maintains connectivity, with a moderate water level (~25%) (0.5 m) and low flow. Water was clear, with no surface films or odour, however, filamentous algae was present across 10-35% of the site. The creek bed substrata included a small (5%) amount of exposed bedrock, with remaining substrata

	having a relatively even amount of boulder, cobble, pebble, gravel, sand and clay. Rocky bed substrata created small riffle habitat in the downstream area of the site. Loose silt was observed on 10-35% of the creek bed, whilst coarse particulate matter/organic detritus (<10 cm) and larger snags (>10 cm diameter) were minimal (<5% coverage). The site had minimal bank overhang and moderate amount of trailing vegetation. Emergent macrophytes comprised of emergent rushes and Watercress (*Nasturtium officinale*). occurred along approximately 15% of the creek at Site 11. Rushes were confined to instream areas along the creek banks, whilst the floating *N. officinale* extended across the creek in some areas. Important habitat features that were present at Site 11 included riffle habitat, gravel beds, trailing vegetation and instream macrophytes. A Blue Yabby (*Cherax destructor*) claw was observed in the creek, indicating that the species may utilise habitat in the creek or nearby.
Riparian Habitat	Riparian habitat at Site 11 continuality consisted of occasional clumps, with moderate disturbance evident, primarily from erosion along the western high bank and in areas upstream where bank subsidence was evident. Trees greater than 10 metres in height typically comprised ~50 % coverage in the upper strata, with an additional 15% coverage by trees less than 10 metres in height, dominated by native species (*Eucalyptus* spp.). Ground cover comprised 90% coverage across the site, dominated by pasture grasses. Approximately 15-20% of the creek was shaded by riparian vegetation, whilst the western high bank of the creek also provides afternoon shading. Trees at Site 11 included Yellow Box (*Eucalyptus melliodora*) and were consistent with the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland TEC, as also identified in the EPBC Act SIAR (ERM 2025).

Table 3-5: Riparian and aquatic habitat at Site 2

Site 2 – Sugarloaf Creek	
Location	Site 2 is located on the downstream 4th order section of Sugarloaf Creek, just upstream of the northern boundary of the Project Area.
Site Description	The site is located at the most downstream section of Sugarloaf Creek within the Project Area, downstream of Sites 1 and 11. Surrounding land use is rural and includes a mix of native and non-native grazing lands, with point disturbances from shoreline grazing, an informal cobble causeway, boundary fence, and subsidence of banks. Numerous cattle tracks were evident along the banks and through the creek at Site 2.
Stream Characteristics (Waterfront Land)	Defined bank: Yes Watercourse Type: Type 5 – Partly Confined Valley (partly confined, narrow floodplain strips on inside bends, relatively step banks except on inside bends) Watercourse features present: Pools, erosion High bank: Type 5
Aquatic Habitat	Site 2 is located on a relatively straight section of Sugarloaf Creek, with the creek typically ranging between 1 – 3.5 m in width. The channel is steep and well defined and up to 10 m wide in places, however, shows evidence of erosion and slumping with a large amount of exposed rock, boulder and sediment. The actual creek lacks defined banks and comprises a series of large, interconnected pools. The water level was low (<25%) with low flow, while creek water was clear with no odours. Surface films and an algal bloom was evident along 35 – 65% of the creek at Site 2, particularly in more stagnant sections. Bed substrata was dominated by cobble and pebble, with some clay, sand, gravel and occasional boulders. Loose silt was observed on 35 - 65% of the creek bed, whilst coarse particulate matter/organic detritus (<10 cm) and larger snags (>10 cm diameter) were minimal (<5% coverage). The site possessed no bank overhang and minimal trailing vegetation aside from encroaching exotic grasses.

	Macrophytes were confined to emergent rushes and *N. officinale* that occurred along approximately 5% of the creek at Site 2. Important habitat features that were present at Site 2 was limited to gravel beds.
Riparian Habitat	Riparian vegetation at Site 2 was isolated/scattered, with moderate to high disturbance evident along the creek, primarily from erosion of the channel and shoreline grazing. Trees greater than 10 metres in height comprised ~20% coverage in the upper strata, primarily confined to areas at the upstream and downstream ends of the site where disturbances are lesser and dominated by native species (*Eucalyptus* spp.). Ground cover comprised 90% coverage across the site, dominated by pasture grasses. Riparian vegetation does not provide any shading of the creek.



Plate 1: Site 1 (a) facing upstream and (b) downstream pools with freshwater vegetation



Plate 2: Site 11 (a) upstream and (b) downstream with areas of gravel, pebble and cobble



Plate 3: Site 2 (a) upstream and (b) downstream with areas of cobble

3.2.2.2 Tamarang Creek

Tamarang Creek is located in the middle of the Project Area, flowing south to north. It is a 4th order Strahler stream with two 1st order tributaries within the Project Area. Aquatic habitat along Tamarang Creek was moderately disturbed, with areas in the upstream third of the creek typically comprising less disturbed and more complex habitat than those areas downstream. Aquatic habitat features including gravel beds and aquatic macrophytes were common along the creek, whilst natural cascades facilitated flow along much of the creek. An existing working shed is present adjacent (to the east) to the middle section of the creek, where an informal vehicle access track also traverses the creek bed, which is more representative of a floodplain in this area. Downstream areas of Tamarang Creek showed a moderate amount of disturbance from shoreline grazing and erosion of creek banks.

Table 3-6: Riparian and aquatic habitat at Site 3

Site 3 – Tamarang Creek	
Location	Site 3 is located in the upstream 4th order section of Tamarang Creek, adjacent to the southern boundary of the Project Area.
Site Description	Site 3 is located on a relatively straight section of the upstream portion of Tamarang Creek, adjacent to the southern boundary fence of the Project Area and receives flow from upper tributaries located in the adjacent property to the south. Surrounding land use is rural and includes a mix of native and non-native grazing lands. A small hill mound runs along the eastern side of the site, comprised of bedrock and clay. Point disturbances are confined to shoreline grazing and a corrugated iron fence across the surface of the creek at the fence boundary to prevent stock movement between properties.
Stream Characteristics (Waterfront Land)	Defined bank: Yes Watercourse Type: Type 3c – Laterally Unconfined Continuous Meandering (laterally unconfined, low sinuosity or meandering river). Watercourse features present: Pools, erosion High bank: Type 3c
Aquatic Habitat	The creek at Site 3 typically ranges between 1-3 m in width and possess defined creek banks, with multiple natural cascades. The creek maintains flow connectivity, with a moderate water level (25-50%) observed and a low albeit consistent flow. Water was clear, with no surface films or odour, however, filamentous algae was observed across 10-35% of the creek. Bed substrata was dominated by clay (50%) and sand (20%), with some pebble, gravel and bedrock. Loose silt was observed across 65-90% of the creek bed, whilst coarse particulate matter/organic detritus (<10 cm) and larger snags (>10 cm diameter) were observed across 5-20% of the creek bed. A

	moderate amount of erosion was evident along clay creek banks, with some slumping observed, likely exacerbated by shoreline grazing. Macrophytes were confined to emergent rushes and *N. officinale*, which occurred along approximately 10% of the creek at Site 3. Important habitat features that were present at Site 3 included gravel beds, instream macrophytes, and snags.
Riparian Habitat	Riparian habitat at Site 3 was isolated/scattered in continuality, with a moderate amount of disturbance. Trees greater than 10 metres in height were limited to native species (*Eucalyptus* spp.), which contributed to ~5% coverage in the upper strata. Ground cover comprised 95% coverage across the site, dominated by grasses. Riparian vegetation provides minimal shading of the creek Trees at Site 3 included White Box (*Eucalyptus albens*) and were consistent with the White Box – Yellow Box – Blakely's Red Gum Grassy Woodland TEC, as also identified in the EPBC Act SIAR (ERM 2025).

Table 3-7: Riparian and aquatic habitat at Site 4

Site 4 – Tamarang Creek	
Location	Site 4 is located mid-way along the 4th order Tamarang Creek in the Project Area, adjacent to an existing shed and at the proposed new single lane bridge crossing.
Site Description	Site 4 on Tamarang Creek at comprises of a meandering creek, transitioning from an ephemeral drainage line in the upstream section of the site, to a defined creek with large, interconnected pools downstream of the shed. The upstream and downstream sections of the site can be defined by the location of an existing informal vehicle track that traverses the creek. Upstream of the crossing, the creek is more characteristic of an unconfined floodplain. Downstream of the crossing, the creek meanders to the east with only the outer bend bank evident and transitions to a creek with defined banks directly adjacent to a large tree (shown in Plate 5d), before flowing downstream to the north. A secondary drainage channel is present that runs in a straight line from the crossing and joins back with the main creek after the meander, comprising a small stagnant pool. Surrounding land use is rural and includes a mix of native and non-native grazing lands and a working shed, with point disturbances from shoreline grazing and an informal muddy causeway.
Stream Characteristics (Waterfront Land)	Defined bank: No (upstream), Yes (downstream) Watercourse Type: Type 4 – Laterally Unconfined Discontinuous (upstream) (laterally unconfined – discontinuous channel, chain of ponds). Type 3c – Laterally Unconfined Continuous Meandering (downstream) (laterally unconfined, low sinuosity or meandering river). Watercourse features present: Pools, erosion High bank: Type 4 (upstream), Type 3c (downstream)
Aquatic Habitat	Site 4 has two distinct creek habitat types. Upstream of the crossing, habitat included a thin drainage line (~1 m wide) and a larger stagnant pool (~5 m wide), with a high amount of disturbance from the existing road crossing. Based on the observed flow downstream, distribution of water and correlating vegetation, some alluvial groundwater may contribute to the creek in this location. Downstream of the crossing, the creek was typically 1-3 m in width, comprising of a series of a large, interconnected pools with natural cascades that facilitated a low flow. Banks were clearly defined along the downstream section of the creek with minimal erosion. The water level was moderate (25-50%), with turbid water and no odours, however, some surface films and algal blooms were present. Bed substrate was dominated by clay, with small deposits of cobble, pebble and gravel in downstream areas. Loose silt was present across 65-90% of the creek bed, whilst >20% was covered by coarse particulate matter/organic detritus (<10 cm). A couple of large snags, including a complete tree, lay within the creek. Some bank

	overhang was observed along the main bend, underneath another large tree which has exposed roots, whilst trailing vegetation was present across ~50% of the downstream creek. Emergent macrophytes occurred along 1-10% of the creek at Site 4, with the community only comprising very occasional emergent rushes. Important habitat features that were present at Site 4 were limited to downstream habitats and included snags, trailing vegetation and instream macrophytes.
Riparian Habitat	Riparian habitat at Site 4 was isolated/scattered with a moderate amount of disturbance. Trees greater than 10 metres in height were dominated by native species and resulted in ~10% coverage in the upper strata, whilst shrubs comprised ~5% cover and were dominated by weeds, while ground cover was dominated by pasture grasses and comprised of ~90% coverage across the site. Riparian vegetation provides very little shading of the creek.

Table 3-8: Riparian and aquatic habitat at Site 5

Site 5 – Tamarang Creek	
Location	Site 5 is located on the downstream 4th order section of Tamarang Creek, just upstream of the northern boundary of the Project Area.
Site Description	The site is located at the most downstream section of Tamarang Creek within the Project Area, downstream of Sites 3 and 4. Surrounding land use is rural and includes a mix of native and non-native grazing lands, with point disturbances including shoreline grazing, erosion, an informal vehicle track, and the boundary fence across the creek, while the end of an irrigation pipe lays along the creek.
Stream Characteristics (Waterfront Land)	Defined bank: Yes Watercourse Type: Type 3c – Laterally Unconfined Continuous Meandering (laterally unconfined, low sinuosity or meandering river). Watercourse features present: Pools, erosion High bank: Type 3c
Aquatic Habitat	Site 5 is located along a meandering section of Tamarang Creek comprising a series of large, relatively isolated pools with minimal connectivity and no obvious flow. Pools ranged between 1-3 m in width, with a moderate water level (25-50%), turbid water, surface films and algal blooms present. Channel banks were defined, typically comprised of clay and rock material with some erosion evident along the eastern bank and a small area of bedrock bank face in the upstream area of the site. Bed substrate was dominated by clay, with an even distribution of boulder, cobble, pebble and gravel habitats. A small section of the creek bed in the upstream section of the site comprised bed rock. Loose silt was present across 10-35% of the creek bed, whilst 5-20% was covered by coarse particulate matter/organic detritus (<10 cm). A large snag (entire tree) lay within the creek in the middle of the site. Emergent macrophytes that were limited to very occasional emergent rushes occurred along 1-10% of the creek at Site 5. Important habitat features that were present at included gravel beds, snags, trailing vegetation and instream macrophytes.
Riparian Habitat	Riparian habitat at Site 5 was isolated/scattered with a high amount of disturbance. Trees greater than 10 metres in height were dominated by native species and comprised ~15% coverage in the upper strata, whilst ground cover that was dominated by pasture grasses and weeds comprised of ~80% coverage across the site. Riparian vegetation provides very little shading of the creek.



Plate 4: Site 3 (a) upstream with large snags and (b) downstream with areas of gravel



Plate 5: Site 4 (a) creek facing upstream floodplain (b) existing vehicle crossing facing upstream (c) downstream narrow creek large snag and (d) downstream section of creek, facing east towards bend.

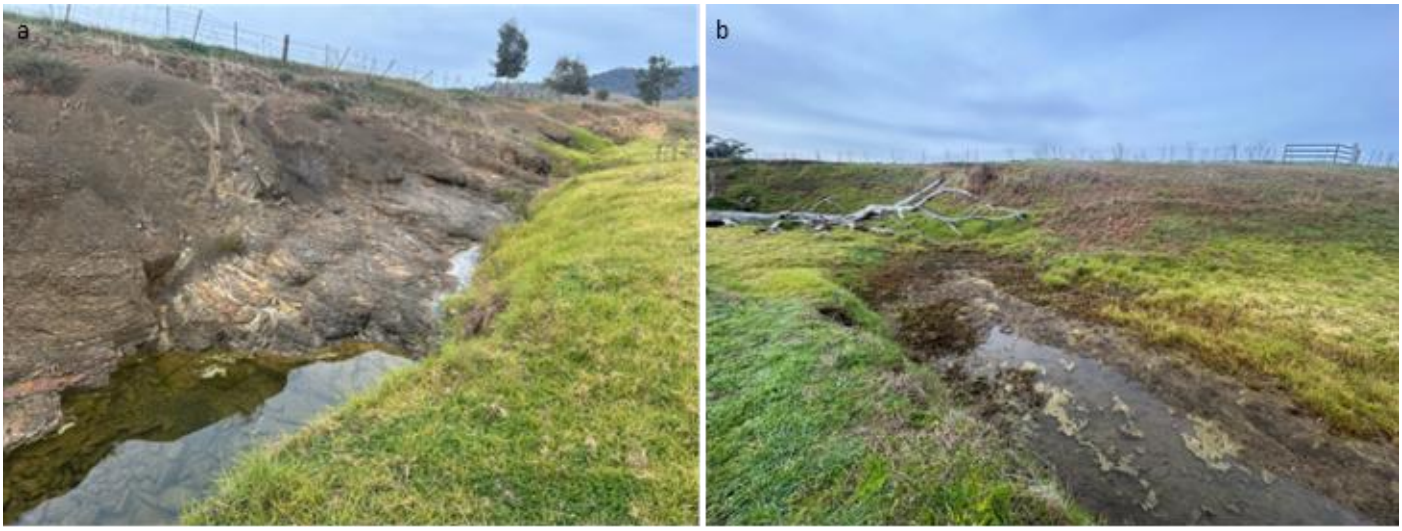


Plate 6: Site 5 (a) upstream with steep banks and exposed bedrock and (b) downstream with limited connectivity and snag.

3.2.2.3 Eastern 4th order tributary (Sugarloaf Creek)

The eastern 4th order tributary is located in the middle of the Project Area, flowing south to north. Two 3rd order tributaries confluence in the upstream section of the creek at an existing agricultural dam, where the tributary transitions to a 4th order stream. It is a tributary of Sugarloaf Creek, however, does not join Sugarloaf Creek until 2.3 km downstream of the Project Area. The tributary was completely dry during surveys, with no defined creek banks or bed evident downstream of the existing dam. This tributary is likely an ephemeral drainage line that may receive a small amount of flow following rain events and does not provide semi-permanent or permanent habitat for aquatic fauna.

Table 3-9: Riparian and aquatic habitat at Site 6

Site 6 - Eastern 4th order tributary	
Location	Site 6 is located in the upstream section of the eastern 4th order tributary, at the confluence of two 3rd order streams, along the southern boundary of the Project Area.
Site Description	Site 6 includes the confluence of two defined, meandering 3rd order channels and a small dam, from which the tributary runs northward. The site was dry at the time of survey, with no water in the 3rd order channels and only mud in the dam. Downstream of the dam, the 4th order section of the tributary did not possess a defined channel or banks, with the only indicator of a drainage line being changes in vegetation, thus is likely limited to an ephemeral drainage line. Surrounding land use is rural and includes non-native pasture, with point disturbances including shoreline grazing.
Stream Characteristics (Waterfront Land)	Defined bank: Yes (upstream in 3rd order tributaries), No (downstream) Watercourse Type: Type 3c – Laterally Unconfined Continuous Meandering (upstream) (laterally unconfined, low sinuosity or meandering river), Floodplain/wetland (downstream) (Change in vegetation). Watercourse features present: Erosion High bank: Type 3c (upstream), Type 7 (downstream)
Aquatic Habitat	Aquatic habitat was not present at Site 6 during surveys; the 3rd order tributaries were both dry and completely overgrown with terrestrial vegetation, whilst the dam did not contain any water. Review of aerial imagery shows that the dam is periodically filled after rain events, however, the 3rd order tributaries do not typically hold pooling or flowing water, nor does the 4th order section of the tributary downstream. Channel banks along the 3rd order tributaries and dam were well defined and up to 4 metres high in some places, with erosion evident. The edges of the channels and dam are used for grazing by cattle. Creek bed substrate was dominated by clay and muds. Downstream of the dam, the tributary runs along the western side of a small hill crest. While no pooling or flow is present, vegetation indicates that an ephemeral drainage ~25 m wide line is present, with some potential for alluvial contribution, that runs northward through the Project Area. No important aquatic habitat features or macrophytes were observed.
Riparian Habitat	Riparian trees at Site 6 were typically absent, with the exception of one established *Eucalypt* (possibly *E. melliodora*). Ground cover typically included tussock grasses, weeds and palisade grass. Riparian vegetation does not provide any shading of the creek.

Table 3-10: Riparian and aquatic habitat at Site 7

Site 7 - Eastern 4th order tributary	
Location	Site 7 is located mid-way along the eastern 4th order tributary (of Sugarloaf Creek) in the middle of the Project Area.
Site Description	Site 7 is located in the middle of a grazing paddock along a 4th order tributary. No creek banks or channel are present in this section of the tributary, with channel alignment evident only from changes in vegetation and a very slight dip in topography. The tributary running south to north

	across the Project Area comprises of an ephemeral drainage line. A small mound is present at Site 7 that runs east to west and supports an informal vehicle track. Similar changes in vegetation indicate that part of the alluvial system may also occur along the southern side of this mound. Surrounding land use is rural and includes non-native pasture, with point disturbances including shoreline grazing and vehicle tracks.
Stream Characteristics (Waterfront Land)	Defined bank: No Watercourse Type: Floodplain/wetland (Change in vegetation) Watercourse features present: None High bank: Type 7
Aquatic Habitat	Aquatic habitat was not present at Site 7 during surveys; the tributary was dry and completely overgrown with terrestrial vegetation. No channels or pools were evident during surveys, with the tributary alignment identified through changes in the ground cover type, indicating an ephemeral drainage ~30 m wide line is present, with some potential for an alluvial contribution. Substrata along the tributary comprised of clay and muds, which were soft under foot compared to the adjacent paddock. No important aquatic habitat features or macrophytes were observed.
Riparian Habitat	Riparian trees at Site 7 were typically absent, with the exception of one established *Eucalypt.* Ground cover typically included tussock grasses, weeds and palisade grass. Riparian vegetation does not provide any shading of the creek.

Table 3-11: Riparian and aquatic habitat at Site 8

Site 8 - Eastern 4th order tributary	
Location	Site 8 is located along the most downstream section of the eastern 4th order tributary at the northern boundary of the Project Area.
Site Description	Site 8 is located at the edge of a grazing paddock along a 4th order tributary. No creek banks or channels are present in this section of the tributary, with channel alignment evident from only changes in vegetation. The tributary running south to north across the Project Area comprises an ephemeral drainage line. Surrounding land use is rural and includes native and non-native pasture, with point disturbances including shoreline grazing.
Stream Characteristics (Waterfront Land)	Defined bank: No Watercourse Type: Floodplain/wetland (Change in vegetation) Watercourse features present: None High bank: Type 7
Aquatic Habitat	Aquatic habitat was not present at Site 8 during surveys; the tributary was dry and completely overgrown with terrestrial vegetation. No channels or pools were evident during surveys, with the tributary alignment identified through changes in the ground cover, indicating an ephemeral drainage line ~30 m wide is present, with some potential for alluvial contribution. Substrata along the tributary comprised of clay and muds, which were soft under foot compared to the adjacent paddock. Some macrophyte species were observed along the tributary, including occasional stands of *Juncus* (likely *J. radula*). No important aquatic habitat features were observed.
Riparian Habitat	Riparian trees at Site 8 were typically absent. Ground cover typically included tussock grasses and weeds, with occasional *Juncus* stands. Riparian vegetation does not provide any shading of the creek. Downstream of the site on the northern side of the boundary fence, a distinct change in habitat was evident and characteristic of a marsh/wetland area. Ground cover included a moderate to high coverage of *Juncus* rushes, whilst large established *Eucalypts* were evenly spaced throughout the riparian zone to the north.

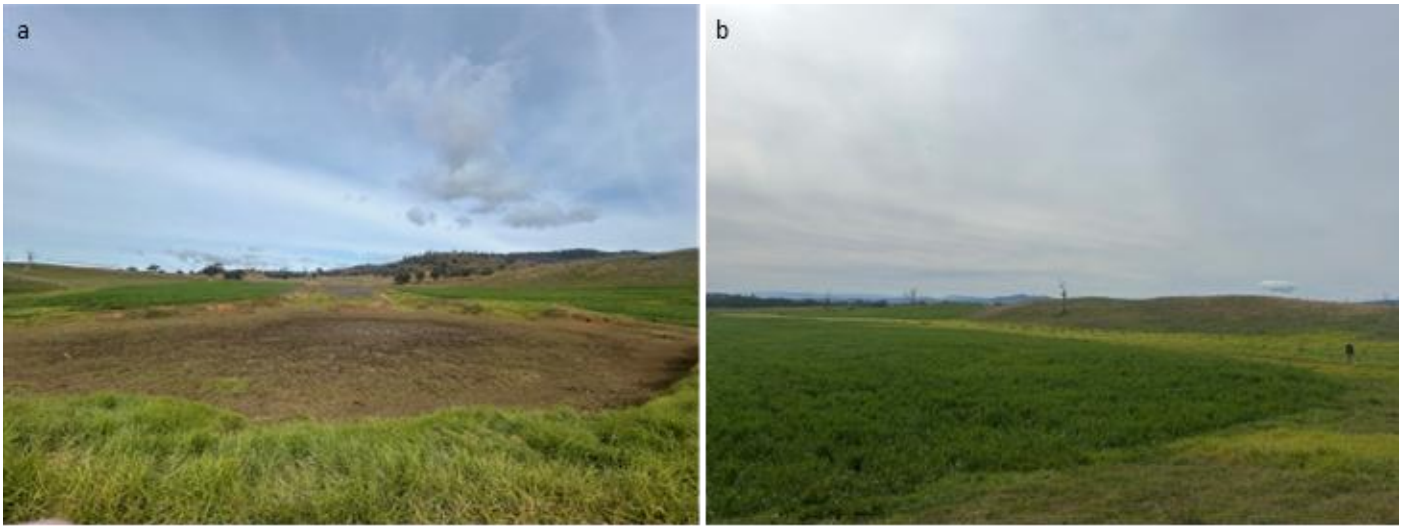


Plate 7: Site 6 (a) upstream at northern end of dam and (b) downstream ephemeral drainage



Plate 8: Site 7 (a) upstream and (b) downstream ephemeral drainage



Plate 9: Site 8 (a) upstream and (b) downstream ephemeral drainage

3.2.2.4 Eastern 2nd order tributary (Sugarloaf Creek)

The eastern 2nd order tributary is located in the east of the Project Area, flowing south to north. An existing agricultural dam is present along the upstream section of the tributary, whilst multiple unmapped ephemeral drainage lines drain to the tributary from the east. It is a tributary of Sugarloaf Creek and joins the eastern 4th order drainage line approximately 230 m downstream of the Project Area. The tributary was mostly dry during surveys with the exception of the dam and some small ephemeral pools along the northern Project Area boundary, with no defined creek banks or bed evident. This tributary is likely an ephemeral drainage line that may receive a small amount of flow following rain events and does not provide semi-permanent or permanent habitat for aquatic fauna.

Table 3-12: Riparian and aquatic habitat at Site 12

Site 12 - Eastern 2nd order tributary	
Location	Site 12 is located in the southeast of the Project Area, along the upstream section of the eastern 2nd order tributary.
Site Description	Site 12 is located in the middle of grazing paddock. An agricultural dam is present in the upstream section of the site, which held water at the time of survey. Channel alignment downstream of the dam is evident only from changes in vegetation and a slight dip in topography that likely only received flow during over topping. The tributary running south to north across the Project Area comprises of an ephemeral drainage line. Surrounding land use is rural and includes native and non-native pasture, with point disturbances including shoreline grazing.
Stream Characteristics (Waterfront Land)	Defined bank: No Watercourse Type: Floodplain/wetland (Change in vegetation) Watercourse features present: None High bank: Type 7
Aquatic Habitat	Aquatic habitat was only present within the agricultural dam at Site 1. No channels or pools were evident downstream of the dam during the survey, with the tributary alignment identified through changes in the ground cover type, indicating an ephemeral drainage line is present spanning up to 45 m wide. The dam at Site 12 is approximately 240 m^2 in area, with water level high observed near the top of bank at time of survey. Water was turbid with no flow; however, no surface films, odour or algal blooms were evident. Banks of the dam consisted of clay and while they were highly disturbed by stock use, were relatively stable. The low point of the bank indicates that under high rainfall when the dam is full, overflow may run from the west of the dam and then towards the north. The downstream tributary is completely covered by vegetation, with bed substrata comprised of clay. Emergent macrophytes occurred along 1-10% of the dam bank in occasional clumps at Site 12, with the community only comprising of very occasional emergent rushes. Important habitat features that were present were limited to instream macrophytes. A number of unmapped drainage gullies occur to the east of Site 12, running east to west towards the 2nd order tributary. These drainages supported very shallow, muddy pools and were lined with a moderate coverage of *Juncus* rushes.
Riparian Habitat	Riparian trees at Site 12 were absent and the riparian zone was highly disturbed. Ground cover typically included tussock grasses and weeds, with occasional *Juncus* stands. Riparian vegetation does not provide any shading of the creek.

Table 3-13: Riparian and aquatic habitat at Site 9

Site 9 - Eastern 2nd order tributary	
Location	Site 9 is located along the downstream section of the eastern 2nd order tributary, approximately 260 m upstream of the northern boundary of the Project Area.

Site Description	The site is located in the middle of a grazing paddock. Isolated, relatively dry pools are present along the tributary; however, it is expected that this tributary is an ephemeral drainage line. Surrounding land use is rural and includes native and non-native pasture, with point disturbances including shoreline grazing.
Stream Characteristics (Waterfront Land)	Defined bank: No Watercourse Type: Floodplain/wetland (Change in vegetation) Watercourse features present: None High bank: Type 7
Aquatic Habitat	Aquatic habitat was not present at Site 9 at the time of survey. An isolated muddy pool was present at the site, however, did not hold water. This section of the tributary does not possess defined banks and did not maintain connectivity or flow, with channel alignment only evident from changes in vegetation. The creek bed substrata along the tributary comprised of clay and muds, which were soft under foot compared to the adjacent paddock. Emergent macrophytes that were limited to very occasional rushes occurred within 1-10% of Site 9. Important habitat features that were present at were limited to instream macrophytes.
Riparian Habitat	Riparian trees at Site 12 were absent and riparian zone was highly disturbed. Ground cover typically included tussock grasses and weeds, with occasional *Juncus* stands. Riparian vegetation does not provide any shading of the creek.

Table 3-14: Riparian and aquatic habitat at Site 10

Site 10 - Eastern 2nd order tributary	
Location	Site 10 is located along the most downstream section of the eastern 2nd order tributary, along the northern boundary of the Project Area.
Site Description	The site is located along the edge of a grazing paddock. Five isolated pools are present along the tributary, and it is likely that this tributary is limited to an ephemeral drainage line. Surrounding land use is rural and includes native and non-native pasture, with point disturbances including shoreline grazing.
Stream Characteristics (Waterfront Land)	Defined bank: No Watercourse Type: Type 4 – Laterally Unconfined Discontinuous (laterally unconfined – discontinuous channel, chain of ponds) Watercourse features present: Pools High bank: Type 4 (upstream)
Aquatic Habitat	Aquatic habitat at Site 10 comprised five isolated, very shallow, muddy pools. Pools did not maintain connectivity or flow and were up to 2 m in width, with water level less than a quarter and turbid water. No surface films, odours or algal blooms were evident; however, the pools were highly disturbed from grazing. This section of the tributary does not possess defined banks, with channel alignment evident only from changes in vegetation and the alignment of pools. Creek bed substrata along the tributary comprised of clay and muds, which were soft under foot. Coarse particulate matter/organic detritus (<10 cm) covered 5-20% of pool beds. Emergent macrophytes were limited to very occasional emergent rushes occurred within 1-10% of the pools at Site 10. Important habitat features that were present at were limited to instream macrophytes.
Riparian Habitat	Riparian trees at Site 10 were absent and the riparian zone was highly disturbed. Ground cover typically included tussock grasses and weeds, with occasional *Juncus* stands. Riparian vegetation does not provide any shading of the creek. Similarly to Site 8, habitat downstream of Site 10 transitioned to a marshy area with a moderate to high coverage of rushes (likely *J. radula* and *J. aridicola*).



Plate 10: Site 12 (a) upstream drainage at dam (b) downstream ephemeral drainage (c) and (d) unmapped drainage gullies facing west towards 2nd order tributary



Plate 11: Site 9 (a) upstream and (b) downstream ephemeral drainage



Plate 12: Site 10 (a) upstream and (b) downstream with small, isolated pools

Riparian vegetation identified across the Study Area are listed below in Table 3-15.

Table 3-15: Riparian species observed across the Study Area

Scientific Name	Common Name
Trees	
Eucalyptus albens	White Box
E. blakelyi	Blakely's Redgum
E. camaldulensis	River Red Gum
E. melliodora	Yellow Box
Groundcover and herbs	
Carex inversa	Common Sedge
Erodium crinitum	Carolin
Juncus effusus	Soft Rush
Lomandra filiformis	Wattle Mat-rush
Lomandra multiflora	Many-flowered Mat-rush
Oxalis perennans	Native Oxalis
Plantago debilis	Shade Plantain
Rumex brownii	Browne's dock/swamp dock
Exotic groundcover/pasture/weeds	
Brachiaria brizantha	Palisade grass
Cotula australis	Bachelor's Buttons/Annual Buttonweed
Cynodon dactylon	Scutch Grass
Dittrichia graveolens	Stinkwort
Onopordum acanthium	Scotch Thistle
Opuntia sp.	Prickly Pear
Rosa rubiginosa	Sweet Briar Rose
Schinus molle	California Peppertree
Silybum marianum	Variegated Thistle
Urtica spp	Stinging Nettle

3.2.3 Key Fish Habitat

The KFH Type and waterway classification for all waterways in the Study Area are presented in Table 3-16 and Figure 4, based on KFH and waterway class classification schemes in the Policy for fish habitat conservation and management (Fairfull 2013).

Table 3-16: Classification of KFH and waterway class for waterways in the Study Area, including reasoning based on the Policy (Fairfull 2013).

Waterway	Stream Order	Key Fish Habitat Type and Waterway Class	Reasoning
Sugarloaf Creek	1st order drainages (along main creek)	Non-KFH Class 4 – Unlikely KFH	Type: • 1st order stream on gaining streams Class: • Little or no defined drainage channel, no flow or free standing water (dry gullies and shallow floodplain depressions).
	2nd order drainages (along main creek)	Non-KFH Class 3 – Minimal KFH	Type: • 2nd order stream on gaining streams Class: • Intermittent flow with semi-permanent pools after a rain event.
	3rd order sections (southwest corner of Study Area)	Type 1 KFH Class 2 – Moderate KFH	Type: • Instream Gravel beds >500mm • Native aquatic plants • Protected species habitat (*Mogurnda adspersa*) • Snags >300mm D or 3m L Class: • Intermittent creek (named) with clearly defined bed and banks with semi-permanent to permanent waters in pools. Freshwater aquatic vegetation present. Type 1 habitat present.
	4th order section (along western boundary)	Type 1 KFH Class 2 – Moderate KFH	
Tamarang Creek	1st order drainages (along main creek)	Non-KFH Class 4 – Unlikely KFH	Type: • 1st order stream on gaining streams Class: • Little or no defined drainage channel, no flow or free standing water (dry gullies and shallow floodplain depressions).
	4th order section (main creek)	Type 1 KFH (dominant) Class 2 – Moderate KFH *and* Type 3 KFH Class 3 – Minimal KFH	Type: • Instream Gravel beds >500mm • Native aquatic plants • Snags >300mm D or 3m L Class: • Intermittent creek (named) with clearly defined bed and banks with semi-permanent to permanent waters in pools. Freshwater aquatic vegetation present. Type 1 habitat present. Type: • Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation.

			Class: • Minor waterway that interconnects with other CLASS 1-3 fish habitats.
Eastern 4th order tributary (Sugarloaf Creek)	3rd order sections (southern boundary of Study Area)	Type 3 KFH Class 3 – Minimal KFH	Type: • Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation. Class: • Intermittent flow with semi-permanent pools after a rain event (dry at time of survey, but defined banks).
	Farm dam on 3rd order section (southern boundary of Study Area)	Type 3 KFH Class 3 – Minimal KFH	Type: • Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation. Class: • Intermittent flow with semi-permanent pools after a rain event (dry at time of survey).
	4th order section (main creek)	Type 3 KFH Class 4 – Unlikely KFH	Type: • Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation. Class: • Little or no defined drainage channel, no flow or free standing water (dry gullies and shallow floodplain depressions).
Eastern 2nd order tributary (Sugarloaf Creek)	1st order sections (along main creek)	Non-KFH Class 4 – Unlikely KFH	Type: • 1st order stream on gaining streams Class: • Little or no defined drainage channel, no flow or free standing water (dry gullies and shallow floodplain depressions).
	Farm dam on 2nd order section	Non-KFH Class 3 – Minimal KFH	Type: • Farm dam on first and second order streams Class: • Sporadic refuge, breeding or feeding areas for aquatic fauna, semi-permanent pool
	2nd order section (main creek)	Non-KFH Class 4 – Unlikely KFH	Type: • 2nd order stream on gaining streams • Mapped as indicative distribution for *Mogurnda adspersa*, however, no habitat present for this species. Class: • Little or no defined drainage channel, no flow, little free standing water (dry gullies and shallow floodplain depressions).

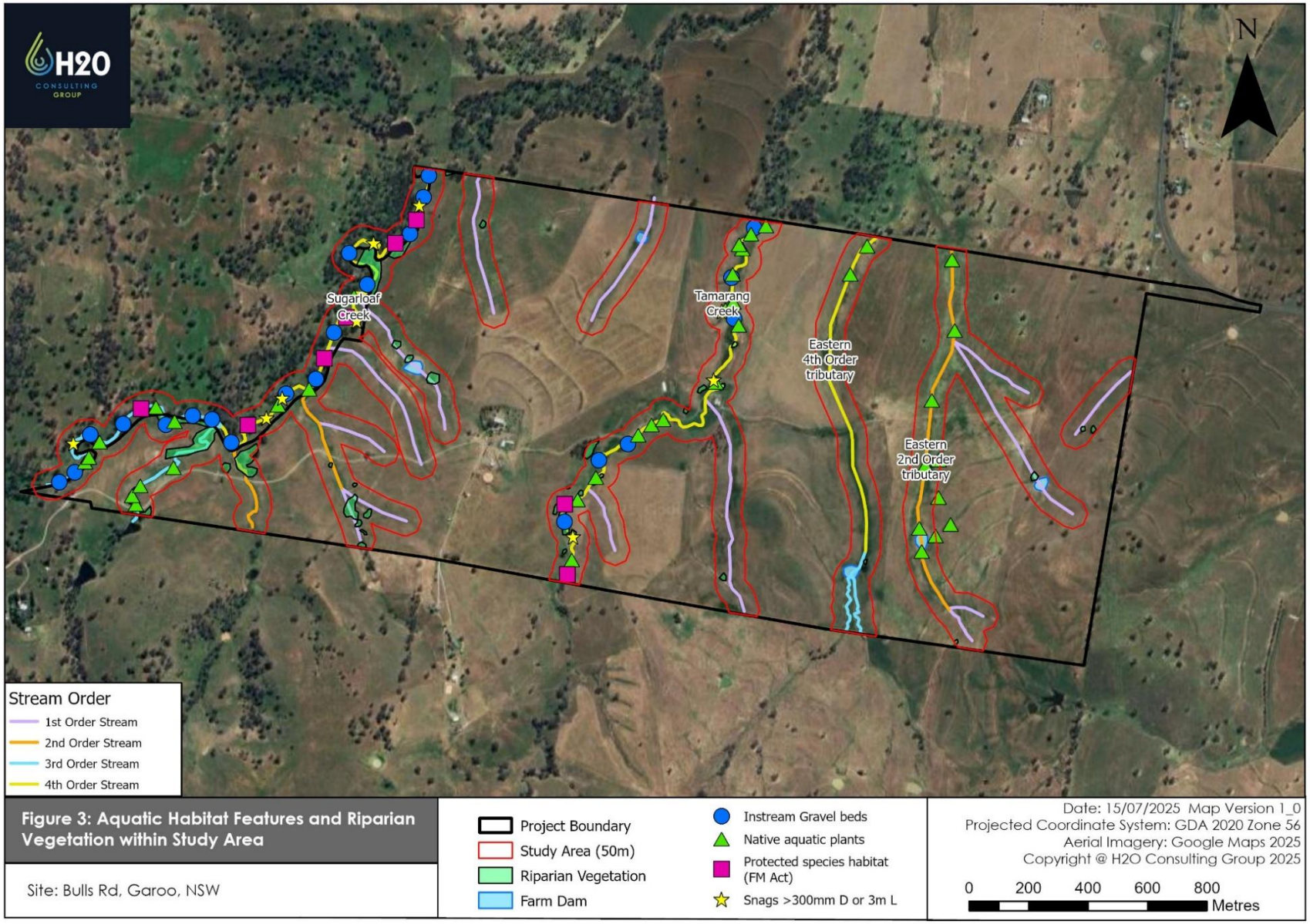


Figure 3: Aquatic Habitat Features and Riparian Vegetation within Study Area

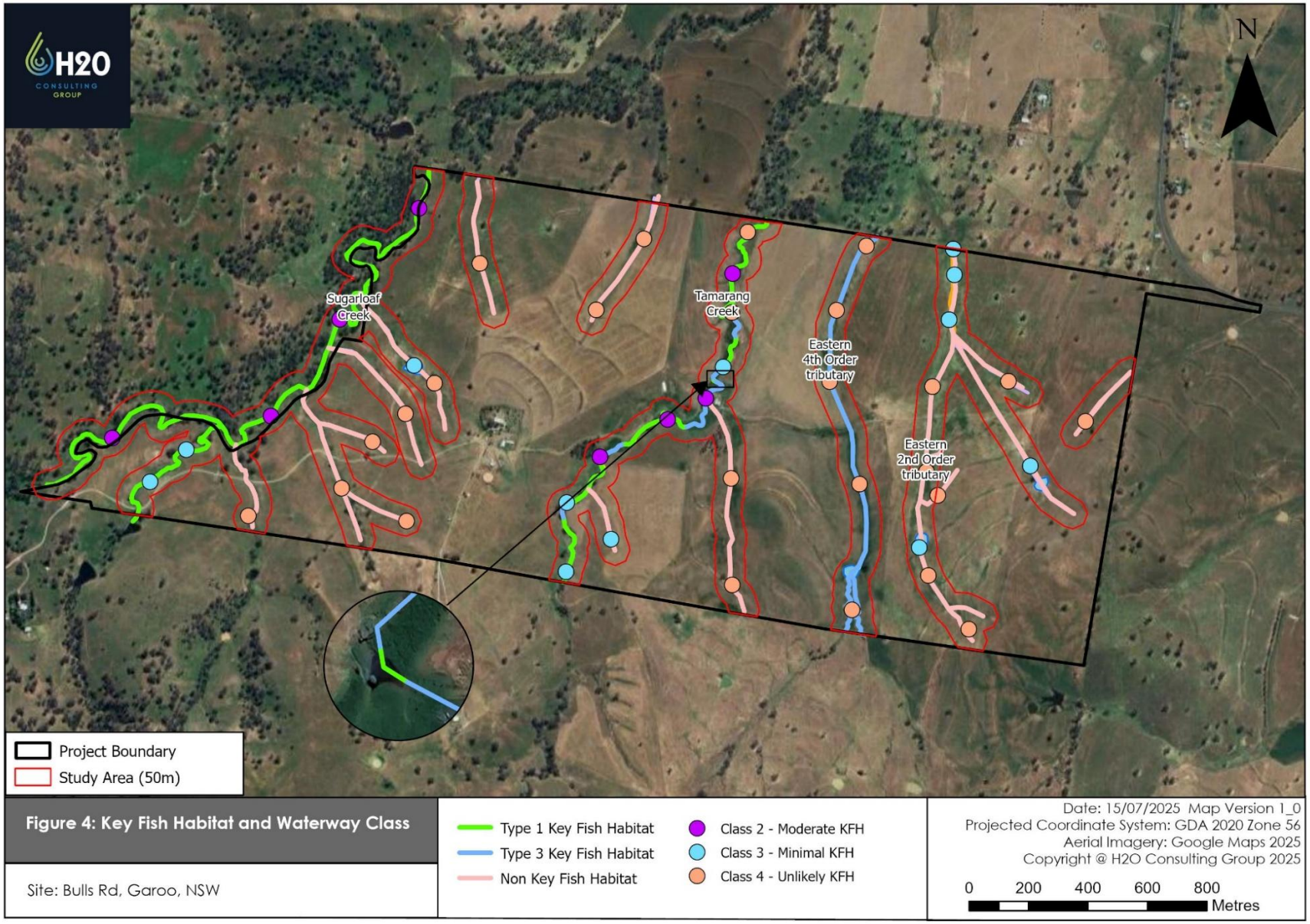


Figure 4: Key Fish Habitat and Waterway Class in the Study Area

3.2.4 Aquatic Flora

Instream aquatic flora across the Study Area was typically confined to emergent rush species, with occasional stands of other emergent or floating macrophyte species. Rushes occurred along creek banks, within the creeks and along the ephemeral drainage lines. Stands of aquatic macrophytes were typically isolated and provided minimal habitat value in Tamarang Creek and along the eastern 4th and 2nd order tributaries. Stands of macrophytes along sections of Sugarloaf Creek were typically in higher densities compared to the other waterways in the Project Area and provided both instream habitat and trailing vegetation. Species identified to occur in the Study Area included:

- Water Plantain (likely *Alisma* spp.),
- Pale Spikerush (*Eleocharis pallens*),
- Tussock Rush (*Juncus aridicola*),
- Hoary Rush (*J. radula*),
- Many-flowered Mat-rush (*Lomandra multiflora*),
- Watercress (*Nasturtium officinale*),
- River Buttercup (*Ranunculus inundatus*); and
- Browne's dock/swamp dock (*Rumex brownii*).

3.2.5 Aquatic Fauna

3.2.5.1 Native Fauna

A Blue Yabby (*C. destructor*) was observed at Site 11 in Sugarloaf Creek during the survey; however, no other opportunistic sightings of freshwater aquatic fauna were recorded. Various duck species were observed along creek banks at Sugarloaf and Tamarang Creeks. Sugarloaf and Tamarang Creeks, which both maintain connectivity along a majority of the creek, and agricultural farm dams within the Project Area likely provide some semi-permanent or permanent freshwater habitat for native freshwater fauna, including fish, eels, crustaceans and freshwater turtles, as well as various macroinvertebrates.

Freshwater turtles and eels may utilise semi-permanent/permanent habitat provided by agricultural dams in the Project Area, whilst Sugarloaf and Tamarang Creeks may provide habitat for the species to migrate upstream into headwaters and dams. While not threatened, eight records of the Eastern long-necked turtle (*Chelodina longicollis*) and one record of the Macquarie River Turtle (*Emydura macquarii*) were identified to occur within 10 km of the Study Area during Bionet searches and have potential to occur in the Project Area at times. *Chelodina longicollis* is widespread throughout NSW and is strongly associated with temporary water bodies and habitat separate from main river channels, whilst *E. macquarii* occurs in all but the coldest parts of the Murray-Darling system and in coastal NSW rivers and is known to occupy a range of habitats, with a preference for deeper water (>2 m) (NSW DPE 2022). Records of the Bell's turtle/Western saw-shelled turtle (*Myuchelys belli*) (endangered under the BC Act and vulnerable under the EPBC Act) exist in the region along the MacDonald River (ALA 2025), however, the MacDonald River does not join the Peel River (of which the creeks in the Study Area flow to) until downstream of Keepit Dam over 45 km west of Tamworth, with minimal connectivity to the Study Area. Freshwater eels that may utilise habitats in the Project Area include the Long-finned eel (*Anguilla reinhardtii*) and Short-finned eel (*A. australis*).

The protected platypus (*Ornithorhynchus anatinus*) is known to occur within the wider catchment, with numerous records along the Peel River (ALA 2025). Some habitat features that have been found to be positively correlated with platypus abundance or activity that were present along Sugarloaf and Tamarang Creeks included indigenous trees growing on banks that were partly undercut, shaded sections of the channel, coarse inorganic bottom materials (gravel, pebbles, cobbles, large rocks) and sizable pools (APC 2025). However, these creeks had large areas of bank erosion and unconsolidated sediments, whilst uncontrolled shoreline grazing and cattle movements also evidently cause a moderate to high amount of disturbance along the creeks. Use of habitat by the species is possible, but with a low likelihood.

3.2.5.2 Threatened Species and Ecological Communities

No threatened fauna species listed under the EPBC Act, BC Act or FM Act were opportunistically observed during surveys.

The Southern Purple Spotted Gudgeon (*M. adspersa*), listed as Endangered under the FM Act, has indicative distribution mapped to occur within the Study Area by NSW DPIRD Fisheries (2025a), in Sugarloaf Creek and the eastern 2nd order tributary. The species is found in a variety of aquatic habitats, including rivers, creeks and billabongs that possess slow-moving or still waters, or in streams with low turbidity. Habitat features that provide cover such as aquatic vegetation, overhanging vegetation, leaf detritus, rocks and snags are important for the species.

No targeted surveys for the species was undertaken, however, habitat for this species is present within Sugarloaf Creek along the western boundary of the Project Area. Potential habitat comprised of a slow-flowing stream with low turbidity, with rock beds, gravel, snags and overhanging vegetation, and occasional instream aquatic vegetation. Some features were also present within upstream sections of Tamarang Creek; however, the creek has broken connectivity through the Project Area, with areas of turbid and highly disturbed habitat and was not considered to provide suitable for the species. The eastern 2nd order tributary does not provide potential semi-permanent or permanent habitat for the species. Whilst no records of the species occur within 10 km of the Study Area, the species has potential to occur within this habitat and potential impacts have been considered in Section 4, including an Assessment of Significance (Appendix 4).

4 Impact Assessment

4.1 Potential Impacts to the Aquatic Environment

The Guidelines for Aquatic Ecology in Environmental Impact Assessment identifies that environmental disturbances to aquatic ecology can be categorised in terms of potential physical, chemical and biological effects, which allows for the nature of impacts and their likely magnitude to be assessed (Lincoln Smith 2003). Environmental impacts may also be attributed to a threatening process, referred to as Key Threatening Processes (KTP) identified in Section 3.1.3.

Solar farms have potential to alter environmental microclimates and can influence factors such as water distribution and runoff, vegetation growth and microorganisms. Surface temperatures, relative humidity, wind speed and direction, soil moisture and vegetation communities can also be influenced by the height and angle of PV panels (Anderson et al., 2025). Such changes and their impact on the surrounding environment have potential to indirectly impact on adjacent aquatic ecosystems.

A summary of impacts to the aquatic environment from the proposal is presented in Table 4-1 and discussed below.

Table 4-1: Identification of potential aquatic impacts from the proposal.

Impact	Likelihood	Description
Physical		
Removal or modification of KFH	Known	Type 1 KFH in Sugarloaf Creek and Tamarang Creek is avoided by the proposal. A small amount of disturbance may occur to a section of Type 3 KFH in Tamarang Creek to facilitate the construction of the single lane bridge. The bridge will be supported by four sets of double piers (2 m diameter). Indicative location of piers is available at this stage of assessment and there is potential that one set of piers may be within or in close proximity to Tamarang Creek habitat. Where this set of piers are within creek or bank habitat, direct impacts to ~25 m^2 of Type 3 KFH may occur, which is discussed below. Direct disturbance is expected to occur to 180 m^2 of Type 3 KFH in the eastern 4th order tributary associated with an internal road crossing. Direct impacts to all other KFH in the Project Area have been avoided, with at least a 40 m buffer to most KFH habitats.
Removal or modification of other aquatic habitat	Known	Some direct disturbance to the eastern 2nd order tributary will occur to install PV panel modules and construct a road crossing. This tributary was predominantly dry and expected to provide only very ephemeral habitat after heavy rainfall, with impacts to aquatic habitat expected to be minimal. Some modification of 1st and 2nd order streams across the Project Area may also occur during construction where they are within the project footprint, particularly if these habitats are impacted by trenching to install underground cables. The temporary workforce accommodation camp footprint includes a small section of the upper reach of two 1st order drainage lines, which may be disturbed. All agricultural dams within the Project Area have been avoided by the proposal and will be retained. Any ongoing disturbances to riparian and groundcover vegetation, erosion patterns, and drainage patterns has potential to impact on adjacent aquatic habitats during operation.
Disturbance to KFH and aquatic habitat	Possible	Indirect impacts during construction, operation and decommissioning may occur to KFH and other aquatic habitats in the Project Area. This may include minor changes in hydrology and sediments patterns that could result in temporary reductions in water quality from increased sedimentation and turbidity, particularly from the mobilisation of sediment-laden waters.
Loss or disturbance of threatened aquatic fauna species	Unlikely	Marginal potential habitat for the Southern Purple Spotted Gudgeon was identified in Sugarloaf Creek. Sugarloaf Creek is outside of the Project Area and no direct impacts to this creek are expected. Any potential impacts to the species are expected to be limited to temporary disturbances to water and habitat quality if sediment-laden waters are mobilised.
Loss or disturbance of other aquatic fauna species	Known	Some disturbances may occur to fauna inhabiting ephemeral pools in 1st and 2nd order streams across the Project Area that are within the project footprint during construction, particularly if these habitats are impacted by trenching to install underground cables. Mobilisation of sediment-laden waters during any phase of the project has potential to smother downstream habitats by increasing loose silt on the creek bed, reduce water and habitat quality and reduce foraging and refuge habitat. Some smaller fauna may also be smothered by mobilised sediments. Increased vehicle presence within the Project Area has potential to increase potential vehicle strikes to aquatic fauna such as eels and turtles that may traverse short distances over land.
Loss or disturbance of aquatic flora	Possible	Aquatic macrophytes are typically limited to Sugarloaf and Tamarang Creeks and along dam banks, with very occasional clumps along ephemeral drainage lines in the Study Area. As Sugarloaf and

		Tamarang Creeks and existing dams are predominately avoided by design, impacts to macrophytes in these locations are unlikely. Some disturbance may occur to the sporadic occurrences of macrophytes along ephemeral drainage lines that lie within the project footprint from construction of PV panel modules, roads, cables and ancillary infrastructure, or where construction vehicles or placement of materials disturb them.
Temporary or permanent obstruction or barriers to fish passage	Possible	Existing barriers to fish passage in the Study Area include formal road crossings and culverts, informal vehicle causeways, agricultural dams, dry tributaries and natural cascades along Sugarloaf and Tamarang Creeks. The proposal includes for numerous waterway crossings, including a single lane bridge across Tamarang Creek and internal roads crossing 11 mapped 1st and 2nd order tributaries. These crossings will need to consider guidelines detailed in policy documents to avoid and minimise impacts, discussed in Section 4.8.3. The single lane bridge is not expected to result in a permanent barrier to fish passage where piers do not encroach into creek habitat. Some temporary barriers may also be required if any 1st or 2nd order drainage lines require bunding to facilitate trenching for underground cables. Considering the existing barriers to fish passage that exist at the site, an ecologically significant increase in barriers to fish passage from the proposal is not expected.
Removal, disturbance or degradation of riparian habitat	Possible	Riparian vegetation in the Study Area was typically confined to Sugarloaf Creek and upstream areas of Tamarang Creek. Riparian vegetation has been avoided by the Project Area design for the most part, with design buffers around Sugarloaf and Tamarang Creeks, the eastern 4th order tributary and some smaller tributaries. A few trees may require removal within the footprint of the single lane bridge across Tamarang Creek. Impacts to riparian vegetation during the operational phase of the project is considered to be low, given the Project Area buffers allow for avoidance of disturbance to a majority of riparian vegetation. The main potential impact to riparian vegetation during impact may result from changes in vegetation cover and associated runoff and sediment movements from adjacent habitats.
Introduction of or increase in uncontrolled stock grazing along the riverbank	Unlikely	The proposal may reduce or remove shoreline grazing where livestock are removed from the Project Area. This may improve aquatic and riparian habitat quality. Where solar grazing is implemented, restriction of livestock to within fenced areas is also expected to reduce existing disturbance to aquatic and riparian habitats.
Increased potential for debris to enter waterways	Likely	The proposal will result in various potential sources for debris to enter the waterway at all stages of development and as a result of the development. This may include construction materials and debris during development works and increased litter as a result of land development and by workers inhabiting the temporary workforce accommodation camp. Increased pathways of entry to the waterway may also be facilitated through required stormwater drainage channels.
Increased potential for wastewater to enter waterways	Unlikely	Wastewater produced by the temporary workforce accommodation camp will be managed and a wastewater management plan will be developed. Compost toilets will be installed to treat blackwater and the onsite wastewater treatment plant will treat grey water. All wastewater will be disposed of offsite to a suitably licenced waste management provider (ERM 2025) and is not expected to enter any waterways onsite.
Changes in hydrology and sediment patterns	Possible	The presence of PV panels has potential to influence surface runoff and water infiltration patterns, whilst activities or infrastructure that disturbs or impacts sediments have potential to exacerbate erosive processes and mobilise sediments. As vegetation is not expected to be cleared underneath panels, these impacts are expected to be lesser.
Chemical		
Changes in water quality within the waterway	Likely	Water quality within the receiving waters in the Project Area is likely to experience additional pressures during construction. Earthworks including trenching and backfilling have potential to mobilise sediments in the Project Area, with some potential for these sediments to enter adjacent aquatic habitats and result in temporary reductions in water quality. This may alter physio-chemical attributes such as dissolved oxygen, pH, electrical conductivity and turbidity.
Mobilisation of contaminants into the waterway	Possible	The construction of the project is not expected to result in the mobilisation of contaminants; however, risk remains for inadvertent chemical spills such as fuel from machinery. Such spills can pollute adjacent waterways and reduce habitat quality, whilst some materials may be harmful and toxic to aquatic fauna. Appropriate management plans can minimise this risk. As the project reaches the end-of-life stage or during decommissioning, hazardous chemicals have potential to leach from old or damaged panels, or as materials are recycled and disposed of. Appropriate maintenance of panels and management of waste through the life of the project will be required to mitigate this risk.
Biological		
Invasion or spread of non-native or invasive species	Possible	It is not expected that construction works will directly facilitate the introduction or spread of an aquatic pest species. However, given the prevalence of algal blooms throughout the Study Area, machinery may facilitate the spread of algal species if not cleaned thoroughly between sites. Additionally, disturbances to aquatic habitat across the Study Area may favour invasive species that are adapted to environmental disturbance, which have potential to outcompete native vegetation.

Introduction of disease or pathogens	Unlikely	No known diseases or pathogens have been identified as an environmental issue for aquatic fauna and flora in this locality, while no aquaculture occurs in the vicinity of the Study Area.
Behavioural		
Generation of underwater noise with potential to impact aquatic fauna	None	No works are proposed within creeks; thus, no generation of underwater noise is expected.
Increase in artificial lighting	Likely	Increased artificial light from construction and security lighting have potential to impact foraging and movement behaviours during nighttime hours of some aquatic fauna.
Key Threatening Processes		
Degradation of Native Riparian Vegetation	Possible	The proposal typically incorporates an approximate 40 m or greater riparian buffer for 3rd and 4th order streams within the Project Area. Disturbance to riparian vegetation is typically avoided, with the exception of a few trees at the single lane bridge site, which may be impacted by works. Some potential disturbance to riparian vegetation remains as a result of adjacent construction works, establishment of services, associated erosional processes, or the spread of exotic species.
Removal of Large Woody Debris	Unlikely	Numerous large snags occur in the waterways in the Project Area. As works within creeks are predominantly avoided, the removal of snags is not expected. A large snag is present in Tamarang Creek approximately 25 m north of the proposed single lane bridge, however, this expected to be avoided during construction.
Introduction of fish to fresh waters within a river catchment outside their natural range	Unlikely	Fish surveys were not conducted during works, however, waterways in the Study Area may support some exotic fish species such as Mosquito Fish or Carp. As instream works in creeks and dams are not expected, the potential to facilitate spread of any exotic fish species is considered to be unlikely.
Alteration of Natural Flow Regimes of Rivers and Streams	Possible	A single lane bridge is proposed over a small section of Tamarang Creek. Where culvert ends are designed to span across the entire creek bank, alteration of natural flow is not expected, however, this will need to be considered during the detailed design phase. Other waterway crossings across the Project Area that may be required across the eastern 4th order tributary or 1st and 2nd order streams have potential to result in some alterations to natural flow regimes of drainage lines. The presence of PV panels has potential to influence surface runoff and water infiltration patterns across the site, where rainfall may be directed by the angle, height and layout of panels. While this may have minor influences on surface runoff patterns, it is not expected to significantly impact on the natural flow regimes of creeks and drainage lines in the Project Area.

4.2 Existing Impacts

Habitat within the Project Area is subject to a range of anthropogenic activities and influences that contribute to existing impacts to aquatic ecology. These existing impacts include:

- Historic modification of the natural landscape for agricultural land use purposes,
- Farm roads and informal vehicle tracks, including formal stream crossings with pipe culverts and informal stream crossings/causeways,
- Shoreline grazing by livestock, including trampling of native riparian and aquatic vegetation and trampling of creek beds and banks, resulting in exacerbated erosion,
- Potential nutrient imbalances in aquatic habitats as a result of livestock waste or fertilisers,
- Presence of non-native riparian and aquatic vegetation,
- Agricultural equipment and infrastructure, including but not limited to, fences and irrigation pipes; and
- Erosion of channels and creek banks by steep slopes and the natural geology of the site with some areas of exposed soils and sedimentation.

The proposal has potential to both exacerbate and improve existing stressors on aquatic habitats and ecology within the Project Area, as discussed in the sections below.

4.3 Water Quality, Flow and Sediments

Water quality measurements taken across the Project Area indicated that aquatic habitats had elevated EC values that exceeded the ANZEEC DGV. High EC values may be attributed to the soil landscape of the region, which include clay or loam soils (Nandewar IBRA Bioregion) and Chromosols and Ferrosols (ASC Soil Types). Chromosols are among the most widespread soils used for agriculture in Australia and possess a distinct subsoil with a layer enriched in clay, which can influence water movement and the concentration of dissolved substances.

Construction

Water quality within the receiving waters in the Project Area is likely to experience additional pressures during construction. Earthworks works including trenching and backfilling have potential to mobilise sediments in the Project Area, with some potential for these sediments to enter adjacent aquatic habitats. Increase in suspended sediments in the water column can alter the physical chemistry of the water, increase turbidity and reduce available light to the creek bed, eventually settling on the creek bed. This may result in short term reductions in habitat quality for instream and fringing macrophyte stands and any freshwater fauna in the vicinity of works.

It is not clear whether smaller 1st and 2nd order tributaries in the Project Area will require trenching for the installation of underground cables, however, any temporary barriers that may be required to facilitate trenching of drainage lines will result in barriers to the longitudinal connectivity of streams, if alternative flow channels are not provided. This may result in pooling and reduced flow in areas upstream of the barrier, where natural flow and velocity cannot operate as normal, whilst areas downstream of the barrier may experience drying with reduced flow. These changes to natural flow may alter the physical chemistry of the water, resulting in imbalanced chemical and nutrient balances, which can lead to eutrophication or algal blooms. Additionally, these changes may reduce available fish habitat from reduced water capacity, or changes to water quality. Such impacts are likely to be of lesser magnitude in these ephemeral tributaries that naturally likely only provide minimal and very transient aquatic habitat after heavy rainfall events. These impacts are expected to be able to be minimised and mitigated through the implementation of appropriate construction, sedimentation, erosion and water management plans.

Other contaminants such as some hydrocarbons and pesticides can be toxic to aquatic fauna and/or have significant impacts to their physiology (Clarke 2001). Accidental spills from construction machinery, vehicles or materials used in construction have potential to pollute adjacent waterways where appropriate controls are not implemented. Material that is brought to site to be used for any fill works has potential to result in elevated nutrients or contaminants entering the adjacent water body. Waters throughout the Study Area already appear to have very low dissolved oxygen concentration, indicating some stressors from pollution sources may be of influence on these creeks under the existing conditions, potentially from surrounding agricultural and grazing properties in the region and/or the natural flow rates and creek morphologies of the waterways in the Study Area.

Operation and decommissioning

The presence of PV panels has potential to influence surface runoff patterns and water infiltration across the Project Area. Such potential changes have been identified in previous studies to include uneven precipitation distribution from concentration of water at panel edges, increased soil water fluctuations and higher soil water availability from lower evaporation rates (Anderson et al., 2025); however, these changes have been found to be more significantly linked with coverage of vegetation underneath the panels (Cook and McCuen 2011). No clearing of vegetation is expected to occur within panel module footprints, which is currently vegetated by native and non-native grasses. Where vegetation is maintained, changes to surface runoff and infiltration is expected to be lesser and maintain flow volumes and velocities to receiving aquatic habitats as similar to existing conditions. Some potential exists for minor erosion under the downward end of panels where rainfall flow reaches the ground, as flow is less evenly distributed. Where bare soils are present or vegetation is lost, loose sediment may be mobilised, and sediment-laden waters may be transported to receiving aquatic waters. The Project Area maintains buffers from Sugarloaf and Tamarang Creek and the eastern 4th order tributary that are expected to minimise such risk, whilst the dry and low gradient nature of the

eastern 4th and 2nd order tributaries will likely minimise sedimentation to downstream areas. Additionally, approximately 26 km of internal and access and roads will be constructed as part of the proposal. These roads will increase hard, non-permeable surfaces in the Project Area, however, are not considered to increase hard surfaces to such an extent that surface flow would be significantly altered. Appropriate vegetation and erosion management is expected to be sufficient to mitigate these risks.

PV technologies can be categorised into four major generations; first generation (thick crystalline films comprising monocrystalline and polycrystalline silicon), second generation (thin-film solar cells comprising cadmium telluride and copper indium gallium selenide), third generation (emerging technologies using nanomaterial and dye-based solar cells), and fourth generation (hybrids comprising metal nanoparticles and metal oxides, carbon nanotubes and graphene) (Pastuzak and Wegierek 2022; Anderson et al., 2025). Some concerns have been identified that as components of first and second generation reach the end of their life (25-30 years) or are damaged, they have potential to leach hazardous chemicals such as cadmium and lead into the surrounding environment (Anderson et al., 2025). Whilst third and fourth generation PV panels contain fewer toxic components, they still contain several toxic components and hold potential for leachates (Anderson et al., 2025). There is also some potential for release of contaminants during decommissioning of panels, as materials are recycled and components placed in landfill (Nain and Kumar 2020). Leakage of heavy metals like cadmium and lead can contaminate surrounding soil and aquatic habitats without proper operational and decommissioning controls. Heavy metals can impact on aquatic habitat quality by altering water quality variables, whilst exposure to heavy metals can also lead to adverse effects on aquatic organisms, such as reduced growth rates, impaired reproduction and increased mortality (Taslima et al., 2022). Appropriate maintenance, management and disposal of PV panels over the life and decommissioning of the proposal will be critical for avoiding and minimising such impacts.

4.4 Riparian Vegetation

With the exception of Sugarloaf Creek and upstream areas of Tamarang Creek, riparian vegetation in the Study Area was minimal, typically observed to occur in occasional clumps or as isolated/scattered stands. Riparian vegetation has been avoided by the Project Area design for the most part, with design buffers around Sugarloaf and Tamarang Creeks, the eastern 4th order tributary and some smaller tributaries.

Construction

Some isolated riparian trees and adjacent ground cover may be lost where they lie within the project footprint, including one to two trees at the single lane bridge across Tamarang Creek, and potentially some isolated trees along 1st order tributaries of Sugarloaf Creek. A large tree on the eastern side of Tamarang Creek at the bridge crossing includes trunk and root overhang into pooling habitat and may provide some habitat value to aquatic species; removal and modification of this tree should be avoided or minimised if possible. Removal of riparian trees within the Project Area is minimal and not expected to significantly impact on the structural integrity of creek banks, reduce creek shading or remove/reduce complex aquatic habitats. Additionally, restricted areas have been nominated where the White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland TEC was identified by the SIAR (ERM 2025), which provides valuable riparian habitat (Figure 5).

Exotic species occur across the Project Area. Construction works, particularly those involving construction vehicles and earthworks, have potential to act as vectors and facilitate spread of exotic species. It is anticipated the proposal will include the development and implementation of a weed and pest management plan which will have a net-positive impact on the existing exotic species in the Project Area (ERM 2025).

Operation

Impacts to riparian vegetation during the operational phase of the project is considered to be low, given the Project Area buffers allow for avoidance of disturbance to a majority of riparian vegetation. The main potential impact to riparian vegetation during impact may result from changes in vegetation cover and associated runoff and sediment

movements from adjacent habitats underneath PV panels. Increases in sediment-laden waters to riparian zones may impact on habitat quality as a result of increased sedimentation or erosion, which is of concern due to the high erodibility of soils observed during surveys and the existing amount of erosion and bare soil along creek banks. Presence of PV panels may also impede the growth of new riparian vegetation along minor tributaries in the Project Area. As the riparian corridors along Sugarloaf Creek, Tamarang Creek and the eastern 4th order tributary are expected to be relatively undisturbed, impacts to riparian vegetation during operation are expected to be minor.

Solar grazing is the practice of allowing livestock to graze on land that is being used for the generation of solar energy. Typically, this livestock includes sheep, which are small and gentle enough to move freely underneath the panels. Livestock graze vegetation underneath the PV panels, maintaining ground cover that would otherwise require spraying or mowing, whilst the panels can provide shelter for the livestock. If solar grazing occurs within the Project Area, protecting riparian zones by confining livestock to within the designated fenced zones will be critical for reducing continued shoreline grazing disturbances to riparian and creek bank habitats. In the case livestock are reduced or removed from the site, reduced shoreline grazing may provide an opportunity for improved riparian conditions.

4.5 Key Fish Habitat

KFH in the Study Area was verified *in-situ* and identified Type 1 KFH along the entirety of Sugarloaf Creek, Type 1 and Type 3 KFH along Tamarang Creek, and Type 3 KFH along the eastern 4th order tributary. The proposal design predominantly avoids direct impacts to KFH throughout the Project Area (Figure 5).

Construction

Sugarloaf Creek (Type 1 KFH) lies along the western boundary of the proposal, with the main channel completely outside of the Project Area. A 3rd order tributary (location of Site 1) is traversed by an existing road and culvert, which is not proposed to be modified by the proposal. No direct impacts are expected to occur to Type 1 KFH in Sugarloaf Creek.

Tamarang Creek (Type 1 and Type 3 KFH) flows south to north through the middle of the proposal site, however, the Project Area has maintained at least a 50 m buffer to a majority of the creek, with fences and other infrastructure set back from the channel. A small amount of disturbance may occur to a section of Type 3 KFH in the middle of Tamarang Creek to facilitate the construction of the single lane bridge (Figure 5). The bridge is approximately 246 m in length and 8.5 m wide (with a 10 m development footprint) and has been designed to span across the top of the channel bank. The bridge will be supported by four sets of double piers, each 2 m in diameter, spaced evenly across the length of the bridge. Habitat in this area is already disturbed by the existing informal vehicle crossing of the creek adjacent to the existing property shed, whilst habitat along this section of Tamarang Creek is typically ephemeral with no important aquatic habitat features identified during surveys. Downstream of the existing road crossing creek banks are minimal, with only a small defined mound along the outer bend of the creek. Creek banks become defined on both sides of the creek at the channel bend, approximately 75 m downstream of the crossing, coinciding with the location of a large tree (refer to Plate 13). A small amount of ephemeral creek habitat may be disturbed by one set of piers between approximately 25 m downstream of the existing crossing and 28 m upstream of the tree. Where piers are placed within the tributary channel or on the creek bank, approximately 25 m^2 of Type 3 KFH may be directly impacted, whilst piers may impact on the stability of the small creek banks and encourage scouring. Where placement of piers avoid the channel and creek banks, direct impacts to Type 3 KFH are not expected. Operationally, the structure is likely to reduce existing impacts from vehicles crossing the creek bed. Some potential for indirect disturbance to Type 3 KFH and downstream Type 1 KFH (~20 m north of proposed bridge) during construction remains, which may occur as a result of mobilised sediment during earthworks, resulting in water quality impacts such as sedimentation and increased turbidity. These impacts are expected to be able to be mitigated by suitable sediment, erosion, and stormwater controls.



Plate 13: Site of proposed bridge at Tamarang Creek, facing upstream, showing a) large tree at channel bend and the small outer bend creek bank; and b) location of existing road crossing

The eastern 4th order tributary (Type 3 KFH) is aligned south to north through the middle of the proposal site. The Project Area has maintained a ~40 m buffer to a majority of the tributary, with the exception of an internal road crossing across the middle of the tributary (downstream Site 7) and encroachment of an internal road within ~15 m of the channel near the agricultural dam (Site 6) (Figure 5). The tributary was dry at the time of survey and identified to be an ephemeral drainage line, with no defined banks downstream of the dam. Flow is likely to only occur after heavy rainfall events, whilst the tributary provides next to no semi-permanent or permanent habitat for aquatic species aside from the dam, when filled. The ephemeral drainage line was identified to maintain an approximate 30 m width, based on observation of vegetation change during surveys and on review of historic aerial imagery. Considering a road width of 6 m, direct impacts to Type 3 KFH as a result of the road crossing equates to 180 m^2. No aquatic vegetation is expected to be removed. Final design of the road crossing must maintain flow connectivity to avoid creation of a barrier to fish passage. Some disturbance to Type 3 KFH may also occur adjacent to the road running parallel to the tributary where the footprint encroaches within drainage channel, however, this is expected to be limited to edge effects and indirect disturbance from mobilisation of sediments, with no instream works or removal of aquatic vegetation expected.

Creeks in the Project Area possess numerous areas with large snags and woody debris, which are an important habitat feature for aquatic species. Under the FM Act, in-water snags greater than 300 mm in diameter or 3 m in length are considered Type 1 KFH (Faithfull 2013). The removal of large woody debris (snags) from rivers and streams in NSW is considered a Key Threatening Process under the FM Act 1994. Snags provide numerous ecosystem services to their surrounding environment, including important breeding, spawning and resting habitat for fish, nursery habitat for juvenile aquatic juveniles, macroinvertebrate habitat and shelter from larger predators. A large snag is present in Tamarang Creek approximately 25 m north of the proposed single lane bridge and should be avoided during construction.

Operation

Direct impacts to KFH during the operational phase of the project are unlikely, with potential impacts likely to be confined to indirect impacts from minor changes in hydrology and sediment patterns and temporary disturbances to water quality. Erosion and the mobilisation of sediment-laden waters from the across the Project Area has potential to be transported to areas of more sensitive KFH, within the Project Area or in downstream habitats. One of the dominant important habitat features identified in KFH in the Project Area were gravel beds; sedimentation of these beds has potential to remove important breeding, spawning, refuge and foraging habitat for aquatic fish and invertebrates. An appropriate erosion and sedimentation control plan will be developed to mitigate these risks.

The current land use across the Project Area is agricultural and includes livestock. As described in Section 3, all sites in the Study Area showed evidence of point disturbance from shoreline grazing, with extensive livestock tracks along

creek banks and physical disturbance to creek beds and aquatic vegetation observed. Shoreline grazing has been identified as an existing impact to aquatic ecology within the Project Area and likely contributes to exacerbation of erosion of creek banks. Where grazing pressures are reduced or removed within the Project Area, this may allow for the stabilisation of creek habitats and overall habitat improvements, with potential to increase the suitability of aquatic habitat for native species. Where solar grazing practices are implemented, these disturbances may continue with potential for ongoing impacts to aquatic habitats if grazing is allowed to continue along the shoreline. Fencing to protect sensitive KFH areas from ongoing shoreline grazing can minimise these impacts.

4.6 Other Aquatic Habitat

The eastern 2nd order tributary, all other 1st and 2nd order drainage lines and the remaining farm dams (5) were classified as non-KFH during surveys. The smaller tributaries across the Study Area are typically within the project footprint and may be disturbed from the construction of project components and operation of the solar farm. Eleven mapped 1st and 2nd order tributaries, and some additional drainage lines along the eastern side of the eastern 2nd order tributary, are entirely or partially within the footprint of the proposed PV panel modules and associated internal roads.

Construction

Ephemeral aquatic habitats within the project footprint may experience some direct disturbance from construction and placement of panels, construction of underground cables (including trenching), construction of roads and supporting ancillary infrastructure and buildings, and associated earthworks. Some of these tributaries, namely those that drain to Sugarloaf Creek, have pockets of pooling that may provide some semi-permanent or transitionary habitat. These pools are typically associated with the drainage line adjacent to existing road culverts and are ephemeral. As stated above, it is not clear whether smaller 1st and 2nd order tributaries in the Project Area will require trenching for the installation of underground cables. Any trenching across a waterway will result in physical disturbance to ephemeral waterways, which may include modification of bank and bed substrate or temporary bunding, and which may result in temporary barriers to fish passage. Barriers to fish passage and stream connectivity can have detrimental impacts on native fish species by restricting the migration of spawning or juvenile fish (such as migration of eels or fish such as mullet), restricting passage of fish between feeding grounds, fragmenting fish communities and altering hydrology and water quality of waterways which may create unsuitable conditions (Fairfull 2013). General habitat observations along 1st and 2nd order creeks in the Study Area identified that these minor tributaries were typically dry with no defined banks or beds, with very occasional ephemeral, shallow, isolated pools unlikely to support permanent habitat for freshwater aquatic species. Habitats within these creeks may experience temporary changes to flow regimes if temporary barriers are required during trenching. However, these changes are expected to be of a very short term, with creek sections likely to be crossed in under a day. Any aquatic fauna that are inhabiting these habitats at the time of construction may be disturbed by these works and may require capture of fish and translocation immediately before and during construction, using appropriately qualified personnel. Such impacts are likely to be of lesser magnitude in these ephemeral tributaries that naturally likely only provide minimal and very transient aquatic habitat after rainfall events.

Changes in the creek morphology as a result of any trenching works may create instability or exacerbate erosion along adjacent creek banks, which has potential to create new erosive preferential pathways for flow that may scour large sections of the natural creek without proper management of backfilling methodology. Scouring and formation of preferential pathways may also result in the mobilisation of sediments, causing increased sedimentation and turbidity in downstream receiving habitats, decreasing habitat quality for aquatic biota downstream. Improperly backfilled creek banks also have potential to result in erosive subsoil flows, which could cause collapses of creek beds and banks and increase sedimentation and turbidity in downstream habitats.

The eastern 2nd order tributary, excluding the downstream 250 m of the stream and areas just upstream and downstream of the dam, is within the development footprint and will be situated underneath PV panel modules. Some

direct disturbance to this tributary will occur to install panels and construct a road crossing. This tributary was predominantly dry and expected to provide only very ephemeral habitat after heavy rainfall.

All agricultural dams within the Project Area have been avoided by the proposal and will be retained. Aquatic fauna and vegetation that are present within these dams are not expected to be directly impacted, whilst dewatering of dams will not be required.

Operation

The eastern 2nd order tributary, excluding the downstream 250 m of the stream and areas just upstream and downstream of the dam, is within the development footprint and will be situated underneath PV panel modules. As discussed above, the presence of panels has potential to alter surface runoff and water infiltration patterns. Some minor changes to drainage patterns along this tributary may occur, however, considering that this tributary was observed to be only a minor drainage line with no defined bed or banks, impacts are expected to be of a lesser significance.

Any ongoing disturbances to riparian and groundcover vegetation, erosion patterns, and drainage patterns has potential to impact on adjacent aquatic habitats. Erosion and the mobilisation of sediment-laden waters from the across the Project Area has potential to be transported to KFH areas downstream, within the Project Area or in downstream habitats.

4.7 Aquatic Macrophytes

Construction

Aquatic macrophytes in the Project Area are typically limited to emergent species, including various *Juncus* sp., and were present within creeks, along creek banks and in occasional clumps along ephemeral drainage lines. As no instream works are proposed within Sugarloaf Creek, Tamarang Creek or agricultural dams, impacts to macrophytes in these locations are unlikely. Some indirect disturbances to aquatic macrophytes downstream of the proposed single lane bridge may occur, as a result of temporary disturbances to water quality including sedimentation and increased turbidity.

Occasional clumps of rushes along the eastern 2nd order tributary may be disturbed during construction, from the placement of PV panels, construction of roads, stockpiling, storage of materials or vehicles. These macrophytes will also likely experience increased shading from the presence of PV panels. Semi-permanent and permanent aquatic habitat was not observed along this drainage line, with aquatic habitat restricted to small, isolated, muddy, shallow pools. While these macrophytes are located along the drainage line, they are not considered to provide aquatic habitat value comparable with instream macrophytes across other areas of the Project Area.

Operation

The current land use across the Project Area is agricultural and includes livestock. As described in Section 3, all sites in the Study Area showed evidence of point disturbance from shoreline grazing, with extensive livestock tracks along creek banks and physical disturbance to aquatic vegetation observed. Where livestock grazing is reduced/removed, reduced shoreline grazing may be advantageous for increased coverage and health of aquatic macrophytes across the Project Area. Where solar grazing occurs, confinement of livestock to within fenced areas outside of riparian and aquatic habitats will be critical to reducing ongoing disturbances to aquatic macrophytes.

4.8 Aquatic fauna

4.8.1 Threatened Species

The Southern Purple Spotted Gudgeon (*M. adspersa*), listed as Endangered under the FM Act, has indicative distribution mapped to occur within the Study Area by NSW DPIRD Fisheries (2025a), in Sugarloaf Creek and the eastern 2nd order tributary. Habitat features that provide cover such as aquatic vegetation, overhanging vegetation, leaf detritus, rocks and snags are important for the species, which typically inhabit slow-moving or still waters, or in streams with low turbidity.

Habitat-based assessments identified that suitable habitat was present for the species in Sugarloaf Creek. Sugarloaf Creek is outside of the Project Area and is not expected to be directly impacted by works. Any potential impacts to the species is expected to be limited to temporary disturbances to water and habitat quality if sediment-laden waters are mobilised into Sugarloaf Creek or its tributaries. Whilst no records of the species occur within 10 km of the Study Area, the species has potential to occur within this habitat and potential impacts have been considered in an Assessment of Significance (Appendix 4).

The Assessment of Significance concluded that the viability of the Southern Purple Spotted Gudgeon population that may utilise habitat in the vicinity of the proposal is unlikely to be significantly affected by the proposed activity. The habitat inside the Study Area is very marginal for the species, with no known or recent records of the species in the vicinity of the Study Area or in the Namoi River catchment. Additionally, if the species was found to be present within the local catchments, the project works are not expected to significantly affect a local population such that it would cause extinction or impact long-term survival, with no direct impacts expected to Sugarloaf Creek. Thus, any disturbances to the species are unlikely and would be limited to short-term indirect increases in sedimentation or turbidity.

4.8.2 Native Species

Construction

Some disturbances may occur to fauna inhabiting ephemeral pools in 1st and 2nd order streams across the Project Area that are within the project footprint, however, suitable ephemeral pools that may support fauna were typically confined to 1st and 2nd order tributaries of Sugarloaf Creek during surveys. These areas are generally avoided by the Project Area components and impacts to aquatic fauna that may be inhabiting pools at the time of works is expected to have a low likelihood of occurrence.

All agricultural dams in the Project Area have been avoided by design and will be retained. This avoids the need for dewatering and minimises risks to aquatic fauna, such as fish, turtles and eels, that may utilise the dams for semi-permanent or permanent habitat.

Sediment within the Project Area and along creek banks were observed to have high erodibility, with large areas of bare soil observed along creek banks and some creek bends showing significant scouring and collapse. Construction has potential to mobilise such sediments across terrestrial areas and along 1st and 2nd order drainages within the project footprint. Mobilisation of sediment-laden water into adjacent aquatic habitat has potential to smother downstream habitats by increasing loose silt on the creek bed and filling interstitial spaces, which were prevalent across the Study Area among gravel, pebble, cobble, boulder and bedrock creek beds. This has potential to disturb or reduce foraging and refuge habitat for aquatic species, whilst some smaller fauna may also be smothered by mobilised sediments. Increased turbidity may also temporarily reduce habitat quality by impacting water quality.

Operation

As identified above, all sites in the Study Area showed evidence of point disturbance from shoreline grazing, with extensive livestock tracks along creek banks and physical disturbance to creek beds and aquatic vegetation observed.

Where livestock grazing is reduced/removed, reduced shoreline grazing may be advantageous for improved habitat for native aquatic species across the Project Area. Where solar grazing occurs, confinement of livestock to within fenced areas outside of riparian and aquatic habitats will be critical to reducing ongoing disturbances to aquatic habitats and the fauna that inhabit them.

Freshwater turtles and eels are known to utilise agricultural dams and creek headwaters as semi-permanent and permanent habitat. During migration to these habitats, these species can traverse short distances over land to reach aquatic habitats. Increased vehicle presence within the Project Area has potential to increase potential vehicle strikes to these faunae.

Artificial security lighting is proposed as part of project. Artificial Light at Night (ALAN) can have potential impacts on biodiversity, such as changes in physiological processes, body function and behaviour. In freshwater habitats, this can impact on night-time drift of aquatic invertebrates, which typically are more active at night to avoid predation and find suitable habitats (Holker et al., 2023). Increased ALAN can impact on predator-prey interactions in streams that are close to light sources. As the Project Area maintains appropriate buffers to aquatic habitats and lighting is confined to security lighting, likely restricted to important assets, ecological impacts from ALAN as a result of this proposal are expected to be minor.

4.8.3 Fish Passage

Existing barriers to fish passage in the Study Area include formal road crossings and culverts, informal vehicle causeways, agricultural dams, dry tributaries and natural cascades along Sugarloaf and Tamarang Creeks. The proposal includes for numerous waterway crossings, including a single lane bridge across Tamarang Creek and internal roads crossing 11 mapped 1st and 2nd order tributaries. Where piers are located within the creek bed, they have potential to create a barrier to fish passage, particularly as this area of Tamarang Creek is ephemeral with low flow and low water levels. Where piers are located within the creek banks, erosion of the bank or changed patterns in scouring may indirectly result in a barrier to fish passage. As such, the location of piers outside of creek habitat should be prioritised in detailed design. Where piers are located outside of the creek bed and bank, the single lane bridge is expected to result in minimal impacts to creek habitat and flow in Tamarang Creek and is not expected to result in a permanent barrier to fish passage. However, maintenance to clear and remove snags if they accumulate on the upstream side of the bridge may be required to avoid any indirect impacts to fish passage. Design has also included for the first preferred option for a waterway crossing, a bridge, as specified in Fairfull and Witheridge (2003). Some temporary barriers to fish passage may be required if any 1st or 2nd order drainage lines require temporary bunding to facilitate installation of underground cables via trenching. Waterways where this may occur were predominantly dry at the time of survey, with low flow only likely to occur following a rain event. It is expected that this disturbance would be temporary and of minor significance to fish passage considering the natural barrier in these waterways.

Other road crossings across the Project Area may result in some barriers to fish passage, dependent on design, by restricting fish movement. Poorly designed structures can cause fish communities to become stranded, subjected to poor water quality, lack of resources, crowding and predation. Considering that existing agricultural dams are located on four 1st and 2nd order tributaries in the Project Area, whilst most tributaries are traversed by existing formal (with culverts) or informal road crossings, an ecologically significant increase in barriers to fish passage from the proposal is not expected. Design and construction of waterway crossings in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI 2013) and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003) will further minimise potential impacts.

4.9 Waterfront Land

'Waterfront land' is defined as the bed of any river, lake or estuary, and the land within 40 metres of the river banks, lake shore or estuary mean high-water mark (NSW DPIE and NRAR 2020), however, where no creek bed or bank is

present and/or where no watercourse features are present (pools, riffles, erosion and deposition, inside or outside bend) a stream is not considered a watercourse.

Site surveys identified waterfront land occurs along Sugarloaf Creek, Tamarang Creek and agricultural dams. With reference to the NRAR Waterfront Land Tool (NSW DPIE and NRAR 2020), only the southern section of the eastern 4th order tributary is (upstream of the dam) is considered as a watercourse, whilst only the downstream section of the eastern 2nd order tributary (at Site 10) is considered as a watercourse. The proposal has been designed to primarily avoid waterfront land associated with 3rd and 4th order tributaries in the Project Area and most waterfront land associated with agricultural dams. The proposal also avoids waterfront associated with both of the eastern tributaries. Small encroachments into waterfront land along creeks are limited to fences, internal roads and the single lane bridge, whilst encroachments around dams are confined to PV panel placement (Figure 5). While these encroachments are only minor, it is likely a Controlled Activities permit will be required.

4.10 Cumulative Impacts

The NSW EPA Contaminated Sites Register identified four results for Tamworth Regional Council LGA in the last 20 years:

- Duri Store, Duri,
- Coles Express Tamworth, South Tamworth,
- Elgas Depot (former gasworks), Tamworth; and
- Woolomin Gold Rush Store, Woolomin.

None of the above sites are in proximity to the Project Area and not expected to impact the project.

Review of NSW Major Projects Planning Portal indicates that the following state significant applications for other renewable energy projects occur within the Tamworth Regional Council LGA:

- Tamworth Solar Farm and Battery Energy Storage System,
- Middlebrook Solar Farm,
- Wallabadah Battery Energy Storage System,
- Thunderbolt Wind Farm,
- Bendemeer Wind Farm; and
- Hills of Gold Wind farm.

Other nearby renewable energy projects include:

- Gunnedah Solar Plant,
- Meralli Solar Farm,
- New England Solar Farm,
- Armidale Dangarsleigh Solar Farm,
- Orange Grove Solar Farm; and
- Narrabi South Solar Farm.

None of the above sites are in proximity to the Project Area and not expected to impact the project.

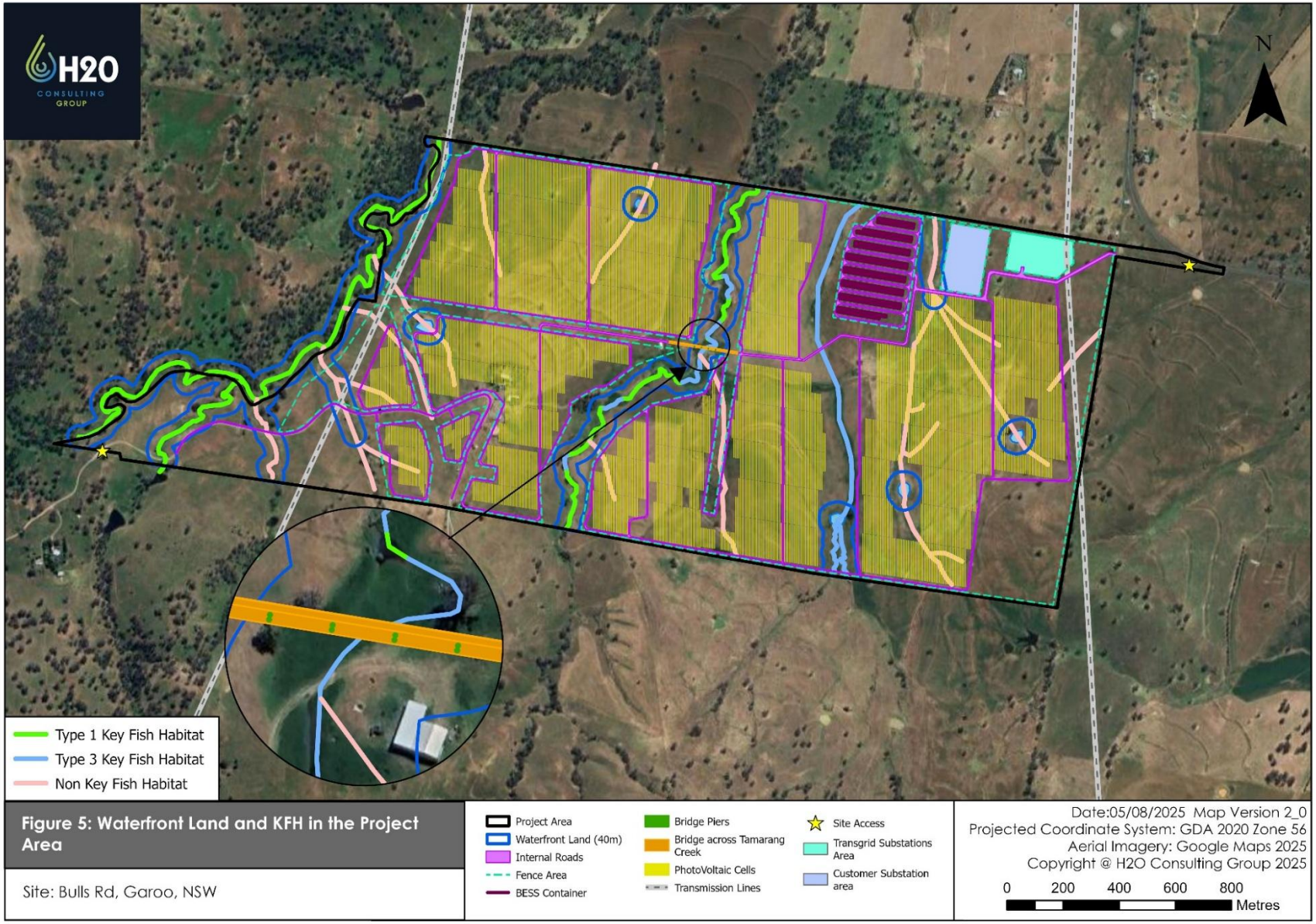


Figure 5: Key Fish Habitat and Waterfront Land in the Project Area

5 Recommendations and Conclusions

5.1 Design Requirements

5.1.1 Riparian Buffers

The riparian corridor to be considered in design requirements includes the core riparian zone adjacent to a watercourse and surrounding vegetated buffer. The proposed development predominantly avoids encroachment into riparian corridor areas of 3rd and 4th order creeks, with the exception of a bridge crossing over Tamarang Creek and road crossing over the eastern 4th order tributary. The project footprint encroaches into the riparian corridor of 1st and 2nd order tributaries in the Project Area, albeit riparian vegetation is minimal, whilst some essential works including stormwater and services may be required within riparian corridors. Disturbance to the riparian corridor should be minimised through development design by:

- Avoiding placement of infrastructure and services within riparian corridors,
- Avoiding and minimising the number of watercourse crossings and associated disturbance through riparian corridors,
- Implementing buffers around riparian corridors,
- Implementing perimeter roads around riparian corridors; and
- Placing stormwater outlets outside of the tree dripline.

The NSW DPE (2022b) recommends the following riparian corridor widths either side of the watercourse in addition to the channel width:

- 1st order streams: 10 metres.
- 2nd order streams: 20 metres
- 3rd order streams: 30 metres
- 4th order and greater streams: 40 metres.

As a guide NSW DPIRD Fisheries recommend the following riparian zones measured from the top of the bank (Fairfull 2013).

- Type 1, class 1: 100 metres
- Type 2, class 2-3: 50 metres
- Type 3, class 3-4: 10-50 metres.

The proposal has implemented the above design considerations and disturbance to riparian corridors is minimal. The proposal has typically maintained at least a 40 m buffer from 3rd and 4th order streams in the Project Area, which include Type 1 and Type 3 KFH, with buffers of up to 100 m from the top of bank in some areas.

5.1.2 Culverts and Watercourse Crossings

The proposed development within the Project Area involves the construction of a bridge over Tamarang Creek and road crossings over various tributaries. The below recommendations should be implemented into the design and construction of waterway crossings, as during periods of the heavy rain drainage lines may maintain some temporary flow. Design and construction of waterway crossings should occur in accordance with the *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI 2013) and *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003). All crossings and associated culverts should be designed with the objective to protect and/or enhance the water quality, stream ecology, flow regime and the riparian corridor in the adjacent areas (NSW DPE 2022c) through the following:

- Regardless of the structure, any infrastructure constructed across a watercourse must not result in stream obstruction or negatively impact the natural ecological, hydrologic, hydraulic and geomorphic functions of the watercourse that they cross.
- Crossings or bridges should be designed to fully span across a watercourse in order to maintain these natural functions of the channel, considering the continued unobstructed movement of fauna, sediment and woody debris, the maintenance of natural gradient and profile and the maintenance of natural flow. Where the implementation of bridges is not possible, box culverts should be utilised in order to maintain passage for fish species, in accordance with the guidelines for riparian corridors.
- Design should avoid crossings and culvert structures on channel bends, as this may exacerbate natural erosion processes.

The NSW DPIRD Fisheries Policy and Guidelines for Fish Habitat Conservation and Management recommend that for Class 4 waterways, which includes those minor 1st and 2nd order tributaries within the proposal footprint that will require road crossings, that culverts are preferred (Fairfull 2013).

Placement of piers within creek bed or bank habitat in Tamarang Creek should be avoided in design.

5.1.3 Stormwater Management

The proposal is to include a stormwater management system that is adequate for the environment and proposed development. The construction of any stormwater outlets in the Project Area should aim to facilitate a drainage system that aligns with the natural flow regime of the surrounding watercourse and riparian zones. Disturbance to the watercourse and riparian corridor should be minimised through development design by (DPE 2022d):

- Constructing a drainage system around stormwater outlets that flow into existing watercourses, including the implementation of gravel, riprap, scour protection and the planting of riparian vegetation such as rushes,
- Rehabilitating any riparian vegetation disturbed by construction to match pre-construction natural native composition,
- Limiting the discharge volume of each outlet so as to not significantly increase the flow volume entering each section of a watercourse,
- Treating stormwater to reduce pollutants entering watercourses in the Study Area,
- Placement of stormwater outlets at stable sections of watercourses between bends to minimise additional erosion, and preferably in existing cleared areas; and
- Placing stormwater outlets outside of the tree dripline and facing the downstream direction of the watercourse.
- The Stormwater Management Plan should address on-site water management to reduce sedimentation and potential pollution of watercourses in the Project Area, through the implementation of retention basins.

Stormwater management systems should be ideally constructed outside of water courses that may provide fish passage (Fairfull 2013). On this site it is recommended that construction of any stormwater management systems within KFH creeks are avoided.

5.1.4 Solar Grazing

The proposal may provide an opportunity for complimentary agricultural activities, such as solar grazing, to be considered during design. The Australian Guide to Agrisolar for Large-scale Solar (Clean Energy Council 2021) provides guidance and considerations for both proponents and graziers.

Where solar grazing is considered as a viable option, it is strongly recommended that livestock is confined to fenced areas that have included for suitable buffers to riparian zones and aquatic habitats to reduce disturbances that occur as a result of shoreline grazing.

5.1.5 Other

Additional necessary infrastructure such as plumbing and electrical facilities should be considered as part of wholistic designs incorporated with the above infrastructure to minimise disturbance to riparian corridors and any channel beds or banks that may require works.

5.2 Construction and Operational requirements

5.2.1 General Construction

The following actions are recommended to be completed during construction works throughout the Study Area. It is recommended that these be adopted into the Construction Environmental Management Plan (CEMP) for the works.

- Adequately manage and store waste products and material in designated areas on the site. To prevent injury caused by ingestion or entanglement in debris, an adequate Waste Management Plan (WMP) should be prepared for the project.
- All construction work locations are to have designated litter disposal bins to avoid potential for aquatic debris, included in the project WMP.
- All machinery should be routinely checked for leaks, with an emergency spill kit to be kept on site at all times. All staff are to be made aware of the location of the spill kit and trained in its use.
- All fuels and hydrocarbon-based products are to be stored in a sealed bunded area(s) at least 30 metres away from the water's edge.
- All vehicles and machinery should not enter the waterway except where absolutely necessary for installation of pipeline. Where they are required to enter the waterway a washdown procedure before doing so should be implemented.

5.2.2 Protection and Buffer Zones

During construction, all works including the placement of equipment and materials should avoid riparian corridors by limiting works to the outer edge of the riparian buffer, as detailed in Section 5.1.1. Where necessary works such as stormwater, services or crossings that involve the disturbance of the riparian corridor are required, works should be planned to minimise the extent of disturbance through:

- Conducting works in areas with existing cleared vegetation where possible,
- Avoiding removal of established trees where possible,
- Rehabilitating areas of disturbed vegetation following the completion of works, in accordance with the natural riparian composition.

5.2.3 Onsite Water Management

The Stormwater Management Plan should ensure that any stormwater run-off or unplanned overflows from the development footprint is retained in water quality basins to avoid sedimentation and the introduction of potential pollutants to the watercourses in the Project Area. Water quality basins will allow for sediments in water to settle in basins and control the flow entering waterways.

Onsite water management during construction should be conducted in accordance with the 'Blue Book' (Landcom 2004). Notably, this includes:

- Installing site drainage infrastructure to lead stormwater away from site, particularly where stormwater may exacerbate soil erosion and pollution of waterways.
- Diverting run-on water from disturbance works occurring on upslope land, using non-erosive methods.
- Installing protective measures to prevent sheet erosion where large portions of soil will be exposed.

A Wastewater Management Plan should be developed for management of black and greywater from the temporary workers accommodation camp. Existing proposed management measures include the installation of compost toilets to treat blackwater and a wastewater treatment plant to manage greywater, with all wastewater to be disposed of offsite to a suitably licenced waste management provider (ERM 2025). No wastewater may be discharged to the waterways on site without appropriate further assessment and approval.

5.2.4 Onsite Sediment and Erosion Control

The project must include an Erosion and Sediment Control Plan (ESCP) that adequately protects for aquatic habitat during construction works, operation and decommissioning. The ESCP should be prepared by a qualified Hydrologist with experience in arid areas. During construction, particularly where earthworks and trenching occurs, adequate sediment and erosion control structures will need to be erected to minimise sedimentation on adjacent aquatic habitats. These structures, their position and their effectiveness should be monitored and checked weekly.

The ESCP will need to consider the following for instream works:

- Placement of alternative routes at stable sections of watercourses to minimise additional erosion.
- On-site water management to reduce sedimentation and potential pollution of watercourses in the Study Area both at trenching sites.
- Management of stormwater and creek water during periods of high flow, considering the presence of flood prone areas within and in the vicinity of the Study Area.

The ESCP should also include for works nearby to creeks and wetland habitat to ensure that any runoff or unplanned overflows from the construction footprint is retained in water quality basins to avoid sedimentation and the introduction of potential pollutants to the watercourses in the wider Study Area. Water quality basins will allow for sediments in water to settle in basins and control the flow entering waterways. Onsite water management during construction should be conducted in accordance with the 'Blue Book' (Landcom 2004). The ESCP will need to consider the following for works adjacent to creeks:

- Installing site drainage infrastructure to lead stormwater away from site, particularly where stormwater may exacerbate soil erosion and pollution of waterways.
- Diverting run-on water from disturbance works occurring on upslope land, using non-erosive methods.
- Installing protective measures to prevent sheet erosion where large portions of soil will be exposed. These will also need to be located in location where they are not at-risk during flooding.

The ESCP should also address work where excavation and backfilling of land occurs. Adequate sediment and erosion control structures will need to be erected to minimise sedimentation on adjacent aquatic habitats in the creek lines. These structures, their position and their effectiveness should be monitored and checked weekly. Onsite water management during construction should be conducted in accordance with the 'Blue Book' (Landcom 2004). The ESCP will need to consider the following for excavation and backfilling works:

- Implementing water management controls as stated above to prevent sedimentation and erosion resulting from movement of water.
- Construction of sediment filters or sediment retention traps where appropriate, particularly below fill batters near waterways.

Where excavation occurs near creek lines but not within creek lines, construction of retention basins to collect sediment-laden runoff and reduce sedimentation of nearby waterways, built as close to sedimentation source as possible and upstream of waterways.

The project should consider the use of a coarse gravel beneath the solar panels in areas void of vegetation to promote infiltration and minimize surface run-off and erosion during high rainfall events. The gravel should be free of heavy metal contaminants.

5.2.5 Earthworks and Trenching

If any 1st or 2nd order tributaries will require trenching to facilitate installation of cables, the following recommendations should be considered to minimise impacts to aquatic and riparian habitats:

- Any creek channels that require trenching to install the various mains should be re-instated to their original form or long-term stable condition in instances where this cannot be achieved or is undesirable.
- Excavated bank and bed material should be stored (for return to the site at the completion of excavation) away from the waterway to minimise potential sedimentation of downstream habitats.
- The backfilling of excavated creek banks or beds should use clean fill or the excavated sediments, ensuring adequate topsoil is maintained for revegetation works.
- Where creek bank vegetation is removed or damaged as part of trenching, their rehabilitation should be incorporated into the project Vegetation Management Plan (VMP).
- Where established assemblages of native macrophytes are removed, weed management of the area should be included in the project VMP to minimise opportunistic replacement by exotic species. This may include monitoring via macrophyte mapping.

If any 1st or 2nd order tributaries will require temporary bunding to facilitate trenching, the following recommendations should be considered to minimise impacts to aquatic and riparian habitats

- Temporary barriers should typically only be in place for less than six to twelve months (Fairfull 2013). Any barrier should be avoided in areas mapped as KFH. Where temporary barriers are required to be in place for over 3 days, water quality monitoring should be considered upstream and downstream of the barrier to alert to potential detrimental habitat impacts for fauna in the vicinity.
- Where excavation works requiring bunding are to be conducted through waterways, adequate alternate fish passage should be provided for works where fish passage will be blocked for serval weeks or more due to construction.
- Where possible, in-stream works should be staged to avoid blocking the entire waterway. If the entire waterway must be blocked, an alternative flow and passage channel should be considered to maintain natural flow conditions of the stream for the duration of construction works.
- Temporary in-stream structures should be installed during periods of low flow, with each structure to have a management plan included in the CEMP for high flow events to prevent erosion and sedimentation.
- Temporary barriers should not be comprised of loose, imported earth fill, with all material to be fully enclosed by geotextile, sheet piling or similar to prevent erosion and sedimentation.

5.2.6 Snag Management

'Snags' include in-stream woody habitat and large rocks and are essential habitat for many native fish species. As per the Policy and guidelines for fish habitat conservation and management (Fairfull 2013), snag management can be separated into four categories ranging from low impact to high impact:

- lopping – whereby protruding limbs of in-stream woody habitat are sawn-off and allowed to sink to the riverbed,
- realignment – whereby a snag is rotated from its existing position,
- relocation – whereby a snag is physically moved from one location in the waterway to another location,
- removal – the snag is completely pulled from the water (i.e. desnagging).

The removal of woody debris and snags or work that involves the removal of any other material from water land that disturbs, moves or harms woody debris and snags is considered "dredging" under the FM Act. Works that involve dredging may require a permit or consultation with the Minister for dredging under ss199-201 of the FM Act.

As a general principle for timber snags, lopping should be considered as the first priority for the management of snags. Where lopping will not solve the immediate problem, re-alignment should be considered as the next possibility, followed by relocation. Removal of a snag is the least desirable option and should only be adopted as a last resort. Proposals for snag removal should be accompanied by a 7-part test and/or Species Impact Statement where proposed in areas that are TYPE 1 aquatic habitats.

5.3 Decommissioning Requirements

Decommissioning requirements should be reviewed at the project's end of life to ensure adherence to updated environmental requirements and legislation. A decommissioning plan should be prepared prior to the decommissioning of the Garoo Solar Farm and BESS. This should include similar controls to those detailed in Section 2 for construction works associated with decommissioning the project.

Other preliminary recommendations for decommissioning include:

- Preparation of a restoration/rehabilitation plan for the project site, including revegetation, stabilisation of soils, restoration of habitat connectivity and maintenance of catchment connectivity.
- Ensure that materials like panel coatings, cabling insulation, or any deteriorated infrastructure are safely removed and disposed of, to prevent leaching into adjacent aquatic habitats.

5.4 Management and Monitoring Plans

5.4.1 Water Quality Monitoring Program

A Water Quality Monitoring Program (WQMP) should be established for the construction of the Garoo Solar Farm and BESS and for one year following completion of construction, as well as during decommissioning. Water quality monitoring will be critical for the assessment of actual and potential emerging water quality impacts. This program should include:

- Details of potential sources of contaminants on site and corrective actions and procedures.
- Establishment of upstream (reference) and downstream (impact) sites on multiple waterways in the Project Area.
- At least one year of baseline stream ecological condition monitoring using the Australian River Assessment System (AUSRIVAS) methodology is recommended to be collected prior to operation (preferably before construction), followed by annual monitoring following commencement of operation for at least 3 years.
- At least one year of monthly water quality monitoring at all established sites is recommended, including physical and chemical parameters, prior to construction to inform average baseline conditions. Site-specific triggers should be developed based on ambient pre-operation conditions.

- Quarterly wet and dry monitoring of physical and chemical parameters is recommended once site-specific triggers have been developed, during construction and for one year post construction.

5.4.2 Stream Bank Erosion Monitoring Plan

A Stream Bank Erosion Monitoring Plan (SBEMP) should be established for the construction and operation of the Garoo Solar Farm and BESS. Stream bank erosion monitoring should include:

- Monitoring (ground truthing or drone survey): mapping of distances from the top of bank to the Project Area extent and areas of known erosion. This is recommended to occur annually for 3 years and then reviewed.
- Event-based monitoring (flood or high flow events): site investigation and mapping of problem erosion areas.

5.4.3 Vegetation Management Plan

A VMP should be prepared by suitable qualified botanist, ecologist or bush regenerator. The VMP should address the management of riparian zone vegetation, including bank stability and the removal of existing weeds.

5.5 Offsetting and Permits

5.5.1 Offsetting

NSW DPI enforces a 'no net loss' habitat policy as a permit condition or condition of consent. This may require proponents to conduct habitat rehabilitation and/or provide environmental compensation. This assessment identified approximately 180 m^2 of Type 3 KFH would potentially be disturbed or lost during construction works associated with the eastern 4th order tributary road crossing. This area will require offsetting at a ratio of 2:1.

Habitat rehabilitation and/or environmental compensation can be undertaken to ensure 'no net loss' of KFH. Within the Project Area, this may include activities such as removal of aquatic and riparian weed species; planting, rehabilitation and maintenance of riparian trees and shrubs to increase habitat value and assist in stabilising eroded creek banks, re-snagging, improving habitat complexity and removing existing disturbances.

Potential additional offset requirements may need to be calculated during the detailed design phase if the single lane bridge is expected to have any instream footprint or impacts in Tamarang Creek. An additional 25 m^2 of Type 3 KFH may be impacted in Tamarang Creek from placement of bridge piers.

5.5.2 Permits

It is likely a controlled activities approval from NSW DPI Water for works on waterfront land will be required. As some proposed works occur within 40 m of the riverbanks, the proposal is expected to trigger the requirement for this approval.

A Section 201 – permit to carry out works of dredging or reclamation (i.e. any excavation within, or filling or draining of, water land or the removal of woody debris, snags, rocks or freshwater native aquatic vegetation or the removal of any other material from water land that disturbs, moves or harms these in-stream habitats) will likely be required, under the FM Act, for construction works within water land.

A Section 219 - permit to obstruct the free passage of fish may be required if temporary bunding of any waterways will be required during construction, under the FM Act.

As Sugarloaf Creek, which contains potential threatened species habitat, is not expected to be impacted by the proposal, a licence to harm threatened species or damage their habitat under Part 7A of the FM Act will not be required.

5.6 Conclusions

The Study Area includes semi-permanent and permanent aquatic habitat provided by Sugarloaf and Tamarang Creeks (4th order streams) and existing agricultural dams. Sugarloaf Creek provides Type 1 KFH with various important aquatic habitat features, whilst Tamarang Creek provides areas of both Type 1 and Type 3 KFH. Both creeks contain pool and riffle habitats, with gravel beds, snags, and aquatic macrophytes that likely support various aquatic fauna at times. The eastern 4th order tributary provides Type 3 KFH, and the eastern 2nd order tributary and other 1st and 2nd order tributaries were identified as non-KFH. These waterways were predominantly observed to have no obvious beds, banks or aquatic vegetation stands and are ephemeral drainage lines that provide very minimal aquatic habitat value.

No threatened aquatic flora species listed under the EPBC Act, BC Act or FM Act are likely to occur within the Study Area. No threatened aquatic fauna species listed under the EPBC Act, BC Act or FM Act were observed to occur within the Study Area, however, Sugarloaf Creek may provide some marginal potential habitat for the Southern Purple Spotted Gudgeon (*Mogurnda adspersa*) (listed as endangered under the FM Act). No direct impacts are expected to occur to Sugarloaf Creek and a 7-Part Test concluded that the viability of the Southern Purple Spotted Gudgeon population that may utilise habitat in the vicinity of the proposal is unlikely to be significantly affected by the proposed activity.

The proposal has avoided direct disturbances to all Type 1 KFH and most Type 3 KFH within the Project Area. Direct disturbances to KFH are expected to be limited to 180 m^2 of Type 3 KFH associated with a road crossing over the eastern 4th order tributary. Impacts to this habitat is expected to be of a lesser magnitude as the tributary lacks defined creek banks and bed, has no aquatic vegetation and likely provides only ephemeral aquatic habitat after rainfall. Some additional impacts may occur to a small section of Type 3 KFH in Tamarang Creek associated with the single lane bridge, dependent on the final location of culvert ends during the detailed design stage, with potential impacts to approximately 25 m^2 of Type 3 KFH. Where all structures are located outside of creek banks, direct impacts are not expected. The construction of the PV panel modules and internal roads over the eastern 2nd order tributary will directly impact on the ephemeral drainage line, however, this tributary was classed as non-KFH. Additional direct impacts may occur to various other 1st and 2nd order tributaries across the Project Area where they lie within the footprint of PV panels and ancillary infrastructure. This may include trenching to facilitate the installation of underground cables, which may impact on creek bed and bank morphology and temporary disturbances to aquatic fauna that may be inhabiting ephemeral aquatic habitat at the time of works. Temporary barriers to fish passage may be required if bunding of ephemeral drainage lines are required, which will require appropriate management. As these 1st and 2nd order streams were predominantly dry during surveys, with no defined bed or banks, the magnitude of these impacts is not expected to be of ecological significance. Direct impacts to riparian vegetation have also been mostly avoided by design, with appropriate buffers to riparian zones and creeks across the Project Area.

The primary indirect impacts with potential to occur includes the exacerbation of erosion and disturbance and/or mobilisation of sediments, and the associated mobilisation of sediment-laden waters to adjacent riparian zones and aquatic habitats with potential to impact on water and habitat quality. These indirect impacts are likely largely confined to the construction and decommissioning phases and appropriate erosion and sediment control measures are considered suitable to mitigate these impacts. A WQMP and SBEMP have been recommended to monitor these indirect impacts during the life of the project. A series of recommendations have been provided to avoid or mitigate impacts to aquatic ecology across the life of the project, including the implementation of buffer zones, design and construction of waterway crossing in accordance with policy, detailed design of the single land bridge to include pier placement outside of aquatic habitat, implementation of management and monitoring plans, rehabilitation of riparian vegetation and offsetting of unavoidable impacts to KFH.

With the implementation of these recommendations, the proposal is considered unlikely to have a significant impact on matters of aquatic ecology.

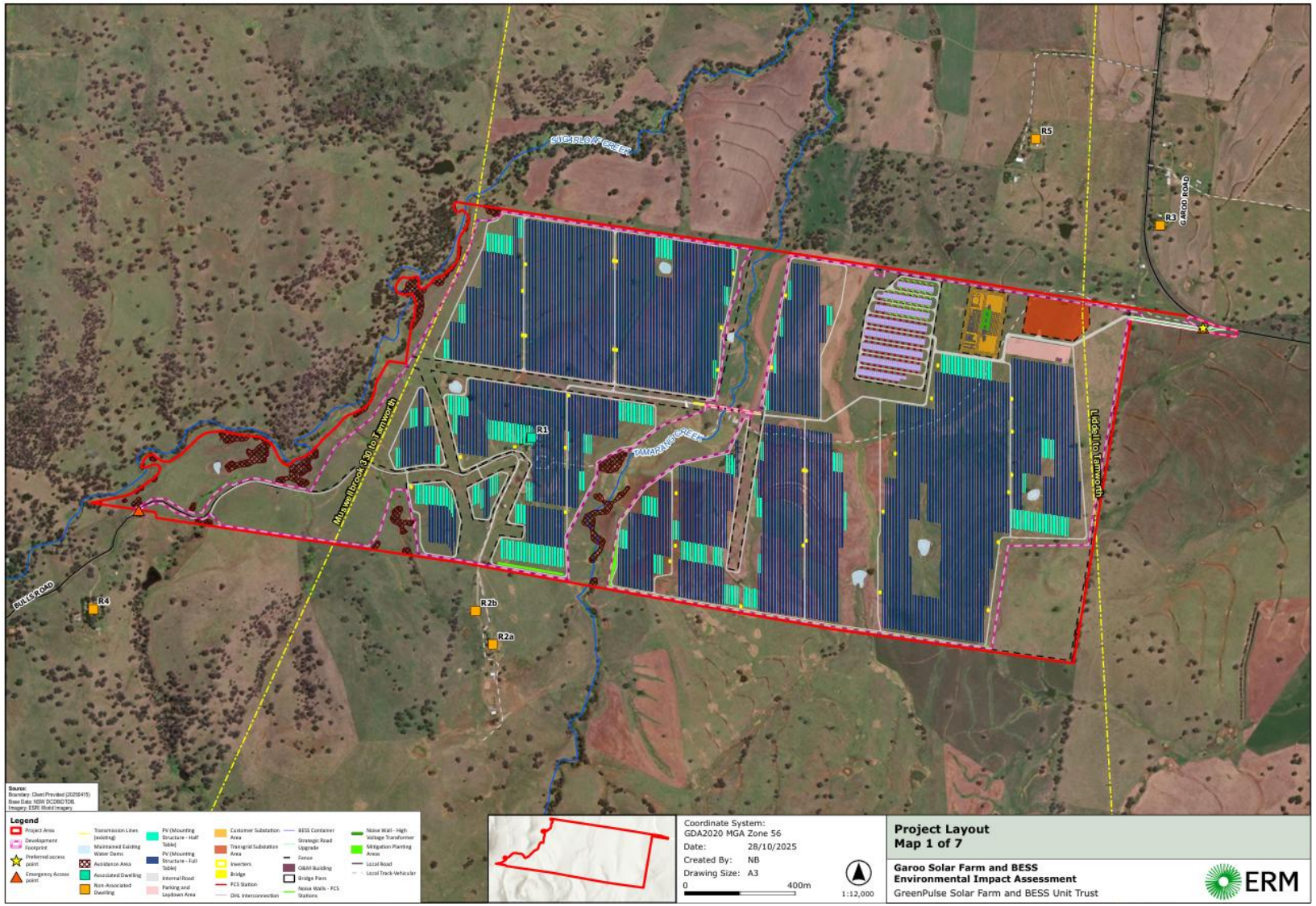
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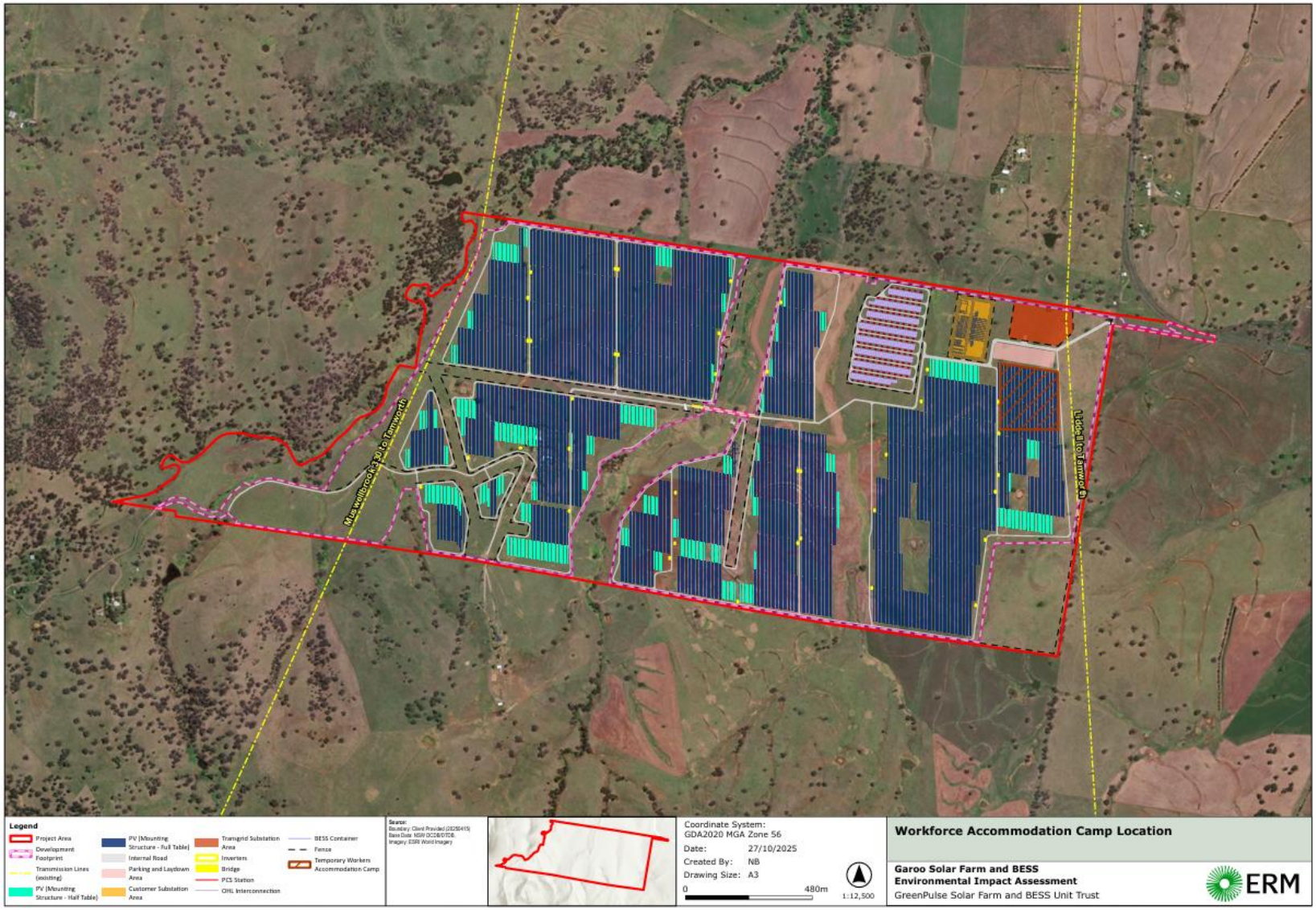
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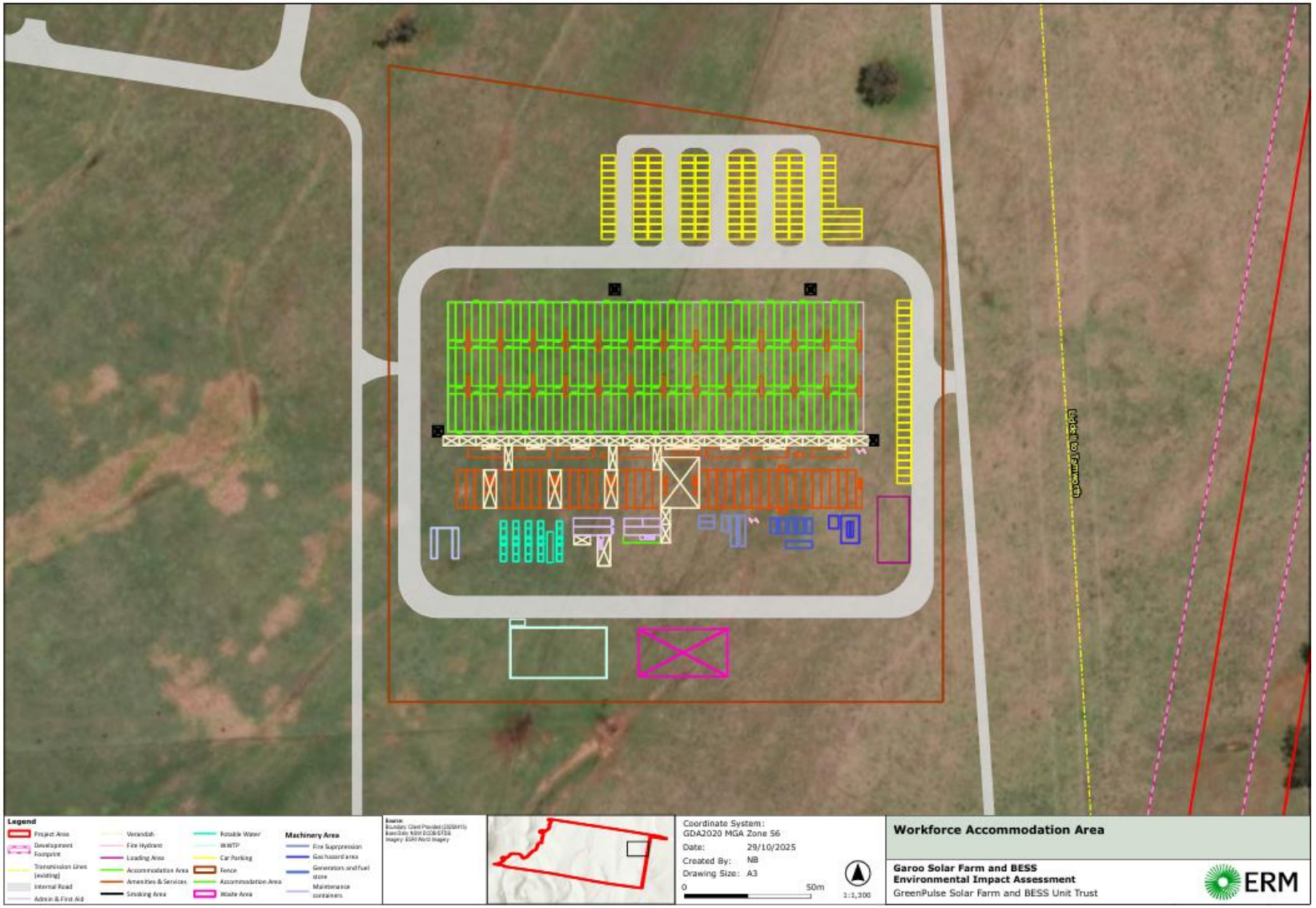
Appendix 1 – Proposed Development Drawings



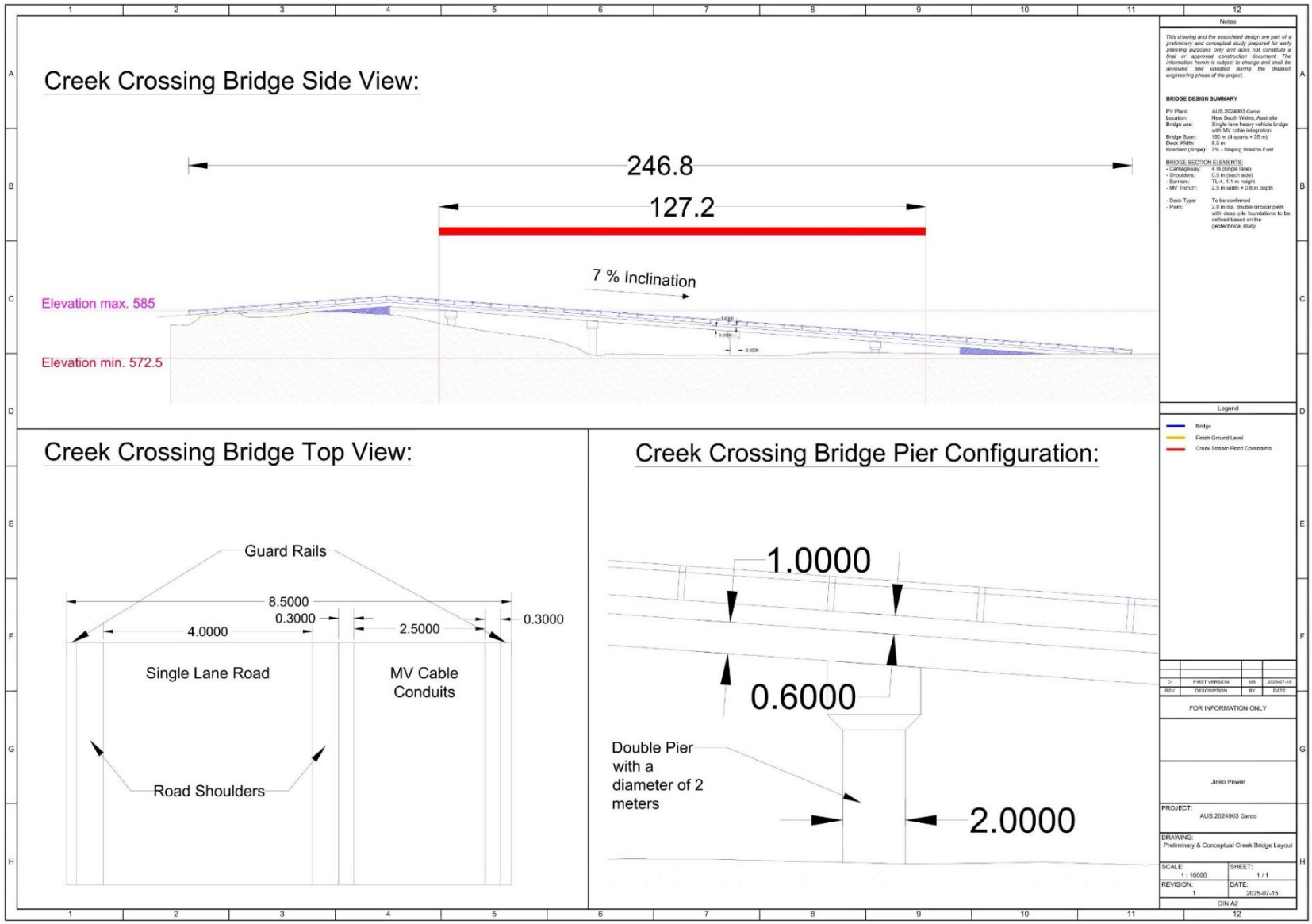
Project Area and Layout (ERM 2025)



Temporary workforce accommodation camp location (ERM 2025)



Workforce accommodation area (ERM 2025)

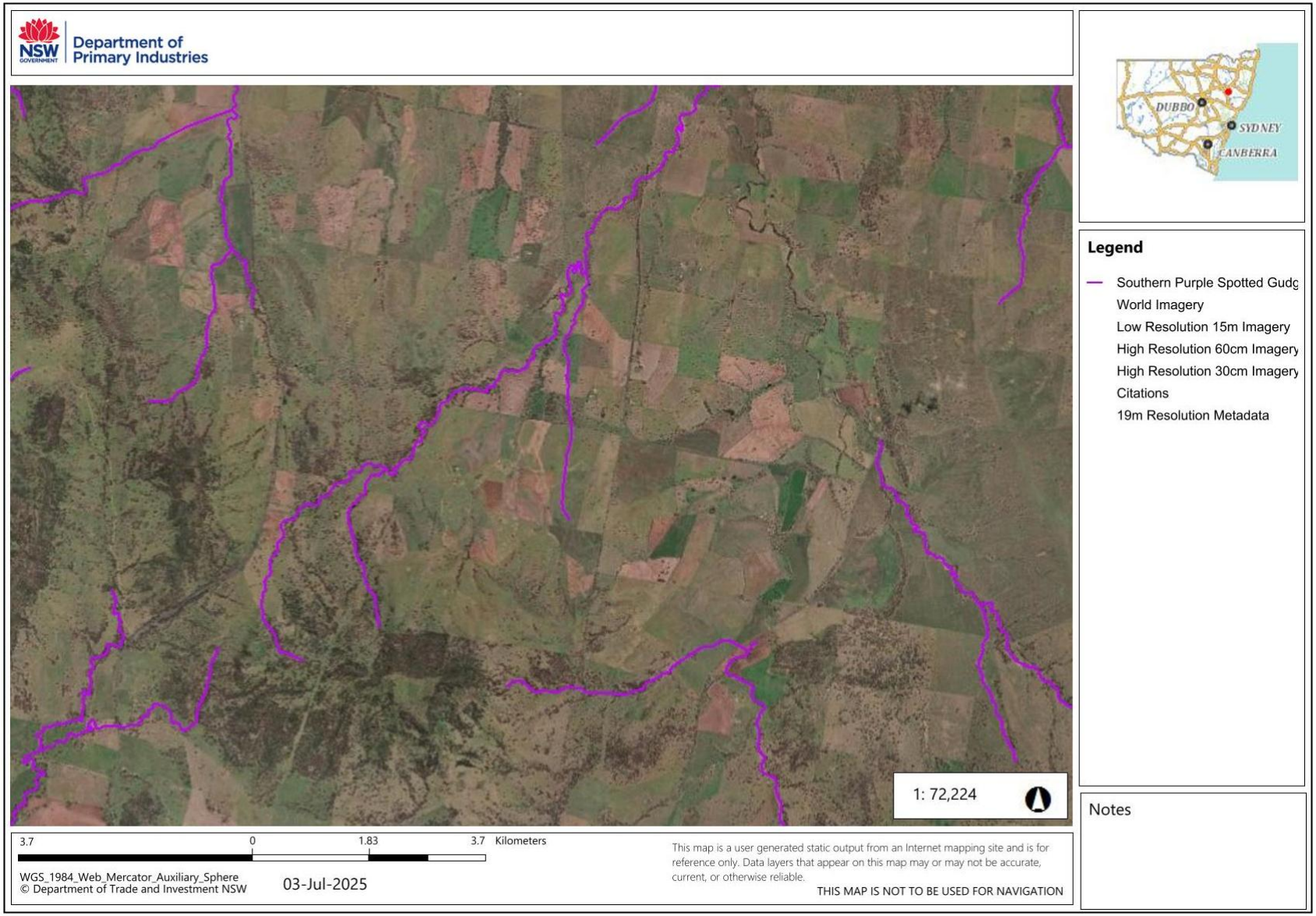


Creek crossing bridge design (ERM 2025)

Appendix 2 – Threatened Species Searches

Protected Matters Search Report Tool (relevant listings)

Scientific Name	Common Name	Class	Threatened Category	Migratory Category
Galaxias sp. nov. 'Hunter'	Hunter Galaxias, Hunter Upland Galaxias	Fish	Critically Endangered	n/a
Maccullochella peelii	Murray Cod	Fish	Vulnerable	n/a

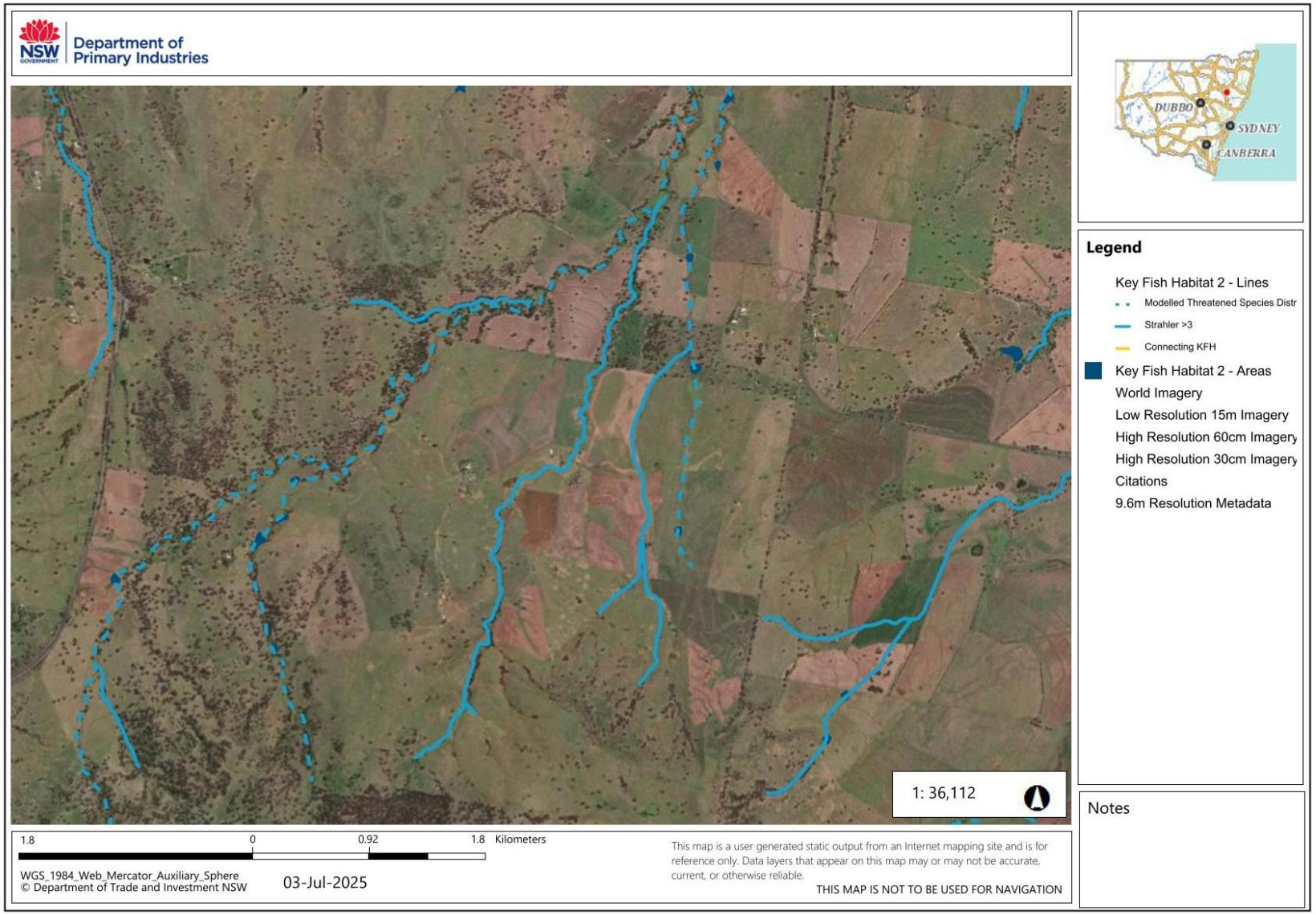


Threatened Freshwater Fish Species (*Mogurnda adspersa*).

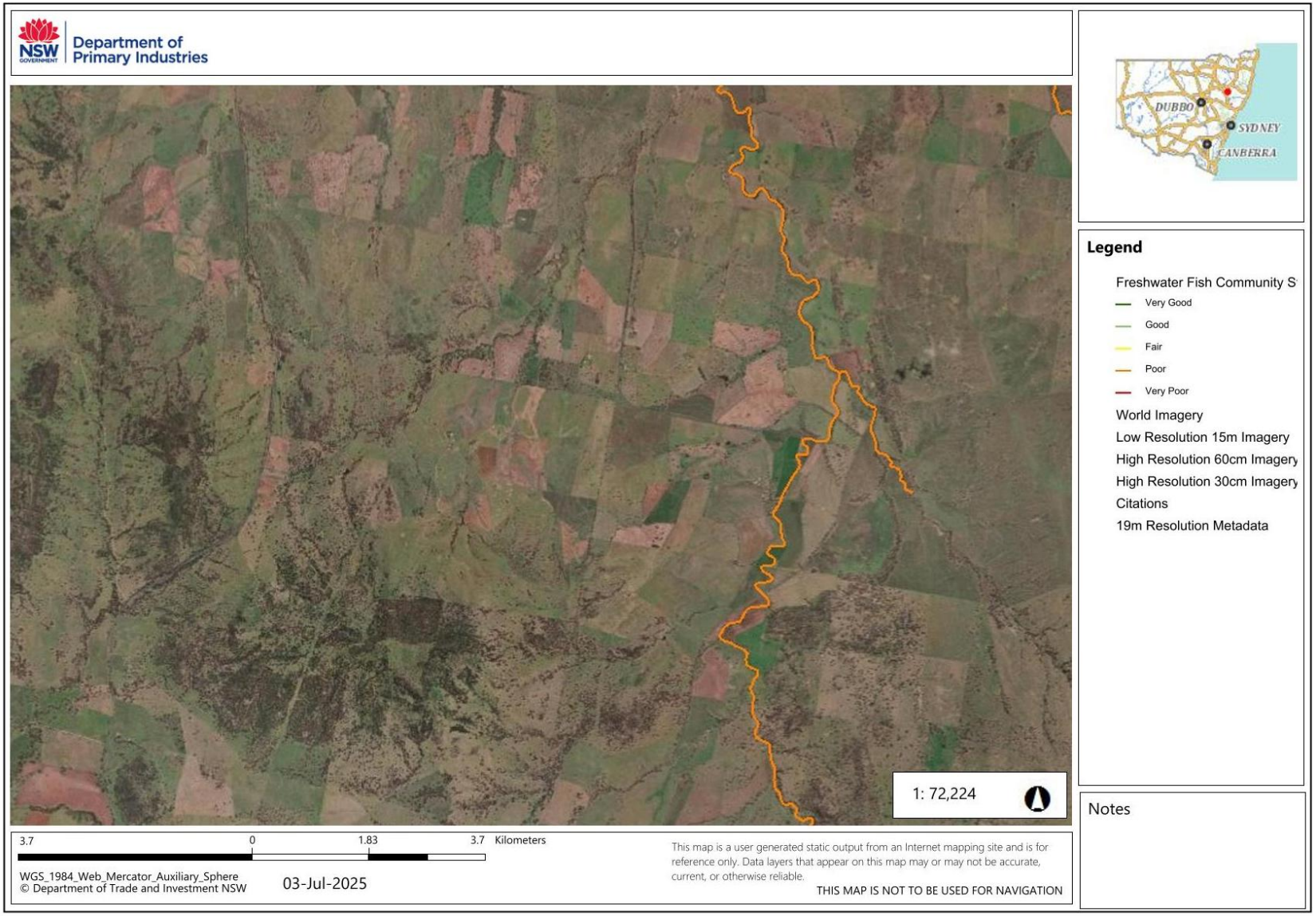


Threatened Freshwater Fish Species (*Tandanus tandanus*).

Appendix 3 – Review of Existing Mapping



NSW Key Fish Habitat



Freshwater Fish Habitat

Appendix 4 – Assessment of Significance

Mogurnda adspersa – Southern Purple Spotted Gudgeon

Species Review

Name /Species		Status FM Act	Status EPBC Act
Southern Purple Spotted Gudgeon (*Mogurnda adspersa)*		Endangered	-
Species	**Distribution**	**Habitat and Prey**	**Breeding**
M. adspersa	Two populations occur in NSW. The eastern population is generally found in coastal catchments north of Clarence River, with recent records identifying two extant populations in Richmond catchment and Hunter Valley. The western population is found throughout Murray-Darling Basin, however experienced rapid decline in the 1980s and now confined to remnant populations in Macquarie, Gwydir and Border Rivers catchments, and a captive-bred population in Castlereagh catchment. Current projects include conservation stocking in Tenterfield Creek, Dubbo Zoo, Buckinbah Creek, Middle and Sheepstation Creek, and Tycannah Creek (NSW DPI 2025d).	Inhabit a variety of habitat, including rivers, creeks and billabongs with still or slow-moving waters with low turbidity. Preferential habitat includes coverage by aquatic vegetation and macrophytes, overhanging vegetation, leaf litter and the presence of rocks and snags. Species preys on terrestrial insects and larvae, polychaetes, small fish, tadpoles and some organic matter. Species is primarily a bottom dweller.	Females lay several batches of 30-1,300 eggs per season on solid objects such as rocks, woods or large leaves. Spawning occurs over Summer during warmer periods; however, the species has not been observed to undertake critical movements during any life stage (Lewellyn 2006).

Source: NSW DPI 2017.

7 Part Test – FM Act

***Mogurnda adspersa* – Endangered (FM Act)**
(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
The Southern Purple Spotted Gudgeon bottom-dwelling species that inhabits freshwater habitats in mid to northern NSW and southern QLD. The species spawns during Summer in warmer conditions, using hard substrate such as rocks, wood or large leafed plants to deposit egg clusters. In Winter, the species migrates from deeper waters and spends colder months in more sheltered locations. Within the Study Area, potential suitable permanent habitat for this species was confined to Sugarloaf Creek, which runs along the outside of the western Project Area boundary. Habitat along Sugarloaf Creek included preferential aquatic habitat features for the species, including slow moving waters with low turbidity, snags, rocks and gravel, aquatic vegetation and overhanging vegetation. Some pools in upstream sections of Tamarang Creek provided some of these features, however, the limited connectivity in the middle and downstream sections and the presence of natural and artificial barriers to fish passage in this creek provided was considered unlikely to provide suitable semi-permanent or permanent habitat for this species. There are no current ALA records (last 20 years) of the species in the Namoi River catchment, with the closest record hydraulically connected to the Study Area at Bingara on the Gwydir River. Presence of species has also been confirmed in this location via environmental DNA samples (Wilderlab 2025). Given there are no current records of the species in the vicinity or catchment of the Study Area, the species is not expected to maintain a significant part of the local population in the Study Area. No direct impacts are expected to occur in Sugarloaf Creek, as the creek is outside of the Project Area. Any disturbance to this habitat would be indirect and likely limited to temporary pulse disturbances to water quality during construction and decommissioning if sediment-laden waters are mobilised and enter the creek. This may temporarily reduce water and habitat quality by increases in sedimentation and turbidity. Given that the species is mobile, individuals that may be present would be expected to move up or down stream away from disturbance if effected. As the species is not known to occur in the catchment, with no known populations in vicinity of the Study Area, and the creek with potential suitable habitat is not expected to be directly impact, the project is unlikely to have an adverse effect on the life cycle of the Southern Purple Spotted Gudgeon such that a viable local population of the species is likely to be placed at risk of extinction.
(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.
Not Applicable

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction
Not Applicable
(d) in relation to the habitat of a threatened species, population or ecological community: (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality
i) Potential suitable habitat for the species is present within Sugarloaf Creek, along the western boundary of the Project Area. Sugarloaf Creek is not proposed to be directly removed or modified as a result of the proposed activity. ii) Aquatic habitat in the main channel of Sugarloaf Creek is not likely to become fragmented or isolated from other areas of habitat as a result of the proposed activity. Upstream areas of some minor 1st and 2nd order tributaries may require temporary bunding or trenching during construction, however, naturally do not maintain connectivity with the main channel due to no or low flow. iii) Habitat within the Study Area is not considered to support any known populations of the species based on recent records over the last 20 years (ALA 2025), known distribution of populations and conservation stocking locations. Thus, it is unlikely that the habitat within the Study Area would be important to the long-term survival of the species. If the species does occur in the locality, habitat that provides suitable habitat is not proposed to be removed, modified, fragmented or isolated as part of the proposed activity, thus the proposed activity is not likely to significantly impact the long-term survival of the species in the locality, assuming that the location does not provide critical spawning habitat and that no critical life cycle movements occur for this species.
(e) Whether the proposed development or activity is likely to have an adverse effect on any critical habitat (either directly or indirectly)
This question is not applicable, as no critical habitat has been listed for the Southern Purple Spotted Gudgeon.
(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.
A recovery plan or threat abatement plan does not exist for the Southern Purple Spotted Gudgeon; however, recovery actions are provided in the Priorities Action Statement for this species. Actions part of the project that are consistent with recovery actions include preventing sedimentation and poor water quality by using effective erosion and sediment control measures. This action will be implemented as part of the water and soil and erosion management recommendations provided in this report.
(g) Whether the proposed development constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.
KTPs with potential to be exacerbated by the proposed development with potential to impact on the Southern Purple Gudgeon include the installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams. Excavation works and associated temporary barriers may result in temporary alterations to the natural flow regimes of 1st and 2nd order tributaries of Sugarloaf Creek, which may result in short-term impacts to creek connectivity, however, considering the natural barriers that already exist along the tributaries this is not expected to be significant. The adoption of recommendations in this report will minimise these impacts.
Conclusion — The viability of the Southern Purple Spotted Gudgeon population that may utilise habitat in the vicinity of the proposal is unlikely to be significantly affected by the proposed activity. The habitat inside the Study Area is very marginal for the species, with no known or recent records of the species in the vicinity of the Study Area or in the Namoi River catchment. Additionally, if the species was found to be present within the local catchments, the project works are not expected to significantly a local population such that it would cause extinction or impact long-term survival, with no direct impacts expected to Sugarloaf Creek. Thus, any disturbances to the species are unlikely, with any potential disturbances limited to short-term indirect increases in sedimentation or turbidity.

Appendix 5 – Survey Data

1. Average Water Quality

Site	Temperature (°C)	pH	Turbidity (NTU)	DO (%)	DO (mg/L)	Salinity (ppt)	EC (µS/cm)	TDS (g/L)	ORP (mV)
1	11.10	7.36	0.00	51.87	5.35	0.31	631.33	0.40	144.67
2	12.79	7.66	0.00	72.70	7.67	0.53	1073.33	0.69	154.33
3	10.32	8.23	110.70	71.57	8.01	0.48	981.33	0.63	129.67
4	8.09	7.66	70.03	46.93	5.58	0.46	933.67	0.61	152.00
5	9.76	7.61	4.30	50.60	5.74	0.37	768.33	0.49	153.00
11	10.42	7.68	0.00	82.27	9.15	0.48	986.33	0.63	138.00
12	8.18	7.56	927.00	29.30	3.45	0.12	252.50	0.16	19.50

2. Stream Habitat Attributes

Site	Stream width (min-max) (m)	Channel width (min-max) (m)	Riffle (% of instream habitat)	Pool (% of instream habitat)	Loose silt on bed (% coverage)	Coarse particulate material (<10cm) (% coverage)	Large organic material (>10cm) (% coverage)	Velocity in stream
1	1-4	1-7	5	95	10-35%	5-20%	<5%	No obvious flow
2	1-5	5-10	15	85	35-65%	<5%	<5%	Low
3	1-3	3-5	10	90	65-90%	5-20%	5-20%	Low
4	0-5	2-30	0	100	65-90%	>20%	5-20%	Low
5	0-3	2-6	0	80	10-35%	5-20%	<5%	No obvious flow
6	0	4-10	0	0	1-10%	5-20%	<5%	No obvious flow
7	0	10-30	0	0	<1%	<5%	<5%	No obvious flow
8	0	25-30	0	0	<1%	<5%	<5%	No obvious flow
9	0	25-30	0	0	<1%	5-20%	<5%	No obvious flow
10	0	25-30	0	5	<1%	5-20%	<5%	No obvious flow
11	1-3	4-7	30	70	10-35%	<5%	<5%	Low
12	0	25-30	0	25 (dam)	<1%	<5%	<5%	No obvious flow

3. Riparian Attributes

Site	Adjacent Landuse	Point Disturbances	Longitudinal Extent	Vegetation Disturbance	Native vegetation (%)	Exotic vegetation (%)
1	Grazing (native or non-native), Rural	Culverts/ Bridge/ Wharf, Roads, Shoreline grazing	Occasional clumps	Moderate Disturbance	70	30
2	Grazing (native or non-native), Rural	Roads, Shoreline grazing	Isolated / scattered	Moderate Disturbance	60	40
3	Grazing (native or non-native), Rural	Shoreline grazing	Isolated / scattered	Moderate Disturbance	80	20
4	Grazing (native or non-native), Rural	Roads, Shoreline grazing	Isolated / scattered	Moderate Disturbance	40	60

5	Grazing (native or non-native), Rural	Irrigation runoff or pipe outlet, Roads, Shoreline grazing	Isolated / scattered	High Disturbance	50	50
6	Grazing (native or non-native), Rural	Shoreline grazing	None	Very High Disturbance	50	50
7	Grazing (native or non-native), Rural	Roads, Shoreline grazing	None	High Disturbance	50	50
8	Grazing (native or non-native), Rural	Shoreline grazing	Isolated / scattered	Moderate Disturbance	70	30
9	Grazing (native or non-native), Rural	Shoreline grazing	Isolated / scattered	Moderate Disturbance	60	40
10	Grazing (native or non-native), Rural	Shoreline grazing	Isolated / scattered	Moderate Disturbance	60	40
11	Grazing (native or non-native), Rural	Roads, Shoreline grazing, Subsidence	Occasional clumps	Moderate Disturbance	70	30
12	Grazing (native or non-native), Rural	Shoreline grazing	None	High Disturbance	80	20

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